CLEMSON UNIVERSITY

RECORD
SEVENTY-SIXTH YEAR

CATALOG NUMBER
1968-1969

PRELIMINARY ANNOUNCEMENTS, 1969-1970

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- **REQUIREMENTS FOR ADMISSION**
- **EXPENSES**
- **STUDENT LIFE AND ACTIVITIES**
- **SCHOLASTIC REGULATIONS**
- **DEGREES AND CURRICULUMS**
- **AGRICULTURE AND BIOLOGICAL SCIENCES**
- **ARCHITECTURE**
- **ARTS AND SCIENCES**
- **EDUCATION**
- **ENGINEERING**
- **INDUSTRIAL MANAGEMENT AND TEXTILE SCIENCE**
- **NURSING**
- **DESCRIPTION OF COURSES**
- **PUBLIC SERVICE ACTIVITIES**
UNIVERSITY CALENDAR

SUMMER SESSIONS 1968

First Session
(Classes meet Monday-Friday)
Matriculation and registration .................. May 13
Classes begin ........................................ May 14
Examinations ........................................ June 19, 20

Second Session
(Classes meet Monday-Friday except as indicated)
Matriculation, new students ..................... June 24
Matriculation and registration .................. June 25
Classes begin ........................................ June 26
Classes meet ......................................... June 29
Examinations ........................................ July 31, August 1
Faculty meeting to consider candidates for graduation. August 3
Graduation ........................................... August 3

SESSION 1968-1969

First Semester
Orientation, new undergraduate students who
have not previously attended .................... August 19, 20
Matriculation and registration, all students .... August 21
Late registration ................................... August 22
Late registration fee applies at noon .......... August 22
Classes begin, abbreviated class schedule .... August 23
Last day to register without prior settlement of fees August 26
Last day for matriculation ....................... August 29
Last day for settlement of fees without penalty August 29
Last day to add a subject ......................... September 5
Last day to drop a subject without record of drop September 19
Last day to order diploma for mid-year grad. September 19
Homecoming, classes suspended ................ October 12
Preliminary reports due ........................... October 14
Last day to withdraw without having grades recorded November 9
Last day to drop a subject ....................... November 9
Clemson-Carolina game—classes suspended .... November 23
Thanksgiving holidays * ........................... November 28-30
Examinations begin ................................ December 9
Mid-year graduation ............................... December 19

Second Semester
Matriculation, new students .................... January 6
Registration, all students ....................... January 7, 8
Late registration fee applies at noon .......... January 8

* Follow Thursday, Friday, Saturday schedule on Monday, Tuesday, Wednesday, November 25, 26, 27.
Classes begin, abbreviated class schedule .................. January 9
Last day for matriculation ................................ January 16
Last day to add a subject .................................. January 23
Last day to drop a subject without record of drop .... February 6
Last day to order diploma for May graduation ......... February 6
Preliminary reports due .................................. March 3
Spring holidays begin at noon ............................. March 15
Classes resume .......................................... March 24
Last day to withdraw without having grades recorded .. April 7
Last day to drop a subject ................................ April 7
Honors and Awards Day—
classes suspended at 12 noon ......................... April 9
Examinations begin .................................... April 28
Commencement ........................................ May 9

SUMMER SESSIONS 1969

First Session
(Classes meet Monday-Friday)
Matriculation and registration .......................... May 19
Classes begin .......................................... May 20
Examinations ............................................. June 25, 26

Second Session
(Classes meet Monday-Friday except as indicated)
Matriculation, new students ............................. June 30
Matriculation and registration ........................ July 1
Classes begin .......................................... July 2
Independence Day holiday ................................ July 4
Classes meet .......................................... July 19
Classes meet .......................................... August 2
Examinations ............................................ August 6, 7
Graduation ................................................ August 9

SESSION 1969-1970

First Semester
Orientation, new students .............................. August 18, 19
Registration, all students ............................... August 20
Late registration ....................................... August 21
Late registration fee applies .......................... August 22
Classes begin .......................................... August 22
Last day for registration ................................ August 28
Last day to add a subject ................................ September 4
Last day to drop a subject without record of drop ... September 18
Last day to order diploma for mid-year graduation .. September 18
Preliminary reports due ................................. October 13
Homecoming—classes suspended ....................... October 18
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Last day to drop a subject .............................. November 11
Clemson-Carolina game—classes suspended .......... November 22
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Mid-year graduation ................................................... December 18

Second Semester
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Registration, all students .......................................... January 6
Late registration ...................................................... January 7
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Classes begin ......................................................... January 8
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Last day to drop a subject without record of drop .......... February 4
Last day to order diploma for May graduation .............. February 4
Preliminary reports due ............................................ March 2
Spring holidays begin at noon ..................................... March 14
Classes resume ........................................................ March 23
Last day to withdraw without having grades recorded .... April 4
Last day to drop a subject ......................................... April 4
Honors and Awards Day—classes suspended at 12 noon .... April 8
Examinations begin .................................................... April 27
Commencement ........................................................ May 8

SUMMER SESSIONS 1970

First Session
(Classes meet Monday-Friday)
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Classes begin ........................................................ May 19
Examinations .......................................................... June 24, 25

Second Session
(Classes meet Monday-Friday except as indicated)
Matriculation, new students ...................................... June 29
Matriculation and registration .................................. June 30
Classes begin ........................................................ July 1
Classes meet .......................................................... August 1
Examinations .......................................................... August 5, 6
Graduation ............................................................... August 8

* Follow Thursday, Friday, Saturday schedule on Monday, Tuesday, Wednesday, November 24, 25, 26.
PERSONNEL

PART I
PART I—Personnel

BOARD OF TRUSTEES

LIFE MEMBERS

EDGAR A. BROWN, President of the Board .................................................. Barnwell
JAMES F. BYRNEs ................................................................. Columbia
WINCHESTER SMITH ................................................................................ Williston
ROBERT R. Coker ...................................................................................... Hartsville
JAMES C. SELF .......................................................................................... Greenwood
FRANK J. JERVEY ...................................................................................... Clemson
PATRICK N. CALHOUN ........................................................................... Charlotte, N. C.

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L. D. HOLMES ......................................................................................... Johnston
E. OSWALD LIGHTSEY ............................................................................... Hampton

TERM EXPIRES 1972

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W. GORDON MCCABE, JR. ........................................................................ Greenville
T. KENNETH CRIBB .................................................................................. Spartanburg

A. W. RIGSBY, Secretary ............................................................................ Clemson

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1968

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BEN T. CRAIG ............................................................................................. Lancaster
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I. H. GRIMBALL, JR. .................................................................................. Greenville
L. L. HUTCHISON ..................................................................................... Florence
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WINCHESTER C. SMITH, JR. .................................................................... Williston
R. B. WHITE ............................................................................................... Hartsville
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James Edwin Halpin, Ph.D. .............................................. Associate Director of Agricultural Experiment Station
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Bobby Dale Barnett, Ph.D. .................................................. Head, Department of Poultry Science

* See also College of Agriculture and Biological Sciences Staff, including Public Service Activities, on page 347.
† Agricultural Education curriculum is jointly administered by the College of Agriculture and Biological Sciences and the School of Education.
‡ Agricultural Engineering curriculum is jointly administered by the College of Agriculture and Biological Sciences and the College of Engineering.
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Robert Howard Hunter, M.F.A. Head, Department of Visual Studies

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Cooper, Herbert Press, B.S., M.S., Ph.D., Dean Emeritus, School of Agriculture; Director Emeritus of South Carolina Agricultural Experiment Station; Professor Emeritus of Agronomy; Agronomist Emeritus.
Earle, Samuel Broadus, A.B., A.M., M.E., LL.D., Dean Emeritus, School of Engineering; Professor Emeritus of Mechanical Engineering; Director Emeritus, Engineering Experiment Station.
Epting, Carl Lafayette, A.B., A.M., Head Emeritus of Social Sciences Department; Professor Emeritus of History and Government.
Farrar, Milton Dyer, B.S., M.S., Ph.D., Dean Emeritus, School of Agriculture; Senior Scientist Emeritus in Agriculture and Biological Sciences; Professor Emeritus of Entomology and Zoology.
Foster, Harold Homer, A.B., M.A., Ph.D., Associate Professor Emeritus of Botany and Bacteriology.
Freeman, Edwin Jones, B.S., M.E., M.S., Head Emeritus of Industrial Engineering Department; Professor Emeritus of Metallurgical Engineering.
Gage, Gaston, B.S., M.Ed., Dean Emeritus of the School of Industrial Management and Textile Science; Head Emeritus of Yarn Manufacturing Department; Professor Emeritus of Carding and Spinning.
Goodale, Ben Edmund, B.S., M.S., Head Emeritus of Dairy Science Department; Professor Emeritus of Dairy Science; Dairy Scientist Emeritus.
Green, Joseph Coleman, B.A., M.A., Ph.D., Professor Emeritus of English.
Hall, Evey Eugene, B.S., M.S., Superintendent Emeritus of Pee Dee Experiment Station.
Hodge, Wylie Fort DuPre, Associate Professor Emeritus of Architecture.
Hodges, Baxter Howard, B.S., Assistant Professor Emeritus of Chemistry.
Kyzer, Edward Deane, B.S., Superintendent Emeritus of Coast Experiment Station.
LaMaster, Joseph Paul, B.S., M.S., Head Emeritus of Dairy Department; Professor Emeritus of Dairying; Dairy Husbandman Emeritus.
Lindsay, Joseph, Jr., A.B., M.S., Head Emeritus of Textile Chemistry and Dyeing Department; Professor Emeritus of Textile Chemistry and Dyeing.
Lindsey, Tate Jefferson, B.A., Ph.D., Professor Emeritus of Physics.
McKenna, Arthur Ernest, B.S., M.S., Senior Professor Emeritus of Textiles.
Marshall, John Logan, B.S., Head Emeritus of Industrial Arts Department; Professor Emeritus of Industrial Arts.
Mitchell, Jack Harris, B.S., M.S., Professor Emeritus of Chemistry.
Monroe, James Beasley, B.S., M.S., Head Emeritus of Agricultural Education Department; Professor Emeritus of Agricultural Education.
Musser, Albert Myers, B.S., Head Emeritus of Horticulture Department; Professor Emeritus of Horticulture; Horticulturist Emeritus.
Paden, William Reynolds, B.S., M.S., Ph.D., Agronomist Emeritus.
Rausch, Karl William, B.S., M.E., Professor Emeritus of Mechanical Engineering.
Reed, Albert Raymond, A.B., M.S., Associate Professor Emeritus of Physics.
Reed, Charles Albert, A.B., M.S., Ph.D., Professor Emeritus of Physics.
Rhyne, Orestes Pearl, A.B., A.M., Ph.D., Head Emeritus of Modern Languages Department; Professor Emeritus of Modern Languages.
Riley, James Alvin, B.S., M.S., Superintendent Emeritus of Sandhill Experiment Station; Agronomist Emeritus of Sandhill Experiment Station.

Roderick, Donald Barclay, B.A., Chemistry Assistant Emeritus.

Rogers, William Bryan, B.S., Superintendent Emeritus of Edisto Experiment Station.

Rosenkrans, Duane Benjamin, A.B., M.A., Professor Emeritus of Botany.

Rush, John Millard, A.B., M.S., Ph.D., Professor Emeritus of Botany and Bacteriology.

St. Hubert, Robert LaMontagne, P.A.G.F., Visiting Professor Emeritus of Architecture.

Shackelford, MacFarland, B.S., Assistant Professor Emeritus of Physics.

Sheldon, Dawson Clement, B.S., M.A., Ph.D., Head Emeritus of Mathematics Department; Professor Emeritus of Mathematics.

Simpson, Francis Marion, B.S., Visiting Professor Emeritus of Agricultural Economics.


Stuart, Charles Morgan, A.B., M.A., Associate Professor Emeritus of Mathematics.

Stribling, Bruce Hodgson, B.S., M.S., Associate Professor Emeritus of Agricultural Education.

Tarrant, William Edward, Sr., B.S., M.Ed., Associate Professor Emeritus of Textiles.

Washington, William Harold, B.S., M.S., Dean Emeritus, School of Education; Professor Emeritus of Vocational Education.

White, Thomas Arlington, B.S., M.S., Ph.D., Professor Emeritus of Agricultural Education.

Williams, William Bratton, B.S., M.S., Associate Professor Emeritus of Textiles.

Wilson, Milner Bradley, Jr., A.B., A.M., Associate Professor Emeritus of English.

**LIBRARY STAFF**

John Wallace Gordon Goulay, A.M.L.S. .............. Director of the Library

Myra Ann Armistead, M.Li. ...................... Documents Librarian

Lois Jones Goodman, B.S. .......................... Cataloger

Peggy Jo Hopkins, M.A. .......................... Head, Science, Technology and Agriculture Division

Carse Oren McDaniel, M.S. in L.S.  .............. Head, Social Sciences and Humanities Division

Agnes Adger Mansfield, M.L.S.  .................. Cataloger

Sue H. Moss, B.S. in L.S.  ...................... Cataloger

Margy H. Nowack, A.B. .......................... Acquisitions Librarian

Genevieve L. Reidy, M.S.L.S ...................... Reference Librarian

Muriel Gipson Rutledge, B.S.  ..................... Serials Librarian

Sophia E. Sullivan, M.S. .......................... Head, Catalog Department

Marian Hull Withington, M.S ...................... Reference Librarian
Teaching and Research Faculties

STANDING COMMITTEES OF THE FACULTY, 1968-1969

Admissions:

Archives:

Curriculum:

Ethics and Religion:
C. E. Raynal, Chairman; C. A. Arrington, J. W. Arrington, W. T. Cox, V. Hurst, P. H. Lewis, C. J. Lupo, B. É. Trent.

Faculty Basic Research:

Fine Arts Series:
C. B. Green, Chairman; N. D. Camper, R. J. Calhoun, R. W. Hill, A. J. Kaufmann, C. O. Shuler, H. G. Spencer, J. N. Thurston, A. S. Tombes, J. L. Young, J. H. Butler, ex officio; H. M. Cox, ex officio; W. T. Cox, ex officio; V. Hurst, ex officio; H. E. McClure, ex officio; K. N. Vickery, ex officio.

Graduate Council:

Honors and Awards:

Honors Program Council:

Improvemen of Undergraduate Teaching:

Library:
Patent Committee:
M. A. Wilson, ex officio, Chairman; D. W. Bradbury, E. Harrison, K. R. Helton, G. C. Kingsland, C. M. McHugh, W. W. Bryan, ex officio; T. D. Efland, ex officio; O. B. Garrison, ex officio; S. G. Nicholas, ex officio.

Safety and Fire Prevention:

Schedule:

Social:

Special Advisory Committee for Disposal of Poisonous Chemicals:
N. R. Page, Chairman; H. T. Polk, J. J. Porter, R. S. Collins, ex officio.

Special Advisory Committee on Use of Radioactive Materials:
J. G. Dinwiddie, Chairman; T. D. Efland, K. Lehotsky, S. G. Nicholas.

Faculty Senate

Research Faculty Council
ADMINISTRATION OF STUDENT AFFAIRS

Walter Thompson Cox, B.S. ............. Vice-President for Student Affairs and Dean of Students

OFFICE OF THE DEAN OF MEN
George Edward Coakley, B.S. ............. Dean of Men
Joseph G. Guggino, M.S. ................ Assistant Dean of Men
Manning N. Lomax, B.S. ................ Assistant Dean of Men
Richard C. Robbins, B.B.A. ............. Staff Assistant
Thomas J. Tisdale, B.S. ................ Head Resident

OFFICE OF THE DEAN OF WOMEN
Susan Goodwin Delony, M.S. ............. Dean of Women
Lucille K. Corley ........................ Head Resident
Mary B. Hood ............................ Head Resident
Margaret B. Poole ....................... Adviser
Rosa C. Smith, B.A. ..................... Head Resident

OFFICE OF ADMISSIONS, REGISTRATION, AND FINANCIAL AID
Kenneth Notley Vickery, B.S. .......... Dean of Admissions and Registration
Gertrude Ramsay Bailey ................ Recorder
Eugenie Ventre Bartmess, M.S. ........ Schedule Coordinator
Reginald Justin Berry, B.S. ............ Registrar
Arnold Mandigo Bloss, B.S. .......... Director of Financial Aid
William Richard Mattox, M.S. ....... Assistant Director of Admissions
Stanley B. Smith, Jr., M.A. .......... Admissions Officer

PLACEMENT OFFICE
Davis Gregory Hughes, M.Ed. .......... Director of Placement

COUNSELING CENTER
Virginia Smith Hardie, Ed.D. .......... Counseling Psychologist
John Randolph Anderson, M.S. ....... Counselor
Mary B. English, M.R.E. ............... Psychometrist

STUDENT HEALTH SERVICE
Judson Elam Hair, M.D. ............... Director of Student Health Service
James Bowers, M.D. .................... Physician
Donald K. Freeman, M.D. ............ Psychiatrist
Evelyn Littleton, R.L.T. .............. X-ray and Laboratory Technician
Ruth Durham, R.N. ..................... Director of Nurses

DIRECTOR OF STUDENT ACTIVITIES
F. James Hoffmann, M.A. ............. Director of Student Activities

DEPARTMENT OF BANDS
John Harrison Butler, Ed.D. .......... Director
Bruce F. Cook, M.F.A. ................. Assistant Director
Y. M. C. A. AND UNIVERSITY RELIGIOUS AFFAIRS

Buford E. Trent, M.E. ........................................... Director, Y. M. C. A. and Coordinator of Religious Affairs
Nash Newton Gray, B.S. ........................................... Associate Director
Otis Duell Nelson, M.R.E. ......................................... Associate Director
William Carlisle Wooten, B.C.E. ................................. Youth Director

Y. M. C. A. ADVISORY BOARD

R. W. Moorman, Chairman; R. H. Burley, Vice-Chairman; Buford E. Trent, Secretary; Joe F. Allen, F. C. Anderson, Sr., C. A. Arrington, Wright Bryan, T. K. Cribb, O. B. Garrison, D. G. Hughes, W. A. King, E. O. Lightsey, Joseph Lindsay, B. N. Skardon, Melford Wilson, P. B. Holtzendorff, Jr., Honorary Life Member; W. T. Cox, ex officio; R. C. Edwards, ex officio; N. N. Gray, ex officio; O. D. Nelson, ex officio.

ATHLETIC STAFF

Frank James Howard, B.S. ........................................... Director of Athletics and Head Coach
Arthur W. Baker, A.B. ............................................... Assistant Coach
Thomas S. Bass, B.A. ................................................ Assistant Coach
Lawrence M. Beckish, B.S. ......................................... Assistant Football Coach
Robert Cole Bradley, B.S. .......................................... Athletic Publicity Director
James E. Brennan, B.S. ............................................. Assistant Basketball Coach
Fred Cone, B.S. ...................................................... Assistant Coach
Ronald D. Grace, M.S. .............................................. Freshman Football Coach
H. C. Greenfield, M.S. ............................................... Track Coach
Fred W. Hoover, B.S. ................................................ Head Trainer
Robert Morgan Jones, B.S. .......................................... Assistant Coach
R. P. Jordan, B.S. .................................................... Assistant Football Coach
Robert Long ............................................................ Assistant Coach
James Banks McFadden, B.S. ..................................... Assistant Coach
H. C. McLellan, Jr., M.S. .......................................... Assistant Athletic Director
Christopher Columbus Roberts, Jr., A.B. ...................... Basketball Coach
Robert William Smith, B.S. ........................................ Assistant Coach
Billy Hugh Wilhelm, A.B., Baseball Coach and Director of Intramural Sports
Eugene Perritt Willimon, B.S. ..................................... Assistant Athletic Director

ATHLETIC COUNCIL

R. R. Ritchie, Chairman; T. D. Efland, W. J. Lanham, R. W. Moorman, B. N. Skardon, J. L. Young, E. Park, President, Faculty Senate, ex officio; K. N. Vickery, Dean of Admissions and Registration, ex officio; Vacant, Alumni Member; W. G. DesChamps, Alumni Member.
**ADMINISTRATION OF BUSINESS AND FINANCIAL AFFAIRS**

**MELFORD A. WILSON, B.S. in Commerce**  Vice-President for Business and Finance and Comptroller  
**KENNEY RIXIE HELTON**  Budget Director  
**ELMER H. MCCARTER, M.B.A.**  Financial Analyst  
**CLYDE E. WOODALL, M.S.**  Administrative Specialist

### ACCOUNTING DIVISION

<table>
<thead>
<tr>
<th>Position</th>
<th>Name</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chief Accountant</td>
<td>MELVIN EUGENE BARNETTE</td>
</tr>
<tr>
<td>Supervisor of Contract Accounts</td>
<td>VIVIAN RAYMOND HARRELL</td>
</tr>
<tr>
<td>Data Processing Supervisor</td>
<td>RONALD TIMOTHY HERRIN</td>
</tr>
<tr>
<td>Junior Accountant</td>
<td>ALDEN LEE McCRAKEN</td>
</tr>
<tr>
<td>Senior Accountant</td>
<td>JAMES THOMAS ROBERTS</td>
</tr>
<tr>
<td>Accountant</td>
<td>WILLIAM ALLEN THOMPSON</td>
</tr>
<tr>
<td>Senior Accountant</td>
<td>JOSEPH SHELOR WALKER</td>
</tr>
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### PERSONNEL DIVISION

<table>
<thead>
<tr>
<th>Position</th>
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<tbody>
<tr>
<td>Director of Personnel</td>
<td>JOHN B. GENTRY</td>
</tr>
<tr>
<td>Assistant Personnel Director</td>
<td>RAY L. THOMPSON</td>
</tr>
<tr>
<td>Safety Coordinator</td>
<td>WALTER E. BERRY</td>
</tr>
<tr>
<td>Insurance Assistant</td>
<td>WILLIAM J. STAMEY</td>
</tr>
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</table>

### PHYSICAL PLANT DIVISION

<table>
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<tr>
<th>Position</th>
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<tbody>
<tr>
<td>Director of Physical Plant</td>
<td>RALPH SIMPSON COLLINS</td>
</tr>
<tr>
<td>Superintendent of Grounds</td>
<td>JAMES CLEVELAND CAREY</td>
</tr>
<tr>
<td>Superintendent of Buildings</td>
<td>GEORGE CARLISLE JONES</td>
</tr>
<tr>
<td>Assistant Superintendent of Planning and Engineering</td>
<td>WILLARD LIEBEN MEIGS</td>
</tr>
<tr>
<td>Plant Engineer</td>
<td>ROY MARCUS ROCHESTER</td>
</tr>
<tr>
<td>Assistant Plant Engineer</td>
<td>JAMES ALLEN STANLEY</td>
</tr>
<tr>
<td>Chief of Security</td>
<td>JACK WILLIAM WEEDEEN</td>
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### PURCHASING DIVISION

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<tr>
<th>Position</th>
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<tr>
<td>Director of Purchasing</td>
<td>EARL SPENCER LIBERTY</td>
</tr>
<tr>
<td>Assistant Director of Purchasing</td>
<td>DANIEL WHEELER BICKLEY</td>
</tr>
<tr>
<td>Senior Accountant, Property Control</td>
<td>JACK NORMAN WILSON</td>
</tr>
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### AUXILIARY ENTERPRISES

<table>
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<tr>
<th>Position</th>
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<tbody>
<tr>
<td>Director of Auxiliary Enterprises</td>
<td>HENRY HUGHES HILL</td>
</tr>
<tr>
<td>Supervisor, Central Office Services</td>
<td>WILLIAM DRYE CROMER</td>
</tr>
<tr>
<td>Associate Director of Auxiliary Enterprises</td>
<td>CHARLES DIMMOCK</td>
</tr>
<tr>
<td>Manager, Student Food Service</td>
<td>LUTHER J. FIELDS</td>
</tr>
<tr>
<td>Manager, Laundry</td>
<td>THOMAS ROY RHYMES</td>
</tr>
<tr>
<td>Manager, Residence Halls</td>
<td>LEROY EDWARD RUTLAND</td>
</tr>
<tr>
<td>Associate Director of Housing</td>
<td>ERNEST CHISOLM WATSON</td>
</tr>
</tbody>
</table>

### THE CLEMSON HOUSE HOTEL

<table>
<thead>
<tr>
<th>Position</th>
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<tbody>
<tr>
<td>Manager</td>
<td>FREDERICK LEONARD ZINK, JR.</td>
</tr>
<tr>
<td>Resident Manager</td>
<td>VERNER EUGENE CATHCART</td>
</tr>
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### ADMINISTRATIVE COUNCIL

<table>
<thead>
<tr>
<th>Position</th>
<th>Name</th>
</tr>
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<tbody>
<tr>
<td>President</td>
<td>R. C. EDWARDS</td>
</tr>
<tr>
<td>Vice-President for Business and Finance and Comptroller</td>
<td>M. A. WILSON</td>
</tr>
</tbody>
</table>
ADMINISTRATION OF DEVELOPMENT ACTIVITIES

William Wright Bryan, B.S., Litt.D., LL.D., Vice-President for Development

ALUMNI RELATIONS
Joseph E. Sherman, B.S. .................................. Director of Alumni Relations
George M. Moore, B.S. .......................... Associate Director of Alumni Relations
George U. Bennett, B.S. .......................... Alumni Field Representative
John C. Mann, B.A. .......................... Alumni Editor

PLANNING AND CORPORATE SUPPORT
Millard Baker Farrar, B.S. .......................... Director

PUBLIC RELATIONS
Melvin C. Long, B.S. .......................... Director of Public Relations
John L. Allen, B.A. .......................... Editor, University News Bureau
Allen M. Sale, Jr., B.A. .......................... Publications Editor

UNIVERSITY COMMUNICATIONS CENTER
William Harry Durham, M.A. .......................... Director, University Communications Center
James Pearson Burns .......................... Manager, Technical Services
Earl Thurman Cosens .......................... Chief Engineer
Thomas Newcome Greer, B.A. .......................... Producer-Director
Charles William Haralson .......................... Supervisor, Central Photography

DEVELOPMENT COUNCIL
R. C. Edwards, President; W. W. Bryan, Vice-President for Development; Victor Hurst, W. T. Cox, M. A. Wilson, George H. Aull, Jr., and A. W. Rigsby, Secretary.

CLEMSON ALUMNI ASSOCIATION
1969

Officers
President ......................... George H. Aull, Jr., '44 .......... Columbia, S. C.
Vice-President ..................... Sam E. McGregor, '49 .......... Hopkins, S. C.
Secretary ......................... Joe Sherman, '34 .......... Clemson, S. C.
Treasurer ....................... Trescott Hinton .......... Clemson, S. C.

National Council

<table>
<thead>
<tr>
<th>District</th>
<th>Name</th>
<th>College, State</th>
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<tbody>
<tr>
<td>1</td>
<td>Edward S. Olson, '38</td>
<td>Clemson, S. C.</td>
</tr>
<tr>
<td>2</td>
<td>Goode Bryan, '18</td>
<td>Greenville, S. C.</td>
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<td>3</td>
<td>Philip H. Prince, '49</td>
<td>Spartanburg, S. C.</td>
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<tr>
<td>4</td>
<td>Walter T. Jenkins, Jr., '43</td>
<td>Rock Hill, S. C.</td>
</tr>
<tr>
<td>5</td>
<td>Edward L. Proctor, '47</td>
<td>Conway, S. C.</td>
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<td>6</td>
<td>E. Hugh Agnew, '16</td>
<td>Starr, S. C.</td>
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<td>7</td>
<td>Frank W. Atkinson, Jr., '50</td>
<td>North Augusta, S. C.</td>
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<td>8</td>
<td>C. Ken Powell, '61</td>
<td>Columbia, S. C.</td>
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[ 44 ]
<table>
<thead>
<tr>
<th>District</th>
<th>Name and Class</th>
<th>City and State</th>
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<tr>
<td>9</td>
<td>Henry F. Frierson, '47</td>
<td>Orangeburg, S. C.</td>
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<tr>
<td>10</td>
<td>Daniel S. Lesesne, Jr., '38</td>
<td>Mt. Pleasant, S. C.</td>
</tr>
<tr>
<td>11</td>
<td>John B. Butt, '56</td>
<td>New Haven, Conn.</td>
</tr>
<tr>
<td>12</td>
<td>Davis T. Moorhead, '54</td>
<td>Annandale, Va.</td>
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<tr>
<td>13</td>
<td>J. Will Patterson, '30</td>
<td>Charlotte, N. C.</td>
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<td>14</td>
<td>Samuel L. Lucas, '56</td>
<td>Winston-Salem, N. C.</td>
</tr>
<tr>
<td>15</td>
<td>A. Cary Cox, '49</td>
<td>Atlanta, Ga.</td>
</tr>
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<td>16</td>
<td>G. Charles Hope, '60</td>
<td>Jacksonville, Fla.</td>
</tr>
<tr>
<td>17</td>
<td>Thomas C. Breazeale, Jr., '42</td>
<td>Knoxville, Tenn.</td>
</tr>
<tr>
<td>18</td>
<td>Walter C. Synder, '30</td>
<td>Midland, Texas</td>
</tr>
<tr>
<td>At-Large</td>
<td>C. Calhoun Lemon, '32</td>
<td>Barnwell, S. C.</td>
</tr>
<tr>
<td>Past President</td>
<td>Thomas E. Thornhill, '48</td>
<td>Charleston, S. C.</td>
</tr>
<tr>
<td>Past President</td>
<td>Henry C. Coleman, '26</td>
<td>Daytona Beach, Fla.</td>
</tr>
<tr>
<td>Past Vice-President</td>
<td>J. Stuart Land, '40</td>
<td>Abbeville, S. C.</td>
</tr>
<tr>
<td>President</td>
<td>Clemson Foundation</td>
<td>Patrick N. Calhoun, '32</td>
</tr>
</tbody>
</table>

Presidents of the following:
Faculty Senate, Research Faculty, Extension Senate, Student Government, Senior Class, Junior Class, Sophomore Class, Freshman Class.
INFORMATION

PART II
PART II—Information

GENERAL INFORMATION

Clemson is a land-grant, state-supported university. Clemson is fully accredited by the Southern Association of Colleges and Schools. The thirty-six undergraduate and sixty-five graduate curriculums under the Colleges of Agriculture and Biological Sciences, Arts and Sciences, and Engineering and the Schools of Architecture, Education, Industrial Management and Textile Science, and Nursing, and the Graduate School form a background of training for the hundreds of occupations and professions in which Clemson graduates engage. The University is organized on a basis whereby it retains a clear entity through the interrelationships of colleges, schools, and departments providing a well-balanced fundamental and general educational program.

The enrollment of Clemson has grown from 446 students at the opening of the University in 1893 to 6,842 for the first semester, 1968-1969, including 317 at the Greenville and Sumter campuses. Since the opening of the University, through the second semester 1968-1969, 55,949 students have attended Clemson, and through December 1968, 19,452 have been awarded the bachelor's degree. During this same period, 52 associate degrees, 1,198 masters' degrees, and 112 Doctor of Philosophy degrees have been awarded.

ADMINISTRATIVE ORGANIZATION

The government of the University is vested in a Board of 13 members, including 6 elected by the Legislature and 7 life and self-perpetuating members, in accord with the Clemson will. The President of the University is the chief executive and administrative officer appointed by the Board of Trustees; and under the President there are four areas of administration, each headed by a chief administrative officer responsible to the President. The organizational units under each of these officers are outlined below:

I. Vice-President for Academic Affairs and Dean of the University
   A. College of Agriculture and Biological Sciences
   B. School of Architecture
   C. College of Arts and Sciences
   D. School of Education
E. College of Engineering
F. School of Industrial Management
   and Textile Science
G. School of Nursing
H. The Graduate School
I. Extended Programs
J. The University Library
K. The Summer Sessions
L. The Computer Center
M. ROTC
N. Water Resources Research Institute
O. Clemson University at Greenville
P. Clemson University at Sumter

II. Vice-President for Student Affairs and
    Dean of Students
  A. Office of the Dean of Men
  B. Office of the Dean of Women
  C. Office of Admissions, Registration,
     and Financial Aid
  D. Y.M.C.A. and University Religious Affairs
  E. Placement Office
  F. Counseling Center
  G. Athletic Department
  H. Student Health Service
  I. Director of Student Activities
  J. Department of Bands

III. Vice-President for Business and
     Finance and Comptroller
  A. Accounting Division
  B. Personnel Division
  C. Physical Plant Division
  D. Purchasing Division
  E. Auxiliary Enterprises
  F. The Clemson House Hotel

IV. Vice-President for Development
  A. Alumni Relations
  B. Public Relations
  C. Communications Center
  D. Planning and Corporate Support
REQUIREMENTS FOR ADMISSION

To receive consideration for admission to Clemson, the applicant must, as a rule, present a transcript of his high school record giving evidence of graduation, and submit an official copy of his scores for the College Board tests used as an entrance examination. In reaching an admissions decision, the examination scores along with the student's academic preparation, rank in class, and the recommendation of the high school principal will be weighed carefully.

In addition, students may qualify for entrance by:

(1) Achieving satisfactory scores on the College Board examinations and presenting a South Carolina High School Certificate (awarded by certificate examination).

(2) Achieving satisfactory scores on the College Board examinations and completing a minimum of 12 high school units. Students in this category must have earned both a high school record and College Board scores that are distinctly above average.

(3) Achieving satisfactory scores on the College Board examinations and meeting the additional requirements for entrance with advanced standing.

As minimum additional criteria, the transfer applicant must present a statement of honorable dismissal from the institution last attended, an original transcript of his record from each college or university attended, and an official statement that he is eligible to return to the institution last attended. Candidates meeting these requirements will then be considered carefully in the light of the quality of their previous record, and work completed in other colleges with a grade at least one letter grade higher than the lowest passing mark will be evaluated in terms of equivalent courses in the curriculum at Clemson selected by the student.

Furthermore, in order for a transfer student to be considered for enrollment, his complete application, including test scores, transcripts and statement of eligibility, must be on file in the Admissions Office at least two weeks prior to the date of desired matriculation. Exception will be made only in the case of a student enrolled in another college who is applying for mid-year entrance.

Finally, various non-intellective factors will be considered in the case of both freshman and transfer applicants about whom it is
Requirements for Admission

impossible to make a positive decision on the strength of aptitude and previous academic performance alone.

Although not required, students planning to apply for entrance to Clemson are advised to include in their high school curriculums the following units:

- English ............... 4
- Algebra ............... 2
- Chemistry ............. 1
- Geometry ............. 1
- Physics ............... 1
- Trigonometry .......... ½

It is appropriate for students planning to enroll in Agriculture, Biology, Medical Technology, or Pre-Medicine to include biology in their science program.

An admissions deposit is required following the issuance of a provisional or final acceptance. Instructions concerning this deposit will be included in the acceptance letter.

Application Forms. Forms to be used in applying for admission to the University may be obtained by writing the Office of Admissions and Registration, Clemson University, Clemson, S. C. 29631.

Entrance Examinations. With the single exception of those who already hold a bachelor's or higher level degree from an accredited college or university, all candidates for admission to Clemson on the undergraduate level must complete the College Entrance Examination Board Scholastic Aptitude Test. In addition, all candidates, with the exception of those transferring acceptable college credit in mathematics, should take one of the mathematics achievement tests. Although the score earned on either of the mathematics tests will be considered, it is suggested that candidates take the Level I examination. Applicants who have completed the required tests previously are advised that for a fee of $1 and upon request, the College Entrance Examination Board will furnish Clemson an official transcript of scores. Unofficial score reports from other sources are not acceptable.

Freshman applicants may secure a Bulletin of Information and an application for the tests from their local high school principals or guidance counselors. Transfer candidates will often be able to obtain this material from someone in the student personnel division of their present colleges. If this literature is not available locally, the applicant should write to College Entrance Examination Board, Box 592, Princeton, New Jersey 08540 (Box 1025, Berkeley, California 94701, for Western residents), requesting a Bulletin of Information/Admissions Testing Program.
All candidates are reminded to forward applications for the entrance examinations as indicated in the Bulletin of Information, and not to Clemson University.

Three other very important points are:

1. Be sure to list Clemson on the application for the College Board examinations as one of the schools to receive your scores.
2. Consideration will be given to your examination results only in the event that an official application for entrance to the University is on file in the Admissions Office.
3. Up to five weeks is required for College Board to furnish scores, and you must schedule your tests at a date sufficiently early to allow time for them to be received prior to your anticipated entrance date.

Advanced Placement by Examination. In addition to earning credit by the usual method involving classroom attendance, students may receive credit toward their degree by completing a course successfully by examination only. Freshmen interested in exempting some of the elementary courses in this manner should participate in the College Board Advanced Placement Examination program, and have the results of these tests sent to Clemson.

Matriculation. Upon arrival for the opening of the session, new students report to the Office of Admissions and Registration to complete enrollment. A student's matriculation is equivalent to his pledge to conform to the rules of the institution. Any admission gained or matriculation made irregu larly is subject to cancellation.

Students from Other Countries. A limited number of well-qualified students from other countries are accepted. The application for admission must be in English on the official application form furnished by the Office of Admissions and Registration. Official transcripts of all high school and college level work which the applicant has undertaken should accompany the application. They must also complete the entrance examination requirements discussed previously, although in a few unusual cases a substitute examination is authorized.

In addition to academic and personal qualifications equivalent to those required of United States citizens, the applicant from another country is required to submit evidence of his possessing dollar resources adequate without assistance from the University for at least the first year of his course of study, including round trip travel expenses. The University is unable to grant scholarship or loan
assistance to students from abroad, and there is little likelihood that any type of employment may be secured.

If accepted, students from other countries should have a minimum of $1,000 in their possession upon reporting to the University. This amount is sufficient to make the entrance payment which includes tuition, fees, and living expenses for a semester, and for books and supplies. Foreign students will also be required to purchase student accident and health insurance.

EDUCATIONAL BENEFITS FOR VETERANS AND WAR ORPHANS

The Veterans Administration provides educational assistance for veterans and children of deceased or totally disabled veterans who meet requirements of applicable laws and regulations. Any veteran or child of a deceased or totally disabled veteran should communicate with the nearest Veterans Administration office to determine whether or not he is entitled to any educational benefits.

SELECTIVE SERVICE REGULATIONS

Registration. For the benefit of students who become 18 years of age during the school year, provision has been made for such students to register for Selective Service in the Office of Admissions and Registration on the campus. The registration is then sent through channels to the registrant’s local board.

Deferment. The following Selective Service Regulations published in the summer of 1967 are quoted for the guidance of undergraduates:

“In Class II-S shall be placed any registrant who has requested such deferment and who is satisfactorily pursuing a full-time course of instruction at a college, university, or similar institution of learning, such deferment to continue until such registrant completes the requirement for his baccalaureate degree, fails to pursue satisfactorily a full-time course of instruction, or attains the twenty-fourth anniversary of the date of his birth, whichever occurs first.

“In determining eligibility for deferment in Class II-S, a student’s academic year shall include the 12-month period following the beginning of his course of study.

“A student shall be deemed to be satisfactorily pursuing a full-time course of instruction when, during his academic year, he has earned, as a minimum, credits towards his degree which, when added to any credits earned during prior academic years, represent
a proportion of the total number required to earn his degree at least equal to the proportion which the number of academic years completed bears to the normal number of years established by the school to obtain such degree. For example, a student pursuing a four-year course should have earned 25% of the credits required for his baccalaureate degree at the end of his first academic year, 50% at the end of his second academic year, and 75% at the end of his third academic year.

“It shall be the registrant's duty to provide the local board each year with evidence that he is satisfactorily pursuing a full-time course of instruction at a college, university, or similar institution of learning.”

**EXPENSES**

*Settlement of University Fees.* The schedule of semester charges for all undergraduate students—full-time, part-time, and auditing—is shown on the pages which follow. The entire semester's expenses are due and payable at the beginning of each semester, and no student is officially enrolled until all semester expenses have been satisfied. In special cases the University will accept at the beginning of a semester a non-interest bearing promissory note for a portion of the semester residence-hall rent and semester-plan board fee. Amounts up to $65 for room rent and $115 for board fee may be included in the note. In such cases, a note for the first semester charges will be due October 10, and a note for the second semester charges will be due March 1.

A $60 advance payment of room rent is required for a room reservation for the fall semester. This payment must be made by cash, check or money order and should be sent to the Residence Halls Manager's Office with the completed “Student Application for Room Reservation” card not later than July 1. The $60 advance payment of room rent will be deducted from the amount otherwise due for the first semester's expenses. All other transactions relating to payments should be conducted with the Accounting Division. All checks and money orders should be made payable to Clemson University. A personal check given in payment of University expenses which is returned by the bank unpaid, immediately creates an indebtedness to the University.

The University reserves the right to adjust charges to current costs.

*Past Due Student Accounts.* Any indebtedness to the University which becomes past due immediately jeopardizes the student's en-
rollment, and no such student will be permitted to graduate or register for a subsequent semester or summer school term. Further, any student who fails to pay all indebtedness to the University may not be issued an honorable discharge, transcript, or diploma.

Refund of Academic Fees for Students Enrolled for Less than a Full Semester. No adjustments in charges will be made on a semester's tuition and fees after five weeks from the date classes begin for the semester. Charges for periods of attendance of five weeks or less during a semester shall be made on the following basis:

Two weeks or less ........................................... 20%
More than 2 but not more than 3 weeks .............. 40%
More than 3 but not more than 4 weeks .......... 60%
More than 4 but not more than 5 weeks .......... 80%
More than 5 weeks ........................................... 100%

Special provision has been made for a student who is required to discontinue his enrollment to report for active duty in the Armed Forces of the United States. Such students shall be charged for tuition, maintenance and activity fee, and medical fee on a daily pro rata basis, holidays excepted, instead of the percentage basis stated above, provided that such discontinuance of enrollment is the result of circumstances, conditions, or actions over which the student has no control.

Refund of Dining Hall and Residence Hall Fees. Specific information relating to living-expense refunds is given in the sections on dormitories and dining hall.

Schedule of Charges. The schedule of semester charges for the 1969-1970 session is as follows:

SCHEDULE OF SEMESTER CHARGES 1969-1970 SESSION

Resident of South Carolina (Full-time student)

<table>
<thead>
<tr>
<th></th>
<th>Men</th>
<th>Women</th>
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</thead>
<tbody>
<tr>
<td>Tuition</td>
<td>$75.00</td>
<td>$75.00</td>
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<tr>
<td>Matriculation Fee</td>
<td>5.00</td>
<td>5.00</td>
</tr>
<tr>
<td>Maintenance and Activities Fee</td>
<td>$186.00</td>
<td>$186.00</td>
</tr>
<tr>
<td>Medical Fee</td>
<td>20.00</td>
<td>20.00</td>
</tr>
<tr>
<td>Library Fee</td>
<td>12.00</td>
<td>12.00</td>
</tr>
</tbody>
</table>

Semester Total Excluding Room and Board ........... $298.00 $298.00
**Non-Resident of South Carolina (Full-time student)**

<table>
<thead>
<tr>
<th></th>
<th>Men</th>
<th>Women</th>
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<tbody>
<tr>
<td>Tuition</td>
<td>$200.00</td>
<td>$200.00</td>
</tr>
<tr>
<td>Matriculation Fee</td>
<td>5.00</td>
<td>5.00</td>
</tr>
<tr>
<td>Maintenance and Activities Fee</td>
<td>361.00</td>
<td>361.00</td>
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<tr>
<td>Medical Fee</td>
<td>20.00</td>
<td>20.00</td>
</tr>
<tr>
<td>Library Fee</td>
<td>12.00</td>
<td>12.00</td>
</tr>
<tr>
<td><strong>Semester Total Excluding Room and Board</strong></td>
<td><strong>$598.00</strong></td>
<td><strong>$598.00</strong></td>
</tr>
</tbody>
</table>

**Room:**

- **West Campus Residence Halls:**
  - Johnstone Hall (except A and F Sections) . . $125.00
  - A and F Sections, Johnstone Hall (Air-Conditioned) . . . . 150.00
  - Donaldson, Bowen, Wannamaker, Bradley, and Norris Halls (Air-Conditioned) . . 150.00
  - Benet, Young, Cope, Geer, and Sanders Halls (Air-Conditioned) . . 150.00

- **East Campus Residence Halls:**
  - Mauldin, Barnett, Manning and Lever (Air-Conditioned) . . . . $160.00 $160.00
  - Board (5-day plan, Monday through Friday) . . . . $220.00 $220.00
  - Board (7-day plan) . . . . $275.00 $275.00

**Part-time Student.** Undergraduate students taking less than 12 semester credit hours will be charged each semester according to the following schedule. These fees do not provide for admission to athletic events, concert series, etc.

<table>
<thead>
<tr>
<th></th>
<th>S. C. Resident</th>
<th>Non-Resident Student</th>
</tr>
</thead>
<tbody>
<tr>
<td>Matriculation Fee (non-refundable)</td>
<td>$ 5.00</td>
<td>$ 5.00</td>
</tr>
<tr>
<td>Tuition (per semester hour)</td>
<td>6.00</td>
<td>16.00</td>
</tr>
<tr>
<td>Maintenance and Activities Fee (per semester hour)</td>
<td>12.00</td>
<td>24.00</td>
</tr>
<tr>
<td>Library Fee (per semester hour)</td>
<td>.75</td>
<td>.75</td>
</tr>
</tbody>
</table>

**Auditing.** Charges for auditing are made each semester according to the following schedule:

<p>| | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Tuition (per semester hour)</td>
<td>$ 3.00</td>
<td>$ 8.00</td>
</tr>
<tr>
<td>Maintenance and Activities Fee (per semester hour)</td>
<td>6.00</td>
<td>12.00</td>
</tr>
<tr>
<td>Library Fee (per semester hour)</td>
<td>.75</td>
<td>.75</td>
</tr>
</tbody>
</table>
Graduate Students. For further information concerning advanced degrees see The Graduate Bulletin, which may be obtained from the Offices of Admissions and Registration or the Dean of the Graduate School.

Late Registration Fee. To prevent or reduce the problems incident to late registration, registration schedules are set for specific days, and certain definite procedures are outlined. A student has not completed registration until all of the required steps are taken, the final one being the return of the properly signed Class Registration Card to the Office of Admissions and Registration. Any student who fails to register for classes on the prescribed class registration days will be charged a late registration fee of $10. This late registration fee applies to full-time and part-time students.

Late Payment Fee. Any student who registers for classes on or before a designated date each semester has three additional working days to make satisfactory settlement of all expenses without being charged a Late Payment Fee. Once begun, a Late Payment Fee of $5 per day will be charged until satisfactory settlement of all fees is made.

Definition of Residence for the Purpose of Determining Status for Enrollment in Clemson University

1. A resident student is one who was continuously domiciled in South Carolina for twelve months immediately preceding his initial enrollment in the University. The term “domiciled in South Carolina” excludes those students in the State primarily to attend the institution and whose abode in South Carolina has been established as a technical bar to the higher tuition and fee charges.

2. Attendance at an educational institution is usually interpreted as temporary residence. Accordingly, a student neither gains nor loses residence solely by such attendance. Registration for voting, the act of voting, purchase of property, payment of taxes and employment in South Carolina are not necessarily by themselves proof of residence in the State for the purpose of enrolling in the University; nor does birth in South Carolina or direct descent from South Carolina forebears necessarily prove domicile in South Carolina.

3. The residence of a married woman is that of her husband, if living together; however, a wife not living with her husband may establish separate domicile. A non-resident woman who marries a resident of South Carolina shall be accepted as a resident student
at the beginning of the next semester following such marriage; and a resident woman who marries a non-resident shall keep her residence status so long as she maintains continuous enrollment in the University. A non-resident man who marries a resident woman does not thereby gain resident status.

4. The residence of a minor child (under 21 years of age) is that of the father; or of the mother if the father be not living or if the parents are separated and the child habitually resides with the mother; or, if both parents are dead, with his legally appointed guardian, or anyone else with whom he habitually resides in the absence of formal legal designation.

5. A minor may become emancipated (freed from parental domicile) through marriage, formal court action, abandonment by parents, or positive action on his own part evidential of his alienation of parental domicile. To qualify under the latter category, a minor must have completely separated himself from the parental domicile and have proved that such separation is complete and permanent. Mere absence from the parental domicile is not proof of its complete abandonment. If an applicant can provide adequate and satisfactory proof of complete emancipation and of his having come to South Carolina with the intention of establishing domicile, he may be granted resident classification at the next enrollment occurring after the expiration of twelve months following establishment of domicile, excluding time spent as a student at the University. The burden of proof of domicile and emancipation shall be upon the applicant.

6. If it is established to the satisfaction of the University that parents have moved to South Carolina with every intention of remaining permanently and establishing themselves as citizens of the State, the dependent children of such parents may be classified as resident students at the first enrollment after the parents move into the State. If the parents of a resident student move to another state with the intention of establishing domicile there, the student shall at the first enrollment after twelve months from the date of establishment of said home by his parents be classified as a non-resident student; however, the student may continue in resident status if he reaches 21 years of age within the twelve-month period, or if he establishes evidence of emancipation.

7. A person enjoying majority privileges (over 21 years old or an emancipated minor) who has resided in South Carolina continuously for twelve months immediately preceding his initial enrollment in the University shall be classified as a resident. If, after
enrollment, such person can provide adequate and satisfactory proof of his establishing domicile in South Carolina and his intention to remain permanently as a resident of the State, he may be granted resident classification at the next enrollment occurring after expiration of twelve months following establishment of domicile exclusive of time spent as a student at the University.

8. Dependents of members of the Armed Services and Federal employees stationed in South Carolina are permitted to attend the University, if accepted, by paying resident fees without regard to resident status, provided that if such military personnel or employees are ordered away from the State, their dependents may continue to have this privilege while they attend the University.

Any student or prospective student in doubt concerning his residence status must bear the responsibility for securing a ruling by stating his case in writing to the Director of Admissions and Registration.

Books and Supplies. The cost of books is not included in the Schedule of Semester Charges. The cost of books and supplies at the beginning of the semester will be approximately $50, except for students enrolling in Architecture the cost will be approximately $75.

Student Depository. For the convenience of students, the University operates a depository in the Bursar's Office where money can be deposited and withdrawn as the occasion may demand. This service is purely local. Students are urged to deposit their money and not to keep it in their rooms.

Optional Expenses. It is not possible to give an estimate of a student's expenditures for such amusements as dancing, motion pictures, etc. This depends largely upon the disposition of the student. The University endeavors to reduce to a minimum the temptation to spend money needlessly, but the authorities cannot be responsible for a student's private expenditures. This must be a matter between the student and his parents.

Transcripts. Official transcripts of scholastic records are issued on request. One transcript is furnished free; additional copies are issued for $1 each. Remittances for transcripts should be made payable to Clemson University, but should accompany transcript requests and should be mailed to the Office of Admissions and Registration.
STUDENT HOUSING

The University residence halls will accommodate 4,764, two students being assigned to a room. The University also has 289 individual units for its married students. All unmarried first-year students entering the University for the first time, not residing with parents, guardians or close relatives, are required to live in University owned residence halls. After the freshman year, students under twenty-one years of age may secure permission to live off campus by having parental permission on file in the Residence Office and approval of the Office of Student Affairs. Students who are assigned a room in University residence halls will be required to sign a Clemson University Residence Hall Contract relating to terms and conditions of occupancy for the full academic year.

Application for Residence Hall and Advance Payment. An application for residence hall accommodations will be forwarded to those students who are accepted by the University for the fall semester. These applications are to be completed and returned with a $60 advance room payment to the Residence Hall Manager's Office at the earliest practicable date.

Students who have made an advance payment and later decide not to enroll or to live in the residence hall may obtain a refund of the advance payment provided notification of intent and request for refund is received at the Residence Hall Manager's Office prior to July 1. When such notification and refund request is not received by the deadline date, no refund of advance payment will be made.

Refund of the advance payment will not be made to students who apply for assignments after July 1.

Normally, residence hall accommodations are available to those students who enter the University at the beginning of the second semester; therefore, the advance payment is not now required of students entering at this time.

Assignment Preference. Students should indicate on their application their preference of room(s) and roommate. Priority of room assignments is given to continuing students who file application and make advance room payments during the priority periods established by the Residence Halls Office. Preferences will be honored provided space is available in the desired residence hall and the request does not require exceptions to existing assignment procedures.

Notification of Assignments. As soon as room assignments are made, students are advised of the assignment and furnished information regarding occupancy.
Assignment Changes. Students who desire to move from the assigned room may apply at the Student Residence Office to change rooms. A service charge of $4 is charged for moving, also charges will be made for students moving from a lower- to a higher-rated room. Rental refunds are made to students moving from a higher- to a lower-rated room on a prorated basis.

Opening and Closing of Residence Halls. The University residence halls officially open for undergraduate students at 8 a.m., the day prior to matriculation date for new students and close at 8 p.m., the day scheduled for graduation exercises of the term or semester. Residence hall fees cover only the time between the day before matriculation and the scheduled date of graduation exercises or end of term when no graduation exercises are scheduled.

For official holidays which occur during the course of a semester, the University reserves the right to close certain halls and to require students remaining on the campus to move to another hall for the duration of the holiday period.

Student Responsibility for Damages. The University holds resident students responsible for any damages other than normal wear that occurs to their rooms and furnishings. Damages will be assessed by the University and the student will be billed for repairs or replacements. Students should inform University officials immediately upon occupancy of any conditions reflecting prior damages which have not been corrected.

Responsibility for Student Possessions. Although every precaution is taken to maintain adequate security, the University cannot assume the responsibility for the loss of or damage to student possessions resulting from any cause.

Refund of Residence Hall Fee. Except for the stated regulations governing the $60 advance payment to reserve a room for the first semester, refunds, when authorized, will be made on a daily pro rata basis.

Extra Residence Hall Charges. Extra charges are made to students who occupy residence halls before or after the dates established for a semester or term. Rates are as follows:

<table>
<thead>
<tr>
<th>West Campus Residence Halls</th>
<th>East Campus Residence Halls</th>
</tr>
</thead>
<tbody>
<tr>
<td>$1.50 per night</td>
<td>Non-Air-Cond.</td>
</tr>
<tr>
<td>$7.00 per week</td>
<td>Non-Air-Cond.</td>
</tr>
<tr>
<td>$2.00 per night</td>
<td>Air-Cond.</td>
</tr>
<tr>
<td>$8.50 per week</td>
<td>Air-Cond.</td>
</tr>
<tr>
<td>$2.50 per night</td>
<td>$9.00 per week</td>
</tr>
</tbody>
</table>
One week and part of another week—weekly rate plus night rate for each additional night.

Students who are required by the University to be on campus prior to and after the scheduled term or semester may upon the approval of the Vice-President for Student Affairs be exempted from paying the extra residence hall charges.

Reservation of Right to Change Fees and Regulations. The University reserves the right to make changes in its fees, charges, rules, and regulations.

**RESIDENCE HALLS**

**West Campus.** The University has available 3,612 spaces in eleven residence halls. Ten of these halls are air-conditioned. Only the newer “A” and “F” annexes are air-conditioned in Johnstone Hall. Each room in Benet, Young, Cope, Geer, and Sanders Hall is air-conditioned and has walk-in type clothes lockers, individual study desks, single beds, and chairs. A lavatory is also installed in each room. Rooms in new annexes “A” and “F” of Johnstone Hall are equipped similarly to those in the halls above. Donaldson, Bowen, Wannamaker, Bradley, and Norris Halls are air-conditioned, carpeted, and furnished with clothes lockers, individual study desks, single beds, and chairs. Rooms in Johnstone Hall other than new “A” and “F” annexes are not air-conditioned and are furnished with individual clothes lockers, bunk-type beds, a study table and chairs. A lavatory is installed in each room.

All residence halls on the West Campus are men’s residence halls. See Schedule of Semester Charges for rates.

**East Campus.** The University has available 1,152 spaces in four residence halls. Two of these halls, Mauldin and Barnett, are modern four-story structures with wall-to-wall carpeting, air-conditioning, and a rooftop deck. Each will house 144 students in 72 rooms. Rooms are arranged in suites of six, accommodating 12 students. Each suite provides a study, bath, washing and drying facilities. Each room contains two closets, two chests of drawers with wall-hung mirrors, single beds, individual study desks, lamps, and chairs. The other two, Manning Hall and Lever Hall, are eleven-story structures, fully carpeted and air-conditioned. Each will accommodate 432 students. Rooms are arranged in suites of six accommodating 12 students. Each room contains two closets, two chests of drawers with wall-hung mirrors, single beds, individual study lamps, desks, and chairs. Draperies are to be provided by occupants. Studies
and laundry room are available on each floor. The first floor is
designed for group living. It includes lounges, a kitchenette, T.V.,
and recreational rooms. The basement floor includes club rooms,
storage areas, and a large room equipped with coin-operated wash-
ers and dryers.

Both men residence halls and women residence halls are located
on the East Campus. See Schedule of Semester Charges for rates.

MARRIED STUDENT HOUSING

Clemson provides comfortable and economical housing for its
married students. There are three housing areas consisting of 139
single Prefab units, 100 East Campus apartments contained in 50
duplex buildings, and 50 Littlejohn apartments in 11 buildings.

All married student housing units have two bedrooms, living room,
kitchen and bath. East Campus apartments are the newest units
and are equipped with stove and refrigerator. The Littlejohn apart-
ments and Prefabs are not equipped with stoves and refrigerators.

Booklets describing these facilities are available and will be
furnished upon request to the Housing Office of the University.
Monthly rental fees are: Prefabs, $30; Littlejohns, $45 for interior
and $48 for end units; East Campus, $60.

STUDENT FOOD SERVICE

The University Dining Halls provide several food service plans
for the students:

(1) A 5-Day Board Plan (15 meals) Monday through Friday—
holidays excluded. The fee for this plan is $440 per year and may
be paid in two installments—one-half at the beginning of the first
semester and the remainder at the beginning of the second semester.

(2) A 7-Day Board Plan (21 meals) Monday through Sunday—
holidays excluded. The fee for this plan is $550 per year and may
be paid in two installments—one-half at the beginning of the first
semester and the remainder at the beginning of the second semester.

Both the 5-Day and 7-Day Board Plans will begin the first day
of classes and end on the day which is scheduled for graduation.
(These dates are listed in the University Calendar appearing in this
catalog.) Individual meals may be obtained in the student dining
halls prior to the day classes begin.

(3) Students who are not on a board plan may purchase tickets
for individual meals at prevailing prices. Except on special occa-
sions, a-la-carte service will not be offered in the Student Dining Halls.

All students who enter the University for the first time from high school or preparatory school and who live in University residence halls are required to subscribe to either the 5-Day or the 7-Day Board Plan. Either the 5-Day or the 7-Day Board Plan is also recommended to upperclassmen who reside in University residence halls.

Upperclassmen and graduate students have the option at the time of their enrollment of electing either the 5-Day or the 7-Day Board Plan provided they agree to pay the board-plan fee for the period of their enrollment during the academic year.

A student having selected the 5-Day or the 7-Day Board Plan for the academic year may not withdraw as long as he remains enrolled, except in the case of marriage or circumstances which are determined by the University to be beyond his control.

**LAUNDRY–DRY CLEANING**

A plant with modern equipment is conveniently located on campus to service the laundry and dry-cleaning requirements of the student. Reasonable prices are charged for individual items on a cash-and-carry basis.

The University will not be liable for lost or damaged items unless reported within two days after the delivery date, and then for not more than the actual depreciated value of such articles as have been lost or damaged.

Coin-operated washing machines and dryers are available in the laundry building and several of the dormitories.

A commercially operated student linen-rental service is also available. Information regarding this service will be forwarded to all students who are accepted for enrollment in the University.

**MEDICAL EXAMINATIONS**

Completion of a medical history and physical examination record is required of all new students entering Clemson University for the first time and of all former students not in attendance for a period of 3 years or more. This examination must be completed by the student and the student’s own physician or the health service of the school from which he graduates or transfers. This examination will be reported on a special form provided for this purpose by the University and mailed directly to the Director of Student Health
Service. No new student will receive final acceptance until this certificate is completed and has been received by the Director of the Student Health Service.

The University requires that all new students have a current tetanus toxoid series or booster (within three years), a smallpox vaccination (within four years) and also immunization against poliomyelitis. The oral (Sabin) type vaccine is preferred. All new students are also required to have a skin test for tuberculosis within one year prior to admission. If this test is positive, a chest X ray is also required. All positive reactors will then be required to have an annual chest X ray. These follow-up X rays after admission will be done at the Student Health Service. The University also requires that all continuing students have a repeat of the skin test every two years. This will be performed by the Health Service.

**STUDENT HEALTH SERVICE**

_Student Health Service: Cost per Semester $20._ Payment of the Student Health Service fee is required of all students living in University residence halls and all full-time students even though they do not reside in University housing. The Student Health Service maintains a new building with a complete outpatient department and a 34-bed hospital. The staff consists of three full-time physicians, including the director, a half-time psychiatrist, ten full-time registered nurses and a full-time registered laboratory technician and a full-time registered X-ray technician. In addition, a sufficient number of nurses aides, secretarial workers, orderlies and maids for 24-hour-a-day operations are employed. The best of modern equipment is available for student use.

The Student Health Service at Clemson University has several important functions. All of these are aimed at keeping the student in good health so that he may effectively pursue his school work.

There is, of course, the basic function of medical care for the ill and injured. This is a vital part of its work. In addition to this, the Student Health Service attempts to put strong emphasis on health rather than illness. This begins with the entrance medical form. In laying out this form an attempt is made to get information, examinations and preventive medical procedures carried out to better equip the staff in protecting the student from illness and to serve as a guide for the care of pre-existing medical problems.

As the student progresses through his academic experiences, other procedures may be required or highly recommended. These are primarily an effort to teach the individual self-responsibility for
maintenance of his own health and locate possible hidden diseases. The Health Service also has the position as the source of medical information as well as responsibility for indicated medical action: diagnostic, therapeutic and preventive.

The medical fee paid by each student covers the services of the University physicians and health service staff for most illnesses and injuries occurring on the campus. There are certain things, however, that it does not include, such as fees for routine physical examinations for employment or transfer to another school and fees for outside physicians when called in for consultation, medical or surgical services performed away from the University or for accidents occurring off the campus. The fee also covers medication for acute illness but not for chronic illness lasting over two weeks or for pre-existing illness. Although ambulance transportation to a general hospital for serious illness or injury occurring on campus will, of course, be arranged, the expense for this service is the responsibility of the student. Transportation for less urgent ailments and routine visits can be arranged through the Health Service at the expense of the student.

The right of the Director of the Student Health Service, with the approval of the proper University authority, to obtain any of these extra services in behalf of any student under his care is hereby expressly reserved.

The Student Government, with full approval of the administration, offers a plan of accident and sickness insurance to full-time students. Each year, prior to the beginning of the fall semester, complete information on this insurance plan will be sent to students. This insurance is inexpensive and is designed to cover major medical expense not covered by the Health Service. It is highly recommended.

UNDERGRADUATE FINANCIAL AID

General. The Office of Student Financial Aid is responsible for coordinating all types of financial assistance administered by the University except those honors and awards which are presented for special achievement and extracurricular grants-in-aid. Currently available financial aids consist of scholarships, student loans, and part-time employment. It must be realized that any program of financial assistance can only be supplementary and that the basic financial responsibility remains that of the applicant and his parents.

Application Procedure. Beginning in January of each year all eligible students may apply to the Student Financial Aid Office for
any type of financial assistance desired for the coming school year. All application forms must be completed in their entirety as the answer to each question will have meaning to the committee considering the request. All requests—except for part-time employment—must be supported by a Parents' Confidential Statement filed directly with the College Scholarship Service, Box 176, Princeton, New Jersey 08540. Action on requests for aid will be based upon scholastic and activity records, eligibility to attend Clemson, and financial resources. Prospective students must complete the entrance examinations and be accepted for admission by the University before final action may be taken upon their requests for aid. Applicants will be notified when they are selected for specific types of assistance and should promptly indicate their acceptance. Further information and application forms may be secured by contacting the Student Financial Aid Office, Tillman Hall, Clemson University, Clemson, South Carolina 29631. Telephone 654-2421, Extension 411 (Area Code 803).

**SCHOLARSHIPS FOR FRESHMEN**

These awards will be based upon high school records, entrance examination scores, and other qualifications established by the selection committees. Completed entrance and scholarship applications, together with a transcript of high school work through the first semester of the senior year, must be submitted by March 1 in order to be considered. For purposes of scholarship application, the College Entrance Examination Board tests should be taken in time to allow our receipt of scores not later than March 1.

*Marshall Williams and Grace Cornett Bell Memorial Scholarships.* Income from a fund donated by Mrs. Bell and family provides one or more annual awards for students (freshmen or upperclassmen) enrolled in the College of Arts and Sciences with preference afforded those concentrating in mathematics or English curriculums. Selection is based upon academic progress, moral character, and financial need.

*Dow Chemical Co. Scholarships.* Two $500 awards are available annually to students (freshmen and upperclassmen) majoring in Chemical Engineering.

*Educational Opportunity Grants.* Non-reimbursable Federal grants, renewable if satisfactory academic progress is maintained, are available from the University for those entering freshmen of exceptional financial requirements. Grants must be matched by
scholarships, loans, or other aid. Selection is based upon financial need and academic promise.

Ferro Corporation Scholarship. A $300 award is available annually to a student (freshman or upperclassman) majoring in Ceramic Engineering. Selection is based upon academic standing and leadership ability.

Harbison-Walker Refractories Company Scholarship. A $500 award is available annually to a student (freshman or upperclassmen) majoring in Ceramic Engineering. Selection is based upon academic standing and leadership ability.

Ira S. Hurd Scholarship. A $500 award is made available annually by the Palmetto Section of the American Association of Textile Chemists and Colorists to a student (freshman or upperclassman) majoring in Textile Chemistry. Selection is based upon need and scholarship.

Jonathan Logan Scholarships. Two $2,000 awards, to be paid in equal installments during four years of satisfactory undergraduate study, are provided annually by the David Schwartz Foundation to be available to freshmen who enroll in the School of Industrial Management and Textile Science.

R. F. Poole Alumni Scholarships. To encourage academic excellence, renewable $1,000 scholarships are awarded annually to incoming freshmen with outstanding academic potential.

Rayonier Scholarship. A $500 award is available annually for a student (freshman or upperclassman) majoring in Engineering. Selection is based upon academic standing and leadership ability.

George E. and Leila Giles Singleton Scholarships. Income from a fund donated by Mr. G. H. Singleton ('19) provides an annual $300 award for a farm boy or girl who enrolls in the College of Agriculture and Biological Sciences. The award is for an entering freshman and may be renewed for an additional year.

South Carolina Fresh Fruit and Vegetable Association Scholarship. A $1,200 award, to be paid during four years of satisfactory undergraduate study, is available annually to a male South Carolinian who enrolls in the Horticulture (Fruit and Vegetable major) curriculum.

South Carolina Pest Control Association Scholarship. A $200 award is available annually for an Entomology major (entering freshman or upperclassman). Selection is based upon scholarship, leadership, character, and financial need.
South Carolina Poultry Improvement Association Scholarships. A $300 award is available annually to a freshman majoring in Poultry Science. An additional $300 award is available each year for a sophomore, junior, or senior.

Southern Railway Scholarships. Two renewable annual awards of $1,000 plus tuition and fees are available to entering freshmen. Priority is afforded sons and daughters of Southern Railway System employees residing in South Carolina. Selection is based upon scholastic excellence and financial need.

J. P. Stevens & Co. Scholarship. A $2,000 award, to be paid in equal installments during four years of satisfactory undergraduate study, is available annually to a freshman who enrolls in a Textile curriculum.

Strom Thurmond Scholarships. Income from a fund donated by Senator Strom Thurmond provides two or more annual grants for worthy and needy entering freshmen from the State of South Carolina. Award of these grants will be in conjunction with participation in one of the established loan programs with which the University is affiliated.

Western Electric Fund Scholarships. Two $600 awards are available annually for freshmen who enroll in Electrical, Industrial, or Mechanical Engineering, and associated fields. May be renewed if satisfactory progress is made.

SCHOLARSHIPS FOR UPPERCLASSMEN

Recipients of the following awards are normally selected by the scholarship committees in early spring for the following school year. Completed applications must be submitted not later than March 1, to insure consideration. (Also note that some few freshman scholarships are equally available for upperclassmen.)

Jerry B. Addy Memorial Scholarship. Income from a fund donated by his relatives and friends provides a renewable annual award to a rising junior majoring in Mathematics, Physics, or Chemistry. Priority is given to residents of South Carolina. Selection is based upon academic proficiency and financial need.

Allied Chemical Foundation Scholarships. Two $750 awards are given annually to upperclassmen majoring in a Textile curriculum.

G. Dewey Arndt Scholarship. Income from a fund established by FCX, Inc., and Carolina Cotton Growers Association, Inc., provides $500 for one or more awards to outstanding students in the
College of Agriculture and Biological Sciences, with preference given to students with an indicated interest in marketing and economics.

**Barney Lee Bickley Memorial Scholarship.** Income from a fund donated by his relatives provides an annual award for a sophomore student. Priority is given to residents of South Carolina.

**Borden Agricultural Scholarship.** A $300 award is made annually to the rising senior in the College of Agriculture and Biological Sciences who has achieved the highest scholastic average on all college work prior to the senior year.

**Burlington Industries Foundation Scholarship.** A $1,000 award, to be paid in equal installments during the last two years of satisfactory undergraduate study, is available annually to a rising junior. Selection is based upon leadership, scholarship, and financial need. Preference will be given to students majoring in Textiles or Industrial Management.

**The Carolina Yarn Association Scholarship.** A $500 scholarship is awarded annually to an upperclassman majoring in Textiles

**The A. B. Carter, Incorporated, Scholarship.** A $500 scholarship is awarded annually to an upperclassman majoring in Textiles

**Chemstrand Scholarship.** A $500 award is available annually to a rising junior majoring in Textiles or Textile Chemistry and planning a career in industry. Selection is based upon scholarship, financial need, and extracurricular activity.

**Langdon Cheves Scholarship.** Income from a fund donated by his family provides an annual $400 award for a male undergraduate whose permanent place of residence is within the Southeaster United States. Selection is based upon academic progress, financial need, and participation in extracurricular activities.

**Coburg Dairy Scholarship.** A $1,000 award, to be paid in equal installments during the last two years of satisfactory undergraduate study, is available annually to a junior majoring in Dairy Science. Selection is based upon scholarship, leadership, character, and financial need.

**Gilbeart H. Collings Memorial Scholarship.** A $600 award, given by the South Carolina Plant Food Educational Society, to be paid in equal installments during the last two years of satisfactory undergraduate study is available each year to a rising junior majoring in the Department of Agronomy and Soils. Selection is based upon scholarship, leadership, character, and financial need.
Cotton Producers Association Scholarship. A $900 award, to be paid in three equal installments during the sophomore, junior, and senior years, is available annually to a rising sophomore majoring in Agricultural Economics, Agricultural Education, Agricultural Engineering, Agronomy—Crops and Soils, Animal Science, Dairy Science, Entomology, Food Science, Horticulture (Fruit and Vegetable), or Poultry Science. Selection is based upon scholarship, leadership, character, and financial need.

Ethyl Corporation Scholarship. A $500 award is available annually for a student majoring in Chemical Engineering. Selection is based upon scholastic ability and financial need.

Forbes Chocolate Scholarship. A $150 award is available annually to a sophomore majoring in Dairy Science. Selection is based upon scholarship, leadership, character, and financial need.

W. T. Fort, Sr., Scholarship. A $500 award is available on alternate years to rising seniors in Architecture or Building Construction. Selection is based primarily upon financial need.

Foundry Educational Foundation Scholarships. Funds made available by grants from the Foundation provide one or more annual awards to students taking organized programs applicable to the casting of metals and foundry technology.

Ben H. Gardner Fund. Income from a fund donated to the University is awarded annually to a worthy student in the College of Engineering.

Ben and Kitty Gossett Scholarship. Income from their contribution provides one or more annual awards for Textile students whose families are employed by the textile industry in South Carolina.

J. H. Griffin Memorial Scholarship. Income from the J. H. Griffin Memorial Scholarship fund provides an annual award for a rising male senior (legal resident of South Carolina) majoring in Animal Science. Selection is based upon scholarship, leadership, character, and financial need.

Pauline Hanckel Dairy Scholarship. A $1,000 award, to be paid in equal installments during the last two years of satisfactory undergraduate study, is provided annually by the Ladies Auxiliary of the South Carolina Dairy Association to be available to a junior majoring in Dairy Science. Selection is based upon scholarship, leadership, character, and financial need.

Higgins Undergraduate Scholarships. Income from a fund donated by Mr. Higgins provides several annual awards for under-
graduate students enrolled in the College of Engineering. Selection is based upon scholarship and need.

Richard O. Hull Scholarships. Two $500 awards are available annually for students majoring in Chemistry and Chemical Engineering who have achieved superior scholastic averages on all their college work. Selection is based primarily upon academic ability although financial need will also be taken into cognizance.

David Jennings Memorial Fund Scholarship. Income from a fund donated by Mr. Jennings and his family provides one or more annual awards for students enrolled in a Textile curriculum. Financial need is a prerequisite.

Kaiser Agricultural Chemical Scholarship. A $500 scholarship is awarded annually for a rising junior majoring in Agronomy and/or Soils. Selection is based upon academic achievement, interest in the field of Agronomy, financial need, and leadership qualities.

John D. Lane Scholarship. A $125 award is available each year to a rising junior. Selection is based upon financial need and scholastic ability, with emphasis upon achievement in the field of English.

Sherwood E. Liles ('00) Engineering Scholarship. Income from a fund donated by his four sons provides an annual tuition award for a deserving undergraduate enrolled in the College of Engineering.

Minnesota Mining & Manufacturing Company Scholarships. Two $500 scholarships are awarded annually to students majoring in Chemical Engineering. Selection is based upon academic standing, character, and demonstrated leadership abilities.

Monsanto Scholarship. A $500 award is available annually for a student majoring in Chemical Engineering.

Owens-Corning Fiberglas Scholarships. Two $500 awards (one in Ceramics) are available annually to rising juniors or seniors majoring in Engineering or Textiles. Selection is based upon academic ability, leadership qualities, and financial need.

Peace Fund Scholarship. A $500 award is available annually to a rising junior or senior. Selection is based upon journalistic ability, scholastic achievement, and evidence of good character.

Pennsylvania Glass Sand Scholarship. A tuition award is given annually to an outstanding rising senior majoring in Ceramic Engineering. Selection is based upon scholastic achievement.

Ralston Purina Scholarship. A $500 award is given annually to a rising senior enrolled in the College of Agriculture and Biological
Scholarships for Upperclassmen

Selection is based upon scholarship, leadership, character, extracurricular activities, sincerity of purpose in agriculture, and financial need.

J. C. Rich ('13) Agriculture Scholarship. Income from a fund donated by his sister provides an annual award for a deserving male undergraduate enrolled in the College of Agriculture and Biological Sciences. Preference is given to relatives.

Seydel-Woolley & Company Scholarship. A $500 award is available annually to a rising junior or senior male student majoring in Textiles. Selection is based upon scholastic ability, evidence of leadership, potential to the Southern textile industry, and financial need.

The J. E. Sirrine Company Scholarship. A $500 scholarship is awarded to an outstanding undergraduate student in Civil Engineering, Chemical Engineering, Electrical Engineering, or Mechanical Engineering. This award is based upon a consideration of character, scholarship, and interest in a particular professional field. Preference is given to rising sophomores. Financial need is not a specific requirement.

Sonoco Products Scholarships. Two $500 awards are available annually for deserving undergraduates majoring in Textiles.

South Carolina Electric and Gas Scholarship. A $500 scholarship is available each year to a student residing in one of the twenty-three counties served by the South Carolina Electric & Gas Company. Applicable counties are: Abbeville, Aiken, Allendale, Bamberg, Barnwell, Beaufort, Berkeley, Calhoun, Charleston, Colleton, Dorchester, Edgefield, Fairfield, Greenwood, Hampton, Jasper, Lexington, McCormick, Newberry, Orangeburg, Richland, Saluda, and Union. Selection is based upon academic standing, leadership qualities, and financial need.

South Carolina Dairy Association Scholarships. A $1,000 award, to be paid in equal installments during the last two years of satisfactory undergraduate study, is available annually to a junior from South Carolina majoring in Dairy Science. Selection is based upon scholarship, leadership, character, and financial need.

Charles H. Stone Scholarship. A $1,000 award is available annually to a rising sophomore. Selection is based primarily upon exceptional academic achievement plus financial need.

Uni-Royal Foundation Scholarship. An $800 award, to be paid in equal installments during the last two years of satisfactory under-
graduate study, is available annually to a rising junior planning a career in industry. Selection is based upon proven scholastic ability and financial need.

Wallace Hatchery Poultry Scholarship. A $500 award is available annually to a senior, junior, or sophomore majoring in Poultry Science. Selection is based upon scholarship, leadership, character, and financial need.

J. P. Williamson Memorial Grants. Income from a fund donated by his relatives and the Winn-Dixie Stores Foundation is available annually for renewable grants to academically qualified and needy upperclassmen. Grants must be matched by loans from one of the established programs with which the University is affiliated. Priority is given to residents of Anderson County.

**LOAN FUNDS**

General prerequisites for the following aid are enrollment, or acceptance for enrollment, as a full-time student, substantiated need, and adequate academic capability or potential to maintain at least average college-level grades. Applicants for other types of financial assistance may also be considered for loans after contacting the Financial Aid Office. Availability is dependent upon adequacy of funds at hand. Normal cutoff date for loan applications is June 1.

Georgianna Camp Foundation Fund. A fund, donated in memory of Georgianna Camp by her husband and sons, is available to assist worthy students who are seeking a college education and need assistance to supplement their individual efforts and available sources of income.

Clemson Architectural Foundation. Needy Architecture students in the upper years of their curriculum who show professional promise will be considered for loans from the General Fund of the Foundation.

Clemson Student Loans. A number of interested faculty and staff members, alumni, students, families, and friends have made memorial donations to assist worthy students. Included are the following funds: Anderson Kiwanis, for juniors and seniors from Anderson County; Beta Tau Sigma, for residents of Horry County; George Cherry, for upperclassmen from Oconee County and the Pendleton area; William Wilson Finley, for students living in counties traversed by the Southern Railway System; Forestry Department, for deserving Forestry upperclassmen; Henry B. Harper, for Agriculture or Industrial Management students; Jerry Allen Harter,
for Agriculture students; Richard Hughes Johnson, with family approval; R. F. Poole ('16), by his classmates; S. R. Rhodes, for deserving junior or senior Electrical Engineering students; Henry Thomas Stroud, for worthy upperclassmen.

**Clemson University Foundation.** A limited sum is available for emergency student loans. Included are donations from family and friends made in memory of J. C. Littlejohn ('08), J. H. Woodward, Jr. ('35), and his father, Uncle Jake ('02).

**Daniel Memorial Fund.** Income from a sum donated by officers of the Daniel Corporation in memory of James Fleming Daniel and Fred Adams Daniel is loaned to deserving students.

**National Defense Student Loan Program.** State and Federal monies are available to provide assistance to graduate and undergraduate students. Prerequisites are verified need and the demonstrated ability or potential to maintain normal and satisfactory academic progress. Normally restricted to those students planning careers in the teaching profession.

**Reid-Baskin Fund.** Income from a fund donated in memory of Cecil L. Reid ('02) and John Baskin will be used to aid deserving students. Preference is given Newberry and York County residents.

**Tile Council of America Fund.** The Tile Council has made a grant to be used for interest-free loans to outstanding and needy students in the lower years of the Architecture curriculum.

**United Student Aid Funds Loan Program.** Clemson University is one of a large number of universities participating in this national nonprofit loan program for needy and deserving students. Full-time undergraduate students may borrow up to $1,000 per year and graduate students may borrow as much as $1,500 per year, but no student may borrow more than $7,500. Interest is 7% simple and payment of interest and principal begin the tenth month after graduation and may be anticipated. The financial aid officer recommends the loan, after consultation with the student, and the loan is negotiated at the student’s home town bank on the student’s own signature. This is the designated lending agency of the State of South Carolina. Under the provisions of the Higher Education Act of 1965, and depending upon family income, the U. S. Commissioner of Education may pay the interest on eligible loans while the student is in school.
STUDENT PART-TIME EMPLOYMENT

Clemson University employs students in those positions where part-time services may be utilized to mutual employment advantage. Students in actual need of financial aid are usually given preference in filling positions, all other qualifications being equal. Part-time employment of first-year students is not encouraged as the University has found through long experience that the period of academic adjustment during the freshman year allows little time for such extracurricular activity. The Student Financial Aid Office maintains application files of students desiring part-time employment for the information of requesting academic departments and off-campus agencies and industries interested in securing such help. Applications must be filed after registration for each semester during which part-time work is desired. Clemson does not participate in the Federal College Work Study Program.

OTHER SOURCES OF FINANCIAL AID

The following types of assistance are not administered by Clemson University. Recipients will be required to furnish the supporting agencies with a schedule of payments due the Bursar if payment is desired to be made through the University. Such funds must be received by him on or before the due dates. Any other arrangements require approval of the Bursar.

National and State Agencies. Students should investigate such sources of financial aid as the following: Veterans Education, War Orphans Education, advanced ROTC programs, National Guard and Reserve training programs, National Merit Scholarships, American Legion free tuition for deceased or totally disabled veterans’ children, and grants made to the handicapped through the State Department of Vocational Rehabilitation.

Other Agencies. Help is often received from grants or loans through Beta, FFA, and 4-H Club membership; local organizations of the Daughters of the American Revolution, United Daughters of the Confederacy, Civitan, Elks, Masonic, Rotary and similar groups; James F. Byrnes Foundation, Pickett and Hatcher Educational Fund, Methodist Student Loan Foundation, Knights Templar Educational Foundation, The Agricultural Society of South Carolina, The Garden Club of South Carolina, South Carolina Agricultural Teachers Association, Institute of Food Technologists, South Carolina Nurserymen’s Association; and various other religious, civic, welfare, and educational agencies.
**Honors and Awards**

**Industry and Related Foundation Support.** Students are often able to finance part of their education by summer employment or by alternating semesters between the University and jobs with establishments near their homes. Some students are eligible for loans or grants which are administered by those corporate and local industries which employ their parents. The finest source of information regarding this type of support has been found to be high school counselors.

**Miscellaneous.** There are available a number of “deferred tuition” lending plans. Examples of these are Education Funds, Inc., and Tuition Plan.

It should be realized that the University has no affiliation or contractual agreement with any of the agencies sponsoring such plans and can accept no responsibility for the outcome of any individual arrangements entered into with those agencies.

**HONORS AND AWARDS**

Recipients for the following awards are chosen for their special achievements by selection committees, and are announced at an annual Honors and Awards Day program in the spring or at other appropriate ceremonies during the year.

**Air Command and Staff College Award.** Presented annually to the Aerospace Studies 400 cadet who is selected as the outstanding AFROTC cadet in the nation. The winner will be selected from cadets who have previously been chosen as recipients of the Legion of Valor Bronze Cross of Achievement Award and/or the Aerospace Education Foundation W. Randolph Lovelace Memorial Award.

**Air Force Association Award.** The Air Force Association of Washington, D.C., awards this medal annually to the outstanding Aerospace Studies 400 cadet who has shown outstanding aptitude for both academic and military pursuits.

**The Alpha Rho Chi Medal.** The Alpha Rho Chi fraternity annually awards a gold medal to the graduate of the professional curriculum in Architecture who has shown the greatest leadership, service to his school, and who gives promise of professional merit.

**Alpha Tau Alpha Scholarship Medal.** An annual award is given to the senior in Agricultural Education having the highest scholastic record.

**Alpha Zeta Award.** An annual award is given to a major in the College of Agriculture and Biological Sciences having a high scholastic record and possessing qualities of character and leadership.
Ambrosia Chocolate Award. An engraved watch is given annually by the Ambrosia Chocolate Company to the senior in Dairy Science having the highest grade in Dy Sc 304.

American Agricultural Economics Association Award. This award is presented each year by the Clemson Student Chapter of the American Agricultural Economics Association to the outstanding student in Agricultural Economics, based on academic attainment and leadership in the club and other extracurricular activities.

American Association of Textile Chemists and Colorists Award. An annual award is given for the best work done in Textile Chemistry and Dyeing by a member of the graduating class.

American Association of Textile Technologists Award. An annual award is given to the graduate having a high scholastic record and all-round qualification for success in the textile industry.

American Association of University Women Award. The Clemson branch awards an engraved silver bowl annually to the girl graduating with the highest cumulative grade-point ratio.

American Chemical Society Award. An annual award is given to the outstanding senior in Chemistry who is a member of the student affiliate chapter of the American Chemical Society.

American Fighter Aces Association Award. Presented annually to the outstanding Aerospace Studies 400 cadet graduating in the pilot category in each of the nine geographical areas based on his performance and achievements as an AFROTC cadet including his performance in the flight instruction program.

South Carolina Chapter, American Institute of Architects Award. The South Carolina Chapter of the American Institute of Architects each year awards a Certificate of Merit to the outstanding fourth-year student of Architecture in the Design Option and the Structural Option.

American Institute of Architects Medal. The National Organization of The American Institute of Architects awards each year a silver medal and a book to the outstanding graduate in the professional curriculum in Architecture at Clemson. An award is also presented to the runner-up.

American Institute of Chemical Engineers Award. The American Institute of Chemical Engineers sponsors an annual award to the junior majoring in Chemical Engineering who has attained the highest scholastic standing through the sophomore year.
Institute of Electrical and Electronics Engineers Scholastic Award. An annual award is given for outstanding participation in the Student Branch activities of IEEE to a second-semester junior or first-semester senior having high scholastic standing.

American Legion ROTC General Military Excellence Award. The American Legion annually awards a medal to an outstanding junior and senior Army ROTC cadet who has demonstrated outstanding qualities in military leadership, discipline, character and citizenship.

American Legion Scholastic Excellence Award. The American Legion annually awards a medal to an outstanding junior and senior Army ROTC cadet based on scholastic achievement, participation in student activities and demonstrated leadership.

American Society of Agronomy Award. The American Society of Agronomy sponsors an annual award to an outstanding senior in the Department of Agronomy and Soils.

American Society of Civil Engineers Membership Award. The South Carolina Section of the American Society of Civil Engineers sponsors an annual award to the outstanding graduating senior in Civil Engineering.

The American Society of Mechanical Engineers Award. An annual award is given to a senior in Mechanical Engineering for his outstanding service in the College of Engineering.

Society of American Military Engineers Award. The Society of American Military Engineers awards annually a gold medal with key replica to the twenty outstanding AFROTC cadet juniors and to the twenty outstanding AFROTC cadet seniors enrolled in Aerospace Studies in colleges and universities throughout the nation who are majoring in Engineering.

Society of American Military Engineers Award. The Society of American Military Engineers awards annually a gold medal with key replica to the twenty outstanding Army ROTC cadet juniors and to the twenty outstanding Army ROTC cadet seniors enrolled in the Army General Military Science ROTC Units in colleges and universities throughout the nation who are majoring in Engineering.

Major Rudolf Anderson, Jr., Trophy. The trophy is presented annually to the Aerospace Studies cadet who has distinguished himself by his performance and dedication to the precepts of the AFROTC Cadet Wing at Clemson University, such actions having
been acknowledged to constitute the most outstanding contribution to the promotion and enhancement of the traditions, ideals, and aspirations of the Air Force Reserve Officer's Training Corps.

Architectural Faculty Award. The faculty of the School of Architecture has established this award for recognition of academic excellence of a first-year pre-architecture student.

Armed Forces Communication and Electronics Association Gold Medal. The Armed Forces Communications and Electronics Association of Washington, D. C., sponsors an annual award to the outstanding senior Army ROTC cadet majoring in Electrical Engineering.

The Armed Forces Communication and Electronics Association Award. An annual award is given to the outstanding AFROTC senior majoring in Electrical Engineering who has demonstrated outstanding qualities of military leadership, character, and definite aptitude for military service.

South Carolina Chapter, Armed Forces Communications and Electronics Association Leadership Award. A $25 Savings Bond is awarded annually to an outstanding ROTC junior majoring in Electrical, Electronics, or Communications Engineering.

Associated Schools of Construction Award. A book is given in the name of the Associated Schools of Construction to a student in Building Construction for scholarship and for his having demonstrated promise of future achievement in his chosen field.

Association of the United States Army Award for Excellence in Military History. The Association of the United States Army annually sponsors an award to the second-year Army ROTC cadet achieving the highest average in Military History.

Association of the United States Army ROTC Award. The Association of the United States Army annually awards a medal to each of four junior ROTC cadets who are in the top 10 per cent in ROTC grades and in the top 25 per cent in general academic grades and who have contributed most, through leadership, to advancing the standing of the Army ROTC unit and the Military Science Department at Clemson University.

G. H. Aull Essay Award. A $25 award is given annually to the senior student presenting the best essay in the field of Agricultural Economics.
Block and Bridle Club Scholarship. A $100 award to be paid at the beginning of each regular semester is available to a junior in the Block and Bridle Club. Selection is based on scholastic ability, financial need and leadership in the club and other activities.

Arnold R. Boyd English Honor Key. This key is awarded annually to a student in the graduating class who has made an outstanding record in English as an undergraduate at the University.

Chemistry Faculty Award. An annual award is given to the sophomore majoring in Chemistry who maintained the highest scholastic record in Chemistry during his first two semesters of work.

Class of 1902 Awards. The members of the Class of 1902 have deposited with the Clemson University Foundation three funds of $2,000 each, in recognition of the distinguished teaching services of three professors who were on the faculty at that time, and in memory of those of the class who have passed on. The income from these funds is to be awarded annually as follows: The Williston Wightman Klugh Award, to a worthy, earnest undergraduate student of good moral code and personality who intends to make teaching his life work; The Rudolph Edward Lee Award, to a worthy undergraduate student in Architecture, upon the recommendation of the faculty of that School after consideration of the student’s grades, extracurricular activities, and those qualities that go toward making a successful professional architect; and The Samuel Maner Martin Award, to a worthy undergraduate student taking mathematics as a major subject.

Commander’s Saber. Presented annually by the Professor of Military Science to the Army ROTC cadet officer considered to have contributed most to the advancement of the cadet brigade through leadership and devotion to duty.

Howard Carlisle Copeland Memorial Award. The family of Howard Carlisle Copeland, who gave his life during World War II, has set up a permanent memorial fund in his memory. Each year the interest from the fund shall be given to the boy who has made the greatest endeavor financially to stay in college.

The H. William Close Achievement Award of the Textile Veterans Association. A medallion and a $100 U. S. Savings Bond is awarded annually to the most outstanding senior in the Textile curriculum in honor of Mr. H. William Close, President of Springs Mills, Incorporated.
The Marvin R. Cross Honor Award of the Textile Veterans Association. A $50 U.S. Savings Bond and a medallion is awarded annually to an outstanding senior in the Textile Department of the School of Industrial Management and Textile Science.

Danforth Fellowships. The Danforth Foundation of St. Louis awards two fellowships each year to agricultural students. One of these is given to an outstanding member of the junior class majoring in either Agricultural Economics, Agricultural Education, Animal Science, Dairy Science or Poultry Science, and provides for a 2-week summer short course with Ralston Purina Company, and a 2-week stay at the American Youth Foundation Leadership Training Camp at Shelby, Michigan. The second award provides for a 2-week stay at the Leadership Camp at Shelby, Michigan, and is awarded to an outstanding freshman in the College of Agriculture and Biological Sciences.

Distinguished AFROTC Cadet Badge. Presented by the Professor of Aerospace Studies to the top 20% of Aerospace Studies 400 cadets upon entrance into AS 400, who possess outstanding qualities of leadership, high moral character, and a definite aptitude for Air Force service. A cadet must be designated as a distinguished cadet before he is eligible to apply for a regular Air Force commission.

Distinguished Military Student Badge. An annual award is given by the Department of the Army to those individuals, designated by the Professor of Military Science, who possess outstanding qualities of leadership, high moral character, and definite aptitude for Army service. They must have attained an academic standing in the upper half of their class and demonstrated leadership ability through their achievements while participating in recognized campus activities. Such recognition carries with it the opportunity for commissioning in the Regular Army.

Samuel B. Earle Award. An award established by Clemson Alumni in honor of Dean Samuel B. Earle, who ended 48 years of service to Clemson University in July, 1950, is given annually to an outstanding senior in the College of Engineering.

Dr. R. C. Edwards Award. Awarded annually to the outstanding Clemson University Army ROTC cadet who attained the highest degree of proficiency during the preceding ROTC summer camp.

South Carolina Entomological Society Award. An annual award is given to an undergraduate student majoring in Entomology. Selection will be made on the basis of scholarship and character.
The Faculty Award of the School of Industrial Management and Textile Science. A gold medallion and a $25 U.S. Savings Bond is awarded annually to the most outstanding graduating senior in the School.

Faculty Scholarship Award. An annual award is given to the member of the graduating class with the highest academic achievement by the academic faculty. The winner receives a certificate and a gold medal and has his name inscribed upon a plaque which is placed in the main entrance of Tillman Hall. This plaque carries the names of all previous winners of the award.

Forestry Award. The income from a fund donated to the University is presented annually to the senior in Forestry with the highest academic record.

Gamma Sigma Delta Awards. Awarded annually to the student in the sophomore class and in the senior class majoring in Agriculture and having the highest scholastic attainment.

Ben H. Gardener Award. The income from a fund donated to the University by the father and son is given annually to some worthy and needy student in the College of Engineering.

General Dynamics Award. An annual award is given to the most outstanding sophomore student of the basic AFROTC course who is qualified and motivated for an Air Force career.

J. H. Griffin Memorial Scholarship. Income from the J. H. Griffin Memorial Scholarship Fund provides for an annual award to a rising male senior (legal resident of South Carolina) majoring in Animal Science. Selection is based upon scholarship, leadership, character, and financial need.

Industrial Management Merit Award. An award is provided by the Neely and Gibson Coal Sales Company (William J. Neely, '32, and Harry H. Gibson, '32) for an Industrial Management major who has demonstrated through outstanding academic performance and excellent personal characteristics sufficient potential to enable him to assume significant managerial responsibilities in modern industry.

Rudolph E. Lee Award. In recognition of the distinguished teaching service of Rudolph Edward Lee and in memory of those of the class who have passed on, the members of the Class of 1902 present each year the Rudolph Edward Lee Award of $100 to a worthy undergraduate student in Architecture, after consideration of his grades, extracurricular activities, and those qualities that go toward making a successful professional architect.
Legion of Valor Bronze Cross of Achievement Award. Presented annually to one Aerospace Studies senior in each of the nine geographical AFROTC areas, based on performance and achievements as an AFROTC cadet in Aerospace Studies, including completion of field training.

James Lynah Merit Awards. Income for several awards is derived from a fund established by Mr. James Lynah, in memory of distinguished professors who were teaching at Clemson when the Class of 1902 were undergraduates, as follows: The Charles Manning Furman Prize in English, The Mark Bernard Hardin Prize in Chemistry, The William Shannon Morrison Prize in History, The Charles Carter Newman Prize in Horticulture, The Walter Merritt Riggs Prize in Electrical Engineering and The Augustus G. Shanklin Prizes in ROTC, Air and Military Science and Tactics. These awards are made to students having a high scholastic rating and possessing outstanding qualities of character and leadership.

Clark Lindsay McCaslan Award. A sum of money has been deposited with the University to establish a fund in memory of Clark Lindsay McCaslan, Class of 1908, and a pioneer in Agricultural Engineering. The income from the fund shall be given annually to the student in the Department of Agricultural Engineering who in the opinion of the faculty shall be deemed to be the most deserving.

Colonel S. T. McDowell Award. Awarded annually to the outstanding Army ROTC cadet senior scheduled to be commissioned in a Combat Arm of the United States Army.

Henry T. Malone Gamma Alpha Mu Award. Henry T. Malone, Class of 1937, will present a $50 award to the undergraduate student who writes the best feature on campus, community, or state history to appear in The Tiger.

Marksmanship Awards. Medals are annually presented to those members of the Army ROTC Rifle Team achieving highest position average scores.

Dr. Ralph Mershon Memorial Award. The Secretary of the Army will present annually a $250 prize to the outstanding Distinguished Military Graduate of a senior division Army ROTC university or college who is commissioned in the Regular Army.

Northern Textile Association Honor Award. A medallion is awarded annually to the graduating senior in the Textile curriculum with the highest scholastic average in the Textile curriculum.
National Defense Transportation Association Award. The National Defense Transportation Association will award annually the NDTA Medal to the twenty outstanding senior students enrolled in General Military Science Army ROTC units throughout the nation.

Thomas Newcomen Award in Material History. The Newcomen Society in North America gives an annual award for the best research paper presented in the field of Material History.

Norris Medal. The following is from the will of the Hon. D. K Norris, a life trustee of Clemson, who died in 1905:

"I give $500.00 face value, Norris Cotton Mill stock . . . on condition the dividend thereon shall be applied annually to the purchase of a gold medal, to be known as the 'Norris Medal', to be awarded to the student of Clemson meriting the same at graduation, under such rules and conditions as may be prescribed by the said Board of Trustees, and which medal shall have engraved on it 'Honor habet onus' (Honor brings responsibility)."

The winner of the Norris Medal has his name inscribed upon a plaque which is placed in the main entrance of Tillman Hall. This plaque carries the names of all previous winners of the Norris Medal since it was first awarded in 1908.

American Ordnance Association Gold Scholarship Key. The American Ordnance Association, Washington, D. C., sponsors annually an award to the senior Army ROTC cadet with the most ability in the ordnance field to be commissioned to the Ordnance Corps.

Outstanding Cadet Non-Commissioned Officer Award. An annual award of the Department of Military Science presented to the Outstanding Army ROTC Cadet NCO based on exhibited improvement in all aspects of military performance.

Willie N. and Joe Wise Padget Scholarship. The income from a fund donated to the University by members of their family is used annually to aid a deserving student from Saluda County.

Phi Eta Sigma Mathematics Award. An annual award is given to a freshman scoring highest on a competitive examination in mathematics.

Phi Eta Sigma Scholarship Medal. An annual award is given to the senior having the highest scholastic record.

Phi Kappa Phi Award. An annual award is given to the junior having the highest scholastic record.
**Phi Psi Award.** This award is made annually by the National Honor Council of the Phi Psi Textile Fraternity to the outstanding textile graduate, considering scholastic record, leadership ability, and other qualities.

**Pomona Pipe Products Award.** A cash award is made to the member of the junior class in Civil Engineering with the most outstanding academic record.

**Piedmont Engineers and Architects Award.** An annual cash award to the sophomore majoring in Civil Engineering who has the highest scholastic record during his first three semesters of work.

**Quartermaster Association Awards.** The Quartermaster Association annually awards a medal to the ten outstanding junior students and a scholastic key to the ten outstanding senior students enrolled in the Army General Military Science ROTC program in colleges and universities throughout the nation. Students must be enrolled in courses including as a major item of curriculum at least one educational area of particular interest to the Quartermaster Corps.

**Reserve Officers Association Award.** Awarded annually to an AFROTC sophomore, junior, and senior cadet, based on scholastic and Aerospace Studies grades, and leadership qualities.

**Reserve Officers Association Medal.** The South Carolina Department of the Reserve Officers Association sponsors an annual award to the outstanding Army ROTC Cadet in each of the four academic years.

**Sigma Pi Sigma Prize.** An annual award is given to the outstanding senior in the Physics Department.

**Sigma Tau Epsilon Award.** An annual award is given to the senior majoring in the College of Arts and Sciences and having the highest scholastic record.

**R. W. Simpson Medal.** A medal designated as the "R. W. Simpson Medal" is awarded annually to the best drilled Army ROTC cadet in each of the freshman, sophomore, or junior classes.

**The Solite Award.** The Southern Lightweight Aggregate Company annually makes a grant of $1,000 to the Clemson Architectural Foundation, a portion of which is used for prizes for those fifth-year professional theses adjudged to be outstanding.

**Sons of the American Revolution Medal.** An annual award is given to a freshman AFROTC cadet who is outstanding in academic courses, Aerospace Studies, and leadership characteristics.
The South Carolina Masonry Association Award. The South Carolina Masonry Association annually makes a grant of $600 to the Clemson Architectural Foundation, a portion of which is used for awards in an intermediate-level architectural design problem.

South Carolina Society of Sons of American Revolution Medal. An annual award is given to an Army ROTC cadet who exhibits a high degree of merit with respect to leadership, soldierly bearing and excellence in theoretical courses of study.

The Southern Brick and Tile Award. The Southern Brick and Tile Association annually makes a grant of $100 for prizes awarded in an advanced-level architectural design problem.

Algernon Sydney Sullivan Medallion. A valuable and artistic memorial, established by the Southern Society of New York in honor of its first president, is awarded each year by the University to a member of the graduating class and to one other person who has some interest in, association with, or relation to the institution, official or otherwise, of a nature as to make this form of recognition appropriate. The recipients of this award shall be chosen in recognition of their influence for good, their excellence in maintaining high ideals of living, their spiritual qualities, and their generous and disinterested service to others.

Superior Cadet Ribbon Awards. The Department of the Army awards annually Superior Cadet Ribbons to those Army ROTC students in each academic year (class) adjudged the most outstanding in their class.

Third Army Certificate of Meritorious Leadership Achievement. An award is given annually by the Commanding General of Third Army to the outstanding cadet on the basis of leadership development throughout the ROTC career.

Tau Beta Pi Scholastic Award. An annual award is given to the sophomore in Engineering having the highest scholastic record.

The Textile Veterans Association Honor Award. A medallion and a $25 U. S. Savings Bond is awarded to a member of the graduating class who has the potential to make an outstanding contribution to the textile industry in future years.

Trustees’ Medal. The Board of Trustees has provided for a gold medal to be awarded annually to the best speaker in the student body.
Virginia Dare Award. An award of $25 is given annually by the Virginia Dare Extract Company, Incorporated, to the senior majoring in Dairy Science and having the highest grade in Dy Sc 402, Dairy Manufactures.

Wall Street Journal Student Achievement Awards. These annual awards are given to the most outstanding senior with a concentration in Agricultural Economics, College of Agriculture and Biological Sciences, and Economics, in the College of Arts and Sciences.

Wyandotte Award. The Wyandotte Chemicals Corporation Trophy is awarded to the senior in Dairy Science having the highest grades in Dy Sc 409 and 410.

GUIDANCE SERVICES

Guidance has an important role at all levels of education and particularly so during times of transition and articulation. To assist students in this period of emotional and academic adjustment, an orientation and counseling program has been established.

At the beginning of his university career, each student is assigned to a faculty adviser selected from his academic school. The faculty advisers provide information on courses of study, approve class schedules, interpret academic regulations, and suggest adjustments in making satisfactory progress toward graduation.

The residence hall program is organized to cope with personal problems and questions regarding procedures and policies of college life. Residence hall counselors and supervisors are primarily concerned with maintaining an environment compatible to serious study and with the educational potential of group living.

COUNSELING SERVICES

Counseling Services are located in Tillman Hall. These services are available free of charge to all registered students and wives of registered students. These services are oriented to early identification of and assistance with academic, vocational, personal, and psychological problems. Testing facilities of a vocational and psychological nature and available. Students are encouraged to take advantage of the individual services of a Counseling Psychologist, a Counselor, and of the Psychometric Services.
Although the University is glad to assist all who ask for help in securing summer or permanent employment, there is no obligation to secure positions for those who complete any of the courses of study.

The Placement Office coordinates and plans campus interview visits requested by representatives seeking graduates for positions with business, industry, and government. It maintains current files of reported job opportunities and of alumni who wish to learn of available openings.

A Placement Bulletin is prepared periodically for distribution on the campus and mailing to alumni upon request to announce scheduled campus interviews, and to list specific openings which may be of interest to students and alumni.

Today, as throughout Clemson's history, the focal point of this picturesque campus is the Tillman Hall clock tower, the symbol of scientific education, research, and public service in South Carolina. Honoring the memory of colorful Governor "Pitchfork Ben" Tillman, this building houses administrative offices on the two lower levels and classrooms upstairs.

The Clemson campus consists of 600 acres and represents an investment of approximately $60 million in academic buildings, student housing, service facilities, and equipment. Basically, this is the plantation that Thomas Green Clemson willed to South Carolina for the establishment of the University. Fort Hill, the former home of both Mr. Clemson and his father-in-law, John C. Calhoun, is preserved in the center of the campus as a national shrine.

Beyond the main campus, stretching into Oconee, Pickens, and Anderson Counties, are another 23,000 acres of farm and agricultural and engineering research lands. Located throughout the State are 6,800 more acres devoted to Agricultural Experiment Station research and 4-H Club work.

The university's $60 million building program to meet the projected needs of a 10,000 student body by 1975 is over 25 per cent complete, with $16 million in new construction enhancing the campus skyline.

The central feature of campus development, the Robert Muldrow Cooper Library, was completed in 1966. This beautiful structure
houses approximately 300,000 volumes, and is the permanent home of papers and souvenirs belonging to the Honorable James F. Byrnes.

Other new facilities completed under the current building program are two high-rise residence halls which currently house 864 women students, a 34-bed hospital and out-patient clinic, an additional cafeteria, an arts and sciences classroom building and 10-story faculty office tower, a graduate engineering research building, and the J. C. Littlejohn Coliseum which seats 10,500 people for basketball games and 12,000 people for speaking engagements, concerts, and other functions.

Teaching and laboratory facilities of the College of Agriculture and Biological Sciences are housed in the several buildings of the R. F. Poole Agricultural Center. Another grouping serves the College of Engineering. Among these are Olin Hall for Ceramic Engineering and Earle Hall for Chemical Engineering. These two buildings and the excellent equipment they house represent gifts from the Olin Foundation totaling nearly two million dollars.

Sirrine Hall is the home of the School of Industrial Management and Textile Science and within it are located government and industrial cotton fiber testing laboratories. The School of Architecture is located in a modern, well-equipped building and other groupings of classrooms and laboratories serve the College of Arts and Sciences, the School of Education and the School of Nursing.

The 15 residence halls for men and women accommodate nearly 5,000 students. Individual units or apartments provide living accommodations for another 289 married students.

The university-owned Clemson House Hotel and 112 faculty and staff housing units provide excellent community hotel facilities and permanent housing.

**RESERVE OFFICERS’ TRAINING CORPS (ROTC)**

The Department of the Air Force and the Department of the Army both maintain Senior Division units of the ROTC at Clemson. The Reserve Officer Training Programs at Clemson University are authorized under the ROTC Vitalization Act of 1964 as promulgated by the 88th Congress and an agreement entered into by the University and the Departments of the Army and Air Force. This legislation entitles students formally enrolled in the Advanced Course to be paid subsistence pay at the rate of $50 per month. In addition, individuals are paid one (1) summer vacation pay
Reserve Officers' Training Corps (ROTC)

exclusive of dates of summer camp. The student is paid at the rate of one-half the rate of a Second Lieutenant's base pay with two or less years service per month while attending summer camp, plus travel allowance to and from camp.

The mission of the Reserve Officers' Training Corps is to produce officers having qualities of leadership and attributes essential to their progress and continued development as commissioned officers in either the Army or the Air Force of the United States.

To implement this mission, a four-year program is offered consisting of the basic course for freshmen and sophomores and the advanced course for juniors and seniors.

The basic course, consisting of the first two years of Military Science or Aerospace Studies, is a requirement in every undergraduate curriculum of the University and as such must be taken the same as other required freshman and sophomore courses and completed for graduation. Entering students will be informed by the University Dean of Admissions as to which ROTC course they are eligible to enter.

Entrance requirements for the basic ROTC programs are as follows:

Students must be at least 14 years of age, citizens of the United States at the time of entrance; of good moral character; must sign a loyalty certificate; and not be physically disqualified to the extent that drill would further aggravate the physical defect. Air Force candidates will be administered a written Air Force Officer Qualification Test and a physical examination during their freshman or sophomore year to determine eligibility for the Advanced AFROTC course, and interested Army candidates will be administered a written Army Officer Qualification Test and a physical examination during their sophomore year to determine eligibility for Advanced Army ROTC. Foreign students may enroll in the ROTC program provided they sign a statement of intention to become American citizens or receive the approval of their governments.

Since a maximum enrollment restriction is placed on entrance into the Advanced ROTC program, it is difficult for a student to transfer from one Advanced Course of a program into the Advanced Course of another program. Hence, students who feel they may not qualify for commission in one program are encouraged to enroll in the program in which they plan ultimately to receive their commission.
The following students are exempt from the requirement of the basic ROTC course but must complete for graduation the equivalent credit hours of approved electives:

a. Students not physically qualified for basic ROTC.
b. Students who have attained age of 21 at time of entrance.
c. Transfer students entering with 30 or more semester credit hours acceptable toward graduation at Clemson in their respective curriculums. In connection with this, transfer students and students from Clemson centers desirous of obtaining a commission in the Army or Air Force upon completion of the requirements for their baccalaureate degree may complete the entire basic ROTC course by attending both summer sessions on the main campus during the summer preceding their junior year. They may take additional academic courses concurrently.
d. Students who are married at time of entrance.
e. Women students.
f. Students who are not citizens of the United States.

Students who have had at least four (4) months of active military service are exempt from the basic ROTC course. However, veteran students who intend to apply for advanced ROTC should consult with the Head of the Military Science or Aerospace Studies Department with reference to placement credit for previous service.

Physically qualified students who are exempt from the basic course for other reasons may elect to take the courses offered in Military Science or Aerospace Studies upon approval of the Head of the Military Science or Aerospace Studies Department, respectively.

Students who complete the prescribed ROTC courses and receive a bachelor’s degree may be awarded commissions in either Regular or Reserve components of the Army or Air Force. Each student receives one (1) credit hour for each semester of the basic course and three (3) credit hours for each semester of Advanced ROTC successfully completed.

Members of the Advanced Course are required to attend one summer camp before commissioning. Both the Army and Air Force encampments are normally of 6 weeks duration.

Uniforms are provided to ROTC students. The University requires a deposit of $25 from each basic student. This is refundable when the uniform is turned in, provided there is no damage to the uniform other than normal wear. Each Advanced ROTC student
is credited with a uniform allowance, paid by the Government to the University, which is used by the University to purchase officer-type uniforms for use during the junior and senior years. The uniform becomes the property of the student when he is commissioned.

AIR FORCE ROTC

The Air Force ROTC program provides for selected college students in designated civilian educational institutions an education vital to the career of a professional Air Force officer. Commissions in the United States Air Force are awarded to male students who qualify for enrollment and successfully complete the program.

The program consists of the General Military Course (GMC) or basic course and the Professional Officer Course (POC) or advanced course. Both courses are general in nature and give the student a broad picture of the Air Force organization and mission. The GMC consists of 2 years with 60 hours of classroom instruction and 30 hours of Corps Training (drill) each year. During the second year of the GMC a cadet may apply for admission into the POC. The POC consists of 120 hours of instruction each year, 90 hours classroom instruction and 30 hours of Corps Training.

If accepted into the POC, the cadet will be placed under contract and after satisfactory course completion and graduation, may be commissioned as a Second Lieutenant in either the Regular or Reserve components of the United States Air Force. To be eligible for formal enrollment in the POC a cadet must: (1) Make application. (2) Pass the Air Force Officer’s Qualification Test. (3) Pass the Air Force physical examination. (4) Be qualified in accordance with citizenship, age, and loyalty requirements. (5) Possess leadership ability and good moral character. (6) Successfully complete two academic years of the GMC or have received credit for its equivalent. (7) Enlist in the Air Force Reserve (Obligated Reserve Section) AFROTC. (8) Have two academic years remaining (including graduate study) at Clemson University at the time of entrance. (9) Be enrolled as a full-time student. (10) Have attained the academic standards required by the University and the Air Force. (11) Be selected by a board of Air Force officers.

Cadets enrolled in the POC attend a four-week training period at an Air Force base between their junior and senior years. This provides an exposure to the Air Force which is beneficial in preparing the cadets for management positions.
ARMY ROTC

The Army ROTC instruction stresses an academic college-level program in content, scope, and intensity. Emphasis is placed on the development of the student's leadership, bearing, discipline, judgment and sportsmanship which will be a distinct asset in any profession that he may choose, military or civilian.

The General Military Science Program is conducted at Clemson (see Part V of this catalog for a description of courses). The program consists of a Basic Course for freshmen and sophomores and the Advanced Program for those participating juniors and seniors. A student who has successfully completed the basic course, who meets the physical requirements, who has earned sufficient academic credits to be designated as an academic junior, and who is recommended by his instructors, may enter the Advanced Course offered during the junior and senior years. Successful completion of the Advanced Program qualifies the student for a regular or reserve commission in any of the arms or services of the United States Army.

Scholarship Program. Scholarships are available to selected ROTC students who are strongly motivated toward a career in the Army. Each scholarship pays for tuition, books and laboratory expenses, and, in addition, pays $50 a month for the duration of the award, except during the Advanced Course summer training camp at the end of the junior year when the pay is at the rate of $151.95 per month. Only students who participate in the four-year camp at the end of the junior year when the pay is one-half the rate of a Second Lieutenant's base pay with two or less years' service. Only students who participate in the four-year program are eligible. For further information concerning the scholarship program, contact the Office of the Professor of Military Science.

The requirements for formal enrollment in the Advanced ROTC Program are as follows:

Junior Year. Must have successfully completed all previous Military Science courses, have acquired a passing grade on a general intelligence test which is administered during the sophomore year, be physically qualified, and must have acquired the credits, a grade-point ratio of 1.8 and be designated an academic junior. The number of credits required for participation in the Advanced Course complements the academic requirements of the university and insures that the cadet receives his commission and his diploma simultaneously.
Senior Year. Must have successfully completed all previous Military Science courses and have attended summer camp, must be an academic senior, and have the cumulative grade-point ratio required for graduation.

Exceptions, where warranted, to the above general rules may be made by the Head of the Military Science Department.

During the fourth year of general military instruction, students will have the opportunity to indicate their preference for assignment to a particular branch. Final assignment authority remains with the Department of the Army and will be dependent upon such factors as the student’s major academic course, class standing, qualities of leadership, the requirements and existing vacancies in the various branches of the Army, in addition to the student’s choice.

Outstanding Army ROTC cadets who attain grades in the upper half of the class in academic subjects and the upper third in Military Science subjects during their junior year and who possess outstanding qualities of leadership, character and aptitude for military service may, with the approval of the University President, be designated as Distinguished Military Students by the Head of the Military Science Department. Those who maintain this outstanding record during their senior year may be designated Distinguished Military Graduates. A Distinguished Military Student may apply for appointment as a Second Lieutenant in the Regular Army.

Flight Training Program. An Army ROTC student in his fourth year of Military Science, or having completed his fourth year of Military Science, but not completed his academic requirements for graduation, may enroll in the Army ROTC Flight Training Program. If accepted, the student will receive 35 hours of ground school and 36½ hours of flight training at Government expense, after which the student may qualify for his FAA license and be recommended for further flight training upon entry on active duty. To be accepted in the Flight Training Program the candidate must agree that if commissioned at time of graduation, he will volunteer for Army Aviation Flight Training and assignment, and to serve on active duty as a commissioned officer for not less than three consecutive years from the date of completion of the Army Aviation Flight Training Course, in addition to meeting other physical and mental requirements.

ROTC students receiving commissions in the Regular Army or Army Reserve have the opportunity to apply for graduate school. If accepted by the Army, applicant may be allowed to delay entry upon active duty to complete graduate study.
The student who receives his commission through Army ROTC is appointed in the Army Reserve as a Second Lieutenant and called to active duty for 2 years. Graduates of the program who enter active duty for 2 years will acquire a 6-year military obligation, only 3 of which would be in the Ready Reserve.

A recapitulation of Army service obligation is listed below:

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<th>Reserve Officers</th>
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<th>Reserve Flight Training Officers</th>
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<td>Ready Reserve</td>
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HISTORICAL STATEMENT

In 1889 the General Assembly of South Carolina accepted the bequest of Thomas G. Clemson, which set aside the bulk of the Clemson estate for the founding of a scientific and technical college. The institution was also established under the Morrill Land-Grant Act passed by the National Congress in 1862. Clemson University, therefore, is a member of the national system of Land-Grant Colleges and Universities.

In 1964, in recognition of the expanded offerings of the institution not only in the areas of agricultural and mechanical arts but also in the sciences and arts, the name of the institution was changed to Clemson University. This change by the Legislature, effective July 1, 1964, followed an earlier recommendation to that body by the Board of Trustees.

The nature of the institution is outlined in Mr. Clemson’s will and its acceptance by the legislature.

The will in part reads:

Feeling a great sympathy for the farmers of this State, and the difficulties with which they have to contend in their efforts to establish the business of agriculture upon a proper basis, and believing that there can be no permanent improvement in agriculture without a knowledge of those sciences which pertain particularly thereto, I have determined to devote the bulk of my property to the establishment of an Agricultural College upon the Fort Hill Place. My purpose is to establish an Agricultural College which will afford useful information to the farmers and mechanics; therefore it should afford thorough instruction in agriculture and the natural sciences connected therewith; it should combine, if practicable, physical with intellectual education; and should be a high seminary of learning in which the graduate of the common schools can commence, pursue and finish a course of studies terminating in thorough theoretic and practical instruction in those sciences and arts which bear directly upon agriculture . . . but to always bear in mind that the benefits herein sought to be bestowed are intended to benefit agriculture and mechanical
industries. . . . I trust I do not exaggerate the importance of such an institution for developing the material resources of the State, by affording its youth the advantages of scientific culture.

The desire to establish such a school or college, as I have provided for in my said last will and testament, has existed with me for many years past, and many years ago I determined to devote the bulk of my property to the establishment of an Agricultural School or College. To accomplish this purpose is now the one great desire of my life.

This will gave all that part of the Fort Hill Estate inherited by Mrs. Clemson from her mother and the bulk of Mr. Clemson's other real and personal property. The latter amounted to a sum, which, considering the purchasing power at the time, probably has been only a few times exceeded in a public benefaction in South Carolina.

A Board of Trustees of seven members was provided for: R. W. Simpson, D. K. Norris, M. L. Donaldson, R. E. Bowen, B. R. Tillman, J. E. Wannamaker, and J. E. Bradley, who with those chosen by the General Assembly, should constitute a governing board in the event the State accepted the bequest; but, who, in the event the State declined the bequest, should alone constitute a governing board for a private institution.

These seven trustees, along with other friends of the movement and the agricultural groups in the State, developed and organized a public opinion favorable to the plan.

In November, 1889, the General Assembly of South Carolina accepted the terms of the will and, following the decision of the United States Supreme Court to uphold the will, the State of South Carolina and the full Board of Trustees proceeded to convert the dream of Thomas G. Clemson into the reality of Clemson College.

The College was formally opened in July, 1893, with an enrollment of 446 students. The first graduating exercises were held in December, 1896, with a graduating class numbering 37—15 in the agricultural courses and 22 in the engineering courses.

LOCATION

The University is located on the Fort Hill homestead of John C. Calhoun, in the foothills of the Blue Ridge Mountains. It has an elevation of 800 feet above sea level and commands an excellent view of the mountains to the north and west, some of which attain an altitude of over 5,000 feet.

The University is located at Clemson, S. C., on the main line of the Southern Railway. U. S. Highways numbers 76 and 123 pass through Clemson, and daily bus service at regular intervals is available.
ALUMNI RELATIONS

The office of alumni relations coordinates all functions and services of the alumni office. The director of alumni relations is secretary of the Clemson Alumni Association and the Clemson Foundation through election by the governing boards of these two organizations.

Accurate records of addresses and information concerning alumni are being compiled by this office which also publishes a magazine and newsletter for distribution to the alumni.

The purpose of the Alumni Association is to serve the University and its alumni in every possible way. The Association holds its regular annual meeting at the University each June. Active membership is made up of former Clemson students who participate in the Clemson Alumni Loyalty Fund for the purpose of providing supplementary financial aid to the educational programs of the University.

The Clemson University Foundation was founded by interested members of the Alumni Association to raise an endowment to be used for the benefit of the University, its students, faculty and alumni. Trustees of the Foundation are elected by the Association.

THE J. E. SIRRINE TEXTILE FOUNDATION

Funds in this foundation were contributed by the members of the textile industry in South Carolina and amount to about one million dollars. Income from this fund is administered by the trustees of the J. E. Sirrine Textile Foundation. They have used the income to benefit textile teaching and research at Clemson University. Under the present system it is used to (1) supplement university travel funds for faculty members, (2) sponsor the school library by paying the salary of the librarian and paying for periodicals and books, (3) provide supplement to the salaries for two major professors, (4) provide four graduate fellowships annually, one of which may be held by a faculty member, (5) sponsor at Clemson annual seminar for South Carolina high school counselors, (6) and support special research projects.
STUDENT LIFE AND ACTIVITIES

PART III
PART III—Student Life and Activities

STUDENT BODY

The students of Clemson University believe that student government is necessary and beneficial and that every student should be represented in this government. All registered undergraduate and graduate students are upon payment of the Student Activities Fee members of the Student Body of Clemson University which in turn is represented by the student government.

Student government is actively sponsored and highly effective at Clemson. The three branches of government are patterned after our federal system; however, there are no political parties within the framework of this student organization. March and April are election months for student-body and class officers except for the freshman class which holds class-officer and Student Senate elections in September. Students interested in self-government are encouraged to participate in this active student organization.

WOMEN'S STUDENT ASSOCIATION

The purpose of the Women's Student Association is to plan and to coordinate activities for women students at Clemson University. W.S.A. also coordinates the activities of the various women's dormitories.

STUDENT PUBLICATIONS

The Chronicle is a student variety magazine published four times a year.

The Taps is the yearbook published by the students of the University.

The Tiger is a weekly paper published by the students of the University.

THE STUDENT CENTER

The student center, located in Johnstone Hall, has a student lounge with space for reading and games and two television sets. On the third floor there are meeting rooms and the student chapel. Also in this area are the offices of student publications, such as The Tiger, student newspaper; the Taps, annual publication; and Radio Station WSBF. The visitors' lounge and the information center are on the first floor off the loggia. The bookstore, post office, and canteen are located one level below the loggia.
CULTURAL, MUSICAL, THEATRICAL ACTIVITIES

University Concert Series
Each year since 1940 Clemson University has sponsored a concert series. All Clemson students paying full-time student activities fees are admitted to these concerts without charge. Others, including faculty members, may purchase tickets at a moderate cost.

The Program of Concerts for 1969-1970 is:
- Brussels Chamber Orchestra
- Osipov Balalaika Orchestra of Moscow
- Norman Luboff Choir
- Stockholm Philharmonic
- Trumpets of the Lord

Architectural Foundation Lectures and Exhibits
The School of Architecture at Clemson is able to present annually an outstanding series of lectures, which are open to all Clemson students, through financial grants from the Clemson Architectural Foundation. The Foundation also presents an annual schedule of at least 12 art exhibits in the Architectural School gallery, which is open to the public weekdays between 9 a.m. and 4:30 p.m.

University Bands

Tiger Band. The Tiger Band and Color Guard, composed of approximately 100 members, participate in football games, pep rallies, functions, and parades throughout the South. This band has appeared in major stadiums in many states, including the Gator, Orange, Sugar, and Bluebonnet Bowls and has performed on national television. The Tiger Band makes several out-of-town trips during the fall season. A smaller "pep band" from its ranks performs at all home basketball games. Members of the Tiger Band report to the campus a few days before registration in the fall for intensive pre-school training.

Concert Band. The Clemson Concert Band is composed of the better musicians on campus. It is formed at the end of the football season, and gives concerts both on and off the campus, including a tour in the spring. This organization plays music of the great composers in addition to lighter fare.

Army and Air Force ROTC Bands. Talented students, members of the Tiger Band and Concert Band are encouraged to join the ROTC Bands. These bands participate in all major military functions, including ceremonial parades and reviews. Admission is open to all ROTC personnel.
Glee Clubs. There are two choral organizations active on the campus for students interested in formal singing activities. The Clemson Glee Club consists of fifty members and is open to men students. For women students, there is a Women's Glee Club. Throughout the school year, these groups perform for many campus events, including full-length concerts. In the spring, a tour of the state and nearby states is made. Audition is required for membership.

Clemson Players. This is the dramatic club of the University and is open to all students interested in dramatics. Four productions are presented annually.

THE YOUNG MEN'S CHRISTIAN ASSOCIATION

The Young Men's Christian Association at Clemson was organized in 1894, one year after the college was established, and has since then served both the University and the community to promote growth in Christian character through a well-balanced program of religious, social, recreational, and counseling activities. Because the YMCA is not specifically concerned with any particular denominational group, its program cuts across denominational lines and is interested in students of the University regardless of denominational affiliation or if they have no denominational affiliation.

Some of the activities which are promoted by the YMCA are the meditations in the student chapel, meditations on the halls where students live, residence hall forums, participation in the joint sponsorship of the annual campus-wide Religious Emphasis program, deputations to other colleges, universities, and high schools. The YMCA also coordinates the overall religious program of the local church groups.

The YMCA offers space and facilities for such activities as drop-ins, dances, television programs, music concerts, as well as physical activities such as basketball, swimming, table tennis, billiards, and the social and recreational activities involved in the YMCA's program. A new feature of the YMCA's program is the development of a recreational area across the lake from the campus, comprising twenty-five acres with a nice beach, bathhouse, and a headquarters building for recreation.

The Young Men's Christian Association at the University is under the direction of an Advisory Board composed of members of the faculty, administration, alumni, and members at large. There is a full-time staff of three men and one woman whose efforts are to
give direction to the social, recreational, and religious life of students.

The student policy group is the YMCA Cabinet, which meets weekly to evaluate and promote the activities which appeal to students.

**RELIGIOUS LIFE**

Religious life at Clemson University is coordinated by the University YMCA with the Director of the YMCA serving as coordinator.

The YMCA building provides a meeting place for denominational groups not having a church at Clemson as well as for many interdenominational groups. The Student Center, which is located in the dormitory, has a chapel which is used by all of the religious groups as scheduled.

The student religious organizations at Clemson offer the student the opportunity to grow spiritually and socially. These organizations are:

- Baptist Student Union
- Clemson Canterbury Association (Episcopal)
- Christian Science Organization
- Hillel-Brandeis (Jewish)
- Lutheran Student Association
- Newman Student Association (Catholic)
- Westminster Fellowship (Presbyterian)
- Clemson Wesley Foundation (Methodist)

**CAMPUS LEADERSHIP AND SERVICE**

*Block “C” Club*—The Block “C” Club includes varsity lettermen in baseball, basketball, football, track, cheerleading, swimming, and soccer.

*Tiger Brotherhood*—A local honorary service fraternity composed of men students from the upper three classes who have demonstrated ability, character and loyalty to Clemson University.

*Circle “K” International*—International Service Club for college men sponsored by Kiwanis International.

*Central Dance Association*—The C.D.A. staff is responsible for planning and coordinating major dance weekends at which time entertainment is brought to the campus.

*WSBF*—WSBF is an educational radio station managed, maintained and operated by a student staff for the enjoyment of the
Clemson student body and the surrounding academic community. The station broadcasts 24 hours a day on both open circuit FM and closed circuit AM from a modern studio in the University Student Center.

Order of Athena—A local honorary society for senior women who have maintained a high standard of scholarship, demonstrated leadership, and shown a spirit of service to the University.

NATIONAL HONOR SOCIETIES

Clemson University has chapters of the following members of the Association of College Honor Societies:

Delta Sigma Rho—Tau Kappa Alpha (Forensics)
Phi Eta Sigma (Scholarship—Freshman Men)
Phi Kappa Phi (Scholarship—Senior Men and Women)
Tau Beta Pi (Engineering—Men)
Tau Sigma Delta (Architecture and Allied Arts—Men and Women)

Other Honor Societies:

Sigma Xi (Scientific Research—Men and Women)
Xi Sigma Pi (Forestry—Men)

NATIONAL RECOGNITION SOCIETIES

The following national recognition societies have chapters established at Clemson:

Alpha Phi Omega (Campus Service—Men)
Alpha Zeta (Agriculture)
Angel Flight (Air Force—Women)
Arnold Air Society (Air Force—Men)
Block and Bridle Club (Animal Science)
Blue Key (Scholarship, Leadership, Service—Men)
Iota Lambda Sigma (Industrial Education)
Pershing Rifles—Company C-4 (Military)
Pershing Rifles—4th Regimental Headquarters
Scabbard and Blade—Company K-7 (Military)
DEPARTMENT AND PROFESSIONAL ORGANIZATIONS
Agricultural and Biological Sciences Council
Agricultural Economics Association
Alpha Tau Alpha (Agricultural Education)
American Association of Textile Chemists and Colorists
American Association of Textile Technology
American Ceramic Society
American Chemical Society
American Dairy Science Association
American Institute of Architects
American Institute of Chemical Engineers
American Society of Agricultural Engineers
American Society of Civil Engineers
American Society of Mechanical Engineers
American Society for Metals
Associated General Contractors of America, Inc.
Calhoun Forensic Society
Calhoun Literary Workshop
Capers (Co-ed Pershing Rifles)
Counter Guerrilla Platoon
Delta Sigma Nu (Pre-Med)
Economics Club
Food Science Club
Forestry Club
Gamma Alpha Mu (English)
Graphic Arts Society
Horticulture Club
Institute of Electronic and Electrical Engineers
Iota Mu Sigma (Industrial Management)
Kappa Alpha Sigma (Agronomy—Crops and Soils)
Keramos (Ceramics)
Light Brigade (Army—Women)
McConnell Society (German)
Mu Beta Psi (Music)
Newtonian Society (Mathematics)
Outing Club
Phi Psi (Textile Arts)
Poultry Science Club
Pre-Law Society
Pre-Veterinary Club
Recreation and Parks Administration Club
Sigma Pi Sigma (Physics)
Sigma Tau Epsilon (Arts and Sciences)
Society for the Advancement of Agricultural Education
Society for Advancement of Management
Society for American Military Engineers
Society of Physics Students
Young Philosophers' Club

GENERAL ORGANIZATIONS

Aero Club
Amateur Radio Club
Bowling Team
Campus Crusade for Christ
Caravelles of Clemson
Cow College Cloggers and Cow College Cloggers Band
Dixie Skydivers Sport Parachute Club, Inc.
Fellowship of Christian Athletes
Fencing Club
Fine Arts Film Club
Four-H Club
Gamma Beta Phi (Beta Club Members)
Gamma Omega Phi (Political)
The Oxfords
Rifle Club
Sailing Club
Scuba Diving Club
Sentimental Jazzmen (Music)
Sigma Psi Nu (Swimming)
Southern Students Organizing Committee
Sports Car Club
Student League for Black Identity
Students for Educational Aid
Tae Kwon Do Club (Karate)
University Political Caucus
Weightlifting Club
Young Democrats Club
YMCA Cabinet
Young Republicans Club
SOCIAL FRATERNITIES AND SORORITIES

Clemson University does not have national fraternities. There are, however, ten local fraternities and three local sororities on the campus. The Interfraternity Council is made up of the president and one representative from each fraternity and serves as the coordinating and governing body of Clemson's social fraternities. The Intersorority Council coordinates the activities of the sororities.

The following local fraternities are represented on the campus:

- Alpha Gamma
- Chi Lambda
- Delta Kappa Alpha
- Delta Phi Kappa
- Kappa Delta Chi
- Kappa Sigma Nu
- Numeral Society
- Phi Kappa Delta
- Sigma Alpha Zeta
- Sigma Kappa Epsilon

The following local sororities are represented on the campus:

- Delta Theta Chi
- Omicron Zeta Tau
- Sigma Beta Chi

REGIONAL CLUBS

The regional clubs of Clemson University are composed of international clubs, out-of-state clubs and clubs representing the various counties in the state. The regional clubs are made up of students who wish to unite with other students from their own home areas. These clubs include:

- Beta Sigma Chi (Charleston County)
- Chester County Clemson Club
- International Student Association
- Dillon County Club of Clemson University
- Colleton County Club
- Union County Clemson Club
- Pickens County Regional Club

ATHLETIC PROGRAM

The University encourages students' interests in sports through a program of intercollegiate athletics and intramural sports.

It is a member of the Atlantic Coast Conference and its athletic teams, The Tigers, regularly play teams of that conference and other colleges. Membership of the Atlantic Coast Conference includes—in addition to Clemson University—Duke University, North Carolina State University, University of Maryland, University of North
Carolina, University of South Carolina, University of Virginia, and Wake Forest University.

The intercollegiate athletic program includes football, basketball, baseball, track, tennis, golf, swimming, cross-country, and soccer. Each year over 200 teams are formed in softball, football, volleyball and basketball in the intramural program, with champions determined in each sport through a tournament.

Among the facilities for intramural and intercollegiate athletics at the University are tennis courts, baseball and track facilities, an indoor swimming pool, and a football stadium which will accommodate almost 50,000 people. The Littlejohn Coliseum, with a seating capacity of approximately 10,000 for basketball and up to 12,000 for other events, was completed in 1968. The Fike Fieldhouse is being renovated to accommodate intramural activities.

AUTOMOBILE PRIVILEGES AND PARKING REGULATIONS

All motor vehicles owned and operated on the campus by students, faculty, and staff members must be registered with the designated authorities. On registering, each student, faculty, or staff member will be offered a copy of the parking and traffic regulations and will be issued a decal which will indicate the areas in which the car may be parked.

Students are urged to familiarize themselves with all provisions of the Motor Vehicle Regulations contained in the University Student Regulations pamphlet.
SCHOLASTIC REGULATIONS

PART IV
PART IV—Scholastic Regulations

SCHOLASTIC REGULATIONS

Academic Standards. Proper discharge of all duties is required at Clemson University, and a student's first duty is his scholastic work. All students should be thoroughly acquainted with and cognizant of these basic requirements.

The Credit System. The semester hour is the basis of all credits. Generally, one recitation hour or 3 laboratory or shop hours a week for a semester constitute a semester hour. Thus, in Engl 101, English Composition, 3 cr. (3,0), as you will find this subject listed in the Degrees and Curriculums, the student takes 3 semester hours. When he completes this course satisfactorily, he is granted 3 semester credit hours on his record. The notation “3 cr. (3,0)” means that the course carries 3 credits, has 3 clock hours of theory or recitation per week, and no laboratory hours. Ch 101, General Chemistry, 4 cr. (3,3), carries 4 semester hours, has 3 hours of theory, and a 3-hour laboratory period.

The amount of work required for each credit will vary with the student’s capabilities. In general, it is anticipated that each semester hour credit will require 3 hours work per week for average students. Thus, a 1(1,0) course would have 1 hour of lecture per week and require 2 hours of outside preparation. A 1(0,3) course would require 3 hours of laboratory work and no time for outside preparation.

Semester Grades. The standing of a student in his work at the end of a semester is based upon daily class work, tests or other work, and the final examinations. Faculty members may excuse from the final examinations all students having the grade of A on the work of the course prior to the final examination, but for all other students written examinations are required in all subjects at the end of each semester, except in certain laboratory or practical courses in which final examinations are not deemed necessary by the department faculty.

Scholastic reports are mailed to parents four times each year, including a preliminary statement of progress near the middle of each semester, and a final report at the end of each semester.

The Grading System. The grading system is as follows:
A—Excellent. Indicates that the student is doing work of a very high character. The highest grade given.
B—*Good.* Indicates work that is definitely above average, though not of the highest quality.

C—*Fair.* Indicates work of average or medium character.

D—*Pass.* Indicates work below average and unsatisfactory. The lowest passing grade.

F—*Failed.* Indicates that a student knows so little of the subject that it must be repeated in order that credit may be received.

I—*Incomplete Work.* Indicates that a relatively small part of the semester’s work remains undone. Grade I is not given a student who has made a grade F on his daily work. Students are allowed 30 days after the beginning of the next semester in which the student is enrolled to remove the incomplete grade unless (1) an extension of time is approved by the instructor concerned and the Dean of Admissions and Registration, or (2) within one year of residence after receiving such a grade, a student repeats the conditioned course satisfactorily at Clemson, in which case no credit hours taken shall be recorded for the grade of I. A student who elects to repeat an incomplete course is responsible for notifying the Office of Admissions and Registration of his election during the semester in which the course is taken. This regulation applies only to the first time that a course is repeated.

In order to make up incomplete work, the student must first obtain a permit card from the Office of Admissions and Registration. This card serves as the authority for the removal of the I and also as a form for reporting the final grade.

WP—*Withdrawn Passing.* This grade indicates that the student withdrew from the course while doing satisfactory work. No credit hours taken are recorded for the grade of WP provided that the course is dropped prior to the last three weeks of classes in the semester. Only semester grades shall be given and recorded for courses dropped during the last three weeks.

WF—*Withdrawn Failing.* Indicates that the student withdrew from the course while doing unsatisfactory work. The credit hours of a subject on which the grade of WF is received are counted as credits taken in computing the student’s grade-point ratio.

*dropping class work.* A subject dropped after the first four weeks of class work is recorded as “Withdrawn Passing” or “Withdrawn Failing” depending upon the student’s grade in the course at the time the subject was dropped.

Upon the recommendation of the instructor and the dean concerned, a student’s standing will be investigated and he may be
required to drop a subject because of neglect, or lack of application or preparation. No student will be dropped under this rule without approval of the President.

Removal of Failures. A student who has failed (made a grade F) in a subject cannot receive credit for that subject until it has been satisfactorily repeated hour for hour in class, except that in the case of correlated laboratory work, the number of hours to be taken shall be determined by the instructor. Where separate grades for class and laboratory work are given, that part of the subject shall be repeated in which the failure occurs.

Rescheduling Courses Failed. A student who wishes to reschedule a course he has failed must do so within his next year of residence, or, if the course is not offered during this year of residence, he must reschedule the course the first time it is offered thereafter during his attendance at Clemson.

Rescheduling Courses Passed. A student may repeat a course he has passed with a grade lower than B provided he does so within three semesters of residence after the completion of his original enrollment in the course.

Scheduling Remedial Mathematics. Any student who has passed a course in freshman mathematics is ineligible to enroll in Remedial Mathematics.

Withdrawal from the University. A student may withdraw from the University any time before the last three weeks of classes in the semester without having grades recorded. A student enrolled the last three weeks of classes shall have final semester grades recorded.

A student withdrawing from college after preliminary reports are due must be passing a minimum of 12 semester credit hours at the time of withdrawal to qualify for re-enrollment the following semester.

After the first withdrawal from college the student is eligible to continue his enrollment the following semester, provided he meets other applicable regulations. For each succeeding withdrawal, however, the student shall be ineligible to continue his enrollment the following semester unless there are extenuating circumstances approved by the Committee on Admissions.

Grade Points. Four grade points are assigned for each credit hour on which the student receives the grade of A, 3 grade points for each credit hour of grade B, 2 grade points for each credit hour
of grade C, and 1 grade point for each credit hour of grade D. No grade points are assigned for grades F, I, WP, or WF.

**Grade-Point Ratio.** In calculating a student's grade-point ratio, the total number of grade points accumulated by the student is divided by the total number of credit hours taken by the student at Clemson during the semester, session, or other period for which the ratio is calculated.

**Minimum Requirements for Continuing Enrollment.** At the end of the academic year in May, all student records are inspected for quality. At that time in order to be able to continue his enrollment, a student who has taken a total of:

(a) 24 to 59 credit hours at Clemson must have a cumulative grade-point ratio of 1.30 or above.
(b) 60 to 89 credit hours at Clemson must have a cumulative grade-point ratio of 1.50 or above.
(c) 90 or more credit hours at Clemson must have a cumulative grade-point ratio of 1.70 or above.

A student completing a regular session has the privilege of continuing his enrollment through the immediately following summer session at Clemson or in Clemson parallel programs in an effort to meet the above requirements.

A student who has taken fewer than 90 credit hours at Clemson and who fails to meet the required grade-point ratio, as indicated in the table above, may apply for readmission after a minimum of one semester has elapsed. A student who has taken 90 or more credit hours and fails to meet the required grade-point ratio is permanently ineligible for readmission. Any exceptions to these minimum requirements for continuing enrollment and readmission must be approved by the Admissions Committee of the University.

**Advanced Placement by Examination.** In addition to earning credit by the usual method involving classroom attendance, students may receive credit toward their degree by completing a course successfully by examination only. Freshmen interested in exempting some of the elementary courses in this manner should participate in the College Board Advanced Placement Examination program, and have the results of these tests sent to Clemson.

**Credit by Examination.** Credit may be earned by means of a special examination without the necessity of class attendance subject to the following requirements:

(1) The applicant must present evidence which would indicate that he has received training or taken work which is approximately
equivalent to that given in the course at Clemson for which an examination is requested and that an examination is warranted.

(2) The applicant must not have previously failed or audited the course at Clemson.

(3) The applicant must apply in writing for the examination and the request must be approved by the Instructor, Head of the Department in which the course is taught, Dean of the College or School in which the course is taught, and the Dean of Admissions and Registration.

(4) A grade of not less than C on the examination is necessary in order for the examinee to receive credit on the course. An examinee receiving credit under this provision receives credit for "hours taken," "hours earned," and grade points as well as the course grade.

(5) The time of the examination will be arranged by the student with the instructor concerned, but must be taken within one month after the date of final approval or it will be necessary for the student to initiate another request.

*Work Taken at Another Institution.* Clemson students may receive credit for work taken at another institution; however, approval of the work should be obtained by the student prior to scheduling the work. Information and forms relative to this approval may be obtained in the Office of Admissions and Registration. By obtaining advance approval the student is assured of receiving proper credit at Clemson provided he passes the work with a grade one letter grade higher than the lowest passing grade.

*Classification.* All new students are classified as freshmen unless they have attended another college prior to entrance. For those students who have completed college work elsewhere, classification will be based on semester hours accepted at Clemson rather than the amount of work presented.

To be classified as a sophomore, a student must have completed at least 30 semester hours.

To be classified as a junior, a student must have completed at least 60 semester hours.

To be classified as a senior, a student must have completed at least 95 semester hours.

*Regular Advancement in Classification.* All students are urged to meet the requirements for sophomore classification by the beginning of the second year, for junior classification by the beginning of the third year, and for senior classification by the beginning of
the fourth year. Failure to meet these requirements can jeopardize a student's academic standing with the University as well as jeopardize his deferment under the Selective Service even though he may be otherwise eligible for the deferment.

Course Prerequisites. Prerequisites for individual courses are enumerated under the course listings in the Description of Courses. In addition to these requirements, colleges, schools, and departments may also establish other standards as conditions for enrollment. In the College of Engineering a grade-point ratio of 1.80 or higher is required for registration in all Engineering courses numbered 300 or higher.

Credit Load. Except for an entering freshman, who is restricted to the curriculum requirements of his major course, the credit load for an undergraduate must be approved by his class adviser. The class adviser will approve a credit load deemed in the best interest of the student based on such factors as course requirements, grade-point ratio, participation in other activities, and expected date of graduation.

Since grades are an important factor in determining credit loads, the student should be guided by the following table in presenting his schedule to his class adviser for approval:

<table>
<thead>
<tr>
<th>Grade-Point Ratio (Semester or Cumulative, Whichever is Higher)</th>
<th>Recommended Maximum Number of Semester Hours to Be Scheduled</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.00 to 0.99</td>
<td>14 to 16</td>
</tr>
<tr>
<td>1.00 to 1.99</td>
<td>16 to 18</td>
</tr>
<tr>
<td>2.00 to 2.99</td>
<td>18 to 20</td>
</tr>
<tr>
<td>3.00 to 4.00</td>
<td>20 to 22</td>
</tr>
</tbody>
</table>

When any full-time student reduces his credit load below 12 hours, but is still carrying 9 or more, he may be suspended for at least the remainder of the semester upon recommendation of the Vice-President for Student Affairs and approval of the President. When a student reduces his credit load below 9 hours he shall be suspended for at least the remainder of the semester.

Auditing Policies. Qualified students may audit courses upon the written approval of the professor, head of the department and the dean of the college or school concerned, and registration with the Dean of Admissions and Registration. Auditors are under no obligation of regular attendance, preparation, recitation, or examination and receive no credit. Participation in classroom discussion and laboratory exercises by auditors is at the discretion of the in-
structor. A student who has previously audited a course is ineligible for credit by examination.

A full-time undergraduate student with approval may audit courses at no additional charge as long as the student’s credit load, including the course audited, is approved by his class adviser.

A graduate student regularly enrolled for a minimum of six semester hours may with approval audit one additional course without charge.

Members of the University teaching staff and the professional staff in research and agricultural extension may with approval audit courses without charge. Other full-time University employees may audit without charge with the additional approval of the employee’s immediate supervisor and the Comptroller.

Residence Requirement for Graduation. In order to qualify for an undergraduate degree, a student must spend at least the last year of residence at Clemson and complete at Clemson a minimum of 30 of the last 36 credits presented for the degree.

Honors Program. The Honors Program at Clemson University provides for the fuller development of our most able students. They meet in small classes with outstanding professors and explore the subject matter of a course in greater depth than other students are able to do. The identification and selection of Honor Students begins with their freshman year, and Honors courses are provided at all four levels of undergraduate instruction. To remain in the Honors Program a student must maintain a cumulative grade-point ratio of 3.00.

An Honors Council composed of faculty members from each College and School is responsible for planning and supervising the Honors Program. The Honors Program: A Student Handbook is available for those who are interested.

Honors and Awards Day. Each spring an Honors and Awards Day is held for students who qualify for the honor list and for special awards. A cumulative grade-point ratio of 3.00 to 3.49 is required for listing with honor, 3.50 to 3.79 for high honor, and 3.80 or above for inclusion with highest honor.

Honor Graduates. Students who graduate in the Honors Program will have this fact indicated on their diplomas. Other graduates who meet the required qualifications are designated as having graduated with honor. A grade-point ratio of 3.00 to 3.49 is required for graduation with honor, 3.50 to 3.79 for high honor, and 3.80 or above for graduation with highest honor.
Examination on F Received in Last Semester. A candidate for a degree who in the semester immediately prior to graduation fails to graduate because of an F on one course taken in that semester may stand a special examination on the course provided:

1. That the candidate can furnish evidence of having done satisfactory study for the examination.
2. That the examination is not given until after the regular degree date.
3. That the candidate has fulfilled, prior to the due date for candidates' grades, all other requirements for his degree except those which can be fulfilled by passing the examination.
4. That the candidate by removing the F by examination will finish all requirements for his degree which will be awarded on the next regular date for award of degrees.

Make-ups of I's Received in Last Semester. A candidate for a degree who in the semester immediately prior to graduation receives one or more grades of I shall have an opportunity of removing the unsatisfactory grades provided the final grades are received in the Office of Admissions and Registration by the time grades for candidates for graduation are due.

A candidate who qualifies for graduation under this regulation will be awarded his degree on the regular date for the award of degrees.

Special Graduation Requirements. A cumulative grade-point ratio of 2.00 is required for graduation. Candidates for degrees are required to apply for their degrees within four weeks following the opening of the final semester or within two weeks following the opening of the summer session prior to the date the degrees are to be awarded. These applications should be filled out in the Office of Admissions and Registration on the regular blanks provided.

All work for a degree must be completed, all financial settlements made, and all government property and library books returned by 5 p.m. on the Tuesday preceding graduation.

A student in line for graduation at the end of this semester who fails to graduate because of an F on one course taken this semester may stand a special examination under certain conditions on the course after the regular degree date. A senior who qualifies for graduation under this provision will be awarded his degree on the next regular date for the award of degrees. For further information see paragraph Examination on F Received in Last Semester.
A student in line for graduation at the end of a semester or summer term who meets all requirements for graduation except for a deficiency in his grade-point ratio resulting from a deficiency of not more than six grade points shall have the privilege of making up his deficiency by standing special re-examinations under certain conditions.

The examinations shall be taken after the regular degree date and in courses totaling not more than 6 semester credit hours which were passed during the last year of residence, and only one such examination may be taken on an individual course. When such examinations are taken under the above provision, the credit hours of the course or courses will not be counted as additional credit hours taken. Only the grade points over and above the grade points previously earned in the course may count toward raising the grade-point ratio.

A student who qualifies for graduation under this provision will be awarded his degree on the next regular date for the award of degrees.

If all work toward a degree is not completed within five years after entrance, the student may be required to take additional courses.
DEGREES
AND
CURRICULUMS

PART V
PART V—Degrees and Curriculums

BACHELORS' DEGREES

The degree of Bachelor of Science is awarded to those students who satisfactorily complete one of the four-year curriculums offered under the Colleges of Agriculture and Biological Sciences and Engineering, the School of Industrial Management and Textile Science, and the School of Nursing. In the College of Arts and Sciences, the Bachelor of Science degree is awarded to those students completing the requirements in Chemistry, Geology, Mathematics, Medical Technology, Physics, and Pre-Medicine (Pre-Dentistry). The degree of Bachelor of Arts is awarded to those students who satisfactorily complete the curriculum in Arts and Sciences with a major concentration in Chemistry, English, Geology, History, Mathematics, Modern Languages, Physics, Political Science, Psychology, or Sociology.

In the School of Education the Bachelor of Arts degree in Secondary Education is awarded to those completing the requirements for a teaching major in Economics, English, History, Mathematics, Modern Languages, Natural Sciences, Psychology, or Sociology. Students completing the program in Elementary Education receive a Bachelor of Arts degree in Elementary Education. The Bachelor of Science degree is granted to those who complete the requirements in Agricultural Education, Industrial Education, Recreation and Park Administration, and Science Teaching.

The School of Architecture offers a six-year professional program embracing two degrees and leading to the professional degree, Master of Architecture. The degree of Bachelor of Arts in Pre-Architecture requiring 136 credit hours is awarded at the end of four years and the first professional degree, Master of Architecture, includes 68 additional units for a total of 204.

The Bachelor of Science in Building Construction is a four-year program requiring 141 credit hours.

In addition to the courses prescribed in the various curriculums, each student must complete the elective credits as listed in the curriculums. Students selected for advanced ROTC may substitute courses in aerospace studies or military science for six semester credits of these electives.
ASSOCIATE DEGREE

The School of Nursing offers, in addition to the baccalaureate program in nursing, an Associate in Arts degree program in nursing. This program normally requires 2 years, plus a full semester with a minimum of 71 semester credit hours.

GRADUATE DEGREES

The degrees of Doctor of Philosophy, Master of Arts, Master of Science, Master of Agricultural Education, Master of Architecture, Master of City and Regional Planning, Master of Education, and Master of Industrial Education are awarded to those students who satisfactorily complete prescribed graduate programs.

For further information concerning advanced degrees see The Graduate Bulletin, which may be obtained from the Offices of Admissions and Registration or the Dean of the Graduate School.

UNDERGRADUATE CURRICULUMS

Thirty-six undergraduate curriculums are offered under the Colleges of Agriculture and Biological Sciences, Arts and Sciences, Engineering, and the Schools of Architecture, Education, Industrial Management and Textile Science, and Nursing. The curriculums under each college and school are listed below:

**College of Agriculture and Biological Sciences**
- Agricultural Economics
- †Agricultural Education
- Agricultural Engineering
- Animal Industries
- Biology
- Food Science
- Forestry
- Plant Sciences
- Pre-Veterinary

**College of Arts and Sciences**
- Arts and Sciences
- Chemistry
- Geology
- Mathematics
- Medical Technology
- Physics
- Pre-Medicine or Pre-Dentistry
- Pre-Pharmacy

**School of Education**
- †Agricultural Education
- Elementary Education
- Industrial Education
- Recreation and Park Administration
- Science Teaching
- Secondary Education

† Jointly administered by the School of Education and the College of Agriculture and Biological Sciences.
* Jointly administered by the College of Agriculture and Biological Sciences and the College of Engineering.
In the curriculums which follow are given the official title and number of the course, the descriptive title, the number of semester hours credit, and in parentheses the number of hours per week in class and laboratory, respectively.

**COLLEGE OF AGRICULTURE AND BIOLOGICAL SCIENCES**

The undergraduate curriculums offered by this College are presented under two classifications—Agricultural and Biological Sciences.

**AGRICULTURE**

Modern agriculture is the science, business, and art of producing, processing, and distributing plant and animal products, including those aspects of economics and human relations connected with these activities. Agriculture is a unique area in education because it applies the basic sciences to biological material for economic implications.

Today's agriculture includes much more than farm production. About 6 million people provide supplies and services for farmers and 10 million process and distribute farm products. These two segments together with farm production, which employs 6 million workers, provide jobs somewhere in agriculture for 22 million Americans—approximately one-third of all jobs.

Thousands of agricultural graduates are needed each year in this basic industry. Our land-grant colleges and universities are now graduating about 6,000 students in agricultural majors each year—less than one-half of the total number needed to fill jobs available each year—jobs important to every person, jobs with futures, jobs with challenge, jobs with personal and financial rewards.

The total program in Agriculture at this institution includes Resident Instruction, Research (Agricultural Experiment Station), and
Agriculture Extension (Agricultural Extension Service). Organized under Resident Instruction are curriculums in Agricultural Economics, Agricultural Extension,‡ Agricultural Engineering (majors in Animal Science, Dairy Science, and Poultry Science), Biology (major in Entomology), Food Science, Forestry, Plant Sciences (majors in Agronomy—Crops and Soils, Horticulture—Fruit and Vegetable, and Horticulture—Ornamental), and Pre-Veterinary Medicine.

The curriculums in Agriculture are continuously revised to meet the changing needs of this dynamic industry. In this connection, students in many of the curriculums now have the opportunity to specialize by choosing a minor in Science, Business, Production, International Agriculture, or a Second Department.

Science Minor—This minor emphasizes the basic sciences that prepare students to contribute to the advancement of knowledge in their respective fields. It is designed for students whose anticipated work requires considerable scientific training, usually including graduate studies. Employment opportunities include research with State Agricultural Experiment Stations, the United States Department of Agriculture, and industrial and commercial organizations; and teaching in colleges of agriculture, and other educational work with Federal, State and industrial organizations.

Business Minor—This minor emphasizes principles and practices of business management as applied to businesses and industries associated with agriculture. It is designed for students who plan to work with one of the many businesses and industries that provide supplies and services for the farmer, and process and distribute farm products. Employment opportunities include work related to meat and poultry processing, sales and service of farm machinery, manufacturing and sales of fertilizers and pesticides, dairy and food processing, grain and seed processing, feed manufacturing, banking and credit, insurance, farm management, land appraising, and the marketing of agricultural commodities.

Production Minor—This minor emphasizes the application of scientific principles to agricultural production. It is designed for students whose anticipated work requires broad general training in scientific and practical agriculture. Employment opportunities include general and specialized farming; agricultural extension

* Jointly administered by the School of Education and the College of Agriculture and Biological Sciences.
‡ Jointly administered by the College of Agriculture and Biological Sciences and the College of Engineering.
services; teaching vocational agriculture; conservation of natural resources; agricultural communication; and agricultural services of the United States Department of Agriculture, State Departments of Agriculture and private enterprises.

**International Agriculture Minor**—This minor emphasizes the international aspects of agriculture and applies basic scientific principles and agricultural practices to worldwide agriculture. It is designed for students who contemplate work in international agricultural positions either in the United States or abroad. Employment opportunities include positions with the Foreign Agricultural Service of the United States Department of Agriculture, with foundations such as the Ford Foundation, with the Agency for International Development, with industries such as United Fruit Company, and with other domestic and foreign interests.

**Second Department Minor**—This minor emphasizes special training in an area of study other than the major. A Second Department minor may be selected either within or outside of the College of Agriculture and Biological Sciences. It is designed for students who wish additional specialized training outside their major area of study. Additional information relative to employment opportunities open to students with a minor in a Second Department is given elsewhere in this catalog under the various curriculum listings.

To illustrate further the types of work in which graduates engage, a few of the many occupations of agricultural graduates are listed under each curriculum.

**FRESHMAN YEAR CURRICULUMS**

[For students in Agricultural Economics, Agricultural Education, Animal Industries (majors in Animal Science, Dairy Science, and Poultry Science), and Plant Sciences (majors in Agronomy—Crops and Soils, Horticulture—Fruit and Vegetable, and Horticulture—Ornamental.*)]

<table>
<thead>
<tr>
<th>First Semester</th>
<th>Second Semester</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ag 101 Intro. to Agric.</td>
<td>Ch 102 Gen. Chemistry</td>
</tr>
<tr>
<td>Bot 101 Gen. Botany</td>
<td>Engl 102 English Composition</td>
</tr>
<tr>
<td>or Zool 101 Gen. Zoology</td>
<td>Math 104 Trigonometry</td>
</tr>
<tr>
<td>Engl 101 English Composition</td>
<td></td>
</tr>
<tr>
<td>Math 103 College Algebra</td>
<td></td>
</tr>
<tr>
<td>AS or MS—Basic</td>
<td></td>
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<tr>
<td></td>
<td></td>
</tr>
<tr>
<td>1 (1,0)</td>
<td>4 (3,3)</td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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* Horticulture—Ornamental students take EG 101, Freehand Sketching—1 cr. (0,3), in addition to other courses in the first semester.

† To be selected from the following: Hist 102, Phil 201, Psych 201, Soc 201.
Agricultural Economics and Rural Sociology

[For students in Biology (major in Entomology),* Food Science, Forestry,† and Pre-Veterinary Medicine.]

<table>
<thead>
<tr>
<th>First Semester</th>
<th>Second Semester</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bot 101 Gen. Botany</td>
<td>Ag 101 Introd. to Agric.</td>
</tr>
<tr>
<td>Ch 101 Gen. Chemistry</td>
<td>Engl 102 English Composition</td>
</tr>
<tr>
<td>Engl 101 English Composition</td>
<td>Math 106 Calc. of One Var.</td>
</tr>
<tr>
<td>Math 104 Trigonometry</td>
<td>Zool 101 Gen. Zoology</td>
</tr>
<tr>
<td>AS or MS—Basic</td>
<td>and Zool 103 Gen. Zoology Lab.</td>
</tr>
<tr>
<td></td>
<td>or Bot 101 Gen. Botany</td>
</tr>
<tr>
<td></td>
<td>AS or MS—Basic</td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>

* Biology students majoring in Entomology take EG 101, Freehand Sketching—1 cr. (0,3), in addition to other courses in the first semester.
† Forestry students take For 101, Introduction to Forestry—1 cr. (1,0), in addition to other courses in the first semester.

Agricultural Economics and Rural Sociology

The curriculum in Agricultural Economics places emphasis on a strong background in economic theory with applications to agricultural and agriculturally related businesses. Also included are courses in basic agricultural and biological sciences, liberal arts, and business. Students with a major in agricultural economics now have the opportunity to further specialize by selecting a minor in Science, Business, International Agriculture, or a Second Department.

Employment opportunities open to graduates with degrees in Agricultural Economics are many. They include research and teaching in institutions of higher learning; sales and promotional work for a variety of businesses; management positions in the farm loan departments of private banks or with cooperative farm credit agencies; public relations activities for various firms; market managers and directors; county agents; representatives of government agencies serving agriculture; and operators of numerous enterprises.

Agricultural Economics Curriculum

Agricultural Economics Major

(see page 124 for Freshman Year)

<table>
<thead>
<tr>
<th>Sophomore Year</th>
<th>First Semester</th>
<th>Second Semester</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Ag 201 Introd. to Animal Industries</td>
<td>Ag Ec 202 Agric. Economics</td>
</tr>
<tr>
<td></td>
<td>Econ 201 Principles of Econ.</td>
<td>Ag Ec 301 Prin. of Accounting</td>
</tr>
<tr>
<td></td>
<td>Hist 203 History of Civilization</td>
<td>Ag 202 Introd. to Plant Sciences</td>
</tr>
<tr>
<td></td>
<td>or Engl 203 Survey of Engl. Lit.*</td>
<td>Engl 204 Survey of Engl. and</td>
</tr>
<tr>
<td></td>
<td>Math 106 Cal. of One Var.</td>
<td>Amer. Lit.*</td>
</tr>
<tr>
<td></td>
<td>AS or MS—Basic</td>
<td>or Hist 204 Hist. of Civilization</td>
</tr>
<tr>
<td></td>
<td></td>
<td>or Hist 104 Western Civilization</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Phys 201 Gen. Physics</td>
</tr>
<tr>
<td></td>
<td></td>
<td>AS or MS—Basic</td>
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<td></td>
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</tr>
</tbody>
</table>

* At least one literature course is required.

17
### AGRICULTURAL EDUCATION

The Agricultural Education curriculum is designed for students who wish to prepare for positions in vocational agriculture, agricultural occupations and other teaching positions in the secondary schools; engage in other forms of educational work such as agricultural missionary, public relations and agricultural extension; farming, soil conservation and other governmental work; business and industry.

The curriculum provides for a broad education in general and professional education including student teaching. In addition to required courses giving a thorough background in the agricultural and biological sciences, a student may minor in Business, International Agriculture, or in a Second Department. Students in other departments may minor in Agricultural Education and be certified to teach.

### AGRICULTURAL EDUCATION CURRICULUM

**AGRICULTURAL EDUCATION MAJOR**

(See page 124 for *Freshman Year*)

**First Semester**

<table>
<thead>
<tr>
<th>Course</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ag Ed 201 Introduc. to Agric. Ed.</td>
<td>3 (2.2)</td>
</tr>
<tr>
<td>Ag 202 Intro. to Plant Sciences</td>
<td>3 (2.3)</td>
</tr>
<tr>
<td>Econ 201 Principles of Econ.</td>
<td>3 (3.0)</td>
</tr>
<tr>
<td>Hist 203 History of Civilization</td>
<td>3 (3.0)</td>
</tr>
<tr>
<td>or Engl 203 Survey of Engl. Lit.*</td>
<td>3 (3.0)</td>
</tr>
<tr>
<td>Phys 203 Gen. Physics</td>
<td>3 (3.0)</td>
</tr>
<tr>
<td>Phys 203 Gen. Physics Lab.</td>
<td>1 (0.3)</td>
</tr>
<tr>
<td>AS or MS—Basic</td>
<td>1 (2.1)</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>17</td>
</tr>
</tbody>
</table>

**Second Semester**

<table>
<thead>
<tr>
<th>Course</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>AgE 205 Farm Shop</td>
<td>3 (2.3)</td>
</tr>
<tr>
<td>AgE 206 Agric. Mechanization</td>
<td>3 (2.3)</td>
</tr>
<tr>
<td>Ag 201 Introd. to Animal Industries</td>
<td>3 (2.3)</td>
</tr>
<tr>
<td>Agron 202 Soils</td>
<td>3 (2.2)</td>
</tr>
<tr>
<td>Engl 204 Survey of Engl. and Amer. Lit.*</td>
<td>3 (3.0)</td>
</tr>
<tr>
<td>or Hist 204 Hist. of Civilization</td>
<td>3 (3.0)</td>
</tr>
<tr>
<td>or Hist 104 Western Civilization</td>
<td>3 (3.0)</td>
</tr>
<tr>
<td>AS or MS—Basic</td>
<td>1 (2.1)</td>
</tr>
</tbody>
</table>

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1. Jointly administered by the School of Education and the College of Agriculture and Biological Sciences.
2. At least one literature course is required.
AGRICULTURAL ENGINEERING*

The graduate in Agricultural Engineering, with broad training in mathematics, physics, chemistry, and the biological sciences as well as comprehensive coverage of the engineering sciences, is well equipped to apply engineering to many functions affecting the well-being of mankind. The Agricultural Engineer is sought by industry and public service organizations primarily for his ability to apply engineering know-how to agricultural production and processing, and to the conservation of land and water resources. Specific areas of interest include power and machinery, soil and water resources engineering, electric power and processing, structures and environment, and food engineering.

The undergraduate Agricultural Engineering curriculum leads to the Bachelor of Science degree. Based upon fundamental training in the basic sciences, the curriculum includes such engineering sciences as mechanics, fluids, thermodynamics, electrical theory, computing devices and systems analyses. The basic agricultural sciences of soils, plants and animals are included so as to provide a foundation for Agricultural Engineering analysis and design. Recognition is also given to the necessity for being able to synthesize information from any of the applicable subject matter areas, including studies of energy conversion, engineering analysis and the engineering properties of biological materials, and with emphasis upon economy and integrity of design. Research is included in order to introduce the student to the scientific method. Courses in the humanities are required to provide the graduate engineer with a well-rounded educational experience.

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*The Agricultural Engineering curriculum is jointly administered by the College of Agriculture and Biological Sciences and the College of Engineering.
The undergraduate curriculum is designed for both the student who wishes to terminate his formal academic training at the bachelor's level, and also to provide the necessary prerequisites for those who wish to continue in graduate study. Graduate programs in Agricultural Engineering which lead to both the Master of Science and the Doctor of Philosophy degrees are offered.

Since an Agricultural Engineering graduate has a broad training in engineering, in the sciences, in humanities, and in life sciences, he has the pick of opportunities in many areas. Opportunities in Agricultural Engineering include employment with industry as design engineers, research engineers, production engineers, and in sales and service; with state and federal agencies as teachers, research engineers, and extension engineers; as field engineers with the Soil Conservation Service, Bureau of Reclamation, and similar organizations; and with agricultural enterprises as managers, contractors, equipment retailers and as consulting engineers.

The Agricultural Engineering curriculum is accredited by the Engineers' Council for Professional Development.

### AGRICULTURAL ENGINEERING CURRICULUM

#### AGRICULTURAL ENGINEERING MAJOR

<table>
<thead>
<tr>
<th>First Semester</th>
<th>Freshman Year</th>
<th>Second Semester</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Ch 101 General Chemistry</strong></td>
<td>4 (3,3)</td>
<td>Ag 101 Intro. to Agr. 1 (1,0)</td>
</tr>
<tr>
<td><strong>Engr 101 Engineering Systems</strong></td>
<td>0 (1,0)</td>
<td>Ch 102 General Chemistry 4 (3,3)</td>
</tr>
<tr>
<td>or Humanistic—Social Elective</td>
<td>3 (3,0)</td>
<td>Eng 102 English Composition 3 (3,0)</td>
</tr>
<tr>
<td><strong>Engl 101 English Composition</strong></td>
<td>3 (3,0)</td>
<td>Humanistic—Social Elective 3 (3,0)</td>
</tr>
<tr>
<td><strong>Math 106 Cal. of One Var.</strong></td>
<td>4 (5,0)</td>
<td>or EG 109 Engr. Graph. Comm. 2 (0,6)</td>
</tr>
<tr>
<td>Humanistic—Social Elective</td>
<td>3 (3,0)</td>
<td>Math 205 Cal. and Linear Alg. 4 (5,0)</td>
</tr>
<tr>
<td><strong>AS or MS—Basic</strong></td>
<td>1 (2,1)</td>
<td>Phys 122 Mech. and Wave Phen. 3 (3,0)</td>
</tr>
</tbody>
</table>

17 or 18

<table>
<thead>
<tr>
<th>Sophomore Year</th>
<th>19 or 18</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>AgE 221 Soil and Water Res.</strong></td>
<td>3 (2,3)</td>
</tr>
<tr>
<td><strong>Engr. I</strong></td>
<td>3 (3,0)</td>
</tr>
<tr>
<td><strong>EM 201 Engr. Mech. (Statics)</strong></td>
<td>4 (3,0)</td>
</tr>
<tr>
<td><strong>Engl 203 Surv. of Engl. Lit.</strong></td>
<td>3 (3,0)</td>
</tr>
<tr>
<td><strong>Math 206 Cal. of Sev. Var.</strong></td>
<td>4 (5,0)</td>
</tr>
<tr>
<td><strong>Phys 221 Ther. and Elec. Phen.</strong></td>
<td>3 (3,0)</td>
</tr>
<tr>
<td><strong>AS or MS—Basic</strong></td>
<td>1 (2,1)</td>
</tr>
</tbody>
</table>

17

<table>
<thead>
<tr>
<th>Junior Year</th>
<th>18</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>AgE 353 Computational Systems</strong></td>
<td>2 (0,6)</td>
</tr>
<tr>
<td><strong>AgE 355 Engr. Anal. and Creat.</strong></td>
<td>2 (1,3)</td>
</tr>
<tr>
<td><strong>EE 307 Basic Elec. Engr.</strong></td>
<td>3 (3,0)</td>
</tr>
<tr>
<td><strong>EM 304 Mechanics of Materials</strong></td>
<td>3 (3,0)</td>
</tr>
<tr>
<td><strong>ME 311 Engr. Thermo. I</strong></td>
<td>3 (3,0)</td>
</tr>
<tr>
<td><strong>Zool 101 Gen. Zoology</strong></td>
<td>3 (3,0)</td>
</tr>
<tr>
<td><strong>Zool 103 Gen. Zoology Lab.</strong></td>
<td>1 (0,2)</td>
</tr>
</tbody>
</table>

17

16
### Second Semester

<table>
<thead>
<tr>
<th>Course #</th>
<th>Course Name</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>AgE 416</td>
<td>Agric. Machinery Design</td>
<td>3 (2,3)</td>
</tr>
<tr>
<td>AgE 422</td>
<td>Soil &amp; Water Res. Engr. II</td>
<td>3 (2,3)</td>
</tr>
<tr>
<td>AgE 442</td>
<td>Agric. Proc. Engr.</td>
<td>3 (2,3)</td>
</tr>
<tr>
<td>Bot 352</td>
<td>Plant Physiology</td>
<td>4 (3,3)</td>
</tr>
<tr>
<td>or Zool 307</td>
<td>Animal Anat. and Physiol.</td>
<td>3 (2,3)</td>
</tr>
<tr>
<td>or Micro 301</td>
<td>Gen. Microbiology</td>
<td>4 (3,3)</td>
</tr>
<tr>
<td>ME 304</td>
<td>Heat Transfer</td>
<td>3 (3,0)</td>
</tr>
<tr>
<td>Approved Electives</td>
<td></td>
<td>2 or 3</td>
</tr>
<tr>
<td><strong>Total Credits</strong></td>
<td><strong>16</strong></td>
<td><strong>18</strong></td>
</tr>
</tbody>
</table>

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### ANIMAL INDUSTRIES


### ANIMAL SCIENCE

The Animal Science Department emphasizes subject matter dealing with the application of scientific principles to livestock production and processing.

Students will minor in Science, Business, Production, International Agriculture, or a Second Department.

Occupations for Animal Science graduates include livestock farming; cattle, swine and sheep breeding; extension livestock specialists; feed specialists; county agents; teaching and research in animal industry; positions with meat packing companies; feed dealers; freezer locker operators; livestock dealers; and livestock commission brokers.

### ANIMAL INDUSTRIES CURRICULUM

#### ANIMAL SCIENCE MAJOR

(See page 124 for Freshman Year)

### SOPHOMORE YEAR

<table>
<thead>
<tr>
<th>First Semester</th>
<th>Second Semester</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>AgE 431</strong> Agric. Struct. Design...</td>
<td>Ag 202 Introd. to Plant Sciences...</td>
</tr>
<tr>
<td><strong>AgE 471</strong> Undergraduate Research</td>
<td>Ag 201 Introd. to Animal Sci...</td>
</tr>
<tr>
<td>Econ 201 Principles of Econ.</td>
<td>An Sc 201 Introd. to Animal Sci...</td>
</tr>
<tr>
<td>EM 320 Fluid Mechanics</td>
<td>An Sc 203 Introd. to An. Sc. Lab...</td>
</tr>
<tr>
<td>Math 313 Stat. Theory and Meth.</td>
<td>Engl 204 Survey of Engl. and</td>
</tr>
<tr>
<td>Approved Electives</td>
<td>Amer. Lit...</td>
</tr>
<tr>
<td><strong>Total Credits</strong></td>
<td><strong>17</strong></td>
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<tr>
<td><strong>Credits</strong></td>
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</table>

### JUNIOR YEAR

<table>
<thead>
<tr>
<th>Course #</th>
<th>Course Name</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>An Sc 301</td>
<td>Feeds and Feeding</td>
<td>3 (3,0)</td>
</tr>
<tr>
<td>An Sc 353</td>
<td>Meats</td>
<td>2 (2,0)</td>
</tr>
<tr>
<td>An Sc 355</td>
<td>Meats Lab</td>
<td>1 (0,3)</td>
</tr>
<tr>
<td>Gen 302</td>
<td>Genetics</td>
<td>3 (2,3)</td>
</tr>
<tr>
<td>Micro 301</td>
<td>Gen. Microbiology</td>
<td>4 (3,3)</td>
</tr>
<tr>
<td>Approved Elective</td>
<td></td>
<td>3</td>
</tr>
<tr>
<td><strong>Total Credits</strong></td>
<td><strong>16</strong></td>
<td><strong>18</strong></td>
</tr>
</tbody>
</table>

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* Required for Science Minor.
† At least one literature course is required.
‡ See class adviser for available minors and course requirements.
§ To be selected from the following: Hist 102 or 301, Phil 201, Pol Sc 301, Psych 201, RS 301, Soc 201.
130 Degrees and Curriculums

<table>
<thead>
<tr>
<th>First Semester</th>
<th>Senior Year</th>
<th>Second Semester</th>
</tr>
</thead>
<tbody>
<tr>
<td>An Sc 401 Beef Production</td>
<td>3 (3,0)</td>
<td>An Sc 406 Seminar</td>
</tr>
<tr>
<td>An Sc 403 Beef Prod. Lab.</td>
<td>1 (0,3)</td>
<td>An Sc 408 Pork Production</td>
</tr>
<tr>
<td>Dy Sc 453 Animal Reprod.</td>
<td>3 (3,0)</td>
<td>An Sc 410 Pork Prod. Lab.</td>
</tr>
<tr>
<td>Nutr 401 Fundamentals of Nut.</td>
<td>3 (3,0)</td>
<td>An Sc 452 Animal Breeding</td>
</tr>
<tr>
<td>Minor†</td>
<td>3</td>
<td>Approved Electives</td>
</tr>
<tr>
<td>Approved Electives</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td><strong>17</strong></td>
<td></td>
<td><strong>17</strong></td>
</tr>
</tbody>
</table>

† See class adviser for available minors and course requirements.

DAIRY SCIENCE

The major in Dairy Science is designed to provide the student with an understanding of scientific principles and the application of these principles in the scientific, technical and business phases of the dairy industry. Completion of required studies in the sciences and humanities and selected courses by the student in areas of personal interest prepares the graduate for a successful chosen profession. A career in the dairy industry is a rewarding one, not only monetarily, but in rendering a service in providing a wholesome nutritious food for mankind.

Opportunities for dairy science graduates are many. They include the management of production and processing facilities, quality control work for processing units and production organizations, industrial promotion and public relations work in both production and processing fields, dairy and food products engineering, special services, public health service, teaching and research. Special service opportunities are available in state and national breed association work, breeding organizations, industrial supplies, production and processing equipment and supplies. Opportunities in educational activities include positions with industrial associations, state and federal services and federal programs with foreign assignments.

Students majoring in Dairy Science may choose a minor in Science, Business, Production, International Agriculture, or a Second Department.
ANIMAL INDUSTRIES CURRICULUM

DAIRY SCIENCE MAJOR
(See page 124 for Freshman Year)

First Semester

SOPHOMORE YEAR

<table>
<thead>
<tr>
<th>Course</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ag 202 Introd. to Plant Sciences</td>
<td>3</td>
</tr>
<tr>
<td>Ch 220 Elem. Org. Chem.</td>
<td>(3,3)</td>
</tr>
<tr>
<td>or Ch 223 Org. Chem.</td>
<td>3</td>
</tr>
<tr>
<td>and Ch 227 Org. Chem.</td>
<td>(1,0)</td>
</tr>
<tr>
<td>Dy Sc 201 Introd. to Dairy Science</td>
<td>3</td>
</tr>
<tr>
<td>Econ 201 Principles of Econ.</td>
<td>3</td>
</tr>
<tr>
<td>Engl 203 Survey of Engl. Lit.</td>
<td>(3,0)</td>
</tr>
<tr>
<td>or Hist 203 Hist. of Civilization</td>
<td>(3,0)</td>
</tr>
<tr>
<td>AS or MS—Basic</td>
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Second Semester

<table>
<thead>
<tr>
<th>Course</th>
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<tbody>
<tr>
<td>Agron 202 Soils</td>
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</tr>
<tr>
<td>Eng 204 Survey of Engl. and Lit.</td>
<td>(3,0)</td>
</tr>
<tr>
<td>or Hist 204 Hist. of Civilization</td>
<td>(3,0)</td>
</tr>
<tr>
<td>or Hist 104 Western Civilization</td>
<td>(3,0)</td>
</tr>
<tr>
<td>Phys 201 Gen. Physics</td>
<td>3</td>
</tr>
<tr>
<td>Phys 203 Gen. Physics Lab.</td>
<td>1</td>
</tr>
<tr>
<td>Social Science Elective†</td>
<td>3</td>
</tr>
<tr>
<td>Minor†</td>
<td>3</td>
</tr>
<tr>
<td>AS or MS—Basic</td>
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JUNIOR YEAR

<table>
<thead>
<tr>
<th>Course</th>
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</thead>
<tbody>
<tr>
<td>Dy Sc 307 Market Milk</td>
<td>3</td>
</tr>
<tr>
<td>Fd Sc 305 Dairy and Food Engr.</td>
<td>3</td>
</tr>
<tr>
<td>or Dy Sc 310 Dy. Cattle Select</td>
<td>1</td>
</tr>
<tr>
<td>Micro 301 Gen. Microbiology</td>
<td>4</td>
</tr>
<tr>
<td>Minor†</td>
<td>6</td>
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</tbody>
</table>

SENIOR YEAR

<table>
<thead>
<tr>
<th>Course</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dy Sc 409 Dairy Seminar</td>
<td>2</td>
</tr>
<tr>
<td>Dy Sc 453 Animal Reproduction</td>
<td>3</td>
</tr>
<tr>
<td>and Dy Sc 455 Animal Reproduction Lab.</td>
<td>1</td>
</tr>
<tr>
<td>or Dy Sc 405 Dairy Manufac.</td>
<td>4</td>
</tr>
<tr>
<td>Nutr 401 Fundamentals of Nut.</td>
<td>3</td>
</tr>
<tr>
<td>Minor†</td>
<td>5</td>
</tr>
<tr>
<td>Approved Elective</td>
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<table>
<thead>
<tr>
<th>Course</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>An Sc 301 Feeds and Feeding</td>
<td>3</td>
</tr>
<tr>
<td>Dy Sc 306 Ch. &amp; Phys. Nat. of Milk</td>
<td>3</td>
</tr>
<tr>
<td>Gen 302 Genetics</td>
<td>3</td>
</tr>
<tr>
<td>Minor†</td>
<td>3</td>
</tr>
<tr>
<td>Approved Electives</td>
<td>4 or 5</td>
</tr>
</tbody>
</table>

17 or 17

* At least one literature course is required.
† To be selected from the following: Hist 102 or 301, Pol Sc 301, Psych 201, Soc 201, Phil 201, RS 301.
‡ See class adviser for available minors and course requirements.

POULTRY SCIENCE

The Poultry Science major is expected to gain knowledge in the basic disciplines within which the poultry industry operates and specialized knowledge on the biology of the avian species. Technical poultry courses emphasize the nutrition, physiology, genetics and pathology of domesticated birds and the environmental requirements for incubation of eggs, production of meat and eggs and handling of products.

Minors in Science, Business, Production, International Agriculture, or a Second Department provide for the specialized interest of the student within the broad area encompassed by Poultry Science.

Job opportunities for Poultry Science majors who minor in Science include teaching, extension and research positions in colleges, government laboratories or in industry. This usually involves graduate work. Business minors are especially equipped to move into management positions in the small to large corporations in feed manu-
facturing, production, processing, and marketing of poultry products. Production minors are trained for operation of poultry farms, general farms, or as extension agents working with farmers. International Agriculture minors are expected to export the technical information and techniques so successful in the American poultry industry to a protein-short world. Many American poultry firms are operating on a worldwide basis and our own government and foreign nations are interested in assistance in transferring poultry knowledge to underdeveloped areas.

Students who hope to work in broad agricultural areas that include poultry and other agricultural segments may find a minor in a Second Department helpful. This includes such opportunities as agricultural chemicals, pharmaceuticals, biologicals, feed manufacturers, breeding organizations, marketing organizations, publishers, advertisers, and poultry farmers involved in another enterprise.

### ANIMAL INDUSTRIES CURRICULUM

**POULTRY SCIENCE MAJOR**

(See page 124 for Freshman Year)

<table>
<thead>
<tr>
<th>First Semester</th>
<th>Second Semester</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ag 202 Intro. to Plant Sciences</td>
<td>Econ 201 Principles of Econ.</td>
</tr>
<tr>
<td>Engl 203 Survey of Engl. Lit.† or Hist 203 Hist. of Civilization</td>
<td>or Hist 204 Hist. of Civilization or Hist 104 Western Civilization</td>
</tr>
<tr>
<td>Gen 302 Genetics</td>
<td>Micro 301 Gen. Microbiology</td>
</tr>
<tr>
<td>PS 201 Intro. to Poultry Science</td>
<td>Phys 201 Gen. Physics</td>
</tr>
<tr>
<td>AS or MS—Basic</td>
<td>Phys 203 Gen. Physics Lab.</td>
</tr>
<tr>
<td></td>
<td>PS 356 Incub. and Brooding</td>
</tr>
<tr>
<td></td>
<td>PS 358 Incub. and Brooding Lab.</td>
</tr>
<tr>
<td></td>
<td>AS or MS—Basic</td>
</tr>
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<td>17</td>
<td>18</td>
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<table>
<thead>
<tr>
<th>Junior Year</th>
<th>Senior Year</th>
</tr>
</thead>
<tbody>
<tr>
<td>An Sc 301 Feeds and Feeding</td>
<td>PS 354 Poultry Breeding</td>
</tr>
<tr>
<td>Engl 301 Public Speaking</td>
<td>PS 451 Poultry Nutrition</td>
</tr>
<tr>
<td>Zool 307 Animal Anat. &amp; Physiol.</td>
<td>Minor§</td>
</tr>
<tr>
<td>Social Science Elective†</td>
<td>Approved Elective</td>
</tr>
<tr>
<td>Minor§</td>
<td>17</td>
</tr>
<tr>
<td>18</td>
<td>17</td>
</tr>
</tbody>
</table>

| PS 400 Seminar | Minor§ |
| Minor§ | Approved Electives |
| Approved Electives | 15 |
| 17 | 17 |

* Science minors should substitute Ch 223, 227 or Ch 220. Business minors may substitute Acct 201.
† At least one literature course is required
‡ To be selected from the following: Hist 301 or 102, Phil 201, Pol Sc 301, Psych 201, RS 301, Soc 201.
§ See class adviser for available minors and course requirements.
¶ See class adviser for department major requirements.
BIOLOGY (Entomology Major)

The Entomology major in the Biology curriculum is described below. See pages 140-143 for other majors in the Biology curriculum.

ENTOMOLOGY

Entomology is that branch of science that deals with the study of insects. In many ways insects are the most important group of animals that affect man. At the present time insects are costing the American public approximately four billion dollars annually. There will always be a need for qualified entomologists and the financial rewards to members of this profession are comparable to those enjoyed by most other scientists.

Depending on training, ability, and interest, entomologists find employment in such areas as the following: (1) research entomologist with several federal agencies, the state experiment stations, or private research foundations; (2) teaching entomology and/or zoology at the college or university level; (3) industrial research and the development of more efficient insecticides; (4) quarantine and regulatory work at both state and federal levels; (5) sales and management for agricultural chemical or the pest control industries; (6) the federal and state extension services; (7) many other specialized areas where a knowledge of insects is essential, such as beekeeping or disease transmission.

BIOLOGY CURRICULUM

ENTOMOLOGY MAJOR

(See page 125 for Freshman Year and page 141 for Sophomore Year)

<table>
<thead>
<tr>
<th>First Semester</th>
<th>Second Semester</th>
</tr>
</thead>
<tbody>
<tr>
<td>Phys 201 Gen. Physics</td>
<td>Ent 306 Econ. Entomology</td>
</tr>
<tr>
<td>Ent 305 Econ. Entomology</td>
<td>Phys 202 Gen. Physics</td>
</tr>
<tr>
<td>Social Science Elective*</td>
<td>Phys 204 Gen. Physics Lab</td>
</tr>
<tr>
<td>Approved Electives†</td>
<td>Approved Electives†</td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>Junior Year</th>
<th>16</th>
</tr>
</thead>
<tbody>
<tr>
<td>Engl 301 Public Speaking</td>
<td>3 (3.0)</td>
</tr>
<tr>
<td>Ent 405 Insect Morphology</td>
<td>4 (3.3)</td>
</tr>
<tr>
<td>Ent 461 Seminar</td>
<td>1 (1.0)</td>
</tr>
<tr>
<td>Pl Pa 401 Plant Pathology</td>
<td>3 (2.3)</td>
</tr>
<tr>
<td>Zool 304 Animal Ecology</td>
<td>3 (2.3)</td>
</tr>
<tr>
<td>Approved Electives†</td>
<td>4</td>
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</table>

<table>
<thead>
<tr>
<th>Senior Year</th>
<th>18</th>
</tr>
</thead>
<tbody>
<tr>
<td>Engl 408 Gen. and Tax. Ent.</td>
<td>5 (3.6)</td>
</tr>
<tr>
<td>Ent 462 Seminar</td>
<td>1 (1.0)</td>
</tr>
<tr>
<td>Gen 302 Genetics</td>
<td>3 (2.3)</td>
</tr>
<tr>
<td>Zool 460 Gen. Physiology</td>
<td>3 (2.3)</td>
</tr>
<tr>
<td>Social Science Elective*</td>
<td>3</td>
</tr>
<tr>
<td>Approved Electives†</td>
<td>3</td>
</tr>
</tbody>
</table>

* To be selected from the following: Ag Ec 202, Econ 202, Geog 301, Geog 302, Hist 102 or 301, Hist 104, Hist 203, Hist 204, Phil 201, Phil 302, Pol Sc 201, Pol Sc 202, Pol Sc 301, Pol Sc 302, Psych 201, Rel 301, Rel 302, RS 301, Soc 201.
† Agron 202 must be included.
FOOD SCIENCE

The Food Science curriculum is designed to prepare students for the many career opportunities in technical and management areas of the food industry. The food industry, being the nation's largest industry, is becoming increasingly technical and requires large numbers of professional food scientists. World food supplies, particularly those rich in protein, are becoming increasingly critical in many parts of the globe. This situation is expected to accelerate the demand for food scientists.

Opportunities for graduates in Food Science include research positions in government organizations and state experiment stations, supervisory, administrative, research, and quality control positions in food processing industries, inspection and grading work with state and federal agencies, consulting, and teaching and extension activities with universities and colleges. Students graduating in Food Science are well-prepared to pursue post-graduate training in areas such as microbiology, biochemistry, nutrition, as well as in Food Science.

The student majoring in Food Science will select a minor in Science, Business, International Agriculture, or a Second Department which will emphasize training in an area other than Food Science and which is designed to supplement the major course of study.

FOOD SCIENCE CURRICULUM

FOOD SCIENCE MAJOR
(See page 125 for Freshman Year)

**SOPHOMORE YEAR**

<table>
<thead>
<tr>
<th>First Semester</th>
<th></th>
<th>Second Semester</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Ch 227 Org. Chem.</td>
<td>3 (3,0)</td>
<td>Ch 224 Org. Chem.</td>
<td>3 (3,0)</td>
</tr>
<tr>
<td>Ch 227 Org. Chem. Lab.</td>
<td>1 (0,3)</td>
<td>Ch 228 Org. Chem. Lab.</td>
<td>1 (0,3)</td>
</tr>
<tr>
<td>Econ 201 Principles of Econ.</td>
<td>3 (3,0)</td>
<td>or Ch 313 Quantitative Analysis</td>
<td>3 (3,0)</td>
</tr>
<tr>
<td>Engl 203 Survey of Engl. Lit.</td>
<td>3 (3,0)</td>
<td>and Ch 317 Quant. Anal. Lab.</td>
<td>1 (0,3)</td>
</tr>
<tr>
<td>or Hist 203 Hist. of Civilization</td>
<td>3 (3,0)</td>
<td>Engl 204 Survey of Engl. and</td>
<td></td>
</tr>
<tr>
<td>Phys 201 Gen. Physics</td>
<td>3 (3,0)</td>
<td>Amer. Lit.</td>
<td>3 (3,0)</td>
</tr>
<tr>
<td>Phys 203 Gen. Physics Lab.</td>
<td>1 (0,3)</td>
<td>or Hist 204 Hist. of Civilization</td>
<td>3 (3,0)</td>
</tr>
<tr>
<td>Social Science Elective</td>
<td>3</td>
<td>or Hist 104 Western Civilization</td>
<td>3 (3,0)</td>
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<tr>
<td>AS or MS—Basic</td>
<td>1 (2,1)</td>
<td>Fd Sc 212 Man's Food Resources</td>
<td>2 (2,0)</td>
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<tr>
<td></td>
<td></td>
<td>Phys 202 Gen. Physics</td>
<td>3 (3,0)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Phys 204 Gen. Physics</td>
<td>1 (0,3)</td>
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<td></td>
<td></td>
<td>Social Science Elective</td>
<td>3</td>
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<tr>
<td></td>
<td></td>
<td>AS or MS—Basic</td>
<td>1 (2,1)</td>
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</tbody>
</table>

**Total:** 18

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* At least one literature course is required.
† To be selected from the following: Hist 102 or 301, Soc 201, Phil 201, Psych 201, RS 301, Pol Sc 301.
The Clemson Forestry curriculum includes the fundamental and applied sciences needed in the scientific management of multiple-use forests. Foresters of professional standing are employed in various capacities by private concerns and by federal, state, and other public agencies. They may be engaged as managers and administrators of forest lands, technical specialists in extension, fire protection, recreation, or in other activities presupposing professional forestry knowledge. Foresters earning advanced degrees find employment in academic work and in research conducted both by public and private agencies.

**FORESTRY CURRICULUM**

**FORESTRY MAJOR**

(See page 125 for Freshman Year)

<table>
<thead>
<tr>
<th>Junior Year</th>
<th>First Semester</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fd Sc 305 Dairy and Food Engr.</td>
<td>3 (2,3)</td>
</tr>
<tr>
<td>Fd Sc 311 Food Processing</td>
<td>3 (3,0)</td>
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<td>Fd Sc 313 Food Processing Lab.</td>
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<tr>
<td>Micro 301 Gen. Microbiology</td>
<td>4 (3,3)</td>
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<td>Minor *</td>
<td>3</td>
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<tr>
<td>Approved Elective</td>
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<tr>
<td><strong>Total</strong></td>
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<table>
<thead>
<tr>
<th>Second Semester</th>
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<tbody>
<tr>
<td>Ch 310 Elem. Biochemistry</td>
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<tr>
<td>Engl 301 Public Speaking</td>
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<tr>
<td>Fd Sc 312 Food Processing</td>
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<tr>
<td>Fd Sc 314 Food Process. Lab.</td>
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<td>Micro 404 Food Microbiology</td>
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<td><strong>Total</strong></td>
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<table>
<thead>
<tr>
<th>Sophomore Year</th>
<th>First Semester</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ex St 301 Introd. Statistics</td>
<td>3 (2,2)</td>
</tr>
<tr>
<td>Fd Sc 413 Biochem. of Foods</td>
<td>2 (2,0)</td>
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<tr>
<td>Fd Sc 415 Human Nutrition</td>
<td>2 (2,0)</td>
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<td>Minor *</td>
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<tr>
<td>Approved Electives</td>
<td>4</td>
</tr>
<tr>
<td><strong>Total</strong></td>
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<table>
<thead>
<tr>
<th>Second Semester</th>
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<tbody>
<tr>
<td>Fd Sc 412 Food Quality Control.</td>
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<tr>
<td>Fd Sc 414 Food Qual. Con. Lab.</td>
</tr>
<tr>
<td>Fd Sc 416 Food Analysis</td>
</tr>
<tr>
<td>Fd Sc 418 Seminar</td>
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<tr>
<td>Minor *</td>
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<tr>
<td>Approved Electives</td>
</tr>
<tr>
<td><strong>Total</strong></td>
</tr>
</tbody>
</table>

\* See class adviser for available minors and course requirements.

**FORESTRY SUMMER CAMP**

| For 251S Silvics | 2 cr. |
| For 252S Forest Engineering | 2 cr. |
| For 253S Dendrometry | 4 cr. |
| For 254S Forest Products | 1 cr. |
136 Degrees and Curriculums

Junior Year

First Semester
- Bot 352 Plant Physiology: 4 (3,3)
- Econ 201 Principles of Econ.: 3 (3,0)
- Ent 307 Forest Entomology: 3 (2,3)
- Ex St 301 Introductory Statistics: 3 (2,2)
- WB 412 Wildlife Management: 3 (2,3)
- Approved Electives*: 3

19

Second Semester
- For 302 Dendrometry: 3 (2,3)
- For 304 Forest Economics: 3 (3,0)
- For 306 Ident. of Wood and Wood Fibers: 1 (0,3)
- For 308 Aerial Photos in For.: 3 (2,3)
- For 310 Silviculture: 4 (3,3)
- Approved Electives*: 3

17

Senior Year

For 401 Logging and Milling: 4 (2,6)
- For 407 Forest Regulation: 4 (3,3)
- Pl Pa 405 Forest Pathology: 3 (2,3)
- Pol Sc 301 Am. Gov. and Pol. Par.: 3 (3,0)
- Approved Electives*: 3

17

PLANT SCIENCES

The Plant Sciences curriculum includes three majors—Agronomy—Crops and Soils, Horticulture (Fruit and Vegetable), and Horticulture (Ornamental).

AGRONOMY—CROPS AND SOILS

Agronomy encompasses the natural and physical sciences involved in the production of crops that are used to feed and clothe the world’s population. Agronomy students may specialize in the sciences relating to field crops and soils. Trained agronomists may choose an occupation that ranges from the applied (farming) to the abstract (basic research). Agronomists may be employed by the Agricultural Extension Service, the Soil Conservation Service, and the Agricultural Research Service. In addition, agronomists may find employment in college and high school teaching in foreign service work, and in the many allied industries in agriculture.

Students majoring in Agronomy—Crops and Soils will declare a minor in Science, Business, Production, International Agriculture, or a Second Department.

* At least three credits must be selected from the following courses: Hist 102 or 301, Phil 201, Psych 201, RS 301, Soc 201.
PLANT SCIENCES CURRICULUM

AGRONOMY—CROPS AND SOILS MAJOR
(See page 124 for Freshman Year)

<table>
<thead>
<tr>
<th>First Semester</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ag 202 Intro. to Plant Sciences</td>
</tr>
<tr>
<td>Ch 220 Elem. Org. Chem</td>
</tr>
<tr>
<td>or Ch 223 Org. Chem</td>
</tr>
<tr>
<td>and Ch 227 Org. Chem. Lab.</td>
</tr>
<tr>
<td>Econ 201 Principles of Econ.</td>
</tr>
<tr>
<td>Engl 203 Survey of Eng. Lit.</td>
</tr>
<tr>
<td>or Hist 203 Hist. of Civilization</td>
</tr>
<tr>
<td>Minor*</td>
</tr>
<tr>
<td>Phys 201 Gen. Physics</td>
</tr>
<tr>
<td>Phys 203 Gen. Physics Lab.</td>
</tr>
<tr>
<td>AS or MS—Basic</td>
</tr>
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<table>
<thead>
<tr>
<th>Sophomore Year</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ag 201 Introd. to Animal Industries</td>
</tr>
<tr>
<td>Agron 202 Soils</td>
</tr>
<tr>
<td>Engl 204 Survey of Engl. and Amer. Lit.</td>
</tr>
<tr>
<td>or Hist 204 Hist. of Civilization</td>
</tr>
<tr>
<td>or Hist 104 Western Civilization</td>
</tr>
<tr>
<td>Minor†</td>
</tr>
<tr>
<td>A5 or MS—Basic</td>
</tr>
<tr>
<td>§</td>
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<tr>
<td>18</td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>Second Semester</th>
</tr>
</thead>
<tbody>
<tr>
<td>Agron 301 Fertilizers†</td>
</tr>
<tr>
<td>Agron 410 Cotton and Other Fiber Crops†</td>
</tr>
<tr>
<td>or Agron 411 Grain Crops</td>
</tr>
<tr>
<td>or Agron 412 Tobacco and Spec. Use Crops</td>
</tr>
<tr>
<td>Bot 352 Plant Physiology</td>
</tr>
<tr>
<td>Gen 302 Genetics</td>
</tr>
<tr>
<td>Micro 301 Gen. Microbiology</td>
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<table>
<thead>
<tr>
<th>Junior Year</th>
</tr>
</thead>
<tbody>
<tr>
<td>Agron 308 Soil and Plant Anal.</td>
</tr>
<tr>
<td>Agron 310 Forage &amp; Pas. Crops†</td>
</tr>
<tr>
<td>Agron 312 Forage Crops Lab.†</td>
</tr>
<tr>
<td>Agron 410 Cotton and Other Fiber Crops†</td>
</tr>
<tr>
<td>or Agron 411 Grain Crops</td>
</tr>
<tr>
<td>or Agron 412 Tobacco and Spec. Use Crops</td>
</tr>
<tr>
<td>Social Science Elective§</td>
</tr>
<tr>
<td>Minor†</td>
</tr>
<tr>
<td>18</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Senior Year</th>
</tr>
</thead>
<tbody>
<tr>
<td>Agron 403 Soil Genesis and Classification†</td>
</tr>
<tr>
<td>Agron 407 Prin. of Weed Control</td>
</tr>
<tr>
<td>Agron 455 Seminar</td>
</tr>
</tbody>
</table>

| Approved Electives | 7 |
| 16 — 20 |

* At least one literature course is required.
† See class adviser for available minors and course requirements.
‡ Required for all students except science minors. Science minors select 13 credits from these courses.
§ To be selected from the following: Hist 102 or 301, Phil 201, Pol Sc 301, Psych 201, RS 301, Soc 201.
¶ Credit requirements depend upon minor.

HORTICULTURE (Fruit and Vegetable)

This major provides the student with a basic education in science and the humanities, and the application of both in the scientific, technical, and business phases of the fruit and vegetable industry.

Opportunities in this field of study include vegetable and fruit farm management; inspection of fresh fruit, vegetable and other food products as well as nursery stock. There are many other opportunities as in plant breeding, agricultural extension service work, horticultural research, horticultural teaching and writing, and fruit and vegetable processing. Other occupations include sales and field work with seedsmen and nurserymen, and manufacturers of food, fertilizer, and pesticide products.
Students majoring in the fruit and vegetable phase of Horticulture may choose a minor in Science, Business, Production, International Agriculture, or a Second Department.

### PLANT SCIENCES CURRICULUM

#### HORTICULTURE (FRUIT AND VEGETABLE) MAJOR

(See page 124 for Freshman Year)

<table>
<thead>
<tr>
<th>First Semester</th>
<th>Second Semester</th>
</tr>
</thead>
<tbody>
<tr>
<td>Agron 202 Soils</td>
<td>Ag 201 Introd. to Animal Industries</td>
</tr>
<tr>
<td>Econ 201 Principles of Econ.</td>
<td>Amer. Lit. or Hist 204 Hist. of Civilization</td>
</tr>
<tr>
<td>Engl 203 Survey of Engl. Lit.*</td>
<td>or Hist 104 Western Civilization</td>
</tr>
<tr>
<td>or Hist 203 Hist. of Civilization</td>
<td>Ent 301 Elem. and Econ. Ent.</td>
</tr>
<tr>
<td>Hort 201 Gen. Horticulture</td>
<td>Phys 201 Gen. Physics</td>
</tr>
<tr>
<td>AS or MS—Basic</td>
<td>Phys 203 Gen. Physics Lab.</td>
</tr>
<tr>
<td>17</td>
<td>Approved Electives</td>
</tr>
<tr>
<td>17</td>
<td>3</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Junior Year</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bot 352 Plant Physiology</td>
</tr>
<tr>
<td>Hort 302 Prin. Veg. Prod.</td>
</tr>
<tr>
<td>Hort 451 Small Fruit Culture</td>
</tr>
<tr>
<td>Micro 301 Gen. Microbiology</td>
</tr>
<tr>
<td>3</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Senior Year</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hort 410 Seminar</td>
</tr>
<tr>
<td>Hort 456 Vegetable Crops</td>
</tr>
<tr>
<td>Minor†</td>
</tr>
<tr>
<td>Approved Electives</td>
</tr>
</tbody>
</table>

*At least one literature course is required.  †To be selected from the following: Hist 102 or 301, Phil 201, Pol Sc 301, Psych 201, RS 301, Soc 201.

†See class adviser for available minors and course requirements.

#### HORTICULTURE (Ornamental)

This major is designed to give students a scientific background and technical facilities in the field of Ornamental Horticulture. Subject matter covers plant materials culture, uses, and planning of ground spaces.

Graduates find careers in nursery work, floriculture, landscape designing, landscape contracting, turf management, and park supervision. Other occupations are as research personnel, teachers, extension workers, and as representatives of fertilizer, machinery, and chemical companies.

Students desiring to major in Ornamental Horticulture may choose a minor in Science, Business, Production, International Agriculture, or a Second Department.
## PLANT SCIENCES CURRICULUM

**HORTICULTURE (ORNAMENTAL) MAJOR**  
(See page 124 for Freshman Year)

### Sophomore Year

<table>
<thead>
<tr>
<th>First Semester</th>
<th>Second Semester</th>
</tr>
</thead>
<tbody>
<tr>
<td>Agron 202 Soils</td>
<td>Engl 204 Survey of Engl and Amer. Lit.</td>
</tr>
<tr>
<td>Ch 220 Elem. Org. Chem.</td>
<td>3 (3.0)</td>
</tr>
<tr>
<td>Econ 201 Principles of Econ.</td>
<td>or Hist 204 Hist. of Civilization</td>
</tr>
<tr>
<td>Engl 203 Survey of Engl Lit.</td>
<td>or Hist 104 Western Civilization</td>
</tr>
<tr>
<td>or Hist 203 Hist. of Civilization</td>
<td>3 (3.0)</td>
</tr>
<tr>
<td>Hort 201 Gen. Horticulture</td>
<td>Ent 301 Elem. and Econ. Ent.</td>
</tr>
<tr>
<td>AS or MS—Basic</td>
<td>Phys 201 Gen. Physics</td>
</tr>
<tr>
<td>3 (2.2)</td>
<td>3 (3.0)</td>
</tr>
<tr>
<td>3 (3.0)</td>
<td>1 (0.3)</td>
</tr>
<tr>
<td>3 (3.0)</td>
<td>Approved Electives</td>
</tr>
<tr>
<td>3 (3.0)</td>
<td>5</td>
</tr>
<tr>
<td>3 (3.0)</td>
<td>AS or MS—Basic</td>
</tr>
<tr>
<td>1 (2.1)</td>
<td>1 (2.1)</td>
</tr>
<tr>
<td><strong>17</strong></td>
<td><strong>16</strong></td>
</tr>
</tbody>
</table>

### Junior Year

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Bot 352 Plant Physiology</td>
<td>Hort 304 Plant Materials II</td>
</tr>
<tr>
<td>Gen 302 Genetics</td>
<td>Hort 308 Landscape Design</td>
</tr>
<tr>
<td>Hort 303 Plant Materials I</td>
<td>Hort 310 Floriculture</td>
</tr>
<tr>
<td>Hort 305 Plant Propagation</td>
<td>Minor</td>
</tr>
<tr>
<td>Social Science Elective†</td>
<td>Approved Electives</td>
</tr>
<tr>
<td>3 (3.3)</td>
<td>6</td>
</tr>
<tr>
<td>3 (2.3)</td>
<td>3</td>
</tr>
<tr>
<td>3 (2.3)</td>
<td><strong>16</strong></td>
</tr>
<tr>
<td>3 (2.3)</td>
<td><strong>18</strong></td>
</tr>
</tbody>
</table>

### Senior Year

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Hort 408 Floral Design and Retail Marketing</td>
<td>Hort 406 Nursery Technology</td>
</tr>
<tr>
<td>Hort 409 Seminar</td>
<td>Hort 410 Seminar</td>
</tr>
<tr>
<td>Hort 412 Turf Management</td>
<td>Pl Ps 401 Plant Pathology</td>
</tr>
<tr>
<td>Hort 460 Adv. Landscape Design</td>
<td>Minor</td>
</tr>
<tr>
<td>Minor</td>
<td>Approved Electives</td>
</tr>
<tr>
<td>3 (2.2)</td>
<td>3 (2.3)</td>
</tr>
<tr>
<td>1 (1.0)</td>
<td>1 (0.3)</td>
</tr>
<tr>
<td>3 (2.3)</td>
<td>6</td>
</tr>
<tr>
<td>3 (3.6)</td>
<td>3</td>
</tr>
<tr>
<td>3</td>
<td><strong>16</strong></td>
</tr>
</tbody>
</table>

† To be selected from the following: Hist 102 or 301, Phil 201, Pol Sc 301, Psych 201, RS 301, Soc 201.

†† At least one literature course is required.

††† See class adviser for available minors and course requirements.

## PRE-VETERINARY MEDICINE

The curriculum in Pre-Veterinary Medicine is designed to meet the general requirements for admission to certain schools of veterinary medicine. Since the requirements for entrance to these schools are not uniform, the student in planning his program should consider the specific requirements of the school he expects to attend. Under the Southern Regional Educational Plan, ten qualified students from South Carolina may enter the School of Veterinary Medicine at the University of Georgia each year. The courses listed below are minimum requirements for all students applying under the Regional Education Board Contract. Only the exceptional student can expect to complete the minimum requirements in four semesters. Students in the entering classes in Schools of Veterinary Medicine now average in excess of three years of Pre-Veterinary training.
PRE-VETERINARY MEDICINE CURRICULUM
(See page 125 for Freshman Year)

<table>
<thead>
<tr>
<th>Course</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>An Sc 201 Intro. to Animal Sc.</td>
<td>2</td>
</tr>
<tr>
<td>An Sc 203 Intro. to A. Sci. Lab.</td>
<td>1</td>
</tr>
<tr>
<td>An Sc 301 Feeds and Feeding</td>
<td>3</td>
</tr>
<tr>
<td>Ch 223 Org. Chemistry</td>
<td>3</td>
</tr>
<tr>
<td>Ch 224 Org. Chemistry</td>
<td>3</td>
</tr>
<tr>
<td>Ch 227 Org. Chemistry Lab.</td>
<td>1</td>
</tr>
<tr>
<td>Ch 228 Org. Chemistry Lab.</td>
<td>1</td>
</tr>
<tr>
<td>Dy Sc 201 Intro. to Dairy Science</td>
<td>3</td>
</tr>
<tr>
<td>Econ 201 Principles of Econ.</td>
<td>3</td>
</tr>
<tr>
<td>Engl 203 Surv. of Engl. Lit.</td>
<td>3</td>
</tr>
<tr>
<td>Gen 302 Genetics</td>
<td>3</td>
</tr>
<tr>
<td>Phys 201 Gen. Physics</td>
<td>3</td>
</tr>
<tr>
<td>Phys 202 Gen. Physics</td>
<td>3</td>
</tr>
<tr>
<td>Phys 203 Gen. Physics Lab.</td>
<td>1</td>
</tr>
<tr>
<td>Phys 204 Gen. Physics Lab.</td>
<td>1</td>
</tr>
<tr>
<td>Pol Sc 301 American Gov. and</td>
<td></td>
</tr>
<tr>
<td>Pol. Par.</td>
<td>3</td>
</tr>
<tr>
<td>PS 201 Introd. to Poultry Science</td>
<td>3</td>
</tr>
<tr>
<td>Zool 301 Comp. Vert. Anat.</td>
<td>3</td>
</tr>
<tr>
<td>AS or MS—Basic</td>
<td>2</td>
</tr>
</tbody>
</table>

BIOLOGICAL SCIENCES

The biological sciences are concerned with understanding the phenomenon of life, its origin and development, its morphology and classification, its mechanisms and regulations and its procreation and demise. Biology, without question, is relevant to the student in the 1970's, for it assists him in understanding not only himself but all forms of life that are around him.

With the establishment of a Division of Biological Sciences, Clemson University plans to expand its program with the development of courses stressing the fundamental structure and unity of life as well as the interrelationships between all components of nature.

Thus, with the fundamentals well established, the developing biologist may choose to complete his undergraduate training in the majors of Botany, Entomology, Microbiology, and Zoology. The curriculum in any one of the four areas will introduce to the student the classical biology or morphology and classification as well as modern biology which seeks to understand the physicochemical bases of the phenomenon of life. Overspecialization will be avoided and instead the choice of subjects will attempt to provide the basic knowledge needed by each student in his chosen career.

Upon the completion of his undergraduate program, the student may choose to become employed in his area of interest or continue his education. If the latter is chosen he should be equipped to enter a professional school, such as a medical college, continue in a graduate biology curriculum; or a graduate program in one of the associated areas, such as bioengineering, biochemistry, biophysics, biomatics, or one of the areas of agriculture, such as plant or animal breeding, plant pathology, entomology and plant or animal physiology.

* See page 133 for Entomology Major.
# BOTANY CURRICULUM

Botany is that portion of Biology dealing with plants, their structure, classification, growth, and development. The Botany major is designed to prepare students for employment as biologists in sales, service, or research in industry or government service. It also provides the background in the fundamental physical and biological sciences necessary for graduate study in the basic and many of the applied plant sciences. Adequate electives are provided so that a student may take additional courses in the area or areas of his special interest.

## BIOLOGY CURRICULUM

### BOTANY MAJOR

(See page 141 for *Freshman and Sophomore Years*)

### FRESHMAN YEAR

<table>
<thead>
<tr>
<th>First Semester</th>
<th>Second Semester</th>
</tr>
</thead>
<tbody>
<tr>
<td>or Zool 101 Gen. Zoology</td>
<td>Engl 102 English Composition</td>
</tr>
<tr>
<td>Engl 101 English Composition</td>
<td>or Bot 101 Gen. Botany</td>
</tr>
<tr>
<td>Math 103 College Algebra</td>
<td>AS or MS—Basic</td>
</tr>
<tr>
<td>Math 104 Trigonometry</td>
<td></td>
</tr>
<tr>
<td>AS or MS—Basic</td>
<td></td>
</tr>
</tbody>
</table>

| Total Credits                  | 16                          |

### SOPHOMORE YEAR

<table>
<thead>
<tr>
<th>First Semester</th>
<th>Second Semester</th>
</tr>
</thead>
<tbody>
<tr>
<td>Econ 201 Principles of Econ.</td>
<td>Bot 202 Surv. of Pl. Kingdom*</td>
</tr>
<tr>
<td>Zool 201 Invertebrate Zool.*</td>
<td>Amer. Lit.</td>
</tr>
<tr>
<td>Chemistry Elective†</td>
<td>Chemistry Elective‡</td>
</tr>
<tr>
<td>AS or MS—Basic</td>
<td>Social Science Elective§</td>
</tr>
<tr>
<td></td>
<td>Approved Electives§</td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td>Total Credits</td>
<td>15</td>
</tr>
</tbody>
</table>

* Entomology majors substitute Ag 201 for Zool 201 and Ag 202 for Bot 202.
† Ch 220 or Ch 223 and 227. Botany majors substitute Phys 201 and 203 for Chemistry Elective.
‡ Ch 224 and 228, Ch 310, or Ch 313 and 317. Botany majors substitute Phys 202 and 204 for Chemistry Elective.
§ To be selected from the following: Ag Ec 202, Econ 202, Geog 301, Geog 302, Hist 102 or 301, Hist 104, Hist 203, Hist 204, Phil 201, Phil 302, Pol Sc 201, Pol Sc 202, Pol Sc 301, Pol Sc 302, Psych 201, Rel 301, Rel 302, RS 301, Soc 201.
¶ Students enrolled in the Entomology major must select Ent 301 and students enrolled in the Microbiology major must select Micro 301.

---

**Ch 220 or Ch 223 and 227.**

† Ch 224 and 228, Ch 310, or Ch 313 and 317.

§ Select 9 credits from the following: Agron 405, Bot 404, Bot 457, Gen 451, Micro 401, Pl Fa 401, Pl Fa 405, Pl Fa 456, Pl Fa 458, Zool 458.
142 Degrees and Curriculums

SECOND YEAR

<table>
<thead>
<tr>
<th>First Semester</th>
<th>Second Semester</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bot 406 Plant Anatomy</td>
<td>Bot 452 Plant Ecology</td>
</tr>
<tr>
<td>Gen 302 Genetics</td>
<td>Social Science Elective*</td>
</tr>
<tr>
<td>Social Science Elective†</td>
<td>Approved Electives†</td>
</tr>
<tr>
<td>Approved Electives‡</td>
<td>8</td>
</tr>
<tr>
<td>17</td>
<td></td>
</tr>
</tbody>
</table>

1 To be selected from the following: Ag Ec 202, Econ 202, Geog 301, Geog 302, Hist 102 or 301, Hist 104, Hist 203, Hist 204, Phil 201, Phil 302, Pol Sc 201, Pol Sc 202 Pol Sc 301, Pol Sc 302, Psych 201, Rel 301, RS 301, Soc 201.

§ Select 9 credits from the following: Agron 405, Bot 404, Bot 457, Gen 451, Micro 401, Pl Pa 401, Pl Pa 405, Pl Pa 456, Pl Pa 458, Zool 458.

MICROBIOLOGY

Microbiology is that discipline of biology concerned with the study of microscopic and sub-microscopic forms of life, which include the bacteria, viruses, yeasts, fungi, protozoa and unicellular algae. The micro biologist seeks to describe these minute life forms in terms of their structures, functions, and processes of reproduction, growth and death at both the cellular and molecular levels. He is also concerned with their interactions and interrelationships with both their animate and inanimate environments, and also with their economic importance to man. To accomplish these goals the microbiologist must be trained in the areas of mathematics, physics, chemistry, and biochemistry in addition to those of microbiology.

The microbiology major offers courses to cover all the areas mentioned above, so that a student graduating from this program is prepared either for entrance to graduate school in the fields of microbiology, biochemistry or bioengineering, or to pursue a career in one of the many industries or public service departments dependent upon microbiology, e.g., the fermentation and drug industries, agriculture, various food industries, medical and public health microbiology.

BIOLOGY CURRICULUM

MICROBIOLOGY MAJOR

(See page 141 for Freshman and Sophomore Years)

JUNIOR YEAR

<table>
<thead>
<tr>
<th>First Semester</th>
<th>Second Semester</th>
</tr>
</thead>
<tbody>
<tr>
<td>Engl 301 Public Speaking</td>
<td>Gen 302 Genetics</td>
</tr>
<tr>
<td>Approved Electives*</td>
<td>Approved Electives*</td>
</tr>
<tr>
<td>17</td>
<td>17</td>
</tr>
</tbody>
</table>

1 To be selected from the following: Ag Ec 202, Econ 202, Geog 301, Geog 302, Hist 102 or 301, Hist 104, Hist 203, Hist 204, Phil 201, Phil 302, Pol Sc 201, Pol Sc 202, Pol Sc 301, Pol Sc 302, Psych 201, Rel 301, Rel 302, RS 301, Soc 201.

‡ Select 12 credits from the following: Bot 451, Micro 402, Micro 404, Micro 410, Pl Pa 456, Pl Pa 458, Zool 458.

† To be selected from the following: Ag Ec 202, Econ 202, Geog 301, Geog 302, Hist 102 or 301, Hist 104, Hist 203, Hist 204, Phil 201, Phil 302, Pol Sc 201, Pol Sc 202, Pol Sc 301, Pol Sc 302, Psych 201, Rel 301, Rel 302, RS 301, Soc 201.
Zoology

Zoology is that aspect of biology which attempts to describe, classify and explore all facets of animal life. The examination of this life would extend from the broad view of the ecologists to the ultra-structural view of the electron microscopists. Of equal importance will be the discussion of historical concepts which have shaped the study of zoology in the past and those of recent origin which characterize modern biology.

The major in Zoology therefore will provide thorough coverage of the fundamentals of zoology, drawing when necessary on the chemical, physical and mathematical as well as philosophical disciplines. The zoology program combines laboratory as well as field exercises in the treatment of vertebrate and invertebrate animals with elective hours available for developing further specific interest areas. On the completion of this major the student should be prepared to continue in graduate studies in several zoological disciplines, enter a medical or dental college, enter the business community in sales or service or serve with a federal or state agency.

BIOLOGY CURRICULUM

ZOOGOGY MAJOR
(See page 141 for Freshman and Sophomore Years)

<table>
<thead>
<tr>
<th>First Semester</th>
<th>Junior Year</th>
<th>Second Semester</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ent 301 Elem. and Econ. Ent.</td>
<td>3 (2,3)</td>
<td>Micro 301 Gen. Microbiology</td>
</tr>
<tr>
<td>Phys 201 Gen. Physics</td>
<td>3 (3,0)</td>
<td>Phys 202 Gen. Physics</td>
</tr>
<tr>
<td>Phys 203 Gen. Physics Lab.</td>
<td>1 (0,3)</td>
<td>Phys 204 Gen. Physics Lab.</td>
</tr>
<tr>
<td>Zool 301 Comp. Vert. Anat.</td>
<td>3 (2,3)</td>
<td>Zool 302 Vert. Embryology</td>
</tr>
<tr>
<td>Social Science Elective*</td>
<td>3</td>
<td>Social Science Elective*</td>
</tr>
<tr>
<td>Approved Electives†</td>
<td>3</td>
<td>Approved Electives†</td>
</tr>
<tr>
<td><strong>16</strong></td>
<td>17</td>
<td></td>
</tr>
</tbody>
</table>

| Senior Year | |
|-------------| |
| Engl 301 Public Speaking | 3 (3,0) | Gen 302 Genetics | 3 (2,3) |
| Zool 304 Ecology | 3 (2,3) | Zool 400 Gen. Physiology | 3 (2,3) |
| Approved Electives† | 11 | Approved Electives† | 11 |
| **17** | 17 |

* To be selected from the following: Ag Ec 202, Econ 202, Geog 301, Geog 302, Hist 102 or 301, Hist 204, Hist 203, Hist 204, Phil 201, Phil 302, Pol Sc 201, Pol Sc 202, Pol Sc 301, Pol Sc 302, Psych 201, Rel 301, Rel 302, RS 301, Soc 201.
† Select 6 credits from the following: Bot 404, Ent 405, Ent 408, Ent 455, Ent 461, Ent 462, Ent 465, WB 412, Zool 403, Zool 404, Zool 405, Zool 410, Zool 456, Zool 458, Zool 461.
SCHOOL OF ARCHITECTURE

The Clemson University School of Architecture provides coordinated pre-professional and professional degree programs at undergraduate and graduate levels in preparation for careers in: Architecture, City Planning and Building Construction. These curriculums are not offered elsewhere in the state. The pre-professional offerings of the School also provide an excellent basis for subsequent graduate studies in Landscape Architecture, Art and Architectural History, Painting and Sculpture.

In addition to the courses and curriculums structured for the professional students of the School, cultural offerings in both lecture and studio courses are available to the general student population and required in certain other schools and colleges.

A rich annual series of exhibitions in the Rudolph Lee Gallery of the School and lectures by figures of international importance in the environmental arts and sciences are presented by the Clemson Architectural Foundation and open to the public. An unusual bond has existed between the architects of the state and region and the School since the first offering of architectural courses to a few students in 1914. The South Carolina Chapter of the American Institute of Architects in 1955 asked that a strong school be established and pledged its continuing unified support of school programs as the prime project of the organization. Sweeping administrative and curricular changes brought a five-year curriculum and full accreditation that year. Following three years of rapid development the School was made an autonomous professional school by action of the Board of Trustees in 1958.

During the decade just ending, the School has sought to select its students with increasing care and to broaden and strengthen its offerings and its faculty. As might be expected, the curriculums and objectives are under continuing study.

To better prepare professional students a two-degree six-year program is required for those majoring in architecture beginning with the entering class of the academic year 1967-1968.

The School enjoys contracts for creative research in several areas, and receives an annual support budget from the Clemson Architectural Foundation to enrich its program. It is a member of the Association of Collegiate Schools of Architecture, the Associated Schools of Construction, collaborates with the South Carolina Chapter of the American Institute of Planners, and is accredited by the National Architectural Accrediting Board.
The Architectural Foundation is a nonprofit corporation established in January 1956 under the Laws of the State of South Carolina and under the sponsorship of the South Carolina Chapter of the American Institute of Architects. It was established to facilitate the continuous improvement of architectural education and of the art and technology of building in South Carolina by providing financial and other assistance to the School of Architecture at Clemson University. By this means students in the School of Architecture at Clemson have been able to enjoy instruction, facilities, and conditions equal to those normally found at the nation’s best universities.

The advantages to the student evolving from the Clemson Architectural Foundation are many. Among them are the programs of celebrated guest critics and lecturers, excellent exhibits of many types—paintings, sculpture, architecture, construction, furniture, ceramics, textiles and other allied arts and crafts—traveling expenses for student field trips and professional activities, and student loans and grants. Visual-aid facilities and gifts to the library are examples of permanent assets provided through Foundation support.

Intangible but important is the sense of unity and of high purpose resulting from the activities of the Clemson Architectural Foundation which now permeates the entire architectural scene in South Carolina: the architects, their friends in the building industry and the faculty of the School.

The School of Architecture is housed in a modern building constructed for its program in 1958. Space nevertheless is limited and enrollment restricted to students with capacity and motivation. A major addition to the building is projected for early construction. At present the requisite functions are provided on two levels arranged around a central landscaped court. Design studios and the library occupy the entire second level. The first level accommodates the auditorium, classrooms, graduate studios, two art studios, the Exhibition Gallery, and administrative and faculty offices. A ground floor houses shops, photo laboratory, and sculpture studio, jury room and gallery preparations and storage. All areas are air-conditioned.

**ENTRANCE REQUIREMENTS**

In the interest of both students and the conservation of School resources and to maintain a program on the highest level, admission to the School of Architecture must necessarily be on a selective basis. Annual enrollment quotas are established consistent with space available. Selection considerations include secondary school
record and performances in the College Board examination (SAT Test). A personal interview with the Dean should be arranged by the applicant as early as possible in the year before admission.

Applicants are required to take the Architectural Aptitude Examination as administered by the Educational Testing Service of Princeton, and although these are not used as criterion for admission, the results are helpful to both the applicant and the admission committee.

Applications for the Aptitude Examination may be obtained from the Educational Testing Service, Princeton, New Jersey 20933. This test is administered at Clemson and other regional testing centers in October, January, and March.

Students wishing admission are advised to make application to the University early in the fall or winter of their senior year in high school and to make arrangements for a personal interview with the Dean of the School as soon as possible. The admissions council of the school will further interview all entering students during freshman matriculation week of each academic year.

THE PROGRAMS OF STUDY

ARCHITECTURE

The architect as a practicing professional has the creative responsibility of designing the buildings which shape our physical environment. To understand the humanistic, economic and technological nature of environmental problems, he must have a sound general education. This professional education must prepare him for a life of continuing change, in which problems to be solved will be large and small, for every sort of function, in every type of climate and for every condition of budget.

The curriculum in architecture is six years in length embracing a four-year Bachelor of Arts in Pre-Architecture sequence with a balance of general education and professional study followed by two intensive years of graduate work leading to the first professional degree, Master of Architecture.

BUILDING CONSTRUCTION

The nation’s leading industry in terms of annual dollar volume is Building Construction. Building contracting is a dynamic field and although organizations vary considerably in type, size and complexity, those in leadership positions must invariably have capability (education) in management, construction science, relevant technical disciplines, and the humanities. The curriculum in Build-
ing Construction has been structured to provide young people with the unique balance of studies needed to equip them for key roles in the industry. There is a tremendous demand for graduates of the curriculum. The course is four years in length and leads to the Bachelor of Science degree in Building Construction.

**City Planning**

The City Planner is a member of an essential and complex profession concerned with the programming and guiding of urban and regional development. Our expanding society presents unusual opportunities for Planning graduates in private firms and on public agency staffs. When asked what made a good planner, a leading British professional replied, "A sensitive, creative leader who has lived a bit." He must be able to integrate recommendations of a wide range of specialists. The sociologist, economist, traffic engineer and ecologist, plays significant roles in urban growth and change, but the city planner and urban designer must bring the city to physical form with balance and imagination.

Students admitted as candidates for the Master of City Planning degree must have the following qualifications:

(a) Meet the admissions requirements for the University Graduate School.

(b) Have a baccalaureate degree approved by the school in such fields as: architecture, civil engineering, economics, landscape architecture, law, political science, or sociology.

Candidates entering the curriculum from a non-design discipline will be required to take a special parallel course designed for their needs, and accordingly may be excused from courses in which they have achieved proficiency.

**Architecture Curriculum**

**Bachelor of Arts in Pre-Architecture**

<table>
<thead>
<tr>
<th>First Year</th>
<th>Second Year</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>First Semester</strong></td>
<td><strong>Second Semester</strong></td>
</tr>
<tr>
<td>Engl 101 English Composition</td>
<td>Engl 102 English Composition</td>
</tr>
<tr>
<td>Hist 203 History of Civilization</td>
<td>Hist 204 History of Civilization</td>
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<td>Modern Language (Elementary)</td>
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<td>AS or MS—Basic</td>
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<table>
<thead>
<tr>
<th><strong>Second Year</strong></th>
<th><strong>Third Year</strong></th>
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</thead>
<tbody>
<tr>
<td>Arch 253 Basic Design I</td>
<td>Arch 254 Arch. Design II</td>
</tr>
<tr>
<td>EM 201 Statics</td>
<td>EM 304 Mechanics of Materials</td>
</tr>
<tr>
<td>Modern Language (Intermediate)</td>
<td>Modern Language (Intermediate)</td>
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<td>AS or MS—Basic</td>
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<table>
<thead>
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<tbody>
<tr>
<td>Arch 315 Arch History I</td>
<td>Arch 316 Arch. History II</td>
</tr>
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<td>Arch 353 Arch. Design III</td>
<td>Arch 354 Arch. Design IV</td>
</tr>
<tr>
<td>CE 301 Intro. to Structural Sci.</td>
<td>CE 302 Structural Design I</td>
</tr>
<tr>
<td>Elective Group I</td>
<td>Elective Group II</td>
</tr>
<tr>
<td>Visual Studies I*</td>
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### Fourth Year

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<tbody>
<tr>
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</tr>
<tr>
<td>Arch 453 Arch. Design V</td>
<td>Arch 454 Arch. Design VI</td>
</tr>
<tr>
<td>CE 402 Structural Design II</td>
<td>CE 403 Structural Design III</td>
</tr>
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<td>Elective Group II</td>
<td>Elective Group III</td>
</tr>
<tr>
<td>Visual Studies II†</td>
<td>Visual Studies II†</td>
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* Visual Studies I—Two courses of the following are required: Vis 205, 207, 209, 211, 213, 215.

† Visual Studies II—Two courses of the following are required: Vis 305, 306, 307, 308, 309, 310, 311, 312, 313, 314, 315, 316.

Elective Group I—At least six credits must be selected from the following courses: Econ 201, Econ 202, Econ 301, Econ 302.

Elective Group II—At least six credits must be selected from the following courses: Phil 201, Phil 302, Phil 303, Pol Sc 201, Pol Sc 202, Pol Sc 301, Soc 201, Soc 202, Soc 331.

Elective Group III—At least three credits must be selected from the following courses: Hist 310, Hist 402, Hist 411, Hist 412.

### Building Construction Curriculum

#### First Year

<table>
<thead>
<tr>
<th>First Semester</th>
<th>Second Semester</th>
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<tbody>
<tr>
<td>Arch Const 141 Elem. and Bldg. I</td>
<td>Arch Const 142 Elem. of Bldg. II</td>
</tr>
<tr>
<td>Arch 101 Intro. to Art and Arch.</td>
<td>Arch 102 Intro. to Art &amp; Arch.</td>
</tr>
<tr>
<td>Math 106 Cal. of One Var.</td>
<td>Arch 102 Eng. Composition</td>
</tr>
<tr>
<td>AS or MS—Basic</td>
<td>Math 205 Cal. and Lin. Alg.</td>
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<td>AS or MS—Basic</td>
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#### Second Year

<table>
<thead>
<tr>
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<th>Second Semester</th>
</tr>
</thead>
<tbody>
<tr>
<td>Arch Const 241 Elem. of Bldg. III</td>
<td>Arch Const 242 Elem. of Bldg. IV</td>
</tr>
<tr>
<td>CE 201 Surveying</td>
<td>EM 201 Statics</td>
</tr>
<tr>
<td>Math 206 Cal. of SEV. Var.</td>
<td>IM 299 Computer Programming I</td>
</tr>
<tr>
<td>AS or MS—Basic</td>
<td>Phil 425 Philos. of Sci.</td>
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<td></td>
<td>AS or MS—Basic</td>
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#### Third Year

<table>
<thead>
<tr>
<th>First Semester</th>
<th>Second Semester</th>
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</thead>
<tbody>
<tr>
<td>Act 201 Prin. of Accounting</td>
<td>Act 202 Prin. of Accounting</td>
</tr>
<tr>
<td>Arch Const 341 Bldg Const. I</td>
<td>Arch Const 342 Bldg. Const. II</td>
</tr>
<tr>
<td>Arch 315 Arch. History I</td>
<td>Arch 316 Arch. History II</td>
</tr>
<tr>
<td>EM 304 Mech. of Materials</td>
<td>CE 301 Intro. to Struc. Science</td>
</tr>
<tr>
<td>IM 312 Commercial Law</td>
<td>CE 320 Conc. &amp; Bitum. Materials</td>
</tr>
<tr>
<td>Soc 201 Intro. to Sociology</td>
<td>Elective</td>
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</table>

#### Fourth Year

<table>
<thead>
<tr>
<th>First Semester</th>
<th>Second Semester</th>
</tr>
</thead>
<tbody>
<tr>
<td>Arch Const 441 Bldg Const. III</td>
<td>Arch Const 442 Bldg. Const. IV</td>
</tr>
<tr>
<td>Arch 415 Arch. History III</td>
<td>Arch Const 432 Conc. Form Work</td>
</tr>
<tr>
<td>Arch 575 Mechanical Plant</td>
<td>Arch 416 Arch. History IV</td>
</tr>
<tr>
<td>CE 302 Structural Design I</td>
<td>Arch 576 Mechanical Plant</td>
</tr>
<tr>
<td>Engl 301 Public Speaking</td>
<td>CE 402 Structural Design II</td>
</tr>
<tr>
<td>Soc 351 Indus. Sociology</td>
<td>Elective</td>
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</tbody>
</table>

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* Hist 310, Hist 402, Hist 411, Hist 412.
COLLEGE OF ARTS AND SCIENCES

In addition to acting as a service school to all other colleges and schools of the University by furnishing nearly all of the instruction in the humanities, the physical sciences, and the social sciences, the College of Arts and Sciences offers six major curriculums leading to the Bachelor of Science, and a curriculum in Arts and Sciences leading to the Bachelor of Arts.

Major curriculums leading to the Bachelor of Science degree are Chemistry, Geology, Mathematics, Medical Technology, Physics and Pre-Medicine (Pre-Dentistry).

Major concentrations in the curriculum in Arts and Sciences leading to the Bachelor of Arts degree may be taken in the following areas: Chemistry, English, Geology, History, Mathematics, Modern Languages, Physics, Political Science, Psychology, or Sociology.

Furthermore, the College of Arts and Sciences offers programs leading to graduate degrees in most of these fields.

BACHELOR OF ARTS CURRICULUM

The curriculum leading to the Bachelor of Arts degree is designed to meet the needs of those students who desire a broad general education as a preparation for intelligent citizenship and for those who desire to teach in the secondary schools. The first two years are spent in introductory work in various areas, in order to give the student breadth of view and to enable him to take a more intelligent part in his own education. During the last two years the student concentrates in selected fields. This curriculum provides an excellent background for pre-law students, business, and journalism.

The work required in the Bachelor of Arts curriculum for the freshman year is as shown below, with the few exceptions noted depending on major or minor concentrations during the later years.

<table>
<thead>
<tr>
<th>First Semester</th>
<th>Freshman Year</th>
<th>Second Semester</th>
</tr>
</thead>
<tbody>
<tr>
<td>Eng 101 Engl. Composition</td>
<td>3 (3,0)</td>
<td>Eng 102 Engl. Composition</td>
</tr>
<tr>
<td>Hist 203 Hist. of Civilization</td>
<td>3 (3,0)</td>
<td>Hist 204 Hist. of Civilization</td>
</tr>
<tr>
<td>Math 101 Math. Analysis*</td>
<td>3 (3,0)</td>
<td>Math 102 Math. Analysis*</td>
</tr>
<tr>
<td>Modern Language</td>
<td>3 (3,1)</td>
<td>Modern Language</td>
</tr>
<tr>
<td>Natural Science†</td>
<td>4</td>
<td>Natural Science†</td>
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<tr>
<td>AS or MS—Basic</td>
<td>1 (2,1)</td>
<td>AS or MS—Basic</td>
</tr>
<tr>
<td>17</td>
<td></td>
<td>17</td>
</tr>
</tbody>
</table>

* Those students planning to concentrate in Chemistry, Mathematics, or Physics, schedule Math 106, 205 instead of Math 101, 102. Those planning to concentrate in Geology, schedule Math 103, 104 and 106 instead of Math 101, 102.

† Election of a two semester sequence of the same Science is required which for chemistry or physics majors must be Ch 101, 102.
Preferably on entrance, and not later than the end of his sophomore year, each student in the Bachelor of Arts curriculum must select a primary and secondary (major and minor) field of concentration from the following:

**Major**
- Chemistry
- English
- Geology
- History
- Mathematics
- Modern Languages
- Physics
- Political Science
- Psychology
- Sociology

**Minor**
- Biology
- Chemistry
- Economics
- English
- Fine Arts
- Geology
- History
- Mathematics
- Modern Languages
- Political Science
- Philosophy
- Physics
- Psychology
- Sociology

The major concentration requires 24 semester hours and the minor 15 semester hours above the sophomore level unless otherwise indicated.

These fit into the basic curriculum for the three upper-class years with minor variations depending on the specific major or minor selected.

Students who plan to take the Bachelor of Arts curriculum and expect to go into secondary school teaching, especially with major concentrations in English, History, or Mathematics, may elect Education courses required for teaching certificates as specified by the South Carolina Department of Education, such courses to be approved by their adviser in the subject-matter field.

The total number of hours required for the Bachelor of Arts curriculum varies from 127 to 132 depending on the major and minor concentrations.

<table>
<thead>
<tr>
<th>First Semester</th>
<th>Sophomore Year</th>
<th>Second Semester</th>
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<tbody>
<tr>
<td>Modern Language</td>
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<td>AS or MS—Basic</td>
<td>AS or MS—Basic</td>
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<tr>
<td>Approved Electives</td>
<td>Approved Electives</td>
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| 3 (8.0) | 3 (3.0) |
| 3 (3.1) | 3 (3.0) |
| 10 | 1 (2.1) |
| 17 | 17 |
Bachelor of Arts Curriculum

<table>
<thead>
<tr>
<th>First Semester</th>
<th>Second Semester</th>
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</thead>
<tbody>
<tr>
<td>Humanities*</td>
<td>Humanities*</td>
</tr>
<tr>
<td>Major</td>
<td>Major</td>
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<tr>
<td>Minor</td>
<td>Minor</td>
</tr>
<tr>
<td>Approved Elective</td>
<td>Approved Elective</td>
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<table>
<thead>
<tr>
<th>Junior Year</th>
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</thead>
<tbody>
<tr>
<td>Major</td>
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<tr>
<td>Minor</td>
</tr>
<tr>
<td>Social Sciences†</td>
</tr>
<tr>
<td>Approved Elective</td>
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<tr>
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<table>
<thead>
<tr>
<th>Senior Year</th>
</tr>
</thead>
<tbody>
<tr>
<td>Major</td>
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<tr>
<td>Minor</td>
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<tr>
<td>Social Sciences†</td>
</tr>
<tr>
<td>Approved Elective</td>
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<tr>
<td>15</td>
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</tbody>
</table>

* Humanities include Art, English, Foreign Languages, Music, Philosophy or Religion.† Social Sciences include Economics, History, Political Science, Psychology and Sociology.

Detailed information concerning the various combinations of majors and minors is as follows:

**Biology (Secondary Field of Concentration Only)**. The recommended program of study consists of the required courses in the Bachelor of Arts curriculum plus 15 semester hours from the field of the biological sciences in addition to Bot 101 and Zool 101, 103. The courses selected must be approved by the student’s adviser.

This secondary field of concentration is particularly recommended for those students majoring in geology.

**Bachelor of Arts Curriculum**

**Chemistry**

Both major and minor concentrations in chemistry are allowed for students in the Bachelor of Arts program. As a major field of concentration, the complete four-year curriculum is as shown below.

<table>
<thead>
<tr>
<th>Freshman Year</th>
<th>Sophomore Year</th>
</tr>
</thead>
<tbody>
<tr>
<td>First Semester</td>
<td>Second Semester</td>
</tr>
<tr>
<td>Ch 101 General Chemistry</td>
<td>Ch 102 General Chemistry</td>
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<td>Engl 101 Engl. Composition</td>
<td>Engl 102 English Composition</td>
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<tr>
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<td>3 (3,0)</td>
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<td>4 (5,0)</td>
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<tr>
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<td>Modern Language</td>
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<td>3 (3,1)</td>
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<td>AS or MS—Basic</td>
<td>AS or MS—Basic</td>
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<table>
<thead>
<tr>
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<th>Ch 224 Organic Chemistry*</th>
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<td>1 (0,3)</td>
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<td></td>
</tr>
<tr>
<td>4 (5,0)</td>
<td>3 (3,0)</td>
</tr>
<tr>
<td>Phys 122 Mech. and Wave Phen.</td>
<td>Hist 203 Hist. of Civilization</td>
</tr>
<tr>
<td>3 (3,0)</td>
<td>3 (3,0)</td>
</tr>
<tr>
<td>Modern Language</td>
<td>3 (3,0)</td>
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<tr>
<td>3 (3,1)</td>
<td></td>
</tr>
<tr>
<td>AS or MS—Basic</td>
<td>1 (2,1)</td>
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<td>1 (2,1)</td>
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<td>18</td>
<td>17</td>
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</tbody>
</table>

A minimum of 130 semester hours required for graduation.

* The organic chemistry will count toward the 24 hours of the chemistry major.
152 Degrees and Curriculums

**Junior Year**

<table>
<thead>
<tr>
<th>First Semester</th>
<th>Second Semester</th>
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</thead>
<tbody>
<tr>
<td>Hist 204 Hist. of Civilization</td>
<td>Chemistry Major</td>
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<td>Minor</td>
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<td>Minor</td>
<td>Elective</td>
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18

**Senior Year**

<table>
<thead>
<tr>
<th>Chemistry Major</th>
<th>Chemistry Major</th>
</tr>
</thead>
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<td>Minor</td>
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<tr>
<td>Elective</td>
<td>Elective</td>
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<tr>
<td>4</td>
<td>4</td>
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<tr>
<td>3</td>
<td>3</td>
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15

Economics (As a Secondary Field of Concentration). The recommended program of study consists of Econ 201, 202 and 15 semester hours selected from the following (including 314 and 407): Econ 301, 302, 305, 306, 308, 309, 314, 403, 404, 407, 410, 412, 416, 420, 422, Ex St 462, IM 311, 404, 405, 406, Ag Ec 456.

English. For a major concentration, the recommended program of study consists of the required courses of the basic Bachelor of Arts curriculum and 24 semester hours of English.

Group I—Engl 402 or 404, 405, 423 or 424.

Group II—Nine semester credits according to one of the following plans:

(A) Engl 461 and 2 of these courses: 425, 427, 431, 438.
(B) Engl 462 and 2 of these courses: 409, 415, 443 or 445.
(C) Engl 461 and 462 and one of these courses: 409, 425, 427, 431, 443, 445.

Group III—Six additional semester credits from courses numbered above 400.

Engl 304, Advanced Composition, or departmental certification of proficiency in composition is required.

The third year of a foreign language or the second year of two foreign languages is required, as well as Hist 308 and 309.

For a minor concentration in English, the recommended program includes the required courses of the Bachelor of Arts curriculum and 15 semester hours of English, arranged as follows:

Group I—Six semester credits from these courses: Engl 405 and either 423 or 424.

Group II—Three semester credits from these courses: Engl 402, 425, 427, 431, 443, 461, 462.

Group III—Six additional semester credits from English courses numbered higher than 400.

Engl 304, Advanced Composition, or departmental certification of proficiency in composition is required.

*Engl 332 may be included in this group by special arrangement with the Head of the Department.
Fine Arts (Secondary Field of Concentration Only). The recommended program of study consists of Hum 201, 202 or Arch 101, 102 and 15 semester hours from the following courses: Arch 303, 315, 316, 415, 416, 511, 512; Engl 305, 311, 331, 332, 333; Mus 310, 315, 316, 362, 363, 364, 405, 406, 411; Phil 305; Vis 203, 205, 207, 209, 211, 213, 215, 305, 306, 307, 308, 309, 310, 311, 312, 313, 314, 315, 316, 405, 406, 407, 408, 409, 410, 411, 412, 413, 414, 415, 416. Departmental prerequisites for advanced courses must be met or permission of instructor obtained.

Geology. The recommended program in Geology consists of the required courses in the basic Bachelor of Arts curriculum with the additional requirement that students majoring in Geology must take Math 103, 104 and 106 instead of Math 101 and 102 in the freshman year and Math 205 and 206. The latter two courses will be taken in place of electives in the sophomore year.

Twenty-four semester hours must be completed to fulfill the requirements for the primary field of concentration and 15 semester hours to fulfill the requirements for the secondary field of concentration. Courses for concentration are as follows:


Additional approved electives will be added as needed to meet the minimum of 132 semester hours required for graduation.

History. The recommended program of study consists of the required courses in the Bachelor of Arts curriculum plus Hist 101, 102, Econ 201, Phil 201 or Phil 312, and the completion of the third year of a modern foreign language. History minors must take Hist 101, 102.

A major in history consists of 24 semester hours (including Hist 499), and a minor of 15 hours. To fulfill the requirements students in the major must take a minimum of six hours and students in the minor a minimum of three hours from each of the following groups (effective for those to be graduated after August 1968):


Group B: Hist 308, 309, 310, 312, 356, 357, 402, 404, 408.

Group C: Hist 331, 332, 340, 341, 342.

History majors will become eligible to take Hist 499 after they have completed 96 semester hours and a minimum of five courses in history at the 300-400 level (excluding Hist 301).
BACHELOR OF ARTS CURRICULUM

MATHEMATICS

For a major concentration the recommended program of study is shown below, with 127 semester hours required for graduation.

Freshman Year

<table>
<thead>
<tr>
<th>First Semester</th>
<th>Second Semester</th>
</tr>
</thead>
<tbody>
<tr>
<td>Engl 101 English Composition</td>
<td>Engl 102 English Composition</td>
</tr>
<tr>
<td>Modern Language</td>
<td>Modern Language</td>
</tr>
<tr>
<td>Natural Science</td>
<td>Natural Science</td>
</tr>
<tr>
<td>AS or MS—Basic</td>
<td>AS or MS—Basic</td>
</tr>
<tr>
<td></td>
<td>15</td>
</tr>
</tbody>
</table>

Sophomore Year

<table>
<thead>
<tr>
<th>alyze Year</th>
<th>17</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hist 203 Hist. of Civilization</td>
<td>Hist 204 Hist. of Civilization</td>
</tr>
<tr>
<td>Modern Language</td>
<td>Modern Language</td>
</tr>
<tr>
<td>Elective</td>
<td>Math 208 Engr. Math. I</td>
</tr>
<tr>
<td>AS or MS—Basic</td>
<td>AS or MS—Basic</td>
</tr>
<tr>
<td></td>
<td>15</td>
</tr>
</tbody>
</table>

Junior Year

<table>
<thead>
<tr>
<th>Humanities</th>
<th>Econ 201 Principles of Econ.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Math 411 Linear Algebra</td>
<td>Math 412 Introd. to Mod. Alg.</td>
</tr>
<tr>
<td>Elective</td>
<td>Mus 310 Music Appreciation</td>
</tr>
<tr>
<td>Minor</td>
<td>or Arch 303 Evol. of Vis. Arts</td>
</tr>
<tr>
<td></td>
<td>Elective</td>
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<td>15</td>
</tr>
</tbody>
</table>

Senior Year

| Math Elective                      | Math, Elective                      |
| Minor                              | Minor                               |
| Social Science                     | Social Science                      |
|                                    | Elective                            |
|                                    | 15                                  |

Mathematics. For a major concentration, the recommended program of study consists of the required courses of the basic Bachelor of Arts curriculum with the additional requirement that students majoring or minoring in Mathematics must take Math 106 and 205 instead of Math 101 and 102 in the freshman year. Math 206, 208, and 295 must be taken in place of electives in the sophomore year.

Twenty-four semester hours of mathematics above the sophomore level must be completed to fill the requirements for the primary field of concentration, including the following:

Math 402, 411, 453 or 463, 454 or 464.

At least two courses from the following:

Math 313, 322, Comp Sc 310, 311, and any 400-level course, including Computer Science.

Fifteen semester hours must be completed to fill the requirements for the secondary field of concentration including the following:§

Math 205, 206.

§ Students who have taken Math 101, 102 should consult the Department of Mathematics about a minor in mathematics.
At least two courses from the following:
Math 208, 295, 313, Comp Sc 310, 311, and any 400-level course, including computer science.

For a minor in a physical science:
Twenty-three semester hours must be completed in one of the sciences. (This includes the basic requirement in a physical science.) Or,
Fifteen hours in another physical science other than that offered to fill the basic requirement.
The minimum number of semester hours for graduation with a major concentration in mathematics will be 127 hours.

Modern Languages. The recommended program in Modern Languages consists of the required courses of the basic Bachelor of Arts curriculum and 24 semester hours in one language or 18 semester hours in one language and 12 semester hours in a second language to fulfill the requirements for the primary field of concentration. Completion of 15 semester hours in one language is required to fulfill the requirements for the secondary field of concentration. Only courses numbered 301 and above may be used in fulfilling these requirements. Courses for concentration shall be chosen from the following, all of which are 3 cr. (3,0):
Fr 303,* 304,* 305,* 306,* 403, 404, 405, 406, 407, 408.
Ger 303,† 304,† 305,† 306,† 403, 404, 406.
Span 303,‡ 304,‡ 305,‡ 306,‡ 401, 402, 405, 406.

Additional approved electives will be added as needed to meet the minimum of 128 semester hours required for graduation.

Philosophy (Secondary Field of Concentration Only). The recommended program of study consists of 15 semester hours of course work beyond Phil 201, 202, drawn from Phil 303, 304, 305, 312, 318, 322, 344, 422, 425, Rel. 309.

BACHELOR OF ARTS CURRICULUM

Physics

Major and minor concentrations in Physics are offered in the Bachelor of Arts program. The first two years of the curriculum for a major in Physics are shown below. The last two years are of the same form as the general Bachelor of Arts curriculum.

* Required of students with the primary field of concentration in French.
† Required of students with the primary field of concentration in German.
‡ Required of students with the primary field of concentration in Spanish.
**First Semester**

<table>
<thead>
<tr>
<th>Course</th>
<th>Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ch 101 General Chemistry</td>
<td>4</td>
</tr>
<tr>
<td>Engl 101 English Comp.</td>
<td>3</td>
</tr>
<tr>
<td>Hist 203 Hist. of Civilization</td>
<td>3</td>
</tr>
<tr>
<td>Math 106 Cal. of One Var.</td>
<td>4</td>
</tr>
<tr>
<td>Modern Language</td>
<td>3</td>
</tr>
<tr>
<td>Phys 101 Current Physics</td>
<td>0</td>
</tr>
<tr>
<td>AS or MS—Basic</td>
<td>1</td>
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</tbody>
</table>

**Second Semester**

<table>
<thead>
<tr>
<th>Course</th>
<th>Hours</th>
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</thead>
<tbody>
<tr>
<td>Ch 102 General Chemistry</td>
<td>4</td>
</tr>
<tr>
<td>Engl 102 English Composition</td>
<td>3</td>
</tr>
<tr>
<td>Hist 204 Hist. of Civilization</td>
<td>3</td>
</tr>
<tr>
<td>Math 205 Cal. and Lin. Alg.</td>
<td>4</td>
</tr>
<tr>
<td>Modern Language</td>
<td>3</td>
</tr>
<tr>
<td>AS or MS—Basic</td>
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**Freshman Year**

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<tr>
<th></th>
<th>Hours</th>
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<tbody>
<tr>
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<td>18</td>
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</table>

**Sophomore Year**

<table>
<thead>
<tr>
<th>Course</th>
<th>Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>Engl 203 Survey of Engl. Lit.</td>
<td>3</td>
</tr>
<tr>
<td>Phys 122 Mech. &amp; Wave Phen.</td>
<td>4</td>
</tr>
<tr>
<td>Modern Language</td>
<td>3</td>
</tr>
<tr>
<td>Approved Electives</td>
<td>3</td>
</tr>
<tr>
<td>AS or MS—Basic</td>
<td>1</td>
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</tbody>
</table>

**Second Semester**

<table>
<thead>
<tr>
<th>Course</th>
<th>Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>Engl 204 Surv. of Engl. &amp; Am. Lit.</td>
<td>3</td>
</tr>
<tr>
<td>Phys 221 Thermal &amp; Elect. Phen.</td>
<td>4</td>
</tr>
<tr>
<td>Phys 223 Electron Phys. Lab.</td>
<td>1</td>
</tr>
<tr>
<td>Math 208 Engr. Math. I</td>
<td>5</td>
</tr>
<tr>
<td>Modern Language</td>
<td>3</td>
</tr>
<tr>
<td>Approved Electives</td>
<td>3</td>
</tr>
<tr>
<td>AS or MS—Basic</td>
<td>1</td>
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**Sophomore Year**

<table>
<thead>
<tr>
<th></th>
<th>Hours</th>
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<tbody>
<tr>
<td></td>
<td>17</td>
</tr>
</tbody>
</table>

For a major in Physics, 24 semester hours are required which must be chosen from Phys 222, 224, or any numbered 300 or above. However, Phys 321, 322, 341 and 455 must be included. A total of 131 credit hours is required for a major in Physics.

For a minor in Physics, 15 semester hours are required including Phys 221 and 222.

**Political Science.** The recommended program of study consists of the required courses in the Bachelor of Arts curriculum plus Pol Sc 101 (or 202 or 301) and 201. A major consists of 24 semester hours in courses drawn from a minimum of four of these fields of Political Science:

1. American Government—Pol Sc 302, 409
2. Public Administration—Pol Sc 321
3. Constitutional Law—Pol Sc 331, 432, 433
5. Political Thought—Pol Sc 351, 352
6. International Relations—Pol Sc 361, 462, 463
7. Comparative Governments—Pol Sc 371, 372

A minor consists of 15 semester hours beyond Pol Sc 101 (or 202 or 301) and 201 in courses drawn from at least three of the above fields.

**Psychology.** The recommended program of study consists of the required courses in the Bachelor of Arts curriculum plus Psych 201, 202, for majors and minors and Comp Sc 310 and Math 203 for majors. A major consists of 24 semester hours drawn from the following courses (including Psych 363) Psych 302, 321, 331, 341, 351, 361, 363, 401, 402, 403, 422, 442, 471. A minor consists of 15 semester hours drawn from the above courses and may include Ed 302, 335, if taken during or before 1967-1968, and Psych 303.

**Sociology.** The recommended program of study consists of the required courses in the Bachelor of Arts curriculum plus Soc 201, 202, Econ 201, 202, Phil 201, 302, Pol Sci 301, and Math 203. Sociology minors must take Soc 201, 202.
A major in sociology consists of 24 and a minor, 15 semester hours beyond Soc 201, 202. Courses should be selected from the following (including Soc 411, 421 for majors): Pol Sc 341, Soc 311, 321, 331, 341, 351, 361, 371, 411, 421, 431, 451, 481, RS 359.

Additional approved electives will be added as needed to meet the minimum of 128 semester hours required for graduation.

BACHELOR OF SCIENCE CURRICULUM

CHEMISTRY

Chemistry, an experimental discipline based on observation guided by molecular theory, is of fundamental importance in much of modern science and technology. Its molecular concepts form the basis for ideas about complex material behavior. Due to the fundamental nature and extensive application of chemistry, an unusually large variety of challenging opportunities to contribute in the science-oriented community are open to the student whose education is built around the principles of this discipline.

The curriculum in chemistry provides, through its advanced chemistry courses and large number of elective hours, a program that may be suited to a student’s specific needs, whether he be interested in graduate work; industrial chemistry, sales or supervision; or related professional fields. Significant features of the program are the student’s extensive participation in experimental laboratory work and his association with teachers who also pursue research activities. Because the undergraduate and graduate studies are closely connected, an undergraduate may elect to take part in a research investigation during his junior and senior years.

CHEMISTRY CURRICULUM

<table>
<thead>
<tr>
<th>First Semester</th>
<th>Freshman Year</th>
<th>Second Semester</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ch 101 General Chemistry</td>
<td>4 (3,3)</td>
<td>Ch 102 Gen. Chemistry</td>
</tr>
<tr>
<td>Engl 101 Engl. Composition</td>
<td>3 (3,0)</td>
<td>Engl 102 Engl. Composition</td>
</tr>
<tr>
<td>Hist 203 History of Civil.</td>
<td>3 (3,0)</td>
<td>Math 205 Cal. and Lin. Alg.</td>
</tr>
<tr>
<td>Math 106 Cal. of One Var.</td>
<td>4 (5,0)</td>
<td>Phys 122 Mech. &amp; Wave Phen.</td>
</tr>
<tr>
<td>AS or MS—Basic</td>
<td>1 (2,1)</td>
<td>AS or MS—Basic</td>
</tr>
<tr>
<td><strong>15</strong></td>
<td><strong>15</strong></td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>Sophomore Year</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Ch 223 Org. Chem.</td>
<td>3 (3,0)</td>
<td>Ch 224 Org. Chem.</td>
</tr>
<tr>
<td>Ch 225 Org. Chem. Lab.</td>
<td>2 (0,6)</td>
<td>Ch 226 Org. Chem. Lab.</td>
</tr>
<tr>
<td>Engl 203 Survey of Engl. Lit.</td>
<td>3 (3,0)</td>
<td>Engl 204 Survey of Engl. and</td>
</tr>
<tr>
<td>Math 206 Cal. of Sev. Var.</td>
<td>4 (5,0)</td>
<td>Amer. Lit.</td>
</tr>
<tr>
<td>Phys 221 Thermal &amp; Elect. Phen.</td>
<td>3 (3,0)</td>
<td>Math 208 Engr. Math. I</td>
</tr>
<tr>
<td>Phys 223 Electron Phys. Lab.</td>
<td>1 (0,3)</td>
<td>Phys 222 Optics &amp; Mod. Phys.</td>
</tr>
<tr>
<td>AS or MS—Basic</td>
<td>1 (2,1)</td>
<td>Phys 224 Modern Phys. Lab.</td>
</tr>
<tr>
<td><strong>17</strong></td>
<td><strong>17</strong></td>
<td>AS or MS—Basic</td>
</tr>
</tbody>
</table>
### 158 Degrees and Curriculums

<table>
<thead>
<tr>
<th>First Semester</th>
<th>Junior Year</th>
<th>Second Semester</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ch 313 Quan. Analysis</td>
<td>Ch 332 Phys. Chemistry</td>
<td>3 (3.0)</td>
</tr>
<tr>
<td>Ch 315 Quan. Anal. Lab.</td>
<td>Ch 334 Phys. Chemistry Lab.</td>
<td>2 (0.6)</td>
</tr>
<tr>
<td>Ch 381 Phys. Chemistry</td>
<td>Ch 442 Chem. Lit.</td>
<td>3 (1.0)</td>
</tr>
<tr>
<td>Ch 339 Phys. Chemistry Lab.</td>
<td>Ger 102 Elem. German</td>
<td>1 (0.3)</td>
</tr>
<tr>
<td>Ger 101 Elem. German</td>
<td>Electives*</td>
<td>3 (3.1)</td>
</tr>
<tr>
<td>Elective*</td>
<td>6</td>
<td></td>
</tr>
<tr>
<td><strong>18</strong></td>
<td><strong>18</strong></td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>Senior Year</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Ch 402 Inorg. Chem.</td>
<td>Ch 411 Instr. Analysis</td>
</tr>
<tr>
<td>Electives*</td>
<td>Electives*</td>
</tr>
<tr>
<td><strong>15</strong></td>
<td><strong>15</strong></td>
</tr>
</tbody>
</table>

A minimum of 130 semester hours required for graduation.

*Electives:

For the degree of B.S. in Chemistry, a student must elect at least 18 hours in English, Languages, History, Political Science, Economics, Sociology, Psychology, etc.

### GEOLOGY

Geology is a relatively young science. The word itself is only about 200 years old. It means the science of the earth. Such a science must be involved with the physics and chemistry of materials which comprise the earth, but equally important it must consider the development of life on earth. Fundamentally then the chemical, physical, and biological responses to various environments on and in the earth must be thoroughly understood so that the historical development of the earth may be deduced, predictions of the future inferred, and natural resources intelligently developed.

Industry in our modern civilization is dependent on minerals and rocks. Metals have their origin in them as do our chief power sources, coal, petroleum, and radio-active minerals. The power and wealth of nations depend largely on their exploration, control and development of mineral wealth.

Geologists today are entering upon a new era. Widening horizons are indicated by employment not only in mineral producing industries but by railroads, municipalities, engineering firms, and water authorities. For this reason, it is important that the geologists’ education rest on a broad yet rigorous base.

This curriculum provides the student with the fundamentals in the geological sciences and excellent support in the other basic sciences. On successful completion of the Bachelor of Science program the student should be adequately prepared for employment or for graduate study in any field of geology.
GEOLoGY CURRICULUM

FRESHMAN YEAR

<table>
<thead>
<tr>
<th>First Semester</th>
<th>Second Semester</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ch 101 General Chemistry</td>
<td>Ch 102 General Chemistry</td>
</tr>
<tr>
<td>Engl 101 English Composition</td>
<td>Engl 102 English Composition</td>
</tr>
<tr>
<td>Modern Language*</td>
<td>Modern Language</td>
</tr>
<tr>
<td>AS or MS—Basic</td>
<td>AS or MS—Basic</td>
</tr>
<tr>
<td>4 (3,3)</td>
<td>4 (3,3)</td>
</tr>
<tr>
<td>3 (3,0)</td>
<td>3 (3,0)</td>
</tr>
<tr>
<td>5 (5,0)</td>
<td>4 (5,0)</td>
</tr>
<tr>
<td>3 (3,1)</td>
<td>3 (3,1)</td>
</tr>
<tr>
<td>1 (2,1)</td>
<td>1 (2,1)</td>
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<tr>
<td>15</td>
<td>15</td>
</tr>
</tbody>
</table>

SOPHOMORE YEAR

| Geol 201 Physical Geology | Geol 204 Historical Geology |
| Hist 203 History of Civilization | Hist 204 History of Civilization |
| Modern Language | Modern Language |
| AS or MS—Basic | AS or MS—Basic |
| 3 (3,0) | 3 (3,0) |
| 3 (3,0) | 3 (3,0) |
| 1 (0,3) | 1 (0,3) |
| 3 (3,0) | 3 (3,0) |
| 4 (5,0) | 3 (3,0) |
| 3 (3,1) | 3 (3,1) |
| 1 (2,1) | 1 (2,1) |
| 18 | 17 |

JUNIOR YEAR

| Geol 306 Mineralogy | Bot 101 General Botany |
| Phys 221 Thermal & Elect. Phen. | Ex St 301 Introductory Statistics |
| Phys 223 Electron Phys. Lab. | Geol 309 Petrology |
| Electives† | Phys 224 Modern Phys. Lab. |
| 3 (2,3) | 4 (3,3) |
| 3 (3,0) | 3 (2,2) |
| 1 (0,2) | 3 (3,0) |
| 5 | 1 (0,3) |
| 16 | 17 |

Summer Geology Field Camp,† 6 semester hours

SENIOR YEAR

| Geol 402 Structural Geology | Geol 307 Optical Mineralogy |
| Geol 403 Invert. Paleontology | Geol 404 Economic Geology |
| Approved Electives† | Approved Electives† |
| 3 (2,2) | 3 (2,2) |
| 3 (2,3) | 3 (3,0) |
| 9 | 9 |
| 15 | 15 |

A minimum of 134 semester hours is required for graduation.
* German or French is recommended. Two years in the same language is required.
† At least 12 hours must be elected from the humanities and/or social sciences.
‡ Clemson University does not conduct a field camp in geology, but attendance at a camp approved by the geology staff is required.

MATHEMATICS

The mathematics curriculum is designed to give basic training to those students whose ultimate goal is the creation of mathematical concepts and methods that are of basic and general applicability to the desired subject whether it be physics, computer science, communication theory, data processing, statistics, operations research, economics, or any branch of the physical sciences in which a strong mathematical background is a prerequisite. In addition to containing basic mathematics courses which are needed to prepare the student for the present day mathematical world, the curriculum allows the student in his junior year, to select one of five optional sets of courses which will provide an introduction to an area where mathematics is applied. These options are physics, operations research, computer science, managerial science, communications, chemistry, and statistics.
This curriculum provides an adequate background for the student who plans to pursue graduate study in mathematics and at the same time adequately prepares the student to fill many interesting positions in space research, computer development, business, or government research.

**MATHEMATICS CURRICULUM**

<table>
<thead>
<tr>
<th>First Semester</th>
<th>Freshman Year</th>
<th>Second Semester</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ch 101 General Chemistry</td>
<td>4 (3,3)</td>
<td>Ch 102 General Chemistry</td>
</tr>
<tr>
<td>Engl 101 English Composition</td>
<td>3 (3,0)</td>
<td>Engl 102 English Composition</td>
</tr>
<tr>
<td>Fr 101 Elem. French</td>
<td>3 (3,1)</td>
<td>Fr 102 Elem. French</td>
</tr>
<tr>
<td>or Ger 101 Elem. German</td>
<td>3 (3,1)</td>
<td>or Ger 102 Elem. German</td>
</tr>
<tr>
<td>Math 106 Cal. of One Var.</td>
<td>4 (5,0)</td>
<td>Math 205 Cal. and Lin. Alg.</td>
</tr>
<tr>
<td>AS or MS—Basic</td>
<td>1 (2,1)</td>
<td>Phys 122 Mech. and Wave Phen.</td>
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<td>AS or MS—Basic</td>
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</tbody>
</table>

**Sophomore Year**

| Comp Sc 310 Introd. to Algorith. Processes | 3 (2,8) | Engl 204 Surv. of Engl. & Am. Lit | 3 (3,0) |
| Econ 201 Principles of Econ. | 3 (3,0) | Fr 202 Inter. French | 3 (3,0) |
| Math 411 Linear Algebra | 3 (3,0) | or Ger 202 Inter. German | 3 (3,0) |
| Math 453 Advanced Calculus I | 3 (3,0) | Math 208 Engr. Math. I | 4 (5,0) |
| or Math 463 Math. Analysis I f | 3 (3,0) | Math 295 Found. of Analysis | 3 (3,0) |
| Math Elective* | 3 (3,0) | Phys 222 Optics & Mod. Phys. | 3 (3,0) |
| | | Phys 224 Modern Phys. Lab. | 1 (0,3) |
| AS or MS—Basic | 1 (3,1) | AS or MS—Basic | 1 (2,1) |
| | | | |
| | | **15** | **15** |

**Junior Year**

| Math 402 Theory of Probability | 8 (5,0) | Engl 301 Public Speaking | 3 (3,0) |
| Math 412 Intro. to Mod. Alg. | 3 (3,0) | Math 454 Adv. Cal. II | 3 (3,0) |
| Option† | 3 | or Math 464 Math. Anal. II f | 3 (3,0) |
| Elective† | 6 | Math Elective* | 3 (3,0) |
| | | Option† | 3 (3,0) |
| | | Elective† | 3 (3,0) |
| | | Math. Elective§ | 3 (3,0) |
| | | | |
| | | **15** | **15** |

**Senior Year**

| Math 403 Statistical Inference | 3 (3,0) | Math 403 Statistical Inference | 3 (3,0) |
| or Math 404 Stochastic Processes | 3 (3,0) | or Math 405 Stat. Th. & Math. II | 3 (3,0) |
| Option† | 3 | Option† | 3 (3,0) |
| Elective† | 5 | Elective† | 3 (3,0) |
| Math. Elective§ | 3 | Math. Elective§ | 3 (3,0) |
| | | | |
| | | **14** | **15** |

A minimum of 128 credit hours required for graduation.

* The elective mathematics courses are as follows: Math 313, 403, 404, 405, 406, 407, 408, 413, 415, 459, 453, 457, 458, Comp Sc 311, 409, 427, 428, and approved mathematics courses in the 800 series.

† The options are as follows: Chemistry: Ch 331, 332, 339, 340, 431, 402, 433, and recommended but not required: Ch 219, 223, 324.


Computer Science: Math 452, Comp Sc 311, 409, and two of Math 429, Comp Sc 427, 428.


Physics: Phys 321, 341, and one of Phys 322, 404, 441, 445.

Statistics: Math 313, 403, 404, 405, 409, and one additional statistics course.

**Required Math 313 for statistics option.**

† The electives may be taken from those courses which the catalog lists as approved courses in the College of Arts and Sciences.

§ Those who expect to go to graduate school should select Math 413 and 415 for these credits.

†† Those who do not expect to go to graduate school will in general prefer to take Math 453, 454 instead of Math 463, 464.
MEDICAL TECHNOLOGY

Medical technologists are individuals who are qualified to perform a wide variety of chemical, microscopical, and bacteriological tests to aid physicians in the detection, diagnosis, and treatment of disease. They are usually responsible to a medical doctor, generally a pathologist (one who specializes in the nature and causes of disease). Some technologists work under the supervision of a medical scientist who specializes in a particular branch of clinical science. The largest group of medical technologists work in hospital laboratories and the demand exceeds the supply at the present time.

In cooperation with the Anderson Memorial Hospital, the Greenville General Hospital, and the Spartanburg General Hospital, Clemson offers a four-year curriculum leading to the Bachelor of Science in Medical Technology. The first three years of this program are spent in class work at Clemson. For the fourth year the student resides in Anderson, Greenville, or Spartanburg, where he will take specified courses under instructors on the staffs of one of the hospitals listed according to his choice and previous agreement with the hospital.

Upon satisfactory completion of the prescribed courses, the student will be awarded the Bachelor of Science degree in Medical Technology.

During the final year of work both room and board are furnished by the hospital.

MEDICAL TECHNOLOGY CURRICULUM

<table>
<thead>
<tr>
<th>Freshman Year</th>
<th>Second Semester</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>First Semester</strong></td>
<td><strong>Second Semester</strong></td>
</tr>
<tr>
<td>Ch 101 General Chemistry</td>
<td>Bot 101 General Botany</td>
</tr>
<tr>
<td>Engl 101 Engl. Composition</td>
<td>Ch 102 General Chemistry</td>
</tr>
<tr>
<td>Hist 101 American History</td>
<td>Engl 102 Engl. Composition</td>
</tr>
<tr>
<td>Math 101 Mathematical Analysis</td>
<td>Math 102 Mathematical Analysis</td>
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<td>Modern Language</td>
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<td>AS or MS—Basic</td>
<td>AS or MS—Basic</td>
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<td>18</td>
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</table>

<table>
<thead>
<tr>
<th>Sophomore Year</th>
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</thead>
<tbody>
<tr>
<td>Ch 223 Org. Chemistry</td>
<td>Ch 224 Org. Chemistry</td>
</tr>
<tr>
<td>Hist 102 American History</td>
<td>Engl 204 Surv. of Engl. &amp; Am. Lit.</td>
</tr>
<tr>
<td>Modern Language</td>
<td>Modern Language</td>
</tr>
<tr>
<td>AS or MS—Basic</td>
<td>AS or MS—Basic</td>
</tr>
<tr>
<td>18</td>
<td>18</td>
</tr>
</tbody>
</table>
Degrees and Curriculums

First Semester | Junior Year | Second Semester
---|---|---
Ch 313 Quan. Analysis | Hist 204 Hist. of Civilization | 3 (3.0)
Ch 315 Quan. Anal. Lab. | Micro 301 Gen. Microbiology | 4 (3.3)
Econ 202 Prin. of Economics | Psych 201 Gen. Psychology | 3 (3.0)
Hist 203 Hist. of Civilization | Zool 309 Vertebrate Embryology | 3 (2,3)
Phys 202 Gen. Physics | Electives | 3
Phys 204 Gen. Physics Lab. | | 16
Zool 301 Comp. Vert. Anat. | | 18

The minimum number of credit hours required for graduation in this curriculum is 141.

Senior Year (52 Weeks)

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
<th>Hours</th>
</tr>
</thead>
</table>
| Med Tech 401 | Serology and Immunology | 4 (21,10, 49)*
| Med Tech 402 | Microbiology | 7 (68, 6,470)
| Med Tech 403 | Hematology | 5 (12,32,276)
| Med Tech 404 | Blood Bank | 3 (8,20,132)
| Med Tech 405 | Cytology | 1 (2,12, 26)
| Med Tech 406 | Histology | 3 (20,30,190)
| Med Tech 407 | Urinalysis | 2 (10, 8,102)
| Med Tech 408 | Chemistry | 10 (40,50,470)
| Med Tech 409 | Radioisotopes | 1 (2, 0, 7)

* First figure represents lecture hours, second figure represents seminar hours, and third figure represents clinical practice hours.

PHYSICS

Physics is the fundamental science. The word physics comes from the Greek term meaning nature. Therefore, physics is a science dedicated to the study of all natural phenomena. Physics is the foundation for the other experimental sciences. The physics curriculum is designed with this point of view.

The first two years of the physics curriculum is generally the same as that for mathematics, the other physical sciences and engineering. During the junior and senior years the physics student is given a strong background in the basic physics courses at an advanced level and is allowed to specialize in a variety of other fields by selecting one of eight options. The options are astrophysics, biophysics, chemical physics, computer science, electronics, geophysics, mathematical physics, and physics. After completing one of these curriculums the student is prepared for positions in industry (e.g., aircraft, electronics, petroleum, textiles, pharmaceutical) and government laboratories (e.g., space research). Those students who select the physics or mathematical physics options are well equipped for graduate study in physics.
## PHYSICS CURRICULUM

### First Semester

<table>
<thead>
<tr>
<th>Course</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ch 101 General Chemistry</td>
<td>4 (3,3)</td>
</tr>
<tr>
<td>Engl 101 English Comp.</td>
<td>3 (3,0)</td>
</tr>
<tr>
<td>Fr 101 Elem. French</td>
<td>3 (3,1)</td>
</tr>
<tr>
<td>or Ge 102 Elem. German*</td>
<td>3 (3,1)</td>
</tr>
<tr>
<td>Math 106 Cal. of One Var.</td>
<td>4 (5,0)</td>
</tr>
<tr>
<td>Phys 101 Current Physics</td>
<td>0 (0,2)</td>
</tr>
<tr>
<td>AS or MS—Basic</td>
<td>1 (2,1)</td>
</tr>
</tbody>
</table>

### Second Semester

<table>
<thead>
<tr>
<th>Course</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ch 102 General Chemistry</td>
<td>4 (3,3)</td>
</tr>
<tr>
<td>Engl 102 English Composition</td>
<td>3 (3,0)</td>
</tr>
<tr>
<td>Fr 102 Elem. French</td>
<td>3 (3,1)</td>
</tr>
<tr>
<td>or Ge 102 Elem. German*</td>
<td>3 (3,1)</td>
</tr>
<tr>
<td>Math 205 Cal. and Lin. Alg.</td>
<td>4 (5,0)</td>
</tr>
<tr>
<td>Phys 132 General Physics I</td>
<td>3 (3,0)</td>
</tr>
<tr>
<td>AS or MS—Basic</td>
<td>1 (2,1)</td>
</tr>
</tbody>
</table>

### Fresman Year

<table>
<thead>
<tr>
<th>Course</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>Engl 203 Survey of Engl. Lit.</td>
<td>3 (3,0)</td>
</tr>
<tr>
<td>Math 206 Cal. of Sev. Var.</td>
<td>4 (5,0)</td>
</tr>
<tr>
<td>Phys 223 Electron Phys. Lab.</td>
<td>1 (0,3)</td>
</tr>
<tr>
<td>Phys 231 Gen. Phys. II</td>
<td>3 (3,0)</td>
</tr>
<tr>
<td>AS or MS—Basic</td>
<td>1 (2,1)</td>
</tr>
<tr>
<td>Approved Elective</td>
<td>3</td>
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</table>

### Sophomore Year

<table>
<thead>
<tr>
<th>Course</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hist 204 History of Civilization</td>
<td>3 (3,0)</td>
</tr>
<tr>
<td>Math 309 Engr. Math II</td>
<td>3 (3,0)</td>
</tr>
<tr>
<td>Phys 321 Mechanics I</td>
<td>3 (3,0)</td>
</tr>
<tr>
<td>Phys 325 Exp. Phys. I</td>
<td>4 (2,6)</td>
</tr>
<tr>
<td>Option†</td>
<td>3</td>
</tr>
</tbody>
</table>

### Junior Year

<table>
<thead>
<tr>
<th>Course</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>Phys 441 Elect. and Magn.</td>
<td>3 (3,0)</td>
</tr>
<tr>
<td>Phys 455 Quantum Phys. I</td>
<td>3 (3,0)</td>
</tr>
<tr>
<td>Phys 465 Thermo and Stat. Mech.</td>
<td>3 (3,0)</td>
</tr>
<tr>
<td>Approved Elective†</td>
<td>3</td>
</tr>
<tr>
<td>Option†</td>
<td>3</td>
</tr>
</tbody>
</table>

### Senior Year

<table>
<thead>
<tr>
<th>Course</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>Physics (as approved)</td>
<td>3 (3,0)</td>
</tr>
<tr>
<td>Approved Electives†</td>
<td>9</td>
</tr>
<tr>
<td>Option†</td>
<td>3</td>
</tr>
</tbody>
</table>

### Notes

- A minimum of 128 semester hours is required for graduation.
- Russ 101, 102 may be substituted.
- A minimum of 18 hours of electives shall be chosen from course offerings in the Humanities and Social Sciences.
- The OPTIONS are:

### A. ASTROPHYSICS

<table>
<thead>
<tr>
<th>Course</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>Phys 304 Descriptive Astronomy</td>
<td>3 (3,0)</td>
</tr>
<tr>
<td>Phys 404 Astrophysics</td>
<td>3 (3,0)</td>
</tr>
<tr>
<td>Phys 432 Physical Optics</td>
<td>3 (3,0)</td>
</tr>
<tr>
<td>Phys 456 Quantum Physics II</td>
<td>3 (3,0)</td>
</tr>
</tbody>
</table>

### B. CHEMICAL PHYSICS

<table>
<thead>
<tr>
<th>Course</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ch 331 Physical Chem.</td>
<td>3 (3,0)</td>
</tr>
<tr>
<td>Ch 332 Physical Chem.</td>
<td>3 (3,0)</td>
</tr>
<tr>
<td>Ch 431 Atomic and Molec. Struc.</td>
<td>3 (3,0)</td>
</tr>
<tr>
<td>Phys 426 Quantum Physics II</td>
<td>3 (3,0)</td>
</tr>
<tr>
<td>or Ch 402 Inorganic Chem.</td>
<td>3 (3,0)</td>
</tr>
</tbody>
</table>

### C. COMPUTER SCIENCE

<table>
<thead>
<tr>
<th>Course</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>Comp Sc 310 Intro. to Algorithm Processes</td>
<td>3 (2,3)</td>
</tr>
<tr>
<td>Comp Sc 311 Computer Organ. and Programming</td>
<td>3 (2,3)</td>
</tr>
<tr>
<td>Comp Sc 409 Numerical Calculus</td>
<td>3 (3,0)</td>
</tr>
<tr>
<td>Comp Sc 428 Algorithm, Lang. and Compilers</td>
<td>3 (3,0)</td>
</tr>
<tr>
<td>or Physics 446 Solid State Phys.</td>
<td>3 (3,0)</td>
</tr>
<tr>
<td>or Math 429 Int. Num. Anal.</td>
<td>3 (3,0)</td>
</tr>
</tbody>
</table>

### D. GEOPHYSICS

<table>
<thead>
<tr>
<th>Course</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>Geol 201 Physical Geol.</td>
<td>3 (3,0)</td>
</tr>
<tr>
<td>Geol 203 Physical Geol. Lab.</td>
<td>1 (0,3)</td>
</tr>
<tr>
<td>Geol 306 Mineralogy</td>
<td>3 (2,3)</td>
</tr>
<tr>
<td>any two of Geol 309</td>
<td>3 (2,3)</td>
</tr>
<tr>
<td>Geol 402</td>
<td>3 (3,0)</td>
</tr>
<tr>
<td>Phys 446</td>
<td>3 (3,0)</td>
</tr>
</tbody>
</table>

### E. ELECTRONICS

<table>
<thead>
<tr>
<th>Course</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>EE 205 Elec. Circuits I</td>
<td>3 (3,0)</td>
</tr>
<tr>
<td>EE 206 Elec. Circuits II</td>
<td>3 (3,0)</td>
</tr>
<tr>
<td>EE 208 Elec. Engr. Lab.</td>
<td>1 (0,2)</td>
</tr>
<tr>
<td>EE 320 Electronics I</td>
<td>3 (3,0)</td>
</tr>
<tr>
<td>EE 325 Elec. Engr. Lab.</td>
<td>1 (0,2)</td>
</tr>
</tbody>
</table>

### F. MATHEMATICAL PHYSICS

<table>
<thead>
<tr>
<th>Course</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>Math 453 Advanced Cal. I</td>
<td>3 (3,0)</td>
</tr>
<tr>
<td>Math 454 Advanced Cal. II</td>
<td>3 (3,0)</td>
</tr>
<tr>
<td>Phys 456 Quantum Physics II</td>
<td>3 (3,0)</td>
</tr>
<tr>
<td>Math. (as approved)</td>
<td>3 (3,0)</td>
</tr>
</tbody>
</table>

### G. PHYSICS

<table>
<thead>
<tr>
<th>Course</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>Phys 446 Solid State Physics</td>
<td>3 (3,0)</td>
</tr>
<tr>
<td>Phys 456 Quantum Physics II</td>
<td>3 (3,0)</td>
</tr>
<tr>
<td>Math (as approved)</td>
<td>6</td>
</tr>
</tbody>
</table>
## PHYSICS CURRICULUM

### BIOPHYSICS OPTION

#### Freshman Year

<table>
<thead>
<tr>
<th>First Semester</th>
<th>Second Semester</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bot 101 General Botany</td>
<td>Ch 102 General Chemistry</td>
</tr>
<tr>
<td>Ch 101 General Chemistry</td>
<td>Ch 102 English Composition</td>
</tr>
<tr>
<td>Phys 101 Current Phys.</td>
<td>AS or MS—Basic</td>
</tr>
<tr>
<td>AS or MS—Basic</td>
<td>16</td>
</tr>
</tbody>
</table>

#### Sophomore Year

| Math 206 Cal. of Sev. Var. | Fr 101 Elem. French |
| Phys 223 Electron Phys. Lab. | or Ger 101 Elem. German* |
| AS or MS—Basic | 16 |

#### Junior Year

| History 204 Hist. of Civilization | Phys 322 Mechanics II |
| Fr 102 Elem. French | Phys 326 Exp. Phys. II |
| or Ger 102 Elem. German* | Phys 241 Elect. and Magnetism |
| Phys 321 Mechanics I | Ch 224 Organic Chemistry |
| Ch 223 Organic Chemistry | Approved Elective† |
| Ch 227 Organic Chem. Lab. | 17 |

#### Senior Year

| Physics 455 Quantum Phys. I | Physics (as approved) |
| Ch 425 BioChem. Lab. | Approved Elective† |
| Approved Elective† | 16 |

A minimum of 128 semester hours is required for graduation.
* Russ 101, 102 may be substituted.
† A minimum of 18 hours of electives shall be chosen from course offerings in the Humanities and Social Sciences.

## PRE-MEDICINE AND PRE-DENTISTRY

The curriculum in Pre-Medicine and Pre-Dentistry is designed to meet the general entrance requirements of standard medical and dental colleges. Since, however, requirements for entrance to various medical and dental schools are not uniform, the student before choosing his electives should consult the specific requirements of the college of his preference.

Those preparing for the study of medicine are advised to complete four years of undergraduate work before entering a medical school, although some medical colleges will accept a student after three years of Pre-Medicine, and most dental colleges will accept good students after three years.
## PRE-MEDICINE AND PRE-DENTISTRY CURRICULUM

### FRESHMAN YEAR

<table>
<thead>
<tr>
<th>First Semester</th>
<th>Second Semester</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ch 101 General Chemistry</td>
<td>Bot 101 General Botany</td>
</tr>
<tr>
<td>Engr 101 Engr. Composition</td>
<td>Ch 102 General Chemistry</td>
</tr>
<tr>
<td>Hist 101 American History</td>
<td>Engr 102 Engr. Composition</td>
</tr>
<tr>
<td>Math 101 Mathematical Analysis</td>
<td>Hist 102 American History</td>
</tr>
<tr>
<td>Modern Language</td>
<td>Math 102 Mathematical Analysis</td>
</tr>
<tr>
<td>AS or MS—Basic</td>
<td>Modern Language</td>
</tr>
<tr>
<td></td>
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<td>3 (3.1)</td>
<td>3 (3.1)</td>
</tr>
<tr>
<td>1 (2.1)</td>
<td>1 (2.1)</td>
</tr>
</tbody>
</table>

### SOPHOMORE YEAR

<table>
<thead>
<tr>
<th>First Semester</th>
<th>Second Semester</th>
</tr>
</thead>
<tbody>
<tr>
<td>Engr 203 Survey of Engr. Lit.</td>
<td>Econ 201 Prin. of Economics</td>
</tr>
<tr>
<td>Hist 102 American History</td>
<td>Eng 204 Survey of Engr. and Amer. Lit.</td>
</tr>
<tr>
<td>Modern Language</td>
<td>Modern Language</td>
</tr>
<tr>
<td>AS or MS—Basic</td>
<td>AS or MS—Basic</td>
</tr>
<tr>
<td>3 (3.0)</td>
<td>3 (3.0)</td>
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<td>1 (2.1)</td>
<td>1 (2.1)</td>
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<td>18</td>
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</table>

### JUNIOR YEAR

<table>
<thead>
<tr>
<th>First Semester</th>
<th>Second Semester</th>
</tr>
</thead>
<tbody>
<tr>
<td>Econ 202 Prin. of Economics</td>
<td>Gen 302 Genetics</td>
</tr>
<tr>
<td>Hist 203 Hist. of Civilization</td>
<td>Hist 204 History of Civilization</td>
</tr>
<tr>
<td>Phys 202 Gen. Physics</td>
<td>Psych 201 General Psychology</td>
</tr>
<tr>
<td>Electives</td>
<td>Elective</td>
</tr>
<tr>
<td>3 (3.0)</td>
<td>3 (2.3)</td>
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<tr>
<td>3 (3.0)</td>
<td>3 (3.0)</td>
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<tr>
<td>1 (0.8)</td>
<td>3</td>
</tr>
<tr>
<td>7</td>
<td>15</td>
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</table>

### SENIOR YEAR

<table>
<thead>
<tr>
<th>First Semester</th>
<th>Second Semester</th>
</tr>
</thead>
<tbody>
<tr>
<td>Engl 301 Public Speaking</td>
<td>Psych 302 Social Psych.</td>
</tr>
<tr>
<td>Soc 201 Introd. Sociology</td>
<td>Electives</td>
</tr>
<tr>
<td>Zool 302 Vertebrate Embryology</td>
<td></td>
</tr>
<tr>
<td>Electives</td>
<td></td>
</tr>
<tr>
<td>3 (3.0)</td>
<td>3 (3.0)</td>
</tr>
<tr>
<td>3 (3.0)</td>
<td>Electives</td>
</tr>
<tr>
<td>3 (2.3)</td>
<td>15</td>
</tr>
</tbody>
</table>

### A minimum of 133 semester hours required for graduation.

## PRE-PHARMACY

Pharmacy is a five-year program, the first two years of which may be taken at Clemson and the student who does pre-pharmacy here will, as a rule, transfer to the S. C. Medical College. His degree, once he completes the final three years, will be in Pharmacy and will be awarded by the School of Pharmacy of the Medical College, not by Clemson.

## PRE-PHARMACY CURRICULUM

### FRESHMAN YEAR

<table>
<thead>
<tr>
<th>First Semester</th>
<th>Second Semester</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bot 101 General Botany</td>
<td>Ch 102 General Chemistry</td>
</tr>
<tr>
<td>Ch 101 General Chemistry</td>
<td>Engl 102 English Composition</td>
</tr>
<tr>
<td>Engr 101 English Composition</td>
<td>Hist 102 American History</td>
</tr>
<tr>
<td>Math 101 Mathematical Analysis</td>
<td>Math 102 Mathematical Analysis II</td>
</tr>
<tr>
<td>Math 101 Mathematical Analysis I</td>
<td>Zool 101 General Zoology</td>
</tr>
<tr>
<td>AS or MS—Basic</td>
<td>AS or MS—Basic</td>
</tr>
<tr>
<td>4 (3.3)</td>
<td>4 (3.3)</td>
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<td>3 (3.0)</td>
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<tr>
<td>3 (3.0)</td>
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<tr>
<td>3 (3.0)</td>
<td>3 (3.0)</td>
</tr>
<tr>
<td>3 (3.0)</td>
<td>1 (0.2)</td>
</tr>
<tr>
<td>1 (2.1)</td>
<td>1 (2.1)</td>
</tr>
<tr>
<td>18</td>
<td>18</td>
</tr>
</tbody>
</table>
## APPROVED ELECTIVES FOR STUDENTS IN THE COLLEGE OF ARTS AND SCIENCES

The following are approved electives in the College of Arts and Sciences:

All undergraduate courses taught in the College of Arts and Sciences except the following:

<table>
<thead>
<tr>
<th>Course</th>
<th>Credits</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ch 450</td>
<td>3</td>
<td>(3,0)</td>
</tr>
<tr>
<td>Engl 351</td>
<td>3</td>
<td>(3,0)</td>
</tr>
<tr>
<td>Geol 406</td>
<td>3</td>
<td>(3,0)</td>
</tr>
<tr>
<td>Phys 241</td>
<td>3</td>
<td>(3,0)</td>
</tr>
<tr>
<td>Ch 224</td>
<td>3</td>
<td>(3,0)</td>
</tr>
<tr>
<td>Ch 228</td>
<td>1</td>
<td>(0,3)</td>
</tr>
<tr>
<td>Engl 204</td>
<td>3</td>
<td>(3,0)</td>
</tr>
<tr>
<td>Amer. Lit.</td>
<td>3</td>
<td>(3,0)</td>
</tr>
<tr>
<td>Phys 202</td>
<td>3</td>
<td>(3,0)</td>
</tr>
<tr>
<td>Phys 204</td>
<td>1</td>
<td>(0,3)</td>
</tr>
<tr>
<td>Electives</td>
<td>6</td>
<td></td>
</tr>
<tr>
<td>AS or MS—Basic</td>
<td>1</td>
<td>(2,1)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Course</th>
<th>Credits</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ch 223</td>
<td>3</td>
<td>(3,0)</td>
</tr>
<tr>
<td>Ch 227</td>
<td>1</td>
<td>(0,3)</td>
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<tr>
<td>Engl 203</td>
<td>3</td>
<td>(3,0)</td>
</tr>
<tr>
<td>Phys 201</td>
<td>3</td>
<td>(3,0)</td>
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<tr>
<td>Phys 203</td>
<td>1</td>
<td>(0,3)</td>
</tr>
<tr>
<td>Social Science Elective</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>(other than Econ 201)</td>
<td>1</td>
<td>(2,1)</td>
</tr>
</tbody>
</table>

### SCHOOL OF EDUCATION

The School of Education provides professional programs designed to prepare undergraduate and graduate students for careers in the field of Education. These curriculums are organized to give students the opportunities to (1) acquire a broad general education through liberal arts and science courses; (2) develop depth of knowledge in the teaching area; (3) gain an understanding of the historical, philosophical and psychological backgrounds of American Education; and (4) acquire knowledge of and skill and experience in using effective teaching techniques.
Curriculums for those preparing to teach have been especially designed by a committee from each department offering a teaching major and the School of Education. The Clemson University Teacher Education Committee, composed of four representatives from the teaching-major departments and four public-school administrators, serves in a curriculum advisory capacity to the Dean of the School of Education.

The School of Education offers courses in Music Education, Agricultural Education, Elementary Education, Industrial Education, Recreation and Park Administration, and Secondary Education.

Programs leading to the Bachelor of Science degree are available in Agricultural Education, Industrial Education, Recreation and Park Administration, and Science Teaching (Biological Science, Chemistry, Physics, or Mathematics). Students preparing to teach in these fields should register as freshmen in the appropriate curriculum in the School of Education.

Students preparing to teach Economics, English, History, Mathematics, French, German, Spanish, Natural Sciences, Psychology, or Sociology should register in the Bachelor of Arts program in Secondary Education. Those preparing for the elementary level should register for the Bachelor of Arts program in Elementary Education.

Any student who has been admitted to the University and who is eligible for continuing enrollment may be admitted to the School of Education. However, admission to specific curriculums is selective and requires meeting established criteria. Students who transfer to the School of Education as upperclassmen will be required to meet all the basic requirements for admission to that Education curriculum.

Application to a specific curriculum should be made to the office of the Dean or to the department concerned during the semester preceding that in which the student wishes to obtain admission. Completion of Sc Ed Form 01 and a personal interview are required as part of the application to a specific teacher education curriculum. Sc Ed Form 02, Application for Directed Teaching, must be filed with the faculty adviser no later than the fifth week of the semester preceding the one in which student teaching is to be scheduled. Sc Ed Form 03, Observation and Participation Data, must be completed prior to registration for Directed Teaching.
## Bachelor of Arts Curriculums

### Elementary Education

The curriculum in Elementary Education leads to a Bachelor of Arts degree in Elementary Education. It prepares students for teaching positions on the elementary level. Provisions are made for more detailed study in an instructional interest area. A minimum of 134 semester hours is required for graduation.

Application to Directed Teaching (Ed 481) should be made in writing no later than the fifth week of the semester prior to the one in which student teaching is to be scheduled. A student whose cumulative grade-point ratio is lower than the requirement for graduation will not be permitted to register for this course.

### Elementary Education Curriculum

#### First Semester

<table>
<thead>
<tr>
<th>Course</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ed 100 Orientation</td>
<td>0</td>
</tr>
<tr>
<td>Engl 101 English Composition</td>
<td>3</td>
</tr>
<tr>
<td>Hist 101 American History</td>
<td>3</td>
</tr>
<tr>
<td>Math 115 Contemporary Math for Elementary Teachers I</td>
<td>3</td>
</tr>
<tr>
<td>Modern Language</td>
<td>3</td>
</tr>
<tr>
<td>Science*</td>
<td>4</td>
</tr>
<tr>
<td>AS or MS</td>
<td>1 (2,1)</td>
</tr>
</tbody>
</table>

#### Second Semester

<table>
<thead>
<tr>
<th>Course</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>Engl 102 English Composition</td>
<td>3</td>
</tr>
<tr>
<td>Hist 102 American History</td>
<td>3</td>
</tr>
<tr>
<td>Math 116 Contemporary Math for Elementary Teachers I</td>
<td>3</td>
</tr>
<tr>
<td>Modern Language</td>
<td>3</td>
</tr>
<tr>
<td>Science*</td>
<td>4</td>
</tr>
<tr>
<td>AS or MS</td>
<td>1 (2,1)</td>
</tr>
</tbody>
</table>

### Sophomore Year

<table>
<thead>
<tr>
<th>Course</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>Engl 203 Survey of Engl. Lit.</td>
<td>3</td>
</tr>
<tr>
<td>Hist 205 History of Civilization</td>
<td>3</td>
</tr>
<tr>
<td>Math 215 Algebra for Elem. Teach.</td>
<td>3</td>
</tr>
<tr>
<td>Modern Language</td>
<td>3</td>
</tr>
<tr>
<td>Science*</td>
<td>4</td>
</tr>
<tr>
<td>AS or MS</td>
<td>1 (2,1)</td>
</tr>
</tbody>
</table>

### Junior Year

<table>
<thead>
<tr>
<th>Course</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ed 301 History of American Ed.</td>
<td>3</td>
</tr>
<tr>
<td>Engl 351 Children’s Literature</td>
<td>3</td>
</tr>
<tr>
<td>In Ed 372 Arts and Crafts</td>
<td>3</td>
</tr>
<tr>
<td>Mus 400 Music in Elementary</td>
<td>3</td>
</tr>
<tr>
<td>Social Science Elective</td>
<td>3</td>
</tr>
<tr>
<td>Interest Area</td>
<td>3</td>
</tr>
</tbody>
</table>

### Senior Year

<table>
<thead>
<tr>
<th>Course</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>Arch 303 Evol. of Visual Arts</td>
<td>3</td>
</tr>
<tr>
<td>Ed 334 Child Growth &amp; Develop.</td>
<td>3</td>
</tr>
<tr>
<td>Ed 461 Teaching Read. in Elem.</td>
<td>3</td>
</tr>
<tr>
<td>Interest Area</td>
<td>6</td>
</tr>
<tr>
<td>Ed 458 Health Education</td>
<td>3</td>
</tr>
<tr>
<td>Hist 413 S. C. History</td>
<td>3</td>
</tr>
<tr>
<td>Social Science Elective</td>
<td>3</td>
</tr>
<tr>
<td>Interest Area</td>
<td>3</td>
</tr>
<tr>
<td>Mus 310 Music Appreciation</td>
<td>3</td>
</tr>
</tbody>
</table>

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* Must include Bot 101, Zool 101, 103 and a two-semester sequence in Chemistry, Geology, Physics or Physical Science.

† Economics, Geography, Political Science, Sociology, Philosophy, Religion.

1 Interest Area: 12 semester hours in one of these areas: English, Fine Arts, Mathematics, Modern Languages, Natural Sciences, Social Sciences, Special Education.
SECONDARY EDUCATION

Programs leading to a Bachelor of Arts degree in Secondary Education are available to students preparing to teach Economics, English, History, Mathematics, French, German, Spanish, Natural Sciences, Psychology, or Sociology on the high school level. The teaching field should be selected as early as possible in order that appropriate freshman and sophomore courses may be taken.

Each curriculum requires a major concentration in the teaching field. Specific courses and sequences have been designated by teacher education committees to meet requirements for those planning to teach. Students who have elective courses in the teaching area should consult the departmental adviser prior to scheduling these courses.

The Professional Education courses must be completed in sequence prior to registering for the block schedule. Application to Directed Teaching (Ed 412) should be made in writing no later than the fifth week of the semester preceding the one in which student teaching is to be scheduled. A student whose cumulative grade-point ratio is lower than the requirement for graduation will not be permitted to register for Directed Teaching.

Education 412 is conducted on a full-day basis for one-half semester. Students taking Ed 412 will register for Ed 424, 458 and Mus 310, these three courses being taught on a six-day basis during the first half of the semester.

SECONDARY EDUCATION CURRICULUMS

TEACHING AREA: ECONOMICS

<table>
<thead>
<tr>
<th>First Semester</th>
<th>Freshman Year</th>
<th>Second Semester</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ed 100 Orientation</td>
<td>0 (1,0)</td>
<td>Engl 102 English Composition</td>
</tr>
<tr>
<td>Engl 101 English Composition</td>
<td>3 (3,0)</td>
<td>Hist 204 Hist. of Civilization</td>
</tr>
<tr>
<td>Hist 203 History of Civilization</td>
<td>3 (3,0)</td>
<td>Math 102 Math. Anal. II</td>
</tr>
<tr>
<td>Math 101 Math. Anal. I</td>
<td>3 (3,0)</td>
<td>Modern Language</td>
</tr>
<tr>
<td>Modern Language</td>
<td>3 (3,1)</td>
<td>Science*</td>
</tr>
<tr>
<td>Science*</td>
<td>4</td>
<td>AS or MS—Basic</td>
</tr>
<tr>
<td>AS or MS—Basic</td>
<td>1 (2,1)</td>
<td></td>
</tr>
</tbody>
</table>

| Sophomore Year |
|----------------|-----------------|
| Engl 203 Survey of Engl. Lit | 3 (3,0) | Acct 201 Prin. of Accounting | 3 (3,0) |
| Econ 201 Prin. of Econ. | 3 (3,0) | Econ 202 Prin. of Economics | 3 (3,0) |
| Math 203 Elem. Stat. Infer | 3 (3,0) | Engl 204 Surv. of Engl. & Am. Lit | 3 (3,0) |
| Modern Language | 3 (3,1) | Modern Language | 3 (3,0) |
| Science* | 4 | Science* | 4 |
| AS or MS—Basic | 1 (2,1) | AS or MS—Basic | 1 (2,1) |

*Bot 101, Zool 101, 103; and a two-semester sequence in Chemistry, Physics, Geology, or Physical Science.
### First Semester
- **Ed 301 History of Am. Ed.** 3 (3,0)
- **Teaching Major** 9
- **Elective** 3

### Second Semester
- **Ed 302 Educ. Psych.** 3 (3,0)
- **Teaching Major** 9
- **Elective** 3

### Junior Year

<table>
<thead>
<tr>
<th>Course</th>
<th>Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Teaching</strong></td>
<td>15</td>
</tr>
<tr>
<td><strong>Elective</strong></td>
<td>9</td>
</tr>
</tbody>
</table>

### Senior Year

<table>
<thead>
<tr>
<th>Course</th>
<th>Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Arch 303 Evol. of Visual Arts</strong></td>
<td>3 (3,0)</td>
</tr>
<tr>
<td><strong>Ed 335 Adol. Growth &amp; Dev.</strong></td>
<td>3 (3,0)</td>
</tr>
<tr>
<td><strong>Ed 498 Sec. Sch. Reading</strong></td>
<td>3 (3,0)</td>
</tr>
<tr>
<td><strong>Teaching Major</strong></td>
<td>6</td>
</tr>
</tbody>
</table>

### Freshman Year

<table>
<thead>
<tr>
<th>Course</th>
<th>Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Ed 100 Orientation</strong></td>
<td>0 (1,0)</td>
</tr>
<tr>
<td><strong>Engl 101 English Composition</strong></td>
<td>3 (3,0)</td>
</tr>
<tr>
<td><strong>Hist 203 History of Civilization</strong></td>
<td>3 (3,0)</td>
</tr>
<tr>
<td><strong>Math 101 Math. Anal. I</strong></td>
<td>3 (3,0)</td>
</tr>
<tr>
<td><strong>Modern Language</strong></td>
<td>3 (3,1)</td>
</tr>
<tr>
<td><strong>Science</strong></td>
<td>4</td>
</tr>
<tr>
<td><strong>AS or MS—Basic</strong></td>
<td>1 (2,1)</td>
</tr>
</tbody>
</table>

### Sophomore Year

<table>
<thead>
<tr>
<th>Course</th>
<th>Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Engl 203 Survey of Engl. Lit.</strong></td>
<td>3 (3,0)</td>
</tr>
<tr>
<td><strong>Modern Language</strong></td>
<td>3 (3,1)</td>
</tr>
<tr>
<td><strong>Science</strong></td>
<td>4</td>
</tr>
<tr>
<td><strong>Social Science Elective†</strong></td>
<td>3 (3,0)</td>
</tr>
<tr>
<td><strong>AS or MS—Basic</strong></td>
<td>1 (2,1)</td>
</tr>
</tbody>
</table>

### Junior Year

<table>
<thead>
<tr>
<th>Course</th>
<th>Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Ed 301 History of Am. Ed.</strong></td>
<td>3 (3,0)</td>
</tr>
<tr>
<td><strong>Hist 308 History of England</strong></td>
<td>3 (3,0)</td>
</tr>
<tr>
<td><strong>Teaching Major</strong></td>
<td>9</td>
</tr>
</tbody>
</table>

### Senior Year

<table>
<thead>
<tr>
<th>Course</th>
<th>Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Arch 303 Evol. of Visual Arts</strong></td>
<td>3 (3,0)</td>
</tr>
<tr>
<td><strong>Ed 335 Adol. Growth &amp; Dev.</strong></td>
<td>3 (3,0)</td>
</tr>
<tr>
<td><strong>Ed 498 Sec. Sch. Reading</strong></td>
<td>3 (3,0)</td>
</tr>
<tr>
<td><strong>Teaching Major</strong></td>
<td>6</td>
</tr>
</tbody>
</table>

---

*Bot 101, Zool 101, 103 and a two-semester sequence in Chemistry, Geology, Physics, or Physical Science.

†Economics, Geography, Political Science, Sociology, Philosophy, Religion.

†This semester is a block schedule and must be taken as listed.

The teaching major requires twenty-four semester hours of junior and senior English courses distributed as follows:

- **Group A:** Engl 402, 405 or 406, 423 or 424.
- **Group B:** Three courses from the following are required: Engl 409, 425, 427, 431, 436, 443.
- **Group C:** Two courses on the 400 level.

Engl 304 or departmental certification of proficiency in composition is required.
## TEACHING AREA: HISTORY

### First Semester
- **Ed 100 Orientation** .................................. 0 (1,0)
- **Engl 101 English Composition** ................. 3 (3,0)
- **Hist 203 History of Civilization** ............... 3 (3,0)
- **Math 101 Math. Anal. I** .......................... 3 (3,0)
- **Modern Language** .................................. 3 (3,0)
- **Science** ............................................. 4
- **AS or MS—Basic** .................................. 1 (2,1)

### Freshman Year
- **Science** ............................................. 4
- **AS or MS—Basic** .................................. 1 (2,1)

### Second Semester
- **Engl 102 English Composition** ................. 3 (3,0)
- **Hist 204 History of Civilization** ............... 3 (3,0)
- **Math 102 Math. Anal. II** .......................... 3 (3,0)
- **Modern Language** .................................. 3 (3,1)
- **Science** ............................................. 4
- **AS or MS—Basic** .................................. 1 (2,1)

### Sophomore Year
- **Engl 203 Survey of Engl. Lit.** .................. 3 (3,0)
- **Hist 101 American History** ...................... 3 (3,0)
- **Modern Language** .................................. 3 (3,1)
- **Science** ............................................. 4
- **Social Science Elective** .......................... 3 (3,0)
- **AS or MS—Basic** .................................. 1 (2,1)

### Junior Year
- **Teaching Major** ................................... 9
- **Elective** ............................................. 3

### Senior Year
- **Arch 303 Evol. of Visual Arts** .................. 3 (3,0)
- **Ed 335 Adol. Growth and Dev.** ................... 3 (3,0)
- **Ed 498 Sec. Sch. Reading** ....................... 3 (3,0)
- **Teaching Major** ................................... 6

### TEACHING AREA: MATHEMATICS

### First Semester
- **Ed 100 Orientation** .................................. 0 (1,0)
- **Engl 101 English Composition** ................. 3 (3,0)
- **Hist 203 History of Civilization** ............... 3 (3,0)
- **Math 106 Cal. of One Var.** ..................... 4 (5,0)
- **Modern Language** .................................. 3 (3,1)
- **Science** ............................................. 4
- **AS or MS—Basic** .................................. 1 (2,1)

### Freshman Year
- **Engl 102 English Composition** ................. 3 (3,0)
- **Hist 204 History of Civilization** ............... 3 (3,0)
- **Math 205 Cal. and Lin. Alg.** ................... 4 (5,0)
- **Modern Language** .................................. 3 (3,1)
- **Science** ............................................. 4
- **AS or MS—Basic** .................................. 1 (2,1)

### Second Semester
- **Engl 204 Surv. of Engl. & Am. Lit.** .......... 3 (3,0)
- **Math 205 Found. of Analysis** ................... 3 (3,0)
- **Modern Language** .................................. 3 (3,0)
- **Science** ............................................. 4
- **Social Science Elective** .......................... 3 (3,0)
- **AS or MS—Basic** .................................. 1 (2,1)

### Sophomore Year
- **Engl 203 Survey of Engl. Lit.** .................. 3 (3,0)
- **Math 206 Cal. of Sev. Var.** ..................... 4 (5,0)
- **Modern Language** .................................. 3 (3,1)
- **Science** ............................................. 4
- **AS or MS—Basic** .................................. 1 (2,1)

---

* Bot 101, Zool 101, 103 and a two-semester sequence in Chemistry, Geology, Physics, or Physical Science.

† Economics, Geography, Political Science, Sociology, Philosophy, Religion.

‡ This semester is a block schedule and must be taken as listed.

The teaching major requires twenty-four semester hours of junior and senior History courses:

Hist 499, 313 and at least one course from Group A and two courses each from Group B and C.


Group B: Hist 308, 309, 310, 312, 356, 357, 402, 404, 408.

Group C: Hist 331, 332, 340, 341, 342.
### First Semester
- **Ed 301 History of Am. Ed.** 3 (3,0)
- **Math 308 College Geometry** 3 (3,0)
- **Math 411 Linear Algebra** 3 (3,0)
- **Social Science Elective†** 3 (3,0)
- **Elective** 3

#### Junior Year
- **Arch 303 Evol. of Visual Arts** 3 (3,0)
- **Ed 302 Educational Psych.** 3 (3,0)
- **Math 313 Stat. Meth. I** 3 (3,0)
- **Math 412 Introd. to Mod. Alg.** 3 (3,0)
- **Elective** 3

15

### Second Semester
- **Ed 335 Adol. Growth and Dev.** 3 (3,0)
- **Ed 498 Sec. Sch. Reading** 3 (3,0)
- **Math 408 Topics in Geometry** 3 (3,0)
- **Math Electives** 6

#### Senior Year
- **Ed 412 Directed Teaching†** 6 (1,15)
- **Ed 424 Meth. & Mat. in Sec. Sch.** 3 (3,0)
- **Ed 458 Health Education** 3 (3,0)
- **Mus 310 Music Appreciation** 3 (3,0)

15

### Freshman Year
- **Engl 103 English Composition** 3 (3,0)
- **Hist 204 History of Civilization** 3 (3,0)
- **Math 101 Math. Anal. I** 3 (3,0)
- **Modern Language** 3 (3,0)
- **Science†** 4
- **AS or MS—Basic** 1 (2,1)

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### Sophomore Year
- **Engl 203 Survey of Engl. Lit.** 3 (3,0)
- **Modern Language** 3 (3,0)
- **Science†** 4
- **Social Science Elective†** 3 (3,0)
- **Elective** 3
- **AS or MS—Basic** 1 (2,1)

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### Junior Year
- **Ed 301 History of Am. Ed.** 3 (3,0)
- **Teaching Major** 9
- **Elective** 3

15

### Senior Year
- **Arch 303 Evol. of Visual Arts** 3 (3,0)
- **Ed 335 Adol. Growth and Dev.** 3 (3,0)
- **Ed 498 Sec. Sch. Reading** 3 (3,0)
- **Teaching Major** 6

15

Chemistry, Geology, Physics, or Physical Science.

† Economics, Geography, Political Science, Sociology, Philosophy, Religion.

† This semester is a block schedule and must be taken as listed.

The French teaching major consists of twenty-four semester hours including Fr 303, 304, 305, 306. Electives from Fr 403, 404, 406, 407, 408.

The German teaching major consists of twenty-four semester hours including Ger 303, 304, 305, 306. Electives to complete the requirement.

The Spanish teaching major consists of twenty-four semester hours including Span 303, 304, 305, 306. Electives from Span 401, 402, 405, 406.

A student desiring to become certified to teach a second Modern Language must complete the third year of the second language.
### TEACHING AREA: NATURAL SCIENCES

#### First Semester
- **Ch 101 General Chemistry** 4 (3,3)
- **Ed 100 Orientation** 0 (1,0)
- **Engl 101 English Composition** 3 (3,0)
- **Hist 203 History of Civilization** 3 (3,0)
- **Language** 3 (3,1)
- **Math 101 Math. Anal. I** 3 (3,0)
- **AS or MS—Basic** 1 (2,1)

#### Freshman Year

#### Second Semester
- **Ch 102 General Chemistry** 4 (3,3)
- **Engl 102 English Composition** 3 (3,0)
- **Hist 204 History of Civilization** 3 (3,0)
- **Language** 3 (3,1)
- **Math 102 Math. Anal. II** 3 (3,0)
- **AS or MS—Basic** 1 (2,1)

#### Sophomore Year
- **Bot 101 General Botany** 4 (3,3)
- **Engl 203 Surv. of Engl. Lit.** 3 (3,0)
- **Math 203 Elem. Stat. Infer** 3 (3,0)
- **Social Science Elective* 3
- **AS or MS—Basic** 1 (2,1)

#### Junior Year
- **Ed 301 History of Am. Ed.** 3 (3,0)
- **Geol 201 Phys. Geol.** 3 (3,0)
- **Geol 203 Phys. Geol. Lab.** 1 (0,3)
- **Phys 201 Gen. Phys.** 3 (3,0)
- **Phys 203 Gen. Phys. Lab.** 1 (0,3)
- **Elective** 3
- **Science Elective** 3

#### Senior Year
- **Arch 303 Evol. of Visual Arts** 3 (3,0)
- **Ed 412 Directed Teaching‡** 6 (1,15)
- **Ed 424 Meth. & Mat. in Sec. Sch.** 3 (3,0)
- **Ed 458 Health Education** 3 (3,0)
- **Mus 310 Music Appreciation** 3 (3,0)

---

Science electives to be taken in: Biological Sciences, Chemistry, Physics, Geology. This major will meet all state requirements for certification in Natural Science, General Science and one Science field.

* Economics, Geography, Political Science, Sociology, Philosophy, Religion.

† The last semester of the senior year is a block schedule and must be taken as listed. This program requires 129 semester hours for graduation.

### TEACHING AREA: PSYCHOLOGY

#### First Semester
- **Ed 100 Orientation** 0 (1,0)
- **Engl 101 English Composition** 3 (3,0)
- **Hist 203 Hist. of Civilization** 3 (3,0)
- **Math 101 Math. Anal. I** 3 (3,0)
- **Modern Language** 3 (3,1)
- **Science** 3 (3,0)
- **AS or MS—Basic** 1 (2,1)

#### Freshman Year

#### Second Semester
- **Engl 102 Engli Composition** 3 (3,0)
- **Hist 204 Hist. of Civilization** 3 (3,0)
- **Math 102 Math. Anal. II** 3 (3,0)
- **Modern Language** 3 (3,1)
- **Science** 4
- **AS or MS—Basic** 1 (2,1)

#### Sophomore Year
- **Engl 203 Surv. of Engl. Lit.** 3 (3,0)
- **Math 203 Elem. Stat. Infer** 3 (3,0)
- **Modern Language** 3 (3,1)
- **Psych 201 General Psychology** 3 (3,0)
- **Science** 4
- **Social Science Elective † 3 (3,0)
- **AS or MS—Basic** 1 (2,1)

---

* Bot 101, Zool 101, 103 and a two-semester sequence in Chemistry, Geology, Physics, or Physical Science.

† Economics, Geography, Philosophy, Political Science, Religion, Sociology.
### First Semester

<table>
<thead>
<tr>
<th>Course</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ed 301 Hist. of Amer. Ed.</td>
<td>3</td>
</tr>
<tr>
<td>Teaching Major</td>
<td>9</td>
</tr>
<tr>
<td>Elective</td>
<td>3</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>15</strong></td>
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### Second Semester

<table>
<thead>
<tr>
<th>Course</th>
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<tbody>
<tr>
<td>Ed 302 Educ, Psych.</td>
<td>3</td>
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<tr>
<td>Teaching Major</td>
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<tr>
<td>Social Science Elective †</td>
<td>3</td>
</tr>
<tr>
<td>Elective</td>
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<tr>
<td><strong>Total</strong></td>
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</tr>
</tbody>
</table>

### Senior Year

<table>
<thead>
<tr>
<th>Course</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>Arch 303 Evol. of Visual Arts</td>
<td>3</td>
</tr>
<tr>
<td>Ed 335 Adol. Growth &amp; Dev.</td>
<td>3</td>
</tr>
<tr>
<td>Ed 498 Sec. School Reading</td>
<td>3</td>
</tr>
<tr>
<td>Teaching Major</td>
<td>6</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>15</strong></td>
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</table>

### Junior Year

<table>
<thead>
<tr>
<th>Course</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ed 412 Direct Teach. †</td>
<td>6</td>
</tr>
<tr>
<td>Ed 424 Meth. &amp; Mat. in Sec. Schs.</td>
<td>3</td>
</tr>
<tr>
<td>Ed 458 Health Education</td>
<td>3</td>
</tr>
<tr>
<td>Mus 310 Music Appreciation</td>
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</tr>
<tr>
<td><strong>Total</strong></td>
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### Teaching Area: Sociology

### Freshman Year

<table>
<thead>
<tr>
<th>Course</th>
<th>Credits</th>
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</thead>
<tbody>
<tr>
<td>Ed 100 Orientation</td>
<td>0</td>
</tr>
<tr>
<td>Engl 101 English Composition</td>
<td>3</td>
</tr>
<tr>
<td>Hist 203 Hist. of Civilization</td>
<td>3</td>
</tr>
<tr>
<td>Modern Language</td>
<td>3</td>
</tr>
<tr>
<td>Science †</td>
<td>4</td>
</tr>
<tr>
<td>AS or MS—Basic</td>
<td>1</td>
</tr>
<tr>
<td><strong>Total</strong></td>
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### Sophomore Year

<table>
<thead>
<tr>
<th>Course</th>
<th>Credits</th>
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</thead>
<tbody>
<tr>
<td>Engl 204 Surv. of Engl. &amp; Am. Lit.</td>
<td>3</td>
</tr>
<tr>
<td>Math 203 Elem. Stat. Infer.</td>
<td>3</td>
</tr>
<tr>
<td>Modern Language</td>
<td>3</td>
</tr>
<tr>
<td>Soc 201 Introductory Soc.</td>
<td>3</td>
</tr>
<tr>
<td>Science †</td>
<td>4</td>
</tr>
<tr>
<td>AS or MS—Basic</td>
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<td><strong>Total</strong></td>
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### Junior Year

<table>
<thead>
<tr>
<th>Course</th>
<th>Credits</th>
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</thead>
<tbody>
<tr>
<td>Ed 301 Hist. of Amer. Ed.</td>
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<tr>
<td>Teaching Major</td>
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</tr>
<tr>
<td>Elective †</td>
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<tr>
<td><strong>Total</strong></td>
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### Senior Year

<table>
<thead>
<tr>
<th>Course</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>Arch 303 Evol. of Visual Arts</td>
<td>3</td>
</tr>
<tr>
<td>Ed 335 Adol. Growth &amp; Dev.</td>
<td>3</td>
</tr>
<tr>
<td>Ed 498 Sec. School Reading</td>
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</tr>
<tr>
<td>Teaching Major</td>
<td>6</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>15</strong></td>
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</tbody>
</table>

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† Economics, Geography, Philosophy, Political Science, Religion, Sociology.

† This semester is a block schedule and must be taken as listed.

The teaching major requires 24 semester hours of junior and senior courses selected from Psych 303, 321, 331, 341, 351, 361, 363, 401, 402, 403, Ed 302, 335, 422, 442, 471. Ed 335 is counted in the teaching area.

### TEACHING AREA: SOCIOLOGY

---

* Bot 101, Zool 101, 103; and a two-semester sequence in Chemistry, Physics, Geology or Physical Science.

† Electives must include Economics 201, 202, Philosophy 201, 302, Political Science 301.

The teaching major consists of Sociology 411, Sociology 421, and the remaining from Sociology 311, 321, 331, 341, 351, 361, 371, 431, 441, 451, 481.

The curriculum requires a minimum of 134 semester hours for graduation.
BACHELOR OF SCIENCE CURRICULUMS

AGRICULTURAL EDUCATION*

The Agricultural Education curriculum is designed for students who wish to prepare for positions in vocational agriculture, agricultural occupations, and other teaching positions in the secondary schools; engage in other forms of educational work such as agricultural missionary, public relations and agricultural extension; farming, soil conservation and other governmental work; business and industry.

The curriculum provides for a broad education in general and professional education including student teaching. In addition to required courses giving a thorough background in the agricultural and biological sciences, a student may minor in business or international agriculture or in one of six subject-matter fields. Students in other departments may minor in Agricultural Education and be certified to teach.

* Jointly administered by the School of Education and the College of Agriculture and Biological Sciences.

AGRICULTURAL EDUCATION CURRICULUM †

<table>
<thead>
<tr>
<th>Freshman Year*</th>
<th>Second Semester</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>First Semester</strong></td>
<td><strong>Second Semester</strong></td>
</tr>
<tr>
<td>Ag 101 Intro. to Agric. .......... 1 (1,0)</td>
<td>Ch 102 General Chemistry .......... 4 (3,3)</td>
</tr>
<tr>
<td>Bot 101 Gen. Botany .......... 4 (3,3)</td>
<td>Engl 102 English Composition .......... 3 (3,0)</td>
</tr>
<tr>
<td>or Zool 101 Gen. Zoology .......... 3 (3,0)</td>
<td>Math 104 Trigonometry .......... 2 (3,0)</td>
</tr>
<tr>
<td>Ch 101 General Chemistry .......... 4 (3,3)</td>
<td>and Zool 103 Gen. Zool. Lab. .......... 1 (0,2)</td>
</tr>
<tr>
<td>Engl 101 English Composition .......... 3 (3,0)</td>
<td>or Bot 101 Gen. Botany .......... 4 (3,3)</td>
</tr>
<tr>
<td>Math 103 College Algebra .......... 2 (3,0)</td>
<td>Social Science Elective† .......... 3 (3,0)</td>
</tr>
<tr>
<td>AS or MS—Basic .......... 1 (2,1)</td>
<td>AS or MS—Basic .......... 1 (2,1)</td>
</tr>
<tr>
<td><strong>15</strong></td>
<td><strong>17</strong></td>
</tr>
</tbody>
</table>

† Jointly administered by the School of Education and the College of Agriculture and Biological Sciences.

* Horticulture (Ornamental) students take EG 101, Freehand Sketching—1 cr. (0.3), in addition to other courses in the first semester.

† To be selected from the following: Hist 102, Phil 201, Psych 201, Soc 201.

<table>
<thead>
<tr>
<th>Sophomore Year</th>
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</thead>
<tbody>
<tr>
<td>Ag 202 Intro. to Plant Sciences .......... 3 (2,3)</td>
</tr>
<tr>
<td>Ag Ed 201 Intro. to Agric. Ed. .......... 3 (2,2)</td>
</tr>
<tr>
<td>Econ 201 Principles of Econ. .......... 3 (3,0)</td>
</tr>
<tr>
<td>Hist 203 History of Civilization .......... 3 (3,0)</td>
</tr>
<tr>
<td>or Engl 203 Surv. of Engl. Lit.* .......... 3 (3,0)</td>
</tr>
<tr>
<td>Phys 201 Gen. Physics .......... 3 (3,0)</td>
</tr>
<tr>
<td>Phys 203 Gen. Physics Lab. .......... 1 (0,3)</td>
</tr>
<tr>
<td>AS or MS—Basic .......... 1 (2,1)</td>
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<tr>
<td><strong>17</strong></td>
</tr>
</tbody>
</table>

* At least one literature course is required.
INDUSTRIAL EDUCATION

The curriculum in Industrial Education is designed to prepare students for careers in the teaching of industrial subjects and in training programs in industry. To accomplish these purposes the curriculum is divided into three areas of specialization leading to the degree of Bachelor of Science in Industrial Education. At the end of his freshman year, each student will select one of three options: Industrial Arts Education, Vocational-Technical Education, or Education for Industry. Each option requires 135 semester hours of course work.

The Industrial Arts Education option is for those students who desire to teach industrial arts in the secondary schools. Industrial arts is the subject area in the public school system which attempts to provide youth with an interpretation of American industry. It is a general education subject designed to give students exploratory experience in the classroom and laboratory. Majors in this option are qualified for full certification as secondary school teachers of industrial arts.

The Vocational-Technical Education option is designed to prepare teachers of vocational and technical subjects in the Senior High Schools, Area Vocational Schools, and Technical Education Centers. All elective courses in this option will be in an area of specialization or related fields. Teachers graduating from this option will possess the skills and knowledge required to teach the occupation or family of occupations in their area of specialization.

The Education for Industry option is designed to prepare students to enter industry as training specialists. Due to the expansion of technology and industrial development, there is a rapidly increasing demand for training specialists and training directors in industry.
There are unlimited opportunities in industry for graduates of this option.

INDUSTRIAL EDUCATION CURRICULUM

<table>
<thead>
<tr>
<th>First Semester</th>
<th>Second Semester</th>
</tr>
</thead>
<tbody>
<tr>
<td>Engl 101 English Composition</td>
<td>Engl 102 English Composition</td>
</tr>
<tr>
<td>In Ed 101 In. Ed. Lab.</td>
<td>In Ed 102 In. Ed. Lab. (Wood)</td>
</tr>
<tr>
<td>Math 103 College Algebra</td>
<td>Math 104 Trigonometry</td>
</tr>
<tr>
<td>Science Elective</td>
<td>Science Elective</td>
</tr>
<tr>
<td>Social Science Elective†</td>
<td>Social Science Elective†</td>
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<tr>
<td>AS or MS—Basic</td>
<td>AS or MS—Basic</td>
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<table>
<thead>
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<th>Freshman Year</th>
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<tbody>
<tr>
<td>Freshman Year</td>
<td>14</td>
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<tr>
<td>Freshman Year</td>
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</table>

EDUCATION FOR INDUSTRY OPTION †

<table>
<thead>
<tr>
<th>Sophomore Year</th>
<th></th>
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</thead>
<tbody>
<tr>
<td>Sophomore Year</td>
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<tr>
<td>Sophomore Year</td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>Junior Year</th>
<th></th>
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</thead>
<tbody>
<tr>
<td>Junior Year</td>
<td>17</td>
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<tr>
<td>Junior Year</td>
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</table>

<table>
<thead>
<tr>
<th>Senior Year</th>
<th></th>
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</thead>
<tbody>
<tr>
<td>Senior Year</td>
<td>18</td>
</tr>
<tr>
<td>Senior Year</td>
<td>18</td>
</tr>
</tbody>
</table>

* Science electives to be selected from Chemistry, Physics, Geology, Botany, or Zoology. At least two fields must be represented, one of which must be in the biological sciences.

† Social Science electives to be selected from History, Sociology, Economics, Political Science, Religion, or Philosophy.

† One summer (400 clock hours) of field experience is required of each student following the completion of his sophomore year.
### INDUSTRIAL ARTS EDUCATION OPTION

#### Sophomore Year

<table>
<thead>
<tr>
<th>First Semester</th>
<th>Second Semester</th>
</tr>
</thead>
<tbody>
<tr>
<td>EG 201 Eng. Graph. for In. Ed.</td>
<td>Cre 303 Ceramic Prod.</td>
</tr>
<tr>
<td>In Ed 203 In. Ed. Lab. (Metal)</td>
<td>Eng 204 Surv. of Engl. &amp; Am. Lit.</td>
</tr>
<tr>
<td>Math 106 Cal. of One Var.</td>
<td>EG 202 Graphic Tech. for In. Ed.</td>
</tr>
<tr>
<td>Science Elective°</td>
<td>In Ed 204 Graphic Arts</td>
</tr>
<tr>
<td>AS or MS—Basic</td>
<td>In Ed 205 Power Technology</td>
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</tbody>
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**Approved: 18**

#### Junior Year

<table>
<thead>
<tr>
<th>First Semester</th>
<th>Second Semester</th>
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</thead>
<tbody>
<tr>
<td>EE 303 Intro. to Elec. Engr.</td>
<td>In Ed 205 In. Ed. Lab. (Mach.)</td>
</tr>
<tr>
<td>In Ed 302 Dwell. Mat. &amp; Constr.</td>
<td>In Ed 333 Design</td>
</tr>
<tr>
<td>In Ed 303 In. Ed. Lab. (Elec.)</td>
<td>In Ed 441 Com. Shop Practice</td>
</tr>
<tr>
<td>Text 460 Textile Processes</td>
<td>Social Science Elective †</td>
</tr>
<tr>
<td>Approved Elective</td>
<td>Approved Elective</td>
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**Approved: 18**

#### Senior Year

<table>
<thead>
<tr>
<th>First Semester</th>
<th>Second Semester</th>
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<tbody>
<tr>
<td>Arch 303 Evol. of Visual Arts</td>
<td>Ed 58 Health Education</td>
</tr>
<tr>
<td>Ed 406 Hist. &amp; Philos. of Ed.</td>
<td>In Ed 402 Directed Teaching</td>
</tr>
<tr>
<td>Engl 301 Public Speaking</td>
<td>In Ed 425 Teaching Ind. Subj.</td>
</tr>
<tr>
<td>In Ed 405 Tests and Meas. in</td>
<td>Mus 310 Music Appreciation</td>
</tr>
<tr>
<td>In. Ed.</td>
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</tr>
<tr>
<td>In Ed 422 Voc. Ed. Programs</td>
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</table>

**Approved: 18**

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*° Science electives to be selected from Chemistry, Physics, Geology, Botany, or Zoology. At least two fields must be represented, one of which must be in the biological sciences.

† Social Science electives to be selected from History, Sociology, Economics, Political Science, Religion, or Philosophy. At least two fields must be represented, with six, but not more than six, hours in one field.

### VOCATIONAL-TECHNICAL EDUCATION OPTION

#### Sophomore Year

<table>
<thead>
<tr>
<th>First Semester</th>
<th>Second Semester</th>
</tr>
</thead>
<tbody>
<tr>
<td>EG 201 Engr. Graph for In. Ed.</td>
<td>EG 202 Graphic Tech. for In. Ed.</td>
</tr>
<tr>
<td>In Ed 203 In. Ed. Lab. (Metal)</td>
<td>In Ed 204 Graphic Arts</td>
</tr>
<tr>
<td>Math 106 Cal. of One Var.</td>
<td>In Ed 205 Power Technology</td>
</tr>
<tr>
<td>Science Elective°</td>
<td>Social Science Electives†</td>
</tr>
<tr>
<td>AS or MS—Basic</td>
<td>AS or MS—Basic</td>
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**Approved: 18**

#### Junior Year

<table>
<thead>
<tr>
<th>First Semester</th>
<th>Second Semester</th>
</tr>
</thead>
<tbody>
<tr>
<td>Engl 301 Public Speaking</td>
<td>In Ed 305 In. Ed. Lab. (Mach.)</td>
</tr>
<tr>
<td>In Ed 302 Dwell. Mat. &amp; Constr.</td>
<td>In Ed 333 Design</td>
</tr>
<tr>
<td>Approved Electives (in field of specialization)</td>
<td>Approved Electives (in field of specialization)</td>
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**Approved: 18**

#### Senior Year

<table>
<thead>
<tr>
<th>First Semester</th>
<th>Second Semester</th>
</tr>
</thead>
<tbody>
<tr>
<td>Arch 303 Evol. of Visual Arts</td>
<td>Ed 458 Health Education</td>
</tr>
<tr>
<td>Ed 406 Hist. &amp; Philos. of Ed.</td>
<td>In Ed 402 Directed Teaching</td>
</tr>
<tr>
<td>In Ed 405 Tests &amp; Meas. in In. Ed.</td>
<td>In Ed 425 Teaching Ind. Subj.</td>
</tr>
<tr>
<td>In Ed 422 Voc. Ed. Programs</td>
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<tr>
<td>Approved Elective</td>
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</tbody>
</table>

**Approved: 18**

*° Science electives to be selected from Chemistry, Physics, Geology, Botany, or Zoology. At least two fields must be represented, one of which must be in the biological sciences.

† Social Science electives to be selected from History, Sociology, Economics, Political Science, Religion, or Philosophy. At least two fields must be represented, with six, but not more than six, hours in one field.
RECREATION AND PARK ADMINISTRATION

The curriculum in Recreation and Park Administration provides training for students who desire to become recreation supervisors and directors and park administrators. Graduates plan and supervise recreation programs in industry, institutions, municipalities and rural communities. The program which leads to a Bachelor of Science degree is designed to provide competencies in recreation administration, management, development, planning, and research. It requires 135 semester hours, including field training during one summer, for completion.

**RECREATION AND PARK ADMINISTRATION CURRICULUM**

<table>
<thead>
<tr>
<th>First Semester</th>
<th>Freshman Year</th>
<th>Second Semester</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bot 101 General Botany</td>
<td>4 (3,3)</td>
<td>Econ 201 Prin. of Econ.</td>
</tr>
<tr>
<td>Engl 101 English Composition</td>
<td>3 (3,0)</td>
<td>Engl 103 English Composition</td>
</tr>
<tr>
<td>Hist 102 American History</td>
<td>3 (3,0)</td>
<td>Math 104 Trigonometry</td>
</tr>
<tr>
<td>Math 103 College Algebra</td>
<td>2 (3,0)</td>
<td>RPA 102 Hist. and Prin. of Outdoor Rec.</td>
</tr>
<tr>
<td>RPA 101 Introd. to Com. Rec.</td>
<td>3 (3,0)</td>
<td>Zool 101, 103 Gen. Zoology</td>
</tr>
<tr>
<td>AS or MS—Basic</td>
<td>1 (2,1)</td>
<td>AS or MS—Basic</td>
</tr>
<tr>
<td><strong>16</strong></td>
<td></td>
<td><strong>16</strong></td>
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**Sophomore Year**

<p>| | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Engl 203 Surv. of Engl. Lit.</td>
<td>3 (3,0)</td>
<td>Acct 201 Prin. of Acct.</td>
</tr>
<tr>
<td>Physical Science</td>
<td>4</td>
<td>Engl 204 Surv. of Amer. and Eng. Lit.</td>
</tr>
<tr>
<td>Psych 201 Gen. Psych.</td>
<td>3 (3,0)</td>
<td>Physical Science</td>
</tr>
<tr>
<td>RPA 201 Meth. and Tech. of Rec. Leadership</td>
<td>3 (3,0)</td>
<td>RPA 202 Mgt. of Aquatic Facil.</td>
</tr>
<tr>
<td>Soc 201 Introd. to Soc.</td>
<td>3 (3,0)</td>
<td>RPA 203 Pers. and Com. Health</td>
</tr>
<tr>
<td>AS or MS—Basic</td>
<td>1 (2,1)</td>
<td>AS or MS—Basic</td>
</tr>
<tr>
<td><strong>16</strong></td>
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<td><strong>16</strong></td>
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</table>

**Junior Year**

<p>| | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
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</thead>
<tbody>
<tr>
<td>Engl 301 Public Speaking</td>
<td>3 (3,0)</td>
<td>Ed 335 Adol. Growth and Develop.</td>
</tr>
<tr>
<td>Hort 303 Plant Materials I</td>
<td>3 (2,3)</td>
<td>Hort 308 Landscape Design</td>
</tr>
<tr>
<td>RPA 302 Camp Org. and Adm.</td>
<td>3 (2,3)</td>
<td>IM 307 Personnel Mgt.</td>
</tr>
<tr>
<td>RPA 306 Prin. of Outdoor Rec.</td>
<td>3 (3,0)</td>
<td>RPA 301 Sports in Recreation</td>
</tr>
<tr>
<td>Elective</td>
<td></td>
<td>RPA 303 Prog. Plan. for Rec.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Elective</td>
</tr>
<tr>
<td><strong>15</strong></td>
<td></td>
<td><strong>17</strong></td>
</tr>
</tbody>
</table>

**SUMMER**

RPA 405 Field Training in Recreation ...... 6

<table>
<thead>
<tr>
<th>First Semester</th>
<th>Senior Year</th>
<th>Second Semester</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ag Ec 352 Public Finance</td>
<td>3 (3,0)</td>
<td>RPA 402 Rec. Adm.</td>
</tr>
<tr>
<td>Ed 491 Descrip. Stat.</td>
<td>3 (3,0)</td>
<td>RPA 403 Facility and Site Plan.</td>
</tr>
<tr>
<td>For 406 For. Pol. and Adm.</td>
<td>2 (2,0)</td>
<td>RPA 404 Meth. of Rec. Research</td>
</tr>
<tr>
<td>Pol Sc 302 State and Local Govt.</td>
<td>3 (3,0)</td>
<td>Soc 331 Urban Sociology</td>
</tr>
<tr>
<td>RPA 401 Pk. Main. and Oper.</td>
<td>3 (3,0)</td>
<td>Elective</td>
</tr>
<tr>
<td>Elective</td>
<td></td>
<td><strong>15</strong></td>
</tr>
</tbody>
</table>

*Two-semester sequence in Chemistry, Geology, Physics, or Physical Science I, II.
SCIENCE TEACHING

The program leading to a Bachelor of Science degree in Science Teaching is designed for students planning to teach Mathematics, Biology, Chemistry or Physics and General Science on the secondary school level.

It requires a major concentration in Mathematics, Biological Sciences, Chemistry or Physics. The required science electives are included to give some degree of competency in a field other than the major area.

A student must have a minimum of 130 semester hours of credit for graduation.

TEACHING AREA: BIOLOGICAL SCIENCES

<table>
<thead>
<tr>
<th>First Semester</th>
<th>Freshman Year</th>
<th>Second Semester</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ch 101 General Chemistry</td>
<td>4 (3,3)</td>
<td>Ch 102 General Chemistry</td>
</tr>
<tr>
<td>Ed 100 Orientation</td>
<td>0 (1,0)</td>
<td>Engl 102 English Composition</td>
</tr>
<tr>
<td>Engl 101 English Composition</td>
<td>3 (3,0)</td>
<td>Hist 204 History of Civilization</td>
</tr>
<tr>
<td>Hist 203 History of Civilization</td>
<td>3 (3,0)</td>
<td>Math 106 Cal. of One Var.</td>
</tr>
<tr>
<td>Math 103 College Algebra</td>
<td>2 (3,0)</td>
<td>AS or MS—Basic</td>
</tr>
<tr>
<td>Math 104 Trigonometry</td>
<td>2 (3,0)</td>
<td></td>
</tr>
<tr>
<td>AS or MS—Basic</td>
<td>1 (2,1)</td>
<td></td>
</tr>
<tr>
<td>15</td>
<td></td>
<td>15</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Sophomore Year</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bot 101 General Botany</td>
</tr>
<tr>
<td>Engl 203 Surv. of Engl. Lit</td>
</tr>
<tr>
<td>Chemistry Elective</td>
</tr>
<tr>
<td>Phys 201 Gen. Phys.</td>
</tr>
<tr>
<td>Phys 203 Gen. Physics Lab.</td>
</tr>
<tr>
<td>AS or MS—Basic</td>
</tr>
<tr>
<td>16</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Junior Year</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bot 202 Surv. of Plant Kingdom</td>
</tr>
<tr>
<td>Ed 301 History of Am. Ed.</td>
</tr>
<tr>
<td>Zool 301 Vertebrate Anatomy</td>
</tr>
<tr>
<td>Science Elective</td>
</tr>
<tr>
<td>Social Science Elective*</td>
</tr>
<tr>
<td>Elective</td>
</tr>
<tr>
<td>19</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Senior Year</th>
</tr>
</thead>
<tbody>
<tr>
<td>Arch 303 Evol. of Visual Arts</td>
</tr>
<tr>
<td>Ed 335 Adol. Growth &amp; Develop.</td>
</tr>
<tr>
<td>Ed 498 Sec. Sch. Reading</td>
</tr>
<tr>
<td>Major Electives†</td>
</tr>
<tr>
<td>Elective</td>
</tr>
<tr>
<td>18 or 19</td>
</tr>
</tbody>
</table>

* Economics, Geography, Philosophy, Political Science, Religion, Sociology.
† Botany, Genetics, Microbiology, Zoology.
† Block schedule must be taken as shown.
### TEACHING AREA: CHEMISTRY

#### Freshman Year

<table>
<thead>
<tr>
<th>First Semester</th>
<th>Second Semester</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ch 101 General Chemistry</td>
<td>Ch 102 General Chemistry</td>
</tr>
<tr>
<td>Ed 100 Orientation</td>
<td>Eng 102 English Composition</td>
</tr>
<tr>
<td>Engl 101 English Composition</td>
<td>Hist 204 History of Civilization</td>
</tr>
<tr>
<td>Math 106 Cal. of One Var.</td>
<td>AS or MS—Basic</td>
</tr>
<tr>
<td>AS or MS—Basic</td>
<td>1</td>
</tr>
<tr>
<td><strong>15</strong></td>
<td></td>
</tr>
</tbody>
</table>

#### Sophomore Year

<table>
<thead>
<tr>
<th>Bot 101 General Botany</th>
<th>Engl 204 Surv. of Engl. &amp; Am. Lit.</th>
</tr>
</thead>
<tbody>
<tr>
<td>AS or MS—Basic</td>
<td>Social Science Elective*</td>
</tr>
<tr>
<td><strong>16</strong></td>
<td>1</td>
</tr>
</tbody>
</table>

#### Junior Year

<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Ch 223 Organic Chemistry</td>
<td>Ch 219 Chemical Principles</td>
</tr>
<tr>
<td>Ch 227 Organic Chem. Lab.</td>
<td>Ch 224 Organic Chemistry</td>
</tr>
<tr>
<td>Ch 315 Quantitative Analysis</td>
<td>Ch 331 Physical Chem.</td>
</tr>
<tr>
<td>Science Elective</td>
<td>Ch 339 Physical Chem. Lab.</td>
</tr>
<tr>
<td>Social Science Elective*</td>
<td>Science Elective</td>
</tr>
<tr>
<td>Elective</td>
<td><strong>3</strong></td>
</tr>
</tbody>
</table>

#### Senior Year

<table>
<thead>
<tr>
<th>Arch 303 Evol. of Visual Arts</th>
<th>Ed 412 Directed Teaching†</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ch 332 Physical Chem.</td>
<td>Ed 424 Meth. &amp; Mat. in Sec. Sch.</td>
</tr>
<tr>
<td>Ch 334 Physical Chem. Lab.</td>
<td>Ed 458 Health Education</td>
</tr>
<tr>
<td>Ch 402 Inorganic Chemistry</td>
<td>Mus 310 Music Appreciation</td>
</tr>
<tr>
<td>Ed 335 Adol. Growth &amp; Develop.</td>
<td><strong>3</strong></td>
</tr>
<tr>
<td>Ed 498 Sec. Sch. Reading</td>
<td><strong>3</strong></td>
</tr>
</tbody>
</table>

* Economics, Geography, Philosophy, Political Science, Religion, Sociology.
† Block schedule must be taken as shown.

### TEACHING AREA: PHYSICS

#### Freshman Year

<table>
<thead>
<tr>
<th>Ch 101 General Chemistry</th>
<th>Ch 102 General Chemistry</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ed 100 Orientation</td>
<td>Eng 102 English Composition</td>
</tr>
<tr>
<td>Engl 101 English Composition</td>
<td>Hist 204 History of Civilization</td>
</tr>
<tr>
<td>AS or MS—Basic</td>
<td><strong>1</strong></td>
</tr>
<tr>
<td><strong>15</strong></td>
<td></td>
</tr>
</tbody>
</table>

#### Sophomore Year

<table>
<thead>
<tr>
<th>Bot 101 General Botany</th>
<th>Engl 204 Surv. of Engl. &amp; Am. Lit.</th>
</tr>
</thead>
<tbody>
<tr>
<td>AS or MS—Basic</td>
<td>Zool 103 Gen. Zoology Lab.</td>
</tr>
<tr>
<td><strong>16</strong></td>
<td>1</td>
</tr>
<tr>
<td>AS or MS—Basic</td>
<td><strong>1</strong></td>
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</tbody>
</table>
### Degrees and Curriculums

#### First Semester
<table>
<thead>
<tr>
<th>Course</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ed 301 History of Am. Ed.</td>
<td>3 (3.0)</td>
</tr>
<tr>
<td>Phys 304 Descriptive Astronomy</td>
<td>3 (3.0)</td>
</tr>
<tr>
<td>Phys 321 Mechanics I</td>
<td>3 (3.0)</td>
</tr>
<tr>
<td>Science Elective</td>
<td>3</td>
</tr>
<tr>
<td>Social Science Elective*</td>
<td>3</td>
</tr>
<tr>
<td>Elective</td>
<td></td>
</tr>
</tbody>
</table>

**Total Credits:** 18

#### Second Semester
<table>
<thead>
<tr>
<th>Course</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ed 302 Educational Psych.</td>
<td>3 (3.0)</td>
</tr>
<tr>
<td>Phys 322 Mechanics II</td>
<td>3 (3.0)</td>
</tr>
<tr>
<td>Phys 325 Experimental Phys. I</td>
<td>4 (2.0)</td>
</tr>
<tr>
<td>Phys 341 Electricity &amp; Magnetism</td>
<td>3 (3.0)</td>
</tr>
<tr>
<td>Social Science Elective*</td>
<td>3</td>
</tr>
</tbody>
</table>

**Total Credits:** 16

#### Junior Year
<table>
<thead>
<tr>
<th>Course</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>Arch 303 Evol. of Visual Arts</td>
<td>3 (3.0)</td>
</tr>
<tr>
<td>Ed 335 Adol. Growth &amp; Develop.</td>
<td>3 (3.0)</td>
</tr>
<tr>
<td>Ed 498 Sec. Sch. Reading</td>
<td>3 (3.0)</td>
</tr>
<tr>
<td>Phys 326 Exp. Physics II</td>
<td>4 (2.6)</td>
</tr>
<tr>
<td>Phys 455 Quantum Phys. I</td>
<td>3 (3.0)</td>
</tr>
<tr>
<td>or Phys 460 Modern Phys.</td>
<td>3 (3.0)</td>
</tr>
<tr>
<td>Elective</td>
<td>3</td>
</tr>
</tbody>
</table>

**Total Credits:** 19

#### Sophomore Year
<table>
<thead>
<tr>
<th>Course</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ch 101 General Chemistry</td>
<td>4 (3.3)</td>
</tr>
<tr>
<td>Ed 100 Orientation</td>
<td>0 (1.0)</td>
</tr>
<tr>
<td>Engl 101 English Composition</td>
<td>3 (3.0)</td>
</tr>
<tr>
<td>Hist 203 History of Civilization</td>
<td>3 (3.0)</td>
</tr>
<tr>
<td>Math 106 Cal. of One Var.</td>
<td>4 (5.0)</td>
</tr>
<tr>
<td>AS or MS—Basic</td>
<td>1 (2.1)</td>
</tr>
</tbody>
</table>

**Total Credits:** 15

#### Junior Year
<table>
<thead>
<tr>
<th>Course</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ed 301 History of Am. Ed.</td>
<td>3 (3.0)</td>
</tr>
<tr>
<td>Math 308 College Geometry</td>
<td>8 (3.0)</td>
</tr>
<tr>
<td>Math 411 Linear Algebra</td>
<td>3 (3.0)</td>
</tr>
<tr>
<td>Science Elective</td>
<td>3</td>
</tr>
<tr>
<td>Social Science Elective*</td>
<td>3</td>
</tr>
<tr>
<td>Elective</td>
<td></td>
</tr>
</tbody>
</table>

**Total Credits:** 18

#### Senior Year
<table>
<thead>
<tr>
<th>Course</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>Arch 303 Evol. of Visual Arts</td>
<td>3 (3.0)</td>
</tr>
<tr>
<td>Ed 335 Adol. Growth &amp; Develop.</td>
<td>3 (3.0)</td>
</tr>
<tr>
<td>Ed 498 Sec. Sch. Reading</td>
<td>3 (3.0)</td>
</tr>
<tr>
<td>Math 408 Topics in Geometry</td>
<td>3 (3.0)</td>
</tr>
<tr>
<td>Math Elective</td>
<td>6 (6.0)</td>
</tr>
</tbody>
</table>

**Total Credits:** 15

#### Freshman Year
<table>
<thead>
<tr>
<th>Course</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ch 102 General Chemistry</td>
<td>4 (3.3)</td>
</tr>
<tr>
<td>Engl 102 English Composition</td>
<td>3 (3.0)</td>
</tr>
<tr>
<td>Hist 204 History of Civilization</td>
<td>3 (3.0)</td>
</tr>
<tr>
<td>Math 205 Cal. and Lin. Alg.</td>
<td>4 (5.0)</td>
</tr>
<tr>
<td>AS or MS—Basic</td>
<td>1 (2.1)</td>
</tr>
</tbody>
</table>

**Total Credits:** 15

#### Sophomore Year
<table>
<thead>
<tr>
<th>Course</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bot 101 General Botany</td>
<td>4 (3.3)</td>
</tr>
<tr>
<td>Engl 203 Surv. of Engl. Lit.</td>
<td>3 (3.0)</td>
</tr>
<tr>
<td>Math 206 Cal. of Surv. Var.</td>
<td>4 (5.0)</td>
</tr>
<tr>
<td>Phys 201 Gen. Phys.</td>
<td>3 (3.0)</td>
</tr>
<tr>
<td>Phys 203 Gen. Physics Lab.</td>
<td>1 (0.3)</td>
</tr>
<tr>
<td>AS or MS—Basic</td>
<td>1 (2.1)</td>
</tr>
</tbody>
</table>

**Total Credits:** 16

#### Junior Year
<table>
<thead>
<tr>
<th>Course</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ed 302 Educational Psych.</td>
<td>3 (3.0)</td>
</tr>
<tr>
<td>Math 318 Stat. Th. &amp; Meth. I</td>
<td>3 (3.0)</td>
</tr>
<tr>
<td>Math 412 Intro. to Mod. Algebra</td>
<td>3 (3.0)</td>
</tr>
<tr>
<td>Science Elective</td>
<td>3</td>
</tr>
<tr>
<td>Social Science Elective*</td>
<td>3</td>
</tr>
<tr>
<td>Elective</td>
<td></td>
</tr>
</tbody>
</table>

**Total Credits:** 18

#### Senior Year
<table>
<thead>
<tr>
<th>Course</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ed 412 Directed Teaching†</td>
<td>6 (1.15)</td>
</tr>
<tr>
<td>Ed 424 Meth. &amp; Mat. in Sec. Sch.</td>
<td>3 (3.0)</td>
</tr>
<tr>
<td>Ed 458 Health Education</td>
<td>3 (3.0)</td>
</tr>
<tr>
<td>Mus 310 Music Appreciation</td>
<td>3 (3.0)</td>
</tr>
</tbody>
</table>

**Total Credits:** 15

*Economics, Geography, Philosophy, Political Science, Religion, Sociology.
† Block schedule must be taken as shown.
COLLEGE OF ENGINEERING

Two types of undergraduate programs are offered by the College of Engineering. These are the professional curricular programs and the engineering analysis program. Each type leads to a wide range of career opportunities and serves as preparation for further study at the graduate level.

Professional Curriculums: Six four-year, professional oriented curriculums are offered by the College of Engineering, namely, Agricultural Engineering, Ceramic Engineering, Chemical Engineering, Civil Engineering, Electrical Engineering, and Mechanical Engineering. Each of these curriculums is accredited by the Engineers Council for Professional Development, the recognized national accrediting agency for professional curriculums in engineering. The curriculum in Agricultural Engineering is jointly administered by the College of Agriculture and Biological Sciences and the College of Engineering.

Although the College of Engineering does not offer specific options or majors in each of these professional curriculums, the instruction includes many phases of each respective field. Thus, a Civil Engineering student is graduated in Civil Engineering rather than Structural Engineering, Highway Engineering, Sanitary Engineering, or other such options. However, a student who wishes to study within the areas encompassed by these options will find adequate courses within the Civil Engineering curriculum to prepare himself for work in any of these areas. In the same way the other engineering curriculums include thorough education in various phases of the field of specialization without over-emphasizing one phase to the neglect of others. The professional curriculums lead to a Bachelor of Science degree in the specific professional area.

The courses required in all professional curriculums for the freshman year are as follows:

<table>
<thead>
<tr>
<th>First Semester</th>
<th>Freshman Year</th>
<th>Second Semester*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ch 101 General Chemistry</td>
<td>4 (3.3)</td>
<td>Ch 102 General Chemistry</td>
</tr>
<tr>
<td>Engr 101 Engineering Systems</td>
<td>0 (1.0)</td>
<td>Engl 102 English Composition</td>
</tr>
<tr>
<td>EG 109 Engr. Graph. Com.</td>
<td>2 (0.6)</td>
<td>Humanistic—Social Elective</td>
</tr>
<tr>
<td>or Humanistic—Social Elective</td>
<td>3 (3.0)</td>
<td>or EG 109 Engr. Graph. Com.</td>
</tr>
<tr>
<td>Engl 101 English Composition</td>
<td>3 (3.0)</td>
<td>Math 205 Cal. and Lin. Alg.</td>
</tr>
<tr>
<td>Math 109 Cal. of One Var.</td>
<td>4 (5.0)</td>
<td>Phys 122 Mech. and Wave Phen.</td>
</tr>
<tr>
<td>Humanistic—Social Elective</td>
<td>3 (3.0)</td>
<td>AS or MS—Basic</td>
</tr>
<tr>
<td>AS or MS—Basic</td>
<td>1 (2.1)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>17 or 18</td>
<td></td>
</tr>
</tbody>
</table>

* Agricultural Engineering students take Ag 101, Introduction to Agriculture, in addition to other courses in the second semester.

Engineering Analysis Curriculum: This curriculum is a four-year, engineering science-oriented course of study. Its objectives are
two-fold. These are (1) to prepare a student for employment in areas of engineering activity requiring a high level of analytical competency, and (2) to provide a flexible undergraduate preparation for the study of engineering at the graduate level.

The curriculum leads to the Bachelor of Science degree in Engineering Analysis. Requirements for this degree are stated in terms of subject matter area rather than in terms of specific courses. This latitude of course selection permits maximum accommodation of the individual student’s interests and career objectives. Degree requirements are as follows:

<table>
<thead>
<tr>
<th>Subject Matter Area</th>
<th>Semester Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mathematics (including 12 credits of post-calculus math)</td>
<td>24</td>
</tr>
<tr>
<td>Basic Science (including 9 credits of physics)</td>
<td>16</td>
</tr>
<tr>
<td>Engineering Science (distributed in at least six science areas)</td>
<td>32</td>
</tr>
<tr>
<td>Humanistic-Social Studies</td>
<td>32</td>
</tr>
<tr>
<td>Electives</td>
<td>30</td>
</tr>
<tr>
<td>AS or MS—Basic</td>
<td>4</td>
</tr>
</tbody>
</table>

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The educational objectives of the program will be met by the selection of an area of concentration which will be chosen from several specialty areas offered within the other professional engineering curriculums. The selection of specific courses, particularly in the junior and senior years, will then depend primarily on the choice of the area of concentration.

Maximum flexibility within this program is achieved by permitting a student to defer his choice of specialization until the junior year or later. Such deferral will then allow students from junior and senior colleges not offering engineering to transfer into the program with little or no loss in academic credit.

Information is available from the office of the Dean of Engineering which lists the courses approved for inclusion in each of the above subject matter areas.

AGRICULTURAL ENGINEERING*

The graduate in Agricultural Engineering, with broad training in mathematics, physics, chemistry, and the biological sciences as well as comprehensive coverage of the engineering sciences, is well equipped to apply engineering to many functions affecting the well-being of mankind. The Agricultural Engineer is sought by industry...

* The Agricultural Engineering curriculum is jointly administered by the College of Agriculture and Biological Sciences and the College of Engineering.
and public service organizations primarily for his ability to apply engineering know-how to agricultural production and processing, and to the conservation of land and water resources. Specific areas of interest include power and machinery, soil and water resources engineering, electric power and processing, structures and environment, and food engineering.

The undergraduate Agricultural Engineering curriculum leads to the Bachelor of Science degree. Based upon fundamental training in the basic sciences, the curriculum includes such engineering sciences as mechanics, fluids, thermodynamics, electrical theory, computing devices and systems analyses. The basic agricultural sciences of soils, plants and animals are included so as to provide a foundation for Agricultural Engineering analysis and design. Recognition is also given to the necessity for being able to synthesize information from any of the applicable subject matter areas, including studies of energy conversion, engineering analysis and the engineering properties of biological materials, and with emphasis upon economy and integrity of design. Research is included in order to introduce the student to the scientific method. Courses in the humanities are required to provide the graduate engineer with a well-rounded educational experience.

The undergraduate curriculum is designed for both the student who wishes to terminate his formal academic training at the bachelor's level, and also to provide the necessary prerequisites for those who wish to continue in graduate study. Graduate programs in Agricultural Engineering which lead to both the Master of Science and the Doctor of Philosophy degrees are offered.

Since an Agricultural Engineering graduate has a broad training in engineering, in the sciences, in humanities, and in life sciences, he has the pick of opportunities in many areas. Opportunities in Agricultural Engineering include employment with industry as design engineers, research engineers, production engineers, and in sales and service; with state and federal agencies as teachers, research engineers, and extension engineers; as field engineers with the Soil Conservation Service, Bureau of Reclamation, and similar organizations; and with agricultural enterprises as managers, contractors, equipment retailers and as consulting engineers.

The Agricultural Engineering curriculum is accredited by the Engineers' Council for Professional Development.
AGRICULTURAL ENGINEERING CURRICULUM
(See page 183 for Freshman Year)

First Semester

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Name</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>AgE 221</td>
<td>Soil and Water Res. Engr.</td>
<td>3 (2,3)</td>
</tr>
<tr>
<td>EM 201</td>
<td>Engr. Mech. (Statics)</td>
<td>3 (3,0)</td>
</tr>
<tr>
<td>Engl 203</td>
<td>Survey of Engl. Lit.</td>
<td>3 (3,0)</td>
</tr>
<tr>
<td>Math 206</td>
<td>Cal. of Sev. Var.</td>
<td>4 (5,0)</td>
</tr>
<tr>
<td>Phys 221</td>
<td>Ther. and Elect. Phen.</td>
<td>3 (5,0)</td>
</tr>
<tr>
<td>AS or MS—Basic</td>
<td></td>
<td>1 (2,1)</td>
</tr>
</tbody>
</table>

17

Second Semester

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Name</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>AgE 212</td>
<td>Fund. of Mechanization</td>
<td>3 (2,3)</td>
</tr>
<tr>
<td>Bot 101</td>
<td>General Botany</td>
<td>4 (3,3)</td>
</tr>
<tr>
<td>EM 202</td>
<td>Engr. Mech. (Dynamics)</td>
<td>3 (3,0)</td>
</tr>
<tr>
<td>Engl 204</td>
<td>Survey of Engl. and Amer. Lit.</td>
<td>3 (3,0)</td>
</tr>
<tr>
<td>Math 208</td>
<td>Engr. Math. I</td>
<td>4 (5,0)</td>
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<td>AS or MS—Basic</td>
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</tbody>
</table>

17

JUNIOR YEAR

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Name</th>
<th>Credits</th>
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</thead>
<tbody>
<tr>
<td>AgE 353</td>
<td>Computational Systems</td>
<td>2 (0,6)</td>
</tr>
<tr>
<td>AgE 355</td>
<td>Engr. Anal. and Creat.</td>
<td>2 (1,3)</td>
</tr>
<tr>
<td>EE 307</td>
<td>Basic Elec. Engr.</td>
<td>3 (3,0)</td>
</tr>
<tr>
<td>EM 304</td>
<td>Mechanics of Materials</td>
<td>3 (3,0)</td>
</tr>
<tr>
<td>ME 311</td>
<td>Engr. Thermo. I</td>
<td>3 (3,0)</td>
</tr>
<tr>
<td>Zool 101</td>
<td>Gen. Zoology</td>
<td>3 (.30)</td>
</tr>
<tr>
<td>Zool 103</td>
<td>Gen. Zoology Lab.</td>
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17

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Name</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>AgE 362</td>
<td>Energy Conv. in Ag. Sys.</td>
<td>3 (2,3)</td>
</tr>
<tr>
<td>AgE 465</td>
<td>Engr. Prop. of Biol. Mat.</td>
<td>3 (2,3)</td>
</tr>
<tr>
<td>Agron 202</td>
<td>Soils</td>
<td>3 (2,2)</td>
</tr>
<tr>
<td>EE 308</td>
<td>Basic Elec. Engr.</td>
<td>3 (3,0)</td>
</tr>
<tr>
<td>Phys 222</td>
<td>Opt. and Mod. Phys.</td>
<td>3 (3,0)</td>
</tr>
<tr>
<td>Phys 224</td>
<td>Modern Phys. Lab.</td>
<td>1 (0,3)</td>
</tr>
</tbody>
</table>

16

SENIOR YEAR

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Name</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>AgE 431</td>
<td>Ag. Struct. Design</td>
<td>3 (2,3)</td>
</tr>
<tr>
<td>AgE 471</td>
<td>Undergraduate Research</td>
<td>1 (0,3)</td>
</tr>
<tr>
<td>Econ 201</td>
<td>Principles of Econ.</td>
<td>3 (3,0)</td>
</tr>
<tr>
<td>EM 320</td>
<td>Fluid Mechanics</td>
<td>3 (3,0)</td>
</tr>
<tr>
<td>Math 313</td>
<td>Stat. Theory and Meth.</td>
<td>3 (3,0)</td>
</tr>
<tr>
<td>Approved Electives</td>
<td></td>
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</tr>
</tbody>
</table>

16

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Name</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>AgE 416</td>
<td>Agric. Machinery Design</td>
<td>3 (2,3)</td>
</tr>
<tr>
<td>AgE 422</td>
<td>Soil &amp; Water Res. Engr. II</td>
<td>3 (2,3)</td>
</tr>
<tr>
<td>AgE 443</td>
<td>Agric. Proc. Engr.</td>
<td>3 (2,3)</td>
</tr>
<tr>
<td>Bot 352</td>
<td>Plant Physiology</td>
<td>4 (3,3)</td>
</tr>
<tr>
<td>or Zool 307</td>
<td>Animal Anatomy</td>
<td>3 (2,3)</td>
</tr>
<tr>
<td>and Physiol.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>or Micro 301</td>
<td>Gen. Microbiology</td>
<td>4 (3,3)</td>
</tr>
<tr>
<td>ME 304</td>
<td>Heat Transfer</td>
<td>3 (3,0)</td>
</tr>
<tr>
<td>Approved Electives</td>
<td></td>
<td>2 or 3</td>
</tr>
</tbody>
</table>

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CERAMIC ENGINEERING

Ceramic Engineering offers rewarding careers for persons interested in making useful products. The ceramic products range from items important to everyday life, such as brick, cement, and glass to more exotic products, such as ceramic fuel elements for nuclear reactors, ceramic parts for electronic equipment and ceramic nose cones, ceramic heart valves, and other prosthetic parts for medical research. A variety of occupations are available to the ceramic engineering graduate thus making it possible to select a type of work that is compatible with individual preferences. Some graduates work as researchers, developing new ceramic knowledge; others are design engineers, creating new processes or new products; still others are engaged in technical sales, supervision of plant operations or in management.

South Carolina possesses a wide variety of ceramic minerals which rank with forests as the richest natural resources in the State and make it possible for South Carolina to contribute raw materials to every major classification of the ceramic industry. South Carolina has a diversified ceramic industry with plants manufacturing portland cement, glass containers, glass fibers, sewer pipes, brick, refractories, special raw materials, and electronic ceramics.
The curriculum of Ceramic Engineering leads to the degree of Bachelor of Science in Ceramic Engineering, and graduate courses are offered leading to advanced degrees. The course is based on a study of the fundamental courses in chemistry, physics, mathematics, and geology, and advanced courses are designed to apply these fundamental sciences to Ceramic Engineering. Courses in the humanities and social sciences together with courses in engineering sciences form major parts of the curriculum. A large number of elective courses permits the individual student to plan a program that is compatible with his particular interests, talents, and educational goals.

The Ceramic Engineering building and equipment are recognized as outstanding throughout the nation. These facilities were provided by a grant from the Olin Foundation.

CERAMIC ENGINEERING CURRICULUM
(See page 183 for Freshman Year)

<table>
<thead>
<tr>
<th>First Semester</th>
<th>Second Semester</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Sophomore Year</strong></td>
<td><strong>Second Semester</strong></td>
</tr>
<tr>
<td>Engl 203 Survey of English Lit.</td>
<td>Engl 204 Surv. of Engl. &amp; Amer. Lit. 3 (3,0)</td>
</tr>
<tr>
<td>Math 206 Cal. of Sev. Var.</td>
<td>Math 208 Engr. Math 1 4 (5,0)</td>
</tr>
<tr>
<td>Phys 221 Ther. &amp; Elec. Phen.</td>
<td>Phys 222 Opt. &amp; Mod. Physics 3 (3,0)</td>
</tr>
<tr>
<td>CrE 201 Intro. Cer.</td>
<td>CrE 202 Materials 3 (3,0)</td>
</tr>
<tr>
<td>CrE 204 Lab. Procedures</td>
<td>EE 299 Dig. Comp. 1 (0.3)</td>
</tr>
<tr>
<td>Planned Elective</td>
<td>Planned Elective 3 (3,0)</td>
</tr>
<tr>
<td>AS or MS—Basic</td>
<td>AS or MS—Basic 1 (2.1)</td>
</tr>
<tr>
<td><strong>17</strong></td>
<td><strong>18</strong></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>Junior Year</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>CrE 307 Thermal Process.</td>
</tr>
<tr>
<td>CrE 304 Exp. Design</td>
</tr>
<tr>
<td>Ch 331 Physical Chem.</td>
</tr>
<tr>
<td>Math 313 Statistics</td>
</tr>
<tr>
<td>EM 201 Statics</td>
</tr>
<tr>
<td>Planned Elective</td>
</tr>
<tr>
<td>Free Elective</td>
</tr>
<tr>
<td><strong>16</strong></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>Senior Year</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>CrE 402 Solid St. Cer.</td>
</tr>
<tr>
<td>EM 304 Strength of Mat.</td>
</tr>
<tr>
<td>EE 320 Electronics I</td>
</tr>
<tr>
<td>Planned Electives</td>
</tr>
<tr>
<td>Free Elective</td>
</tr>
</tbody>
</table>

Note: 9 credits of Planned Electives must be taken in humanistic-social science courses. 19 credits of Planned Electives should be technical courses selected with the help of class adviser.

CHEMICAL ENGINEERING

The graduate of the science-oriented, research-minded Chemical Engineering Department is finding intellectually stimulating and financially rewarding positions in all phases of modern industry. Because of the fundamental nature of the Chemical Engineering curriculum, the graduate is avidly sought by the newer nuclear and
space-oriented industries, as well as by the equally important chemical-process industries. Indeed, the chemical engineer is in great demand in areas of technology, such as textiles, metals, aircraft, power, instrumentation, computers, foods, pulp and paper, and petroleum.

The curriculum is built upon a base of three sciences (chemistry, physics, and mathematics) with supporting courses in mechanics, electrical engineering, and materials engineering and culminates in a solid core of courses in chemical engineering. In all such courses the emphasis is upon why things happen as they do and not how; thus, the student is taught principles that will endure and not the methods of the present or past. He is taught to realize that all material things are chemical in nature; hence, the chemical engineer in the practice of his profession may be called upon to work with anything on the face of the earth. The scope of chemical engineering is broad.

In spite of the strong scientific flavor of the Chemical Engineering curriculum, the faculty is constantly striving to impress upon the student that he is studying engineering and not pure science. The ultimate purpose of engineering is to make some practical use of scientific and engineering theories; hence, economics must always be kept in mind during the design of engineering processes or products. In brief, the chemical engineer in industry, as contrasted to the pure research scientist, is concerned that his company makes a profit.

In industry the chemical engineer may pursue one of two parallel lines of advancement. One path leads to management, and it should be noted that the top management of most chemical companies consists of former technical men. The second and equally rewarding path is in engineering research and development. In this latter category are found the men who have developed the processes and products which shape the modern world in which we live.

The Chemical Engineering Department at Clemson is housed in Earle Hall which is one of the newest and best equipped buildings for chemical engineering education in the Southeast. All members of the Chemical Engineering faculty have been educated at the doctoral level and the department offers work leading to the Master of Science and Doctor of Philosophy degrees as well as the Bachelor of Science degree.
**CHEMICAL ENGINEERING CURRICULUM**

*(See page 183 for *Freshman* Year)*

<table>
<thead>
<tr>
<th>Junior Year</th>
<th>Senior Year</th>
</tr>
</thead>
<tbody>
<tr>
<td>First Semester</td>
<td>Second Semester</td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td>ChE 204 Introd. ChE I</td>
<td>ChE 205 Introd. ChE II</td>
</tr>
<tr>
<td>Ch 223 Organic Chem.</td>
<td>Ch 224 Organic Chemistry</td>
</tr>
<tr>
<td>EM 201 Statics</td>
<td>Ch 228 Organic Chem. Lab.</td>
</tr>
<tr>
<td>AS or MS—Basic</td>
<td>AS or MS—Basic</td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td>Ch 331 Physical Chem.</td>
<td>ChE 331 ChE Thermo. I</td>
</tr>
<tr>
<td>Ch 339 Physical Chem. Lab.</td>
<td>Ch 332 Physical Chemistry</td>
</tr>
<tr>
<td>EE 307 Basic EE</td>
<td>Ch 340 Phys. Chem. Lab.</td>
</tr>
<tr>
<td>EM 304 Strength of Mater.</td>
<td>Phys 222 Opt. &amp; Mod. Physics</td>
</tr>
<tr>
<td>Math 309 Engr. Math II</td>
<td>Humanistic—Social Elective</td>
</tr>
<tr>
<td>Free Elective</td>
<td></td>
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<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td>ChE 401 Trans. Phen.</td>
<td>ChE 419 Engr. Materials</td>
</tr>
<tr>
<td>ChE 430 ChE Thermo. II</td>
<td>ChE 453 Process. Dymn.</td>
</tr>
<tr>
<td>ChE 440 Inspection Trip</td>
<td>Free Elective</td>
</tr>
<tr>
<td>ChE 450 ChE Kinetics</td>
<td>Humanistic—Social Elective</td>
</tr>
<tr>
<td>Humanistic—Social Elective</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>17</td>
</tr>
</tbody>
</table>

* Or ChE 210 if offered.

**Note:** Six credit hours of Advanced MS or AS may be taken as the Free Electives.

**Elective Policy.** All electives must be chosen from a departmental elective list. A copy of this list may be obtained from the departmental secretary.

**CIVIL ENGINEERING**

Civil Engineering is the broadest in scope of the engineering professions, being the parent stem from which most of the other branches of engineering have developed. All branches of Civil Engineering rest on a comparatively compact body of principles, in which the students are thoroughly trained in the classroom, the drafting room, the laboratory, and the field. Particular effort is made to develop those qualities essential to success in any field of endeavor and to fit the graduate to become a useful citizen—a good business man as well as a successful engineer.

The practice of civil engineering involves the planning, design, construction, maintenance, and use of large structures and systems to control and improve the environment for modern civilization. The structures may serve many purposes, such as buildings for commerce and industry, bridges for transportation, vehicles for space exploration, or dams for the control and storage of water or for generation of power. The systems provide essential services: water supply; waste water treatment; rail, air, and water transportation; and systems of
highways. Projects such as these require that the civil engineer be trained in the social and economic issues as well as in basic science, engineering science, and technology. Though he may specialize in a particular branch of civil engineering, such as structural or transportation, he will need some acquaintance with all subdivisions of civil engineering as well as of other branches of engineering.

The course in Civil Engineering at Clemson University leads to the degree of Bachelor of Science and is planned to equip the graduate with a working knowledge of the above subjects. The student receives early drill in the basic sciences of mathematics, chemistry, and physics, and is introduced gradually to the engineering sciences and the technical courses in civil engineering. By the end of the junior year the student will have had courses in structural design, construction materials, transportation engineering, and soil mechanics. These will enable him to choose technical electives in his senior year in the subdivision of his choice. The non-technical electives are sufficient in number to provide breadth in the arts and humanities, and assure that the graduate has a well-rounded education.

The civil engineering graduate is prepared to work immediately upon graduation in practically any of the areas of the profession. He may find himself in responsible charge at an early date, so every effort is made to train him at Clemson in the ethical standards demanded by the profession. All courses are directed toward the development of initiative, self-reliance, and integrity in the student.

The department is located in Lowry Hall, a modern air-conditioned structure erected in 1958. The laboratories are well equipped, and the classrooms are light and conducive to study. The building has an internal television system and the 220 seat auditorium is one of the most attractive ones on the campus.

CIVIL ENGINEERING CURRICULUM
(See page 183 for Freshman Year)

<table>
<thead>
<tr>
<th>First Semester</th>
<th>Sophomore Year</th>
<th>Second Semester</th>
</tr>
</thead>
<tbody>
<tr>
<td>CE 205 Civil Engr. Meth.</td>
<td>2 (1.3)</td>
<td>CE 206 Geometries</td>
</tr>
<tr>
<td>EM 201 Statics</td>
<td>3 (3.0)</td>
<td>EM 304 Mech. of Mater.</td>
</tr>
<tr>
<td>Engl 203 Survey of Engl. Lit.</td>
<td>3 (3.0)</td>
<td>EM 305 Mech. of Mater. Lab.</td>
</tr>
<tr>
<td>Math 206 Cal. of Sev. Var.</td>
<td>4 (5.0)</td>
<td>Eng. 204 Surv. of Eng. &amp; Amer. Lit.</td>
</tr>
<tr>
<td>Phys 221 Ther. &amp; Elec. Phen.</td>
<td>3 (3.0)</td>
<td>Math 208 Engr. Math I</td>
</tr>
<tr>
<td>AS or MS—Basic</td>
<td>1 (2.1)</td>
<td>Phys 222 Optics &amp; Mod. Phys.</td>
</tr>
<tr>
<td></td>
<td>16</td>
<td>Phys 224 Modern Phys. Lab.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>AS or MS—Basic</td>
</tr>
</tbody>
</table>
### ELECTRICAL ENGINEERING

Electrical engineering is the largest and most diversified of the engineering disciplines. Its technical society membership is more than double that of any other and the responsibilities of the profession range from highly analytical problem solving to detailed design of electronics, communications or computing systems. Electrical engineers have traditionally occupied key positions in a wide variety of engineering programs and their educational program must be structured to allow for this diversity of career objectives. The Electrical Engineering Department allows this flexibility of course selection in its curriculum. A liberal number of humanistic-social electives provide the graduate with the ability to address himself to both the “how” and the “why” of engineering.

The flexibility of the curriculum allows either a sampling from the many aspects of Electrical Engineering or a concentration in a specific area. The student’s interests and career objectives are carefully considered by the Electrical Engineering advising staff in structuring a program of study.

Electrical Engineering can be subdivided into the rather broad areas of networks and systems analysis, communications, electronics, computer science, and power. A brief discussion of each of these follows.

Systems and electric network analysis provides the fundamental core materials in the curriculum. These 18 credits of required work constitute the fundamental studies in analysis and experimentation which receive subsequent further development in elective courses. Computer simulation, mathematical modeling, experimental design and scientific reasoning are representative of the topics covered.

---

### First Semester

<table>
<thead>
<tr>
<th>Course</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>CE 301 Introd. to Struc. Sci.</td>
<td>3 (2,2)</td>
</tr>
<tr>
<td>CE 331 Soil Mechanics</td>
<td>3 (2,2)</td>
</tr>
<tr>
<td>Econ 201 Prin. of Econ.</td>
<td>3 (3,0)</td>
</tr>
<tr>
<td>EM 202 Dynm. or Free Elective</td>
<td>3 (3,0)</td>
</tr>
<tr>
<td>Earth or Life Sci. Elective</td>
<td>3</td>
</tr>
<tr>
<td>Math Elective</td>
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<tr>
<td><strong>Total</strong></td>
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</table>

### Second Semester

<table>
<thead>
<tr>
<th>Course</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>CrE 310 Introd. to Mat. Sci.</td>
<td>3 (3,0)</td>
</tr>
<tr>
<td>CE 302 Struct. Desn. I</td>
<td>3 (3,0)</td>
</tr>
<tr>
<td>CE 310 Trans. Engr.</td>
<td>4 (3,2)</td>
</tr>
<tr>
<td>CE 320 Conc. &amp; Bit. Lab.</td>
<td>2 (1,3)</td>
</tr>
<tr>
<td>ME 311 Thermodynamics</td>
<td>3 (3,0)</td>
</tr>
<tr>
<td>Free Elective or EM 202 Dynamics</td>
<td>3 (3,0)</td>
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<td><strong>Total</strong></td>
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</table>

### Junior Year

<table>
<thead>
<tr>
<th>Course</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>CE 424 Construc. Meth.</td>
<td>2 (2,0)</td>
</tr>
<tr>
<td>EE 330 Systems I</td>
<td>2 (2,0)</td>
</tr>
<tr>
<td>EE 331 Elect. Cir. Wksp.</td>
<td>2 (0,4)</td>
</tr>
<tr>
<td>Humanistic—Social Elective</td>
<td>3</td>
</tr>
<tr>
<td>Tech. Elective</td>
<td>3</td>
</tr>
<tr>
<td>EM 320 Fluid Mech.</td>
<td>3 (3,0)</td>
</tr>
<tr>
<td>EM 322 Fluid Mech. Lab.</td>
<td>1 (0,3)</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>16</strong></td>
</tr>
</tbody>
</table>

### Senior Year

<table>
<thead>
<tr>
<th>Course</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>CE 341 Environ. Engr.</td>
<td>3 (3,0)</td>
</tr>
<tr>
<td>CE 402 Struct. Desn. II</td>
<td>3 (3,0)</td>
</tr>
<tr>
<td>CE 425 Engr. Relations</td>
<td>3 (3,0)</td>
</tr>
<tr>
<td>EM 421 Hydrol. &amp; Hyd.</td>
<td>2 (2,0)</td>
</tr>
<tr>
<td>Tech. Elective</td>
<td>3</td>
</tr>
<tr>
<td>Free Elective</td>
<td>3</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>17</strong></td>
</tr>
</tbody>
</table>

† Each class adviser has a list of approved electives from which students must make selections. Any exception to this list must have the written approval of the department head.
Computers, both analog and digital, are studied extensively in the Electrical Engineering program. Few areas in engineering present the promise of continued growth that is offered by the computing industry. In preparing the student to meet this challenge, the department offers courses in real time computing, computer language structures, the theory and design of digital computers, computation and simulation of physical systems, information processing and data handling. The department operates its own digital and analog computing laboratories and has remote terminal equipment to the University Computer Center.

The study of electronics continues to be one of the most active professional areas in Electrical Engineering. Changes in this field have occurred so rapidly that equipment designed five years ago is obsolete by present design criteria. The vacuum tube gave way to the transistor 15 years ago and just recently the integrated circuit has replaced the discrete solid state device. The Electrical Engineering curriculum includes basic work in the theory of operation of solid state devices, the design of solid state circuits and the study of integrated circuit technology. Electronic laboratories within the department contain the most modern equipment available for the study of these devices, including special microscopic and manipulation equipment needed in the study of minute integrated circuits.

The study of power systems analysis and energy conversion is carried out in a recently renovated power laboratory. This new facility contains the machinery and instrumentation necessary to explore solid-state-static motor control, dynamic speed and torque measurement techniques and power system stability.

Communication theory may be the most comprehensive field of specialization found in Electrical Engineering. It includes course work in information theory, electromagnetic theory, switching circuits and electronics. Engineers working in communications find themselves studying switching equipment in tele-communications, working on the plasma blackout problem in missile re-entry, studying the design implications of complex missile detection and defense systems or they may be designing antennas and transmitting equipment for space satellites. Some will be trying to comprehend the nature of Bioelectricity by studying the human brain.

The Honors Program in the Department of Electrical Engineering has for the past four years accounted for a large percentage of the honors students in the University. All qualified Electrical Engineering students are strongly urged to take advantage of this pro-
program since it will provide them with an opportunity to participate in some uncommonly rewarding educational experiences during their final two years of study. Honors students receive individualized professorial guidance and special laboratory privileges in many of their courses. Honors students in the past have designed electronic devices, have written complex computer programs and have studied technical material which ordinarily would be reserved for students at the graduate level. Students are asked to contact their Electrical Engineering adviser for more information.

**ELECTRICAL ENGINEERING CURRICULUM**
*(See page 183 for Freshman Year)*

<table>
<thead>
<tr>
<th>First Semester</th>
<th>Second Semester</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Sophomore Year</strong></td>
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<tr>
<td></td>
<td><strong>Total</strong></td>
</tr>
</tbody>
</table>

| **Junior Year** | |EE 320 Electronics I | 2 (2,0) |
| | |EE 325 Electronics and Electromagnetics Lab. I | 1 (0,2) |
| | |EE 329 Logic & Comput. Devices | 3 (2,2) |
| | |EE 330 Systems I | 2 (2,0) |
| | |EE 331 Elec. Circuits Workshop I | 2 (0,4) |
| | |EE 340 Elec. & Mag. Fields I | 2 (2,0) |
| | |Math 309 Engineering Math II | 3 (3,0) |
| | |Technical Elective† | 3 (3,0) |
| | **Total** |18 |
| | |EE 321 Electronics II | 2 (2,0) |
| | |EE 326 Electronics and Electromagnetics Lab II | 1 (0,2) |
| | |EE 332 Systems II | 2 (2,0) |
| | |EE 333 Elec. Circuits W’shop II | 2 (0,4) |
| | |EE 341 Elec. & Magnetic Fields II | 2 (2,0) |
| | |Humanistic—Social Elective* | 3 (3,0) |
| | |Technical Elective† | 3 (3,0) |
| | |Free Elective | 3 (3,0) |
| | **Total** |18 |

| **Senior Year** | |EE 410 Systems III | 3 (3,0) |
| | |EE 411—Elec. Sys. Workshop III | 2 (0,4) |
| | |EE 422 Electronics III | 2 (2,0) |
| | |Technical Electives† | 9 (3,0) |
| | |Free Elective | 3 (3,0) |
| | **Total** |19 |
| | |EE 450 Analog, Digital, and Hybrid Computation | 3 (3,0) |
| | |EE 451 System Design W’shop IV | 3 (3,0) |
| | |Humanistic—Social Elective* | 3 (3,0) |
| | |Technical Elective† | 9 (9,0) |
| | **Total** |17 |

* A list of approved humanistic social electives is available from the student’s adviser. Any exceptions to this list must be approved in writing by the department head.
† A minimum of 6 credits with Electrical Engineering designations are required among the technical electives. A distribution among the engineering sciences of not less than 9 credits is also required.
### INDUSTRIAL ENGINEERING CURRICULUM*

#### INDUSTRIAL ENGINEERING CURRICULUM*  

**First Semester**  

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>Em 201 Statics</td>
<td>Statistics</td>
<td>3 (3,0)</td>
</tr>
<tr>
<td>Engl 203 Surv. of Engl. Lit.</td>
<td>English Literature</td>
<td>3 (3,0)</td>
</tr>
<tr>
<td>Math 305 Cal. of Sev. Var.</td>
<td>Calculus of Several Variables</td>
<td>4 (5,0)</td>
</tr>
<tr>
<td>Phys 221 Ther. &amp; Elec. Phen.</td>
<td>Thermodynamics &amp; Electrical Phenomena</td>
<td>3 (3,0)</td>
</tr>
<tr>
<td>Phys 223 Electron Phys. Lab.</td>
<td>Electrons Physics Lab.</td>
<td>1 (0,3)</td>
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<tr>
<td>AS or MS—Basic</td>
<td>Basic</td>
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**Sophomore Year**  

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
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</thead>
<tbody>
<tr>
<td>Econ 201 Prin. of Economics</td>
<td>Economic Principles</td>
<td>3 (3,0)</td>
</tr>
<tr>
<td>Engl 204 Surv. of Engl. &amp; Amer. Lit.</td>
<td>English Literature &amp; American Literature</td>
<td>3 (3,0)</td>
</tr>
<tr>
<td>IE 201 Geom. Chang. Proc. II</td>
<td>Geometric Change Engineering II</td>
<td>2 (1,3)</td>
</tr>
<tr>
<td>IE 299 Digital Computation</td>
<td>Digital Computation</td>
<td>1 (0,3)</td>
</tr>
<tr>
<td>Math 208 Engr. Math I</td>
<td>Engineering Mathematics I</td>
<td>4 (5,0)</td>
</tr>
<tr>
<td>Phys 222 Opt. &amp; Mod. Phys.</td>
<td>Optics &amp; Modern Physics</td>
<td>3 (3,0)</td>
</tr>
<tr>
<td>Phys 224 Modern Phys. Lab.</td>
<td>Modern Physics Lab.</td>
<td>1 (0,3)</td>
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<tr>
<td>AS or MS—Basic</td>
<td>Basic</td>
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**Junior Year**  

<table>
<thead>
<tr>
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<th>Course Title</th>
<th>Credits</th>
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</thead>
<tbody>
<tr>
<td>EM 304 Mech. of Materials</td>
<td>Mechanical Engineering Materials</td>
<td>3 (3,0)</td>
</tr>
<tr>
<td>EM 305 Mech. of Mat. Lab.</td>
<td>Mechanical Materials Laboratory</td>
<td>1 (0,3)</td>
</tr>
<tr>
<td>IE 301 Process Planning I</td>
<td>Process Planning I</td>
<td>3 (2,3)</td>
</tr>
<tr>
<td>IE 304 Methods &amp; Standards</td>
<td>Methods &amp; Standards</td>
<td>3 (2,3)</td>
</tr>
<tr>
<td>Math 313 Stat. Th. &amp; Meth. I</td>
<td>Statistics &amp; Methods I</td>
<td>3 (3,0)</td>
</tr>
<tr>
<td>ME 311 Thermodynamics</td>
<td>Thermodynamics</td>
<td>3 (3,0)</td>
</tr>
<tr>
<td>MetE 302 Gen. Metallurgy</td>
<td>General Metallurgy</td>
<td>3 (2,3)</td>
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</table>

**Senior Year**  

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
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</thead>
<tbody>
<tr>
<td>EE 308 Basic Elec. Engr.</td>
<td>Basic Electrical Engineering</td>
<td>3 (3,0)</td>
</tr>
<tr>
<td>EE 310 Elec. Engr. Lab.</td>
<td>Electrical Engineering Lab.</td>
<td>1 (0,2)</td>
</tr>
<tr>
<td>EM 320 Fluid Mechanics</td>
<td>Fluid Mechanics</td>
<td>3 (3,0)</td>
</tr>
<tr>
<td>IE 412 Seminar</td>
<td>Seminar</td>
<td>1 (1,0)</td>
</tr>
<tr>
<td>ME 315 Kinematics of Mech.</td>
<td>Kinematics of Mechanics</td>
<td>3 (2,3)</td>
</tr>
<tr>
<td>ME 480 Methods of O.R. I</td>
<td>Methods of Operations I</td>
<td>3 (3,0)</td>
</tr>
<tr>
<td>Approved Elective</td>
<td>Elective</td>
<td>3</td>
</tr>
<tr>
<td>Humanistic—Social Elective</td>
<td>Social Elective</td>
<td>3</td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>IE 404 Engr. Econ. Anal.</td>
<td>Engineering Economic Analysis</td>
<td>3 (3,0)</td>
</tr>
<tr>
<td>EE 408 Plant Design</td>
<td>Plant Design</td>
<td>2 (1,3)</td>
</tr>
<tr>
<td>IE 411 Work Flow Sys. &amp; Contr.</td>
<td>Work Flow Systems &amp; Controls</td>
<td>3 (3,0)</td>
</tr>
<tr>
<td>IE 413 Seminar</td>
<td>Seminar</td>
<td>1 (1,0)</td>
</tr>
<tr>
<td>ME 481 Methods of O.R. II</td>
<td>Methods of Operations II</td>
<td>3 (3,0)</td>
</tr>
<tr>
<td>Approved Elective</td>
<td>Elective</td>
<td>3</td>
</tr>
<tr>
<td>Humanistic—Social Elective</td>
<td>Social Elective</td>
<td>3</td>
</tr>
</tbody>
</table>

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* This program to be discontinued. No new students admitted after January 1966.  
Each class adviser has an up-to-date list of approved electives. Students must select their electives from this list. Any exceptions to list must be approved in writing by the department head.

### MECHANICAL ENGINEERING

Mechanical engineers are involved in a variety of industries: aerospace, machinery, textile, chemical, automotive, appliance, and many others. Therefore, their education must be rather broad and not overly specialized. It begins with a thorough preparation in the basic sciences: mathematics, chemistry and physics. This is followed by rigorous study of the engineering sciences: electrical sciences, thermal sciences, mechanical sciences, computers, and systems engineering which is a generalized treatment of automatic control systems.

The program is designed to develop technical competence in the three broad technical areas of Thermal Science, Mechanical Design and Systems Engineering.

The thermal sciences are concerned with energy conversion and heat transfer. The chemical energy of fuels may be converted to other more useful forms to propel high-speed jet aircraft, to provide the thrust for space vehicles, or to operate refrigeration or air conditioning systems. The thermal sciences also involve fluid flow...
phenomena: supersonic flow, aerodynamics, and flow through turbo-
machinery.

Mechanical design requires a knowledge of the strength of ma-
terials; mechanisms for converting motion; stress, strain, and
deflection analyses; automatic control; lubrication theory; and other
engineering sciences. It involves the application of the basic and
engineering sciences to the creative design of a wide variety of new
devices and systems from prosthetic devices for the handicapped
to completely automated machines for manufacturing plants.

Systems engineering is an outgrowth of automatic control theory.
It involves instrumentation, and both analog and digital computers
for the mathematical and experimental analyses of complex physical
systems. These systems may be made up of various mechanical,
electrical, and hydraulic components. It is the engineering science
upon which the field of automation is based.

All of the mechanical engineering laboratories and mechanical
design rooms at Clemson are modern and well equipped. A new
Analog Computer Laboratory has recently been developed as well
as a new Instrumentation Laboratory. All research activities in the
department are housed in a new, modern, air-conditioned labora-
tory building.

In order that mechanical engineering students may obtain a well-
rounded education, approximately one-fifth of the program is de-
voted to subjects in the arts and humanities. Thus, with a broad
education in the basic sciences, engineering sciences, and in the
humanities, mechanical engineering graduates are prepared for
careers in industry, research, development, mechanical design,
management or further graduate study.

The Mechanical Engineering Department offers work leading to
the Master of Science and the Doctor of Philosophy degrees as well
as to the Bachelor of Science degree.

MECHANICAL ENGINEERING CURRICULUM
(See page 183 for Freshman Year)

<table>
<thead>
<tr>
<th>Sophomore Year</th>
<th>First Semester</th>
<th>Second Semester</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>EM 201 Statics</td>
<td>3 (3,0)</td>
</tr>
<tr>
<td></td>
<td>Engl 203 Survey of Eng. Lit</td>
<td>3 (3,0)</td>
</tr>
<tr>
<td></td>
<td>Math 208 Cal. of Sev. Var</td>
<td>4 (5,0)</td>
</tr>
<tr>
<td></td>
<td>ME 201 Engr. Design or Math 313, Statistics</td>
<td>3 (2,3)</td>
</tr>
<tr>
<td></td>
<td>ME 209 Digital Comp.</td>
<td>3 (3,0)</td>
</tr>
<tr>
<td></td>
<td>Phys 221 Thermal &amp; Elec. Phen.</td>
<td>1 (0,3)</td>
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<tr>
<td></td>
<td>AS or MS—Basic</td>
<td>1 (2,1)</td>
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</tbody>
</table>

18 18
<table>
<thead>
<tr>
<th>First Semester</th>
<th>Junior Year</th>
<th>Second Semester</th>
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</thead>
<tbody>
<tr>
<td>EE 330 Systems I</td>
<td>2 (2,0)</td>
<td>EE 332 Systems II</td>
</tr>
<tr>
<td>EE 331 EE Workshop</td>
<td>2 (0,4)</td>
<td>ME 304 Heat Transfer</td>
</tr>
<tr>
<td>EM 304 Mech. of Maters.</td>
<td>3 (3,0)</td>
<td>ME 312 Engr. Thermo. II</td>
</tr>
<tr>
<td>EM 320 Fluid Mech.</td>
<td>3 (3,0)</td>
<td>ME 316 Dynamic Sys. Anal.</td>
</tr>
<tr>
<td>ME 311 Engr. Thermo. I</td>
<td>3 (3,0)</td>
<td>ME 314 Engr. Exp.</td>
</tr>
<tr>
<td>ME 313 Inst. &amp; Meas.</td>
<td>2 (1,2)</td>
<td>ME 321 Fluid Dynamics</td>
</tr>
<tr>
<td>Elective</td>
<td>3</td>
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**Senior Year**

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</thead>
<tbody>
<tr>
<td>CrE 310 Material Sci.</td>
<td>ME 402 Engr. Design</td>
<td>3 (1,6)</td>
</tr>
<tr>
<td>ME 401 Prin. of Engr. Des.</td>
<td>ME 414 ME Lab.</td>
<td>1 (0,2)</td>
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<tr>
<td>ME 404 Automatic Control</td>
<td>Electives</td>
<td>12</td>
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<tr>
<td>ME 413 ME Lab.</td>
<td>6</td>
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<tr>
<td>Electives</td>
<td>6</td>
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<tr>
<td><strong>16</strong></td>
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</tbody>
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**Elective Policy**

12 hours must be Humanistic-Social Electives.
15 hours must be Technical Electives (Advanced ROTC may be used for 6 hours of Technical Electives).

Each class adviser has a list of approved electives.

**METALLURGICAL ENGINEERING CURRICULUM†**

<table>
<thead>
<tr>
<th>First Semester</th>
<th>Second Semester</th>
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</thead>
<tbody>
<tr>
<td>Engl 203 Surv. of Engl. Lit.</td>
<td>3 (3,0)</td>
</tr>
<tr>
<td>Math 206 Cal. of Sev. Var.</td>
<td>4 (5,0)</td>
</tr>
<tr>
<td>MetE 202 Introd. to Metallurgy</td>
<td>3 (3,0)</td>
</tr>
<tr>
<td>MetE 323 Metallurgy</td>
<td>2 (1,3)</td>
</tr>
<tr>
<td>Phys 221 Ther. &amp; Elec. Phen.</td>
<td>3 (3,0)</td>
</tr>
<tr>
<td>Phys 223 Electron Phys. Lab.</td>
<td>1 (0,3)</td>
</tr>
<tr>
<td>AS or MS—Basic</td>
<td>1 (2,1)</td>
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<td><strong>17</strong></td>
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**Junior Year**

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</thead>
<tbody>
<tr>
<td>Ch 313 Quan. Anal.</td>
<td>3 (3,0)</td>
<td>Ch 331 Chem. Engr. Thermo.</td>
</tr>
<tr>
<td>Ch 317 Quan. Anal. Lab.</td>
<td>1 (0,3)</td>
<td>Ch 332 Phys. Chemistry</td>
</tr>
<tr>
<td>Ch 339 Phys. Chemistry</td>
<td>1 (0,3)</td>
<td>Ch 340 Phys. Chemistry Lab.</td>
</tr>
<tr>
<td>EE 307 Basic Elec. Engr.</td>
<td>3 (3,0)</td>
<td>EE 308 Basic Elec. Engr.</td>
</tr>
<tr>
<td>Math 313 Stat. Th. &amp; Meth. I</td>
<td>3 (3,0)</td>
<td>EM 304 Mechanics of Mats.</td>
</tr>
<tr>
<td>MetE 301 Phys. Metallurgy</td>
<td>3 (2,3)</td>
<td>EM 305 Mech. of Mats. Lab.</td>
</tr>
<tr>
<td>Non-Technical Elective*</td>
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<td>MetE 304 Physical Metallurgy</td>
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<tr>
<td><strong>20</strong></td>
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<td>MetE 320 Mech. Metallurgy</td>
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**Senior Year**

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<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>CrE 410 Analytical Processes</td>
<td>3 (2,3)</td>
<td>MetE 408 Heat Treating</td>
</tr>
<tr>
<td>CrE 419 Science of Engr. Mats.</td>
<td>3 (3,0)</td>
<td>MetE 425 Senior Thesis</td>
</tr>
<tr>
<td>ChE 430 Chem. Engr. Thermo.</td>
<td>3 (3,0)</td>
<td>MetE 450 Metallic Corrosion</td>
</tr>
<tr>
<td>MetE 402 Metallurgical Lit.</td>
<td>1 (0,3)</td>
<td>Non-Technical Electives*</td>
</tr>
<tr>
<td>MetE 430 Powder Metallurgy</td>
<td>3 (2,3)</td>
<td>Technical Elective*</td>
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<td>Non-Technical Electives*</td>
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<tr>
<td><strong>19</strong></td>
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<td></td>
</tr>
</tbody>
</table>

† This program to be discontinued. No new students admitted after January 1968.
* Class advisers have an up-to-date list of approved electives and will suggest course sequences. A minimum of nine credits in the humanities or social sciences must be elected. Any exception to the courses on the list must be approved by the department head.
SCHOOL OF INDUSTRIAL MANAGEMENT AND TEXTILE SCIENCE

The programs of the School of Industrial Management and Textile Science embrace three major areas, teaching, research, and public service. The school is responsible for six graduate programs (two in cooperation with other administrative units), four undergraduate programs, and a “non credit” series of professional development courses for business and industry. The undergraduate curriculums are in the areas of Economics, Industrial Management, Textiles, and Textile Chemistry. These curriculums are designed to prepare the students for a variety of careers, as well as to furnish an education on which to build for a lifetime. The curriculums recognize the need for an understanding of the basic principles of science and appreciation for the nature of human beings, and the comprehension of the economic, political, and social environment. Flexibility in course selection and choice of areas for emphasis is made possible by secondary concentrations and minors as indicated.

ECONOMICS

The curriculum leading to the Bachelor of Arts degree in Economics is designed to combine a broad general education with a thorough understanding of economics.

The economics curriculum is administered in the School of Industrial Management and Textile Science. Although separate and distinct from the Bachelor of Arts program in the College of Arts and Sciences, it shares several ingredients with that program. The two programs share an identical freshman year sequence, identical minor concentrations in most cases, and many of the same approved electives.

The degree requirements, effective for freshmen entering 1967-1968 and thereafter, are given below. The Bachelor of Arts degree in Economics requires 128 semester hours for graduation; and whenever scheduling permits, the student will be required to take the courses in the sequence given. The curriculum shown, however, can be considered adequate preparation for graduate study in economics only if it is taken with the mathematics minor.
### BACHELOR OF ARTS IN ECONOMICS

<table>
<thead>
<tr>
<th><strong>First Semester</strong></th>
<th><strong>Freshman Year</strong></th>
<th><strong>Second Semester</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>Engl 101 Eng. Composition</td>
<td>3 (3,0)</td>
<td>Engl 102 Eng. Composition</td>
</tr>
<tr>
<td>Hist 203 Hist. of Civilization</td>
<td>3 (3,0)</td>
<td>Hist 204 Hist. of Civilization</td>
</tr>
<tr>
<td>Math 101 Math Analysis I*</td>
<td>3 (3,0)</td>
<td>Math 102 Math. Analysis II*</td>
</tr>
<tr>
<td>Modern Language</td>
<td>3 (3,1)</td>
<td>Modern Language</td>
</tr>
<tr>
<td>Natural Science†</td>
<td>4</td>
<td>Natural Science†</td>
</tr>
<tr>
<td>AS or MS—Basic</td>
<td>1 (2,1)</td>
<td>AS or MS—Basic</td>
</tr>
<tr>
<td><strong>17</strong></td>
<td><strong>17</strong></td>
<td><strong>17</strong></td>
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</table>

<table>
<thead>
<tr>
<th><strong>Sophomore Year</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>Econ 201 Prin. of Economics</td>
</tr>
<tr>
<td>Engl 203 Surv. of Engl. Lit.</td>
</tr>
<tr>
<td>Hist 101 American History</td>
</tr>
<tr>
<td>Math 203 Elem. Stat. Inference *</td>
</tr>
<tr>
<td>Modern Language</td>
</tr>
<tr>
<td>AS or MS—Basic</td>
</tr>
<tr>
<td><strong>16</strong></td>
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<table>
<thead>
<tr>
<th><strong>Junior Year</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>Acct 201 Prin. of Accounting</td>
</tr>
<tr>
<td>Humanities†</td>
</tr>
<tr>
<td>Major</td>
</tr>
<tr>
<td>Minor§</td>
</tr>
<tr>
<td><strong>15</strong></td>
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<table>
<thead>
<tr>
<th><strong>Senior Year</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>Major</td>
</tr>
<tr>
<td>Minor</td>
</tr>
<tr>
<td>Approved Elective†</td>
</tr>
<tr>
<td><strong>15</strong></td>
</tr>
</tbody>
</table>

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* The sequence of Math 101, 102, and 203 may be replaced by Math 106, 205, and 313 or by Math 106, 205, and Ex St 301.

† Courses for the Humanities requirement may not be selected from the minor field.

Humanities include Art, English, Foreign Language, Music, Philosophy and Religion.

§ Where the student selects a minor which contains prerequisites, the prerequisite courses will be counted as approved electives.

Students taking Advanced Aerospace Studies must complete 134 semester hours. Those seeking teacher certification will be required to complete more than 128 semester hours.

Twenty-four semester hours above the sophomore level are required including Econ 314 and Econ 407. Courses must also include 9 semester hours selected from Econ 302, 403, 404, 410, 412 and 420. The remaining hours may be selected from Econ 301, 302, 305, 306, 308, 309, 403, 404, 410, 412, 416, 420, 422, Ex St 462, Mgt Sci 311, IM 404, 405, 406, and Ag Ec 456. (Econ 314 should be scheduled to follow immediately after Econ 202.)

### MINOR CONCENTRATION

A major in economics must select a secondary (minor) concentration from the following:

- Accounting (to include Acct 202, 301, 302, 303, 410)
- Biology
- Chemistry
- English
- Geology
- History
- Mathematics
- Modern Languages
- Physics
- Political Science
- Psychology
- Sociology
Students who plan to take the Bachelor of Arts curriculum in Economics and expect to go into secondary school teaching may select education courses as a minor. The courses will be those required for teaching certificates as specified by the South Carolina Department of Education.

Specific requirements (where not shown) for these minors may be found under the section on the College of Arts and Sciences, Bachelor of Arts Curriculum. Specific requirements for a minor in education are available from the School of Education.

A minor in economics is provided for other degree programs consisting of 15 hours above the sophomore level which must include Econ 314 and 407.

**Approved Electives**

A list of approved electives for both degree and quality requirements may be obtained from the departmental secretary or from an adviser.

**INDUSTRIAL MANAGEMENT**

This curriculum is designed to adequately prepare students for positions of major responsibility in industry, business, government or further academic study. During the first year education in the mathematical and physical sciences is emphasized. In the second, third, and senior years the student’s work expands into the areas of industrial engineering, finance, management and the social sciences. As preparation for careers in professional management, the Industrial Management curriculum is predicated on the philosophy that the individual must manage first himself, coupling this objective with the acquisition of a general education and then acquiring a mastery of the “tools” of management.

**INDUSTRIAL MANAGEMENT CURRICULUM**

<table>
<thead>
<tr>
<th>First Semester</th>
<th>Freshman Year</th>
<th>Second Semester</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ch 101 Gen. Chemistry</td>
<td>4 (3.3)</td>
<td>Ch 102 General Chemistry</td>
</tr>
<tr>
<td>EG 103 Engr. Com. and Design</td>
<td>3 (1.6)</td>
<td>Phys 122 Mech. and Wave Phen.</td>
</tr>
<tr>
<td>or Hist 104 Western Civilization</td>
<td>3 (3.0)</td>
<td>Engl 102 English Composition</td>
</tr>
<tr>
<td>Engl 101 English Composition</td>
<td>3 (3.0)</td>
<td>Hist 104 Hist. of West. Civilization</td>
</tr>
<tr>
<td>Math 106 Cal. of One Var.</td>
<td>4 (5.0)</td>
<td>or EG 103 Engr. Com. &amp; Design</td>
</tr>
<tr>
<td>IM 100 Introd. to IM</td>
<td>0 (1.0)</td>
<td>Math 205 Cal. and Lin. Alg.</td>
</tr>
<tr>
<td>AS or MS—Basic</td>
<td>1 (2.1)</td>
<td>AS or MS—Basic</td>
</tr>
<tr>
<td><strong>15</strong></td>
<td></td>
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</tr>
</tbody>
</table>
**200 Degrees and Curriculums**

<table>
<thead>
<tr>
<th>First Semester</th>
<th>Second Semester</th>
</tr>
</thead>
<tbody>
<tr>
<td>Acct 201 Prin. of Accounting</td>
<td>Acct 202 Prin. of Accounting</td>
</tr>
<tr>
<td>Econ 201 Principles of Econ.</td>
<td>Econ 202 Prin. of Econ.</td>
</tr>
<tr>
<td>Math 207 Multi. Dim. Cal.</td>
<td>IM 201 Intro. to IM</td>
</tr>
<tr>
<td>Phys 221 Thermal &amp; Elec. Phen.</td>
<td>IM 299 Computer Prog. 1</td>
</tr>
<tr>
<td>Soc 201 Introd. to Soc.</td>
<td>or Engl 204 Surv. of Engl. and Amer. Lit.</td>
</tr>
<tr>
<td>AS or MS—Basic</td>
<td>Math 313 Stat. Methods I</td>
</tr>
<tr>
<td></td>
<td>AS or MS—Basic</td>
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<table>
<thead>
<tr>
<th>JUNIOR YEAR</th>
</tr>
</thead>
<tbody>
<tr>
<td>Acct 303 Cost Accounting</td>
</tr>
<tr>
<td>Econ 314 Inter. Econ. Theory</td>
</tr>
<tr>
<td>IE 307 Survey of Engr.</td>
</tr>
<tr>
<td>IM 322 Legal Env. of Bus.</td>
</tr>
<tr>
<td>Area Concentration</td>
</tr>
<tr>
<td>American Studies Elective†</td>
</tr>
<tr>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>SENIOR YEAR</th>
</tr>
</thead>
<tbody>
<tr>
<td>IM 401 Marketing Analysis</td>
</tr>
<tr>
<td>IM 408 Work Simp. &amp; Stand.</td>
</tr>
<tr>
<td>Mgt Sc 414 Stat. Analysis</td>
</tr>
<tr>
<td>Area Concentration</td>
</tr>
<tr>
<td></td>
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<tr>
<td></td>
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<tr>
<td></td>
</tr>
</tbody>
</table>

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*Industrial Management majors are expected to begin their area concentrations in the junior year.
†American Studies Elective. A student selects one 3 credit course from Hist 101, 102, 301, 313, 314, or Pol Sc 202, 301, 302, or he may elect to take an additional 3 hours in his area concentration with approval of his class adviser.
‡Humanities Elective. A student selects one 3 credit course from any English, Architecture, Music, Humanities, Psychology, or Philosophy course for which he is eligible, or he may elect to take an additional 3 hours in his area concentration with approval of his class adviser.
§Students electing Accounting as their area concentration may substitute Acct 403 for IM 499 and IM 407. Students electing the Marketing concentration may substitute IM 410 for IM 407.

**AREA CONCENTRATIONS**

During the junior and senior years the student is required to select courses from one of the following areas for the purpose of emphasizing a particular area of the curriculum. Area concentrations constitute 12 credits and may be extended to 18 credits with the approval of the student’s major adviser.

- A. Accounting
- B. Ceramics
- C. Economics
- D. Finance
- E. Health and Hospital Administration
- F. Industrial Engineering
- G. Management Science
- H. Marketing Analysis
- I. Mathematics
- J. Regional Science
- K. Textile Chemistry
- L. Textile Science
TEXTILE CHEMISTRY

The Textile Chemistry curriculum is designed to prepare students for a variety of positions in the textile fiber, finishing, and related industries. This program also constitutes an excellent foundation for graduate study. During the first two years, the student acquires a firm knowledge of chemistry, physics, and mathematics. In the third and fourth years, this basic knowledge is applied to areas of more specific interest to the textile industry. These include fabric and fiber formulation, dyeing and finishing, color science, textile unit operations, and textile instrumentation. Supporting courses in the humanities, English, statistics, quality control, and fiber science are also included.

In addition to the prescribed course work, senior students are encouraged to participate in original research and seminar programs. These programs carry academic credit and serve to introduce the students to the methodology of textile research and development.

The Textile Department also offers the degree of Master of Science in Textile Chemistry and, in conjunction with the Chemistry Department, the Doctor of Philosophy in Chemistry with a major in Textile Chemistry.

TEXTILE CHEMISTRY CURRICULUM

<table>
<thead>
<tr>
<th>First Semester</th>
<th>Freshman Year</th>
<th>Second Semester</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ch 101 Gen. Chemistry</td>
<td>4 (3,3)</td>
<td>Ch 102 General Chemistry</td>
</tr>
<tr>
<td>Engl 101 Engl. Composition</td>
<td>3 (3,0)</td>
<td>Engl 102 Engl. Composition</td>
</tr>
<tr>
<td>Hist 104 Hist of West. Civilization</td>
<td>3 (3,0)</td>
<td>IM 299 Comp. Program. I</td>
</tr>
<tr>
<td>Math 106 Cal. of One Var.</td>
<td>4 (5,0)</td>
<td>Math 205 Cal. and Lin. Alg.</td>
</tr>
<tr>
<td>Text 122 Intro, Textiles</td>
<td>1 (1,0)</td>
<td>Phys 122 Mech. &amp; Wave Phen.</td>
</tr>
<tr>
<td>AS or MS—Basic</td>
<td>1 (2,1)</td>
<td>AS or MS—Basic</td>
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</table>

<table>
<thead>
<tr>
<th>Sophomore Year</th>
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<th>16</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ch 223 Organic Chemistry</td>
<td>3 (3,0)</td>
<td>Ch 219 Chem. Principles</td>
</tr>
<tr>
<td>Ch 224 Organic Chemistry</td>
<td>3 (3,0)</td>
<td>Ch 224 Organic Chemistry</td>
</tr>
<tr>
<td>Ch 226 Org. Chem. Lab.</td>
<td>2 (0,6)</td>
<td>Ch 226 Org. Chem. Lab.</td>
</tr>
<tr>
<td>Math 206 Cal. of Sev. Var.</td>
<td>3 (3,0)</td>
<td>Math 206 Cal. of Sev. Var.</td>
</tr>
<tr>
<td>Phys 221 Thermal &amp; Elect. Phen</td>
<td>3 (3,0)</td>
<td>Phys 222 Optics &amp; Mod. Phys.</td>
</tr>
<tr>
<td>Phys 223 Electron Phys. Lab.</td>
<td>3 (0,3)</td>
<td>Phys 224 Modern Phys. Lab.</td>
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<tr>
<td>AS or MS—Basic</td>
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<td>AS or MS—Basic</td>
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<table>
<thead>
<tr>
<th>Junior Year</th>
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<tbody>
<tr>
<td>Ch 331 Phys. Chemistry</td>
<td>3 (3,0)</td>
<td>Ch 332 Phys. Chem.</td>
</tr>
<tr>
<td>Econ 201 Prin. of Economics</td>
<td>3 (3,0)</td>
<td>Ch 313 Quan. Anal.</td>
</tr>
<tr>
<td>Math 313 Stat. Theory &amp; Methods</td>
<td>3 (3,0)</td>
<td>Ch 315 Quan. Anal. Lab.</td>
</tr>
<tr>
<td>TC 315 Introd. Poly. Sci. &amp; Engr.</td>
<td>3 (3,0)</td>
<td>TC 316 Chem. Prep. of Text.</td>
</tr>
<tr>
<td>TC 317 Pol. &amp; Fib. Lab.</td>
<td>1 (0,3)</td>
<td>Text 306 Yarn Structure II</td>
</tr>
<tr>
<td>Text 305 Yarn Structure I</td>
<td>3 (2,3)</td>
<td>Elective</td>
</tr>
</tbody>
</table>
# TEXTILE SCIENCE

The Textile Science curriculum prepares the bachelor’s degree candidate in basic science and textile technology. The first two years are devoted primarily to the study of chemistry, physics, mathematics and English. In his third and fourth years, the student is introduced to the basic and applied science and technology necessary for development and production of fibers, woven textiles, non-woven textile systems, and synthetic polymers.

The curriculum prepares the candidate for research and development work as well as for positions in production, standards, and management in the polymer and textile or related industries and for graduate study in Textile Science, engineering, polymer science, and other related branches of science and engineering.

The Textile Department also offers graduate programs in polymer and textile science and engineering.

## TEXTILE SCIENCE CURRICULUM

### First Semester

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
</tr>
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<tbody>
<tr>
<td>Engl 304 Adv. Composition</td>
<td>3 (3,0)</td>
<td></td>
</tr>
<tr>
<td>TC 457 Dyeing &amp; Fin. I</td>
<td>3 (3,0)</td>
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<tr>
<td>TC 459 Dyeing and Fin. Lab.</td>
<td>1 (0,3)</td>
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<tr>
<td>TC 466 Text. Unit Operations</td>
<td>3 (3,0)</td>
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</tr>
<tr>
<td>Text 321 Fiber Science</td>
<td>3 (2,3)</td>
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<tr>
<td>Elective</td>
<td>3</td>
<td></td>
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<td><strong>Total</strong></td>
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### Second Semester

<table>
<thead>
<tr>
<th>Course Code</th>
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<th>Credits</th>
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<tbody>
<tr>
<td>TC 458 Dyeing &amp; Fin. II</td>
<td>3 (3,0)</td>
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</tr>
<tr>
<td>TC 460 Dyeing and Fin. II</td>
<td>1 (0,3)</td>
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</tr>
<tr>
<td>Text 313 Fabric Structure I</td>
<td>3 (2,3)</td>
<td></td>
</tr>
<tr>
<td>Text 322 Prop. of Text. Structure</td>
<td>3 (2,3)</td>
<td></td>
</tr>
<tr>
<td>Text 426 Instrumentation</td>
<td>3 (3,0)</td>
<td></td>
</tr>
<tr>
<td>Text 440 Color Science</td>
<td>3 (2,3)</td>
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</tr>
<tr>
<td>Elective</td>
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<tr>
<td><strong>Total</strong></td>
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</table>

### Freshman Year

#### First Semester

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
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</thead>
<tbody>
<tr>
<td>Ch 101 Gen. Chemistry</td>
<td>4 (3,3)</td>
<td></td>
</tr>
<tr>
<td>Engl 101 Engl. Composition</td>
<td>3 (3,0)</td>
<td></td>
</tr>
<tr>
<td>Hist 104 Hist. of West. Civilization</td>
<td>3 (3,0)</td>
<td></td>
</tr>
<tr>
<td>Math 106 Cal. of One Var.</td>
<td>4 (5,0)</td>
<td></td>
</tr>
<tr>
<td>Text 122 Intro. Textiles</td>
<td>1 (1,0)</td>
<td></td>
</tr>
<tr>
<td>AS or MS—Basic</td>
<td>1 (2,1)</td>
<td></td>
</tr>
<tr>
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</table>

#### Second Semester

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ch 102 General Chemistry</td>
<td>4 (3,3)</td>
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</tr>
<tr>
<td>Engl 102 Engl. Composition</td>
<td>3 (3,0)</td>
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</tr>
<tr>
<td>IM 209 Computer Program I</td>
<td>1 (0,3)</td>
<td></td>
</tr>
<tr>
<td>Math 205 Cal. and Lin. Alg.</td>
<td>4 (5,0)</td>
<td></td>
</tr>
<tr>
<td>Phys 122 Mech. &amp; Wave Phen.</td>
<td>3 (3,0)</td>
<td></td>
</tr>
<tr>
<td>AS or MS—Basic</td>
<td>1 (2,1)</td>
<td></td>
</tr>
<tr>
<td><strong>Total</strong></td>
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</table>

### Sophomore Year

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
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<tbody>
<tr>
<td>Engl 203 Surv. Engl. Lit.</td>
<td>3 (3,0)</td>
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<tr>
<td>Math 206 Cal. of Seq. Var.</td>
<td>4 (5,0)</td>
<td></td>
</tr>
<tr>
<td>Phys 221 Thermal &amp; Elect. Phen.</td>
<td>3 (3,0)</td>
<td></td>
</tr>
<tr>
<td>Phys 223 Electron Phys. Lab.</td>
<td>1 (0,3)</td>
<td></td>
</tr>
<tr>
<td>TC 303 Text. Chemistry</td>
<td>3 (3,0)</td>
<td></td>
</tr>
<tr>
<td>TC 305 Text. Chem. Lab.</td>
<td>1 (0,3)</td>
<td></td>
</tr>
<tr>
<td>Text 201 Fiber Processing I</td>
<td>3 (2,3)</td>
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</tr>
<tr>
<td>AS or MS—Basic</td>
<td>1 (2,1)</td>
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<td><strong>Total</strong></td>
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### Junior Year

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
</tr>
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<tbody>
<tr>
<td>Econ 201 Prin. of Economics</td>
<td>3 (3,0)</td>
<td></td>
</tr>
<tr>
<td>Math 313 Stat. Theory &amp; Methods</td>
<td>3 (3,0)</td>
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</tr>
<tr>
<td>Text 303 Fiber Processing III</td>
<td>3 (2,3)</td>
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</tr>
<tr>
<td>Text 311 Fabric Development I</td>
<td>3 (2,3)</td>
<td></td>
</tr>
<tr>
<td>Text 321 Fiber Science</td>
<td>3 (2,3)</td>
<td></td>
</tr>
<tr>
<td>Elective</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>18</strong></td>
<td></td>
</tr>
</tbody>
</table>

**SCHOOL OF NURSING**

The School of Nursing provides two programs designed to prepare the undergraduate student for a career in nursing.

The program leading to the Bachelor of Science in Nursing degree is designed to prepare nurses for the practice of professional nursing in a variety of settings—hospitals, industry, clinics, and public health agencies. The program offers the foundation for graduate study in nursing, and an unlimited opportunity for men and women for sound career development in professional nursing. The baccalaureate program is four academic years in length. The student is enrolled in liberal arts and basic science courses during the first two years. These courses are arranged sequentially in order to provide the foundation for professional courses which are planned for the junior and senior years. In addition advanced liberal arts courses are taken during the junior and senior years. Clinical nursing experiences under the guidance of the School of Nursing faculty will take place with patients in the Greenville Hospital System and with local public health agencies.

The program leading to the Associate in Arts degree is designed to prepare technically competent nurses who will practice in hospitals and similar agencies. The clinical nursing experiences, under the guidance of the School of Nursing faculty, take place with patients in the Anderson Memorial Hospital. The program covers two years and one summer session. This is a terminal program.

**BACHELOR OF SCIENCE IN NURSING CURRICULUM**

<table>
<thead>
<tr>
<th><strong>First Semester</strong></th>
<th><strong>Second Semester</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Freshman Year</strong></td>
<td><strong>Sophomore Year</strong></td>
</tr>
<tr>
<td><strong>First Semester</strong></td>
<td><strong>Second Semester</strong></td>
</tr>
<tr>
<td>Engl 304 Adv. Composition</td>
<td>3 (3,0)</td>
</tr>
<tr>
<td>TC 315 Intro. Poly. Sci. &amp; Engr.</td>
<td>3 (3,0)</td>
</tr>
<tr>
<td>TC 317 Poly. &amp; Fib. Lab.</td>
<td>1 (0,3)</td>
</tr>
<tr>
<td>Text 411 Fabric Development III</td>
<td>3 (2,3)</td>
</tr>
<tr>
<td>Text 413 Nonwoven &amp; Knit. Struct.</td>
<td>3 (3,0)</td>
</tr>
<tr>
<td>Text 421 Text. Costing</td>
<td>3 (2,3)</td>
</tr>
<tr>
<td><strong>16</strong></td>
<td><strong>16</strong></td>
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</tbody>
</table>

The course of study for the Associate in Arts degree is as follows:

<table>
<thead>
<tr>
<th><strong>First Semester</strong></th>
<th><strong>Second Semester</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>Bot 101 Gen. Botany</td>
<td>4 (3,3)</td>
</tr>
<tr>
<td>Engl 101 English Composition</td>
<td>3 (3,0)</td>
</tr>
<tr>
<td>Ch 101 Gen. Chemistry</td>
<td>4 (3,3)</td>
</tr>
<tr>
<td>Math 101 Math. Analysis</td>
<td>3 (3,0)</td>
</tr>
<tr>
<td>Modern Language</td>
<td>3 (3,1)</td>
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<tr>
<td><strong>17</strong></td>
<td><strong>17</strong></td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>Second Semester</strong></th>
<th><strong>Second Semester</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>Engl 102 English Composition</td>
<td>3 (3,0)</td>
</tr>
<tr>
<td>Ch 102 General Chemistry</td>
<td>4 (3,3)</td>
</tr>
<tr>
<td>Math 102 Math. Analysis</td>
<td>3 (3,0)</td>
</tr>
<tr>
<td>Modern Language</td>
<td>3 (3,1)</td>
</tr>
<tr>
<td>Zool 101, 103 Gen. Zoology</td>
<td>4 (3,2)</td>
</tr>
<tr>
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</table>

**Sophomore Year**

<table>
<thead>
<tr>
<th><strong>First Semester</strong></th>
<th><strong>Second Semester</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>Engl 204 Survey of Engl and American Lit.</td>
<td>3 (3,0)</td>
</tr>
<tr>
<td>Ch 202 El. Org. Chem.</td>
<td>4 (3,3)</td>
</tr>
<tr>
<td>History (Elective)</td>
<td>3 (3,0)</td>
</tr>
<tr>
<td>Zool 461 Anatomy</td>
<td>3 (3,0)</td>
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<tr>
<td><strong>16</strong></td>
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</table>

<table>
<thead>
<tr>
<th><strong>Second Semester</strong></th>
<th><strong>Second Semester</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>Ch 310 Elem. Bio-Chem.</td>
<td>4 (3,3)</td>
</tr>
<tr>
<td>Micro 301 Gen. Microbiology</td>
<td>4 (3,3)</td>
</tr>
<tr>
<td>Nurs 207 Dynamics of Human Relations</td>
<td>3 (2,3)</td>
</tr>
<tr>
<td>Psych 211 Growth &amp; Develop.</td>
<td>3 (3,0)</td>
</tr>
<tr>
<td>Soc 201 Intro to Soc.</td>
<td>3 (3,0)</td>
</tr>
</tbody>
</table>
**SUMMER (FIRST SESSION)**

Nurs 208 Problem Solving in Nursing... 4 (2,6)
Zool 460 Gen. Physiology.............. 3 (2,3)

*Note: Nurs 207 and Nurs 208 open to students in Bachelor of Science in Nursing degree program only. These courses are prerequisite to Junior Year.*

**ASSOCIATE IN ARTS IN NURSING**

<table>
<thead>
<tr>
<th>First Semester</th>
<th>Second Semester</th>
</tr>
</thead>
<tbody>
<tr>
<td>Engl 101 English Composition ... 3 (3,0)</td>
<td>Engl 102 English Composition ... 3 (3,0)</td>
</tr>
<tr>
<td>Nurs 103 Prin. of Nutrition ... 4 (3,3)</td>
<td>Nurs 106 Integrated Science II ... 4 (3,3)</td>
</tr>
<tr>
<td>Nurs 105 Integrated Science I ... 4 (3,3)</td>
<td>Psych 101 Psych. of Nursing ... 3 (3,0)</td>
</tr>
</tbody>
</table>

Nurs 202 Pediatric Nursing ... 5 (3,6)
Nurs 206 Medical-Surg. Nurs. II ... 6 (3,9)
Soc 201 Introd. Soc. ............... 3 (3,0)

**SUMMER SESSION (6 Weeks)**

Nurs 104 Medical-Surgical Nursing I... 5 (3,6)

<table>
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<tr>
<th>Third Semester</th>
<th>Fourth Semester</th>
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<tr>
<td>Nurs 202 Pediatric Nursing ... 5 (3,6)</td>
<td>Nurs 201 Psychodynamic Nursing ... 5 (3,6)</td>
</tr>
<tr>
<td>Nurs 206 Medical-Surg. Nurs. II ... 6 (3,9)</td>
<td>Nurs 204 Mat. and Newborn Care ... 5 (3,6)</td>
</tr>
<tr>
<td>Soc 201 Introd. Soc. ............... 3 (3,0)</td>
<td>Psych 402 Abnormal Psychology ... 3 (3,0)</td>
</tr>
<tr>
<td>17</td>
<td>Soc 311 The Family ............... 3 (3,0)</td>
</tr>
</tbody>
</table>

**DESCRIPTION OF COURSES**

This list of courses includes for each course the catalog number, title of course, credit in semester hours, class laboratory hours per week, and the description of the course. In general, courses numbered 100-199 are freshman courses, 200-299 sophomore courses, 300-399 junior courses, and 400-499 senior courses. Courses numbered 600 or above are graduate courses and are open only to students admitted to the Graduate School, except that seniors with exceptional records may be enrolled with special permission. Where courses are offered on a schedule, there is a designation F, S, or SS following the title of each course, indicating whether it is customarily offered in the fall, spring, or summer school.

**ACCOUNTING**

*Professor: C. C. Davis*

*Associate Professors: F. R. Gray, J. M. Wannamaker*

*Assistant Professor: J. A. Turner*

**Acct 201—Principles of Accounting—3 cr. (3 and 0)**

Practice in handling real and nominal accounts, together with an introduction to the use of various types of books of original entry, statements of profit and loss, and balance sheets.

**Acct 202—Principles of Accounting—3 cr. (3 and 0)**

Continuation of Acct 201 with special attention to corporation and partnership accounting with emphasis on adjustment procedures and the analysis of financial statements. *Prerequisite: Acct 201.*
Accounting 205

**Acct 301—Intermediate Accounting—3 cr. (3 and 0)**
A course in the theory of accountancy designed to follow introductory theory presented in the basic principles courses. Intermediate accounting seeks to broaden the students knowledge of financial accounting theory and practice. **Prerequisite:** Acct 201 and 202.

**Acct 302—Intermediate Accounting—3 cr. (3 and 0)**
A continuation of Accounting 301 with emphasis on managerial accounting. **Prerequisite:** Acct 201 and 202.

**Acct 303—Cost Accounting—3 cr. (3 and 0)**
The application of cost analysis to manufacturing and distributing problems. Analysis of the behavior characteristics of business costs and a study of principles involved in standard cost systems. Lectures and problems. **Prerequisite:** Acct 201 and 202.

**Acct 305—Income Taxation—3 cr. (3 and 0)**
Interpretation of Federal Income Tax laws, regulations, and court decisions with practice in application of these laws to the returns of individuals, partnerships, and corporations. **Prerequisite:** Junior standing.

**Acct 403—Accounting Research—2 cr. (2 and 0)**
A directed research course for those students interested in a career in accounting. **Prerequisite:** Acct 301, 302.

**Acct 405—Advanced Federal Taxes—3 cr. (3 and 0)**
Tax planning and research. Advanced phases of income taxation with emphasis on special problems applicable to corporations, partnerships, estates and trusts. **Prerequisite:** Acct 305.

**Acct 407—Accounting Research—1 cr. (1 and 0)**
A directed research course for those students interested in a career in accounting. **Prerequisite:** Acct 301, 302.

**Acct 410—Budgeting and Executive Control—3 cr. (3 and 0)**
The study and application of selected techniques used in the planning and control functions of business organizations. **Prerequisite:** Acct 303.

**Acct 411—Advanced Accounting—3 cr. (3 and 0)**
A study of accounting principles and practices emphasizing parent-subsidiary accounting. **Prerequisite:** Acct 301, 302.

**Acct 415—Auditing—3 cr. (3 and 0)**
Professional and practical auditing theory. Review of internal controls, audit procedures, and development of audit programs for various types of businesses; consideration of auditor's professional and ethical standards. **Prerequisite:** Acct 301, 302.

**Acct 420—CPA Review—3 cr. (3 and 0)**
Intensive practice in analyzing and solving CPA level accounting problems. **Prerequisite:** Acct 411.

**Acct 710—Budgeting and Executive Control—3 cr. (3 and 0)**
Aerospace Studies

Professor: Colonel E. N. Tyndall, Head

General Military Education Program

AS 109—World Military Systems—1 cr. (2 and 1)
An introductory course exploring the present world conflict and the relationship of the military to that conflict. The course develops a broad view of the United States military establishment and shows the mission and relationship of the three military services within the Department of Defense. Corps Training period provides training in drill fundamentals and leadership.

AS 110—World Military Systems—1 cr. (2 and 1)
The course as a continuation of AS 109 describes the basic missions imposed upon the total military establishment. The U. S. Strategic Offensive Forces and U. S. Defensive Forces are examined in depth in regards to their employment concepts, equipment, roles and missions in war and the deterrence of war. Corps Training.

AS 209—World Military Systems—1 cr. (2 and 1)
A continuation of the study of world military forces placing special emphasis on the General Purposes forces of the Air Force, Army and Navy and their role throughout the entire spectrum of warfare. Also included are the roles of the aerospace support forces which enable the combat forces to carry out their primary missions. Corps Training.

AS 210—World Military Systems—1 cr. (2 and 1)
A study of the trends and implications in international affairs highlighting the struggle, the search and the prospects for peace. Special emphasis is given the conflict between democracy and communism, the alliances and collective security agreements of the United States to preserve peace and some of the specific problems and solutions involved in the search for peace. Corps Training.

Professional Officer Education Program

AS 309—Growth and Development of Aerospace Power—3 cr. (3 and 1)
A comprehensive study of the development of the United States Air Force, its mission and organization. Course objectives are accomplished through a student centered program with emphasis on all phases of communicative skills development. Corps Training.

AS 310—Growth and Development of Aerospace Power—3 cr. (3 and 1)
Introduction to the characteristics of the solar system and how they affect space exploration and operations. As in AS 309, course objectives are accomplished through a student-centered program with emphasis on all phases of communicative skills development. Corps Training.

AS 409—The Professional Officer—3 cr. (3 and 1)
A study of military professionalism, leadership and management. Covers leadership theory and practice. Compares leadership in the military with private enterprise. Flight instruction ground school training consisting of 30 hours of navigation and meteorology for pilot candidates. Corps Training pro-
vides cadets experience in the guidance, direction and control of an Air Force unit.

**AS 410—THE PROFESSIONAL OFFICER—3 cr. (3 and 1)**

A continuation in the study of professionalism with the stress in the management principles and functions. Problem solving in principles and practices are used in the classroom. This course concludes with instruction to prepare cadets for active duty in the United States Air Force. Corps Training.

**AGRICULTURAL ECONOMICS**

**Professors:** W. J. Lanham, Head; J. M. Stepp

**Associate Professors:** L. M. Bauknight, Jr., J. W. Hubbard, H. C. Spurlock, G. R. von Tungeln

**Assistant Professors:** A. B. Carroll, B. L. Dillman, J. C. Hite, J. S. Lytle

**Ag Ec 202—Agricultural Economics—3 cr. (3 and 0) F, S**

An analytical survey of the various subdivisions of agricultural economics, to include farm organization, enterprise analysis, land economics, marketing, farm prices, governmental farm policies, and the relation of agriculture to the national and international economy. **Prerequisite: Econ 201.**

**Ag Ec 302—Agricultural Firm Management—3 cr. (2 and 3) F, S**

Economic principles underlying the organization and operation of agricultural firms and related business enterprises. Particular emphasis is directed to management aspects of the farm as a production unit. **Prerequisite: Ag Ec 202 or Econ 202.**

**Ag Ec 305—Agricultural Business Analysis—3 cr. (2 and 3) F, S**

The principles of financial statement analysis applied to management of farms and other agricultural business firms. Emphasis is placed on enterprise analysis, profitability determination, and other aspects of internal financial operations. **Prerequisite: Ag Ec 202 or Econ 202.**

**Ag Ec 309—Economics of Agricultural Marketing—3 cr. (3 and 0) F, S**

A general course in marketing agricultural commodities, with particular emphasis upon food products. Efficiency criteria, consumer behavior, market organizations and institutions, and marketing functions are analyzed. **Prerequisite: Econ 201.**

**Ag Ec 351—Advertising and Merchandising—3 cr. (3 and 0) F, S**

A general introduction to advertising and merchandising theories and some practice with basic techniques. A partial list of subjects covered includes: function of advertising, propriety in advertising, institutions, media, market research, consumer appeals, loss leaders, mass displays, trade marks and brands, writing copy, color, layout, agencies and integrated advertising campaigns. **Prerequisite:** Junior standing.

**Ag Ec 352—Public Finance—3 cr. (3 and 0) F, S, SS**

Principles of financing government, sources of public revenue, objects of public expenditures, problems of fiscal administration, and the application of fiscal policies in stabilizing the national economy.
AG Ec 357—Natural Resource Economics—3 cr. (3 and 0) F, S, SS
The principles and problems involved in the use of soil, water, forest, and mineral resources, with special emphasis on economic aspects of alternative methods of resource utilization. Prerequisite: Econ 201.

AG Ec 402—Economics of Agricultural Production—3 cr. (3 and 0) F
An economic analysis of agricultural production involving (a) the concept of the farm as a firm, (b) principles for decision making, (c) the quantitative nature and use of production and cost functions and their interrelations and application of these principles to resource allocation on farms and among areas. Prerequisite: Permission of instructor.

AG Ec 403—Land Economics—3 cr. (3 and 0)
A study of the characteristics of land and of the physical, legal, social and economic principles and problems relating to the control and use of land resources. Prerequisite: Permission of instructor.

AG Ec 405—Seminar—1 cr. (1 and 0) F
An examination of the relation of economics and sociology to specific problems. Prerequisite: Major in Agricultural Economics.

AG Ec 406—Seminar—1 cr. (1 and 0) S
A continuation of AG Ec 405.

AG Ec 451—Agricultural Cooperation—2 cr. (2 and 0) F
The principles and practices of business organization and management governing the successful operation of cooperative business enterprises. Major emphasis is placed upon cooperative selling, processing, purchasing, and service enterprises that serve farm people. Prerequisite: Econ 201.

AG Ec 452—Agricultural Policy—3 cr. (3 and 0) F, S
A review of public agricultural policy programs in the United States and a critical examination of current and proposed government policies and programs affecting the agricultural sector of the economy. Included are economic considerations as related to past and current farm price and income problems. Prerequisite: AG Ec 202 or Econ 202.

AG Ec 456—Prices—3 cr. (3 and 0) F, S
A review of the basic theory of price under competitive conditions and various modifications; nature, measurement and causes of daily, seasonal and cyclical price fluctuations; geographical price relationships; nature, function and behavior of futures markets; government price programs. Prerequisite: AG Ec 202 or Econ 202.

AG Ec 460—Agricultural Finance—2 cr. (2 and 0) F, S
The financial needs of agriculture and of the organization, functions and interrelationships of agencies developed to meet these needs. Prerequisite: Econ 201.

AG Ec 702—Economics of Agricultural Production—3 cr. (3 and 0)
AG Ec 703—Land Economics—3 cr. (3 and 0)
AG Ec 751—Agricultural Cooperation—2 cr. (2 and 0)
AG Ec 752—Agricultural Policy—3 cr. (3 and 0)
AG Ec 756—Prices—3 cr. (3 and 0)
AG EC 760—Agricultural Finance—2 cr. (2 and 0)
AG EC 802—Agricultural Production Economics Problems—3 cr. (3 and 0)
AG EC 804—Water Resource Policies—3 cr. (3 and 0)
AG EC 806—Economic Development in Agricultural Areas—3 cr. (3 and 0)
AG EC 807—Market Structure in Agricultural Industries—3 cr. (3 and 0)
AG EC 808—Applied Quantifications in Agricultural Economics—3 cr. (3 and 0)
AG EC 814—Contemporary Economic Problems—3 cr. (3 and 0)
AG EC 851—Seminar in Research Methodology—1 cr. (1 and 0)
AG EC 891—Thesis Research—Credit to be arranged.
AG EC 904—Seminar in Resource Economics—3 cr. (3 and 0)
AG EC 906—Seminar in Area Economic Development—3 cr. (3 and 0)
AG EC 907—Agricultural Marketing Problems—3 cr. (3 and 0)
AG EC 991—Doctoral Research—Credit to be arranged.

AGRICULTURAL EDUCATION*

Professor: L. H. Davis, Head
Associate Professors: W. C. Bowen, E. T. Carpenter, F. E. Kirkley
Assistant Professor: J. A. Hash

AG Ed 201—Introduction to Agricultural Education—3 cr. (2 and 2)
Principles of education, development of agricultural education, and an introduction to the formulation of instructional programs for the teaching of farm people.

AG Ed 401—Methods in Agricultural Education—3 cr. (2 and 2)
Appropriate methods of teaching vocational agriculture in high schools. The course includes procedures for organizing teaching programs, teaching high school students, and directing F. F. A. activities.

AG Ed 406—Directed Teaching—6 cr. (0 and 18)
Guided participation in the professional responsibilities of a teacher of vocational agriculture including an intensive study of the problems encountered and the competencies developed. A half semester of directed teaching in selected schools is required. Prerequisite: Ag Ed 401 and Ag Ed 422.

AG Ed 422—Introduction to Adult Education—3 cr. (2 and 3)
History and nature of adult education in the United States, with emphasis on adult education for rural people.

AG Ed 431—Methods in Conservation Education—3 cr. (3 and 0)
A study of various techniques appropriate to teaching conservation. Instruction is applicable to both elementary and high school teachers. (Offered in Summer School only.)

* Jointly administered by the School of Education and the College of Agriculture and Biological Sciences.
**Description of Courses**

**Ac Ed 463—Advanced Conservation Education—3 cr. (3 and 0)**
The broader aspects of conservation education. The course includes historical, geographical, and national conservation problems. (Offered in Summer School only.)

**Ac Ed 465—Program Development in Agricultural Education—3 cr. (3 and 0)**
Each student will determine needs and resources in a specific community and plan a program to meet these needs.

**Ac Ed 467—Adult Education in Agriculture—3 cr. (2 and 3)**
Principles and practices appropriate to the solution of problems encountered in instructional programs for adult farmers.

**Ac Ed 470—Methods in Agricultural Education—3 cr. (2 and 3)**

**Ac Ed 473—Advanced Conservation Education—3 cr. (3 and 0)**

**Ac Ed 475—Program Planning in Agricultural Education—3 cr. (3 and 0)**

**Ac Ed 477—Adult Education in Agriculture—3 cr. (2 and 3)**

**Ac Ed 483—Evaluation in Agricultural Education—3 cr. (2 and 3)**

**Ac Ed 484—Special Problems—3 cr. (2 and 3)**

**Ac Ed 485—Administration and Supervision in Agricultural Education—3 cr. (3 and 0)**

**Ac Ed 487—Advanced Methods of Teaching Farm Mechanics—3 cr. (2 and 3)**

**Ac Ed 490—Teaching Young Farmers—3 cr. (3 and 0)**

**Ac Ed 495—Supervision of Student Teaching—3 cr. (3 and 0)**

**Ac Ed 499—Introduction to Research in Education—3 cr.**

**AGRICULTURAL ENGINEERING**

*Jointly administered by the College of Agriculture and Biological Sciences and the College of Engineering.*

Professors: A. W. Snell, Head; T. V. Wilson
Assistant Professor: J. T. Craig

**AcE 205—Farm Shop—3 cr. (2 and 3) S**
Correct methods and underlying reasons in proper use and maintenance of hand and power tools are emphasized. Principal topics include: carpentry, painting and finishing, soldering and sheet metal work, farm concrete, pipe fitting and plumbing, and farm and home water supply systems.

**AcE 206—Agricultural Mechanization—3 cr. (2 and 3) F, S**
The agricultural student is taught to apply physical principles and sound reasoning to the mechanization of modern agricultural production and processing enterprises. Planning efficient operational systems and wise selection of
equipment, based on function and economic suitability, are stressed. Prerequisite: Math 103, 104, Phys 201 and 203.

AgE 212—Fundamentals of Mechanization—3 cr. (2 and 3) S
Functional analysis of selected agricultural equipment and the economic performance of machine systems; also, the utility and principles of applied technology and processes essential to providing a background for engineering design, research and development. Prerequisite: EG 109.

AgE 221—Soil and Water Resources Engineering I—3 cr. (2 and 3) F
Physical relationships of factors governing rainfall disposition are used as bases for defining the hydrology of agricultural watersheds. The surveying necessary for design and application of resource management measures and structures is taught. Prerequisite: Math 106.

AgE 301—Soil and Water Conservation—3 cr. (2 and 3) F
Engineering and agronomic principles are applied to water management in agriculture. Elementary surveying, mathematics, crops and soil fundamentals are embodied into principles and practices of erosion control, drainage, water conservation and irrigation. Prerequisite: Math 103, 104.

AgE 352—Farm Power—3 cr. (2 and 3) S, '70 and alternate years and SS, '69 and alternate years.
Farm tractors and stationary power units. Principles of operation, preventive maintenance, adjustment and general repair are emphasized. Prerequisite: AgE 206.

AgE 353—Computational Systems—2 cr. (0 and 6) F
The fundamentals of computational systems including symbolic logic will be followed by methods and techniques of programming digital and analog computers to give solutions to agricultural engineering problems. Prerequisite: Math 208.

AgE 355—Engineering Analysis and Creativity—2 cr. (1 and 3) F
The creative and analytical portions of the engineering design process are developed in a problem approach. Application of physical and mathematical principles, analytical and experimental modeling and intelligent assumption making are stressed. Students are also introduced to the techniques of systems analysis. Prerequisite: Math 208 and Phys 221.

AgE 360—Farm and Home Utilities—3 cr. (2 and 3)
S, '69 and alternate years.
A course for seniors and graduate students in agriculture curriculums, involving a study of electric and other utilities on the farm and in the home. Selection, installation and maintenance of wiring systems, motors and controls, home water systems and sewage disposal systems are emphasized. Prerequisite: Junior standing.

AgE 362—Energy Conversion in Agricultural Systems—3 cr. (2 and 3)
S, '69 and alternate years.
The energy requirements of agricultural systems with emphasis upon energy conversion methods. Characteristics of various sources of energy will be considered including economic aspects. The present energy conversion mechanisms used in agriculture will be studied and their limitations considered. Prerequisite: EM 202, ME 311.
AGE 416—AGRICULTURAL MACHINERY DESIGN—3 cr. (2 and 3) S
Engineering analysis of machines and basic agricultural operations and systems requiring machine functions. Fundamentals of machine design with applications to agricultural machinery. Velocity and acceleration, analyses, dimension determination, power transmission, and vibrations in machinery are studied. Prerequisite: EM 304.

AGE 422—SOIL AND WATER RESOURCES ENGINEERING II—3 cr. (2 and 3) S
Basic soil-water-plant relationships are used to establish criteria for the analysis and design of facilities and structures for conservation, water control, drainage and irrigation. Engineering relationships involved in the design of such facilities are emphasized. Prerequisite: Math 208 and EM 320.

AGE 431—AGRICULTURAL STRUCTURES DESIGN—3 cr. (2 and 3) F, '69 and alternate years.
Analytic and synthetic design of building components, including fastening devices, as determined by both live and dead loads with emphasis on statically determinant members and their positions and utilization in frames and trusses. Major materials considered are wood, steel and concrete. Corequisite: EM 304.

AGE 442—AGRICULTURAL PROCESS ENGINEERING—3 cr. (2 and 3) S, 70
Design of unit operations components used in agricultural processing. Engineering principles and instrumentation as applied to control systems, heat transfer, materials handling, storage and related subjects are emphasized. Prerequisite: ME 311 and EE 308.

AGE 465—ENGINEERING PROPERTIES OF BIOLOGICAL MATERIALS—3 cr. (2 and 3) S, '69 and alternate years.
The thermal, electrical, mechanical, and chemical characteristics of biological materials, organisms, and metabolic processes are studied in relationship to engineering analysis and synthesis. The effects of environmental factors imposed by engineering processes are evaluated. Prerequisite: Math 208, EM 304, Bot 101, Zool 101, 103.

AGE 471—UNDERGRADUATE RESEARCH—1 cr. (0 and 3) F
A course to acquaint senior students in Agricultural Engineering with the scientific method. Literature investigations, planning, and executing of an experiment are integral parts of the course. Prerequisite: Senior standing in Agricultural Engineering.

AGE 473—SPECIAL TOPICS IN AGRICULTURAL ENGINEERING—3 cr. (3 and 0)
A comprehensive study of special topics in the field of agricultural engineering not covered in other courses. Special emphasis will be placed on independent pursuit of detailed investigations.

AGE 481—FUNDAMENTALS OF GINNING ENGINEERING—3 cr. (2 and 3) S, '70 and alternate years.
An analysis of the engineering requirements and associated problems in all phases of ginning, such as handling, storage, drying, separating lint, cleaning, pressing, disposing of foreign matter, quarantine treatment, power requirements and safety precautions. Prerequisite: EM 304 or equivalent.

AGE 652—FARM POWER—3 cr. (2 and 3)

AGE 660—FARM AND HOME UTILITIES—3 cr. (2 and 3)

AGE 716—AGRICULTURAL MACHINERY DESIGN—3 cr. (2 and 3)
Agriculture

AgE 722—SOIL AND WATER RESOURCES ENGINEERING II—3 cr. (2 and 3)
AgE 731—AGRICULTURAL STRUCTURAL DESIGN—3 cr (2 and 3)
AgE 742—AGRICULTURAL PROCESS ENGINEERING—3 cr. (2 and 3)
AgE 765—ENGINEERING PROPERTIES OF BIOLOGICAL MATERIALS—3 cr.
   (2 and 3)
AgE 801—SPECIAL PROBLEMS IN AGRICULTURAL ENGINEERING—3 cr.
   (3 and 0)
AgE 804—ENGINEERING APPLICATION TO AGRICULTURAL PROCESSING—3 cr.
   (2 and 3)
AgE 806—INSTRUMENTATION IN AGRICULTURAL AND BIOLOGICAL
   RESEARCH—3 cr. (2 and 3)
AgE 811—TILLAGE AND SOIL DYNAMICS—3 cr. (3 and 0)
AgE 822—WATER MOVEMENT IN SOILS—3 cr. (3 and 0)
AgE 873—RADIOLOGICAL HEALTH—3 cr. (2 and 3)
AgE 874—RADIOLOGICAL HEALTH ENGINEERING—3 cr. (2 and 3)
AgE 882—SYSTEMS ENGINEERING—3 cr. (2 and 3)
AgE 891—RESEARCH—Credit to be arranged.
AgE 901—SPECIAL PROBLEMS IN AGRICULTURAL ENGINEERING—3 cr.
   (3 and 0)
AgE 991—DOCTORAL RESEARCH—Credit to be arranged.

AGRICULTURE

Professors: J. W. Jones, J. T. Lazar, Jr., R. R. Ritchie
Associate Professors: J. B. Cooper, G. R. von Tungeln
Assistant Professors: M. W. Jutras, B. J. Skelton

Ag 101—INTRODUCTION TO AGRICULTURE—1 cr. (1 and 0) F, S.
   Guides to effectively study; agricultural sciences; scope of the agricultural
   industry; agriculture of South Carolina and the United States; organizations
   and function of the land-grant institution and other agencies serving agri-
   culture; career opportunities.

Ag 201—INTRODUCTION TO ANIMAL INDUSTRIES—3 cr. (2 and 3) F, S
   Fundamental and descriptive aspects of the animal industries as applied
   biology and major segments of food production and distribution systems. The
   subject matter will be presented by Animal Science, Dairy Science, and
   Poultry Science Departments.

Ag 202—INTRODUCTION TO PLANT SCIENCES—3 cr. (2 and 3) F, S.
   A fundamental course in plant sciences, including Agronomic and Horti-
   cultural crops of the major agricultural areas of the world, and emphasizing
   the crops of South Carolina. Included in the laboratory exercises are applica-
   tions of the basic biological concepts of morphology, heredity, physiology and
   ecology to the production of food, fiber and ornamentals for an expanding
   population.
AG 301—INTERNATIONAL AGRICULTURE—3 cr. (3 and 0) F
This course is designed to acquaint the student with current international agriculture. Topics covered include: international agricultural production and consumption patterns, stage of agricultural and industrial development in various countries of the world, current and projected future production-consumption-population balance, world trade patterns in agricultural products, world agricultural marketing problems (including tariffs, balance of trade, import quotas, and common markets). Also included are allied subjects such as population trends and agricultural mechanization.

AG 401—INTERNATIONAL AGRICULTURE SEMINAR—1 cr. (1 and 0) S
This seminar will be directed toward current topics in international agriculture. Seminar speakers will include invited guests from such agencies as the Foreign Agricultural Service, the Food and Agriculture Organization, The Ford Foundation, the Rockefeller Foundation, and the Agency for International Development. Other speakers will include staff members in the College of Agriculture and Biological Sciences that have had foreign assignments in their professional fields. Some sessions will be devoted specifically to employment opportunities in international agriculture.

AGRONOMY—CROPS AND SOILS

Professors: G. R. Craddock, C. M. Jones, U. S. Jones, Head; T. C. Peele
Associate Professors: E. B. Eskew, K. S. LaFleur, B. J. Gossett
Assistant Professors: W. D. Graham, M. W. Jutras, J. D. Maxwell, J. R. Woodruff

AGRON 202—SOILS—3 cr. (2 and 2) F, S
A basic foundation in soil science is presented with emphasis on the chemical and physical properties of soil, the activities of the living soil organisms, and the origin and classification of soils. Prerequisite: Ch 101 and 102.

AGRON 301—FERTILIZERS—3 cr. (3 and 0) F
Sources, mining and manufacture, composition, physical characteristics, and use of fertilizers. A detailed study is made of crop responses to fertilizer use. Prerequisite: Agron 202.

AGRON 308—SOIL AND PLANT ANALYSIS—3 cr. (1 and 6) S
A laboratory study of the physical and chemical properties of soils and methods of their determination. The relation of these properties to the potential fertility and management of soils is emphasized. Methods of plant analysis and the use of plant analysis data as a diagnostic tool in plant nutrition is also studied. Prerequisite: Agron 202.

AGRON 310—FORAGE AND PASTURE CROPS—3 cr. (3 and 0) S
The characteristics, establishment, utilization and maintenance of crops for hay, silage, and pasture. Crops valuable in South Carolina are emphasized. Prerequisite: Ag 202, Agron 202 or consent of instructor.

AGRON 312—FORAGE CROPS LABORATORY—1 cr. (0 and 2) S
Identification, rating, and management of the important forage and pasture species of the Southeast. Prerequisite: Ag 202.
Agronomy—Crops and Soils 215

Agron 403—Soil Genesis and Classification—2 cr. (1 and 3) F
Theoretical and practical phases of soil survey, formation and classification in relation to land usage and plant adaptability. Prerequisite: Agron 202 or consent of instructor.

Agron 405—Plant Breeding—3 cr. (2 and 2) S
The application of genetic principles to the development of improved crop plants. Principal topics include the genetic and cytogenetic basis of plant breeding, mode of reproduction, techniques in selfing and crossing, methods of breeding, inheritance in the major crops, and biometrical methods. Prerequisite: Gen 302.

Agron 407—Principles of Weed Control—3 cr. (2 and 2) F
Weeds, their introduction, ecology, methods of reproduction, dissemination, and control; chemistry and mode of action of herbicides, equipment and techniques of application; a characterization of the common weeds of the Southeast. Prerequisite: Ag 202, Agron 202 or consent of instructor.

Agron 410—Cotton and Other Fiber Crops—2 cr. (2 and 0) F, '69 and alternate years.
History, morphology, physiology, and fundamental principles and practices of production, harvesting, marketing, processing, and utilization of cotton and certain other fiber crops. Emphasis will be placed on the effect of environmental and production factors as they affect fiber quality and subsequent utilization. Prerequisite: Ag 202, Agron 202 or consent of instructor.

Agron 411—Grain Crops—2 cr. (2 and 0) F, '68 and alternate years.
A fundamental study involving principles of production, harvesting, processing, marketing, and utilization of soybeans, corn, sorghum, and the small grains. Emphasis will be placed on factors affecting grain quality as related to utilization of grain. Prerequisite: Ag 202, Agron 202 or consent of instructor.

Agron 412—Tobacco and Special Use Crops—2 cr. (2 and 0) S, '70 and alternate years.
Principles involved in the production, harvesting, curing, grading, and marketing of high quality flue-cured tobacco. Brief coverage of special use crops, such as peanuts, sugar cane, etc. Prerequisite: Ag 202, Agron 202 or consent of instructor.

Agron 452—Soil Fertility and Management—2 cr. (2 and 0) S
Principles of crop rotations, soil fertility, soil management, and other factors necessary for the practical utilization of soils. Prerequisite: Agron 202 or consent of instructor.

Agron 455—Seminar—1 cr. (1 and 0) F
Student presentation of current agronomic topics of special interest in crop production appearing in recent scientific journals and other publications.

Agron 456—Seminar—1 cr. (1 and 0) S
Student presentation of current topics of special interest in the field of soil science appearing in recent scientific journals and other publications.

Agron 601—Fertilizers—3 cr. (3 and 0)

Agron 608—Soil and Plant Analysis—3 cr. (1 and 6)

Agron 610—Forage and Pasture Crops—3 cr. (3 and 0)
### Agronomy Courses

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credit Hours</th>
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<tbody>
<tr>
<td>Agron 612</td>
<td>Forage Crops Laboratory</td>
<td>1 cr. (0 and 2)</td>
</tr>
<tr>
<td>Agron 703</td>
<td>Soil Genesis and Classification</td>
<td>2 cr. (1 and 3)</td>
</tr>
<tr>
<td>Agron 705</td>
<td>Plant Breeding</td>
<td>3 cr. (2 and 2)</td>
</tr>
<tr>
<td>Agron 707</td>
<td>Principles of Weed Control</td>
<td>3 cr. (2 and 2)</td>
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<tr>
<td>Agron 710</td>
<td>Cotton and Other Fiber Crops</td>
<td>2 cr. (2 and 0)</td>
</tr>
<tr>
<td>Agron 711</td>
<td>Grain Crops</td>
<td>2 cr. (2 and 0)</td>
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<tr>
<td>Agron 712</td>
<td>Tobacco and Special Use Crops</td>
<td>2 cr. (2 and 0)</td>
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<tr>
<td>Agron 752</td>
<td>Soil Fertility and Management</td>
<td>2 cr. (2 and 0)</td>
</tr>
<tr>
<td>Agron 755</td>
<td>Seminar</td>
<td>1 cr. (1 and 0)</td>
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<tr>
<td>Agron 756</td>
<td>Seminar</td>
<td>1 cr. (1 and 0)</td>
</tr>
<tr>
<td>Agron 801</td>
<td>Crop Physiology and Nutrition</td>
<td>3 cr. (3 and 0)</td>
</tr>
<tr>
<td>Agron 802</td>
<td>Pedology and Soil Classification</td>
<td>3 cr. (2 and 3)</td>
</tr>
<tr>
<td>Agron 804</td>
<td>Theory and Method of Plant Breeding</td>
<td>3 cr. (3 and 0)</td>
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<tr>
<td>Agron 805</td>
<td>Soil Fertility</td>
<td>3 cr. (3 and 0)</td>
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<tr>
<td>Agron 806</td>
<td>Special Problems</td>
<td>2 cr. (2 and 0)</td>
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<tr>
<td>Agron 807</td>
<td>Soil Physics</td>
<td>3 cr. (2 and 3)</td>
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<tr>
<td>Agron 808</td>
<td>Soil Chemistry</td>
<td>3 cr. (2 and 3)</td>
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<tr>
<td>Agron 812</td>
<td>Crop Ecology and Land Use</td>
<td>3 cr. (3 and 0)</td>
</tr>
<tr>
<td>Agron 820</td>
<td>Pesticide Residues in Soils and Water</td>
<td>3 cr. (3 and 0)</td>
</tr>
<tr>
<td>Agron 825</td>
<td>Seminar</td>
<td>1 cr. (1 and 0)</td>
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<td>Agron 891</td>
<td>Research</td>
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<tr>
<td>Agron 991</td>
<td>Doctoral Research</td>
<td>Credit to be arranged.</td>
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</tbody>
</table>

### Animal Physiology

**Associate Professors:** R. F. Borgman, S. B. Hays, J. R. Hill, Jr., A. S. Tombes  
**Assistant Professors:** J. F. Dickey, Ruth L. Hays, D. M. Henricks

(See courses listed under Animal Science, Dairy Science, Poultry Science, and Zoology)

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credit Hours</th>
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<tbody>
<tr>
<td>An Ph 802</td>
<td>Vertebrate Physiology</td>
<td>3 cr. (2 and 3)</td>
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<tr>
<td>An Ph 803</td>
<td>Animal Physiology</td>
<td>4 cr. (3 and 3)</td>
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<td>An Ph 804</td>
<td>Animal Physiology</td>
<td>4 cr. (3 and 3)</td>
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<td>An Ph 805</td>
<td>Pharmacology</td>
<td>3 cr. (2 and 3)</td>
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<tr>
<td>An Ph 806</td>
<td>Experimental Animal Physiology</td>
<td>3 cr. (1 and 6)</td>
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<tr>
<td>An Ph 851</td>
<td>Animal Physiology Seminar I</td>
<td>1 cr. (1 and 0)</td>
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<tr>
<td>An Ph 852</td>
<td>Animal Physiology Seminar II</td>
<td>1 cr. (1 and 0)</td>
</tr>
<tr>
<td>An Ph 991</td>
<td>Doctoral Research</td>
<td>Credit to be arranged.</td>
</tr>
</tbody>
</table>
ANIMAL SCIENCE

Professors: W. C. Godley, R. R. Ritchie, R. F. Wheeler, Head
Associate Professors: R. L. Edwards, J. R. Hill, Jr., G. C. Skelley
Assistant Professor: D. L. Handlin

AN Sc 201—INTRODUCTION TO ANIMAL SCIENCE—2 cr. (2 and 0)
This course deals with basic principles concerning the breeding, feeding, management and marketing of beef cattle, swine, sheep and horses.

AN Sc 203—INTRODUCTION TO ANIMAL SCIENCE LABORATORY—1 cr.
(0 and 3)
A course designed to demonstrate the basic elements of livestock breeding, feeding and management. Beef cattle, swine, sheep and horses will be used. Evaluation of slaughter animals and carcasses is included.

AN Sc 301—FEEDS AND FEEDING—3 cr. (3 and 0) F, S
Feed nutrients, digestion, metabolism of feed stuffs, nutritive ratios, feeding standards, and the balancing of rations. Prerequisite: An Sc 201, 203 or equivalent and Ch 220 or consent of instructor.

AN Sc 303—FEEDS AND FEEDING LABORATORY—1 cr. (0 and 3) S
Practical work in mixing and balancing rations and identifying feed stuffs. Prerequisite: An Sc 201, 203 or equivalent and Ch 220 or consent of instructor.

AN Sc 305—MEAT GRADING AND SELECTION—2 cr. (1 and 3)
F, '68 and alternate years.
Classification, grading and selection of beef, lamb and pork carcasses and wholesale cuts. Factors influencing quality and value. Students enrolled in this course are eligible to compete in Intercollegiate Meat Judging Contests. Prerequisite: An Sc 201, 203.

AN Sc 306—LIVESTOCK SELECTION AND EVALUATION—2 cr. (1 and 3) S
Selection, breed characteristics and grading of beef cattle, sheep and swine. Students enrolled in this course are eligible to compete in the Southeastern Intercollegiate Livestock Judging Contest. Prerequisite: An Sc 201, 203.

AN Sc 353—MEATS—2 cr. (2 and 0) F
The chemical and physical composition of meat, meat hygiene; nutritive value; curing; freezing; and meat by-products. Prerequisite: An Sc 201, 203.

AN Sc 355—MEATS LABORATORY—1 cr. (0 and 3) F
The selection and grading of meat animals and carcasses. Practical work in slaughtering of animals and in the cutting, curing and freezing of meats. Emphasis is placed on the identification of wholesale and retail cuts. Prerequisite: An Sc 201, 203.

AN Sc 401—BEEF PRODUCTION—3 cr. (3 and 0) F
Breeding, feeding, management and grading of beef cattle. Emphasis is placed on year-round grazing. Prerequisite: An Sc 301 or consent of instructor.

AN Sc 403—BEEF PRODUCTION LABORATORY—1 cr. (0 and 3) F
Practical application of beef production practices. Prerequisite: An Sc 301 or consent of instructor.
An Sc 405—Advanced Livestock Selection and Evaluation—1 cr. (0 and 3) F, '69 and alternate years.
A continuation of An Sc 306 for students who are interested in participating in judging contests or in receiving special training in the selection of breeding cattle, sheep and swine. Judging and grading of market classes are considered. Prerequisite: An Sc 306.

An Sc 406—Seminar—2 cr. (2 and 0) S
Special problems in animal production. Each student is given a subject on which he makes weekly reports before a seminar group. Prerequisite: An Sc 301 or consent of instructor.

An Sc 407—Horse and Sheep Production—2 cr. (2 and 0) F, '68 and alternate years.
The breeding, feeding and care of horses and sheep; the shearing and marketing of sheep and wool; the adaptability of breeds; and parasite and disease control. Prerequisite: An Sc 301 or consent of instructor.

An Sc 408—Pork Production—3 cr. (3 and 0) S
Feeding, breeding, management, and marketing of hogs. Emphasis is placed on winter and summer forages, protein supplements, mineral mixtures, and sanitation practices. In laboratory grading, selection, feeding, management and care of swine is given attention. Prerequisite: An Sc 301 or consent of instructor.

An Sc 409—Horse and Sheep Production Laboratory—1 cr. (0 and 3) F, '68 and alternate years.
Horse and sheep production practices. Prerequisite: An Sc 301 or consent of instructor.

An Sc 410—Pork Production Laboratory—1 cr. (0 and 3) S
Practical application of swine production practices. Prerequisite: An Sc 301 or consent of instructor.

An Sc 452—Animal Breeding—3 cr. (3 and 0) S
The fundamental principles relating to the breeding and improvement of livestock including variation, heredity, selection, linebreeding, inbreeding, cross-breeding and other related subjects. Prerequisite: Gen 302.

An Sc 701—Beef Production—3 cr. (3 and 0)
An Sc 703—Beef Production Laboratory—1 cr. (0 and 3)
An Sc 708—Pork Production—3 cr. (3 and 0)
An Sc 710—Pork Production Laboratory—1 cr. (0 and 3)
An Sc 752—Animal Breeding—3 cr. (3 and 0)
An Sc 802—Topical Problems—1-3 cr. (1-3 and 0)
An Sc 803—Meat Technology—3 cr. (3 and 0)
An Sc 804—Methods in Animal Breeding—3 cr. (3 and 0)
An Sc 805—Nutrition of Meat Animals—3 cr. (3 and 0)
An Sc 891—Research—Credit to be arranged.
ARCHITECTURE


Assistant Professors: K. E. Carpenter, J. Dalton, Z. Kapelis, K. Russo, S. Wang, J. R. Washburn

Lecturers: S. Carter, K. R. Craig, F. P. Morriss

Visiting Professor: P. A. Carmichael

Arch 101—An Introduction to Art and Architecture—3 cr. (1 and 6)  
Studies of architecture and the visual arts with adjunct studio exercises.

Arch 102—An Introduction to Art and Architecture—3 cr. (1 and 6)  
Studies of architecture and the visual arts with adjunct studio exercises. Prerequisite: Arch 101.

Arch Const 141—Elements of Building I—4 cr. (2 and 6)  
An introduction to the principles of building construction. Exercises in graphics, slide rule, print reading and interpretation. Lectures in building materials, building codes, safety, and basic construction methods.

Arch Const 142—Elements of Building II—4 cr. (2 and 6)  
A continuation of Arch Const 141. Prerequisite: Arch Const 141.

Arch Const 241—Elements of Building III—4 cr. (2 and 6)  
Interpretation and analysis of working drawings and specifications of selected building projects. Principles of estimating procedures with emphasis on quantity surveys and construction organization and planning. Prerequisite: Arch Const 142.

Arch Const 242—Elements of Building IV—4 cr. (2 and 6)  
Continuation of Arch Const 241. Prerequisite: Arch Const 241.

Arch 253—Basic Design I—4 cr. (1 and 9)  
Studio problems in visual fundamentals, including graphic representation and adjunct lectures in visual theory. Prerequisite: Arch 102.

Arch 254—Architectural Design II—4 cr. (1 and 9)  
Studio problems in the elements of architecture, basic site development, and three-dimensional representation. Prerequisite: Arch 253.

Arch 302—Art and Architecture Tour—3 cr. (3 and 0)  
A tour of selected cities, either foreign or American, will be organized periodically primarily in a Summer Session. The purpose of the tour is to provide students with firsthand experience with the dynamic qualities of original works of painting and sculpture and especially the spatial qualities of architecture and the relationships of great works of architecture to their environment. The tour will be accompanied by lectures and will require examinations and/or reports.

Arch 303—The Evolution of the Visual Arts—3 cr. (3 and 0)  
A consideration of man’s necessity for and development of the Visual Arts with particular attention to the environmental factors in society which demand

* On leave.
Art as a medium of communication. Illustrated lectures and collateral reading. Not open, except by special permission, to students in the School of Architecture. Preference to students in Education. \textit{Prerequisite:} Sophomore standing.

\textbf{ARCH 304—The Evolution of the Environmental Arts—}3 cr. (3 and 0)
A consideration of man’s necessity for and development of the Environmental Arts (Architecture, Landscape Architecture, City and Regional Planning) with particular attention to the Total Environment of Man and its demands and restrictions upon the architect and planner. Illustrated lectures and collateral reading. Not open, except by special permission, to students in the School of Architecture. Preference to students in Education. \textit{Prerequisite:} Arch 303 or special permission of instructor.

\textbf{ARCH 315—Architectural History I—}3 cr. (3 and 0)
The architectural history of Western man from 1500 B.C. to A.D. 323, with particular attention to Egypt, Greece, Mesopotamia, and Rome.

\textbf{ARCH 316—Architectural History II—}3 cr. (3 and 0)
The architectural history of Europe and the Near East from A.D. 323 to 1453, with particular attention to the Byzantine, pre-Romanesque, Romanesque, and Gothic schools of Western Europe. \textit{Prerequisite:} Arch 315.

\textbf{ARCH Const 341—Building Construction I—}4 cr. (2 and 6)
A study of building construction projects with emphasis on labor relations and jurisdiction, job planning, scheduling, and project control. \textit{Prerequisite:} Arch Const 242.

\textbf{ARCH Const 342—Building Construction II—}4 cr. (2 and 6)
A continuation of Arch Const 341. \textit{Prerequisite:} Arch Const 341.

\textbf{ARCH 353—Architectural Design III—}5 cr. (1 and 12)
Intermediate architectural design problems involving programming and considerations of function, structure and aesthetics. \textit{Prerequisite:} Arch 254.

\textbf{ARCH 354—Architectural Design IV—}5 cr. (1 and 12)
Continuation of Arch 353. \textit{Prerequisite:} Arch 353.

\textbf{ARCH 415—Architectural History III—}3 cr. (3 and 0)
The architectural history of Western Europe and the Americas from 1453 to 1775, with particular attention to the Renaissance, Baroque, and Revivalist schools. \textit{Prerequisite:} Arch 316.

\textbf{ARCH 416—Architectural History IV—}3 cr. (3 and 0)
The architectural history of Western Europe and the Americas from 1775 to 1915 with particular attention to the architecture of the Industrial Revolution and the development of the academies. \textit{Prerequisite:} Arch 415.

\textbf{ARCH Const 432—Concrete Formwork—}2 cr. (2 and 0)
The study of materials, methods, design and estimating of formwork for concrete structures. \textit{Prerequisite:} CE 301.

\textbf{ARCH Const 441—Building Construction III—}4 cr. (2 and 6)
A study of contractor organization and administration including contracts, insurance, bonds, financing, equipment, office procedures, and records. \textit{Prerequisite:} Arch Const 342.
ARCH Const 442—Building Construction IV—4 cr. (2 and 6)
A continuation of Arch Const 441. Prerequisite: Arch Const 441.

ARCH 453—Architectural Design V—5 cr. (1 and 12)
Consideration of design problems involving programming of urban structures with adjunct lectures in design principles, construction and theory. Prerequisite: Arch 354.

ARCH 454—Architectural Design VI—5 cr. (1 and 12)
Continuation of Arch 453. Prerequisite: Arch 453.

ARCH 503—Seminar in the Analysis and Criticism of Architectural and Town Building Works—3 cr. (3 and 0)
A seminar in the analysis and criticism of architectural and town building works. The course sequence will include historic and contemporary examples, literary searches, field trips, essays and oral reports. Fourth-year-design standing or permission of instructor.

ARCH 515—Construction Methods—2 cr. (2 and 0)
A course relating contemporary construction methods with considerations of function, aesthetics and economics. Prerequisite: Fourth year standing.

ARCH 517—Studies in the Art and Architecture of the Ancient World I—3 cr. (3 and 0) F
A consideration of the visual arts and architectural monuments of the Ancient World (Egypt, the Near East, Greece and Rome), with a study in depth of selected examples from the period. Prerequisite: Arch 315, 316, 415, 416, or Arch 303, 304 and History 203, 204, all with a grade of "B" or better.

ARCH 518—Studies in the Art and Architecture of the Ancient World II—3 cr. (3 and 0) S
A consideration of the visual arts and architectural monuments of the Ancient World (Egypt, the Near East, Greece and Rome), with a study in depth of selected examples from the period. Prerequisite: Arch 517, or with the permission of the instructor and the prerequisites for Arch 517.

ARCH 519—Studies in the Art and Architecture of the Early Middle Ages I—3 cr. (3 and 0) F
A consideration of the visual arts and architectural monuments of the Early Middle Ages (Byzantium and Western Europe from the 4th through 12th Centuries), with a study in depth of selected examples from the period. Prerequisite: Arch 315, 316, 415, 416, or Arch 303, 304 and History 203, 204, all with a grade of "B" or better.

ARCH 520—Studies in the Art and Architecture of the Early Middle Ages II—3 cr. (3 and 0) S
A consideration of the visual arts and architectural monuments of the Early Middle Ages (Byzantium and Western Europe from the 4th through 12th Centuries), with a study in depth of selected examples from the period. Prerequisite: Arch 519, or with the permission of the instructor and the prerequisites for Arch 519.

ARCH 521—Studies in the Art and Architecture of the Late Middle Ages I—3 cr. (3 and 0) F
A consideration of the visual arts and architectural monuments of the Late Middle Ages (Western Europe from the 12th to the 15th Centuries), with a study in depth of selected examples from the period. Prerequisite: Arch 315,
Description of Courses

316, 415, 416, or Arch 303, 304 and History 203, 204, all with a grade of "B" or better.

Arch 522—Studies in the Art and Architecture of the Late Middle Ages II—3 cr. (3 and 0) S
A consideration of the visual arts and architectural monuments of the Late Middle Ages (Western Europe from the 12th to the 15th Centuries), with a study in depth of selected examples from the period. Prerequisite: Arch 521, or with the permission of the instructor and the prerequisites for Arch 521.

Arch 523—Studies in the Art and Architecture of the Renaissance I—3 cr. (3 and 0) F
A consideration of the visual arts and architectural monuments of the Renaissance (Western Europe from the 15th through the 18th Centuries), with a study in depth of selected examples from the period. Prerequisite: Arch 315, 316, 415, 416, or Arch 303, 304 and History 203, 204, all with a grade of "B" or better.

Arch 524—Studies in the Art and Architecture of the Renaissance II—3 cr. (3 and 0) S
A consideration of the visual arts and architectural monuments of the Renaissance (Western Europe from the 15th through the 18th Centuries), with a study in depth of selected examples from the period. Prerequisite: Arch 523, or with the permission of the instructor and the prerequisites for Arch 523.

Arch 525—Studies in the Art and Architecture of the Technological Revolution I—3 cr. (3 and 0) F
A consideration of the visual arts and architectural monuments of the Technological Revolution (Western Europe and America from 1685 to 1935), with a study in depth of selected examples from the period. Prerequisite: Arch 315, 316, 415, 416, or Arch 303, 304 and History 203, 204, all with a grade of "B" or better.

Arch 526—Studies in the Art and Architecture of the Technological Revolution II—3 cr. (3 and 0) S
A consideration of the visual arts and architectural monuments of the Technological Revolution (Western Europe and America from 1685 to 1935), with a study in depth of selected examples from the period. Prerequisite: Arch 525, or with the permission of the instructor and the prerequisites for Arch 525.

Arch 527—Studies in the Development of Architectural Technology I—3 cr. (3 and 0) F
A consideration of the development of architectural technology from ancient through contemporary times with a study in depth of selected examples from each period. Prerequisite: Open to students who have completed Architectural History I-IV and to other students with senior standing and permission of the instructor.

Arch 528—Studies in the Development of Architectural Technology II—3 cr. (3 an 0) S
A consideration of the development of architectural technology from ancient through contemporary times with a study in depth of selected examples from each period. Prerequisite: Open to students who have completed Architectural History I-IV and to other students with senior standing and permission of the instructor.
ARCH 529—STUDIES IN THE ART AND ARCHITECTURE OF INDIA AND THE FAR EAST I—3 cr. (3 and 0) F
A consideration of the visual arts and architectural monuments of India and the Far East, with a study in depth of selected examples from the period. Prerequisite: Arch 315, 316, 415, 416, or Arch 303, 304 and History 203, 204, all with a grade of "B" or better.

ARCH 530—STUDIES IN THE ART AND ARCHITECTURE OF INDIA AND THE FAR EAST II—3 cr. (3 and 0) S
A consideration of the visual arts and architectural monuments of India and the Far East, with a study in depth of selected examples from the period. Prerequisite: Arch 529, or with the permission of the instructor and the prerequisites for Arch 529.

ARCH 553—ADVANCED ARCHITECTURAL STRUCTURES—4 cr. (1 and 9)
A course in the synthesis of advanced architectural construction and structural analysis. Prerequisite: Arch 515 and C. E. 302.

ARCH 575—MECHANICAL PLANT—2 cr. (2 and 0)
The water supply, plumbing, heating and ventilating systems of present-day buildings.

ARCH 576—MECHANICAL PLANT—2 cr. (2 and 0)
Air-conditioning, electrical systems, lighting, mechanical transportation and acoustics as applied to contemporary buildings. Prerequisite: Arch 575.

ARCH 581—ARCHITECTURAL OFFICE PRACTICE—2 cr. (2 and 0)
General consideration of architectural office procedure. Study of the professional relationship of the architect to client and contractor, including problems of ethics, law, and business.

ARCH 582—ARCHITECTURAL OFFICE PRACTICE—2 cr. (2 and 0)
A continuation of Arch 581. Prerequisite: Arch 581.

ARCH 591—ARCHITECTURAL AND TOWN PLANNING DESIGN—11 cr. (5 and 18)
Lectures and studio problems in advanced architectural design and Town Planning. Course content will include pre-thesis studies. Prerequisite: Arch 454 with C standing.

ARCH 592—ARCHITECTURAL THESIS—11 cr. (5 and 18)
The student working individually will carefully program an environmental problem of appropriate scope, and conduct his own comprehensive research. He will make a complete oral, written and visual presentation of his solution. Prerequisite: Arch 591.

ARCH 593—STRUCTURAL THESIS RESEARCH—5 cr. (0 and 15)
Studio and laboratory research studies preliminary to undertaking a thesis in Architectural Structures. Prerequisite: Arch 553.

ARCH 594—THESIS IN ARCHITECTURAL STRUCTURES—11 cr. (5 and 18)
The student working individually with laboratory and lecture support will prepare and present a structural thesis of appropriate scope and complexity. Prerequisite: Arch 593.

ARCH 611—DIRECTED RESEARCH IN ART HISTORY—3 cr. (3 and 0)
ARCH 612—DIRECTED RESEARCH IN ART HISTORY—3 cr. (3 and 0)
Description of Courses

ARCH 615—Structural Methods—2 cr. (2 and 0)
ARCH 653—Advanced Architectural Construction—4 cr. (1 and 9)
ARCH 811—Town Planning Theory—3 cr. (3 and 0)
ARCH 812—Town Planning Theory—3 cr. (3 and 0)
ARCH 853—Graduate Design—8 cr. (0 and 24)
ARCH 854—Graduate Design—8 cr. (0 and 24)
ARCH 855—Thesis Research—2 cr. (0 and 6)
ARCH 857—Graduate Design—10 cr. (4 and 18)
ARCH 858—Architectural Thesis—17 cr. (5 and 36)
ARCH 861—Economics Seminar—3 cr. (3 and 0)
ARCH 875—Mechanical Plant—2 cr. (2 and 0)
ARCH 876—Mechanical Plant—2 cr. (2 and 0)
ARCH 881—Office Practice—2 cr. (2 and 0)
ARCH 882—Office Practice—2 cr. (2 and 0)
ARCH 891—Architectural Structural Seminar—2 cr. (2 and 0)
ARCH 892—Architectural Structural Seminar—2 cr. (2 and 0)
ARCH 893—Architectural Structural Seminar—2 cr. (2 and 0)

BIOCHEMISTRY

Professor: J. H. Mitchell
Associate Professors: R. F. Borgman, D. E. Turk, W. P. Williams, Head
Assistant Professors: L. Crook, D. M. Henricks

(See biochemistry courses listed under Chemistry)

Bioch 406—Physiological Chemistry—4 cr. (3 and 3) S
Chemistry of the physiological processes of respiration, digestion, membrane transport, blood and tissue homeostasis, and kidney function is studied. Current literature on these processes is studied and interpretations discussed.
Prerequisite: Ch 310 or Ch 423.

Bioch 706—Physiological Chemistry—4 cr. (3 and 3)
Bioch 810—Advanced Biochemical Techniques—3 cr. (1 and 6)
Bioch 812—Nutritional Biochemistry—3 cr. (3 and 0)
Bioch 814—Laboratory Methods in Nutrition—1 cr. (0 and 3)
Bioch 815—Lipids—2 cr. (2 and 0)
Bioch 816—Proteins and Nucleic Acids—3 cr. (3 and 0)
Bioch 817—Chemistry and Metabolism of Hormones—2 cr. (2 and 0)
Bioch 818—Vitamins and Minerals—3 cr. (3 and 0)
Bioch 819—Intermediary Metabolism—3 cr. (3 and 0)
Bioch 851—Biochemistry Seminar—1 cr. (1 and 0)
BioE 401—Computers for Bioscientists—3 cr. (2 and 3)
Analog and elementary digital computer techniques applied to processes in biology and biochemistry. The emphasis is simulation and modelling, not advanced math or statistics. Prerequisite: One year of college math, preferably calculus; closed to Engineering students.

BioE 701—Computers for Bioscientists—3 cr. (2 and 3)
BioE 801—Biomaterials—3 cr. (3 and 0)
BioE 846—Elements of Bioengineering I—3 cr. (3 and 0)
BioE 847—Elements of Bioengineering II—3 cr. (3 and 0)
BioE 891—Research—Credit to be arranged.
BioE 991—Doctoral Research—Credit to be arranged.

BIOLOGY
(See Botany, Microbiology, and Zoology)

Bio 101—General Botany—4 cr. (3 and 3) F, S, SS
The form, structure and physiology of the higher plants, followed by the algae, bacteria, fungi, liverworts, mosses and ferns, with the application of the biological laws. Descriptions, life histories and adaptation of representative organisms.

Bot 202—Survey of the Plant Kingdom—4 cr. (3 and 3) S
A survey of the major groups of plants, their structure, development, and reproduction. Evolutionary relationships as exemplified by comparisons of body organization and life cycles will be emphasized. Prerequisite: Bot 101.
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Bot 352—Plants Physiology—4 cr. (3 and 3) F, S
The relations and processes which have to do with the maintenance, growth and reproduction of plants, including absorption of matter and energy, water relations of the plant, utilization of reserve products and liberation of energy.
Prerequisite: Bot 101; Ch 101 and 102; Phys 201 and 203 or Phys 211 and 213.

Bot H352—Plant Physiology—4 cr. (3 and 3) F, S
Honors option for Bot 352, admission by special arrangement.

Bot 355—Histology—2 cr. (0 and 6)
The principles of fixing, cutting and staining plant tissues and the various other processes of micro-technique and their application to specific forms of plants.
Prerequisite: Bot 101; Ch 101 and 102.

Bot 356—Taxonomy of Vascular Plants—3 cr. (1 and 6) S
The identification, classification, distribution and interrelationship of vascular plants with emphasis on the flora of South Carolina.
Prerequisite: Bot 101.

Bot H356—Taxonomy of Vascular Plants—3 cr. (1 and 6) S
Honors option for Bot 356, admission by special arrangement.

Bot 404—Cytology—3 cr. (3 and 0) F, ’69 and alternate years.
A detailed consideration of the morphology and ultrastructures of cells. Prerequisite: Bot 352, Zool 101, 103, or permission of instructor.

Bot H404—Cytology—4 cr. (3 and 3), F, ’69 and alternate years.
Honors option for Bot 404, admission by special arrangement.

Bot 406—Plant Anatomy—3 cr. (2 and 3) F, ’68 and alternate years.
The origin and development of the organs and tissue systems of vascular plants and a comparative study of the structure of roots, stems, leaves, flowers, and fruits.
Prerequisite: Bot 101.

Bot H406—Plant Anatomy—3 cr. (2 and 3) F, ’68 and alternate years.
Honors option for Bot 406, admission by special arrangement.

Bot 451—Morphology of the Fungi—3 cr. (2 and 3) F, ’68 and alternate years.
The morphology and taxonomy of the fungi, with special emphasis on species of economic importance.
Prerequisite: Bot 101.

Bot 452—Plant Ecology—3 cr. (3 and 0) S, ’70 and alternate years.
The fundamental principles of the relations between plants and their environment.
Prerequisite: Bot 101.

Bot H452—Plant Ecology—3 cr. (3 and 0) S, ’70 and alternate years.
Honors option for Bot 452, admission by special arrangement.

Bot 457—Phycology—3 cr. (2 and 3) S, ’69 and alternate years.
The taxonomy, morphology, and ecology of freshwater algae with emphasis on the local flora.
Prerequisite: Bot 101 or permission of instructor.

Bot H457—Phycology—3 cr. (2 and 3) S, ’69 and alternate years.
Honors option for Bot 457, admission by special arrangement.

Bot 652—Plant Physiology—4 cr. (3 and 3)

Bot 656—Taxonomy of Vascular Plants—3 cr. (1 and 6)

Bot 704—Cytology—3 cr. (3 and 0)
CERAMIC ARTS

Professor: G. C. Robinson

Cr Ar 101—Pottery Materials—3 cr. (2 and 3)
The occurrence and properties of pottery raw materials. Attention is devoted to the occurrence of natural pottery materials in South Carolina, and the methods and equipment used in preparing these materials.

Cr Ar 102—Pottery Drying and Firing—3 cr. (3 and 0)
The drying and firing processes used in pottery making. A discussion is included on the design and construction of simple pottery kilns and the student is required to build and operate a small outdoor kiln. The laboratory work demonstrates the drying and firing behavior of pottery.

Cr Ar 301—Pottery Glazes—3 cr. (3 and 0)
The materials and methods used in preparing glazes and a study of the methods used in decorating pottery products. Prerequisite: Cr Ar 101 and 102.

Cr Ar 401—Advanced Pottery—3 cr. (2 and 3)
The student is given advanced training in pottery techniques and pottery equipment. Prerequisite: Cr Ar 101 and 102.

CERAMIC ENGINEERING

Professors: G. C. Robinson, Head; H. H. Wilson
Assistant Professors: C. C. Fain, S. F. Hulbert, H. G. Lefort

CrE 201—Introduction to Ceramic Engineering—2 cr. (2 and 0)
An introduction to ceramic engineering together with a study of ceramic forming operation. Exercises are provided in the analysis of processing problems, the evaluation of background information and the creation of new solutions to processing problems.
**Description of Courses**

**CrE 202—Ceramic Materials—3 cr. (3 and 0)**
The properties and uses of commonly used ceramic materials. Equilibrium diagrams are used to gain an understanding of the effect of heat on the materials.

**CrE 204—Laboratory Procedures—1 cr. (0 and 3)**
An introduction to ceramic laboratory procedures. Primary consideration will be given to the evaluation of sources of error and significance of measurement in the major ceramic test procedures.

**CrE 299—Digital Computation—1 cr. (0 and 3)**
An introduction to digital computer programming for students majoring in Ceramic Engineering. Emphasis is placed on the computer languages in use at Clemson University, and their application to the solution of simple problems in ceramic engineering. *Prerequisite:* Sophomore standing.

**CrE 302—Thermo-Chemical Ceramics—3 cr. (3 and 0)**
High-temperature equilibrium using the laws of physical chemistry as applied to ceramic systems in both solid and liquid states. An introduction to the crystal chemistry of ceramic raw materials, and the effect of crystalline form on their high-temperature behavior.

**CrE 303—Ceramic Products—2 cr. (2 and 0)**
The application of ceramic products to a variety of use environments. Refractories, structural ceramics, coated metals and corrosion resistant products are included. The course is for both engineering and non-engineering majors.

**CrE 304—Experiment Design—1 cr. (0 and 3)**
An exercise in the planning and organization of experiments in the ceramic field.

**CrE 306—Fuels Combustion and Heat Transfer—1 cr. (0 and 3)**
Combustion devices, the calculation of combustion problems and heat transfer.

**CrE 307—Thermal Processing of Ceramics—3 cr. (3 and 0)**
The accomplishment of changes in structure and composition through the application of thermal energy. The course includes a study of simultaneous transfer of heat and mass, fluid flow, determinants of rates in a variety of reactions and calculation of the energy requirements to accomplish change in structure or composition.

**CrE 309—Research Methods—2 cr. (0 and 6)**
The planning and solution of selected research problems.

**CrE 310—Introduction to Material Science—3 cr. (3 and 0)**
A beginning course in material science designed primarily for engineering students. The course is a study of the relation between the electrical, mechanical and thermal properties of products and the structure and composition of these products. All levels of structure are considered from gross structures easily visible to the eye through electronic structure of atoms.

**CrE 402—Solid State Ceramics—3 cr. (3 and 0)**
The effects of the composition, form, and shape of ceramic raw materials on the manufacturing processes and final properties of ceramic products. Included are fundamental studies of such phenomena as deflocculation, plasticity, sinter-
ing and the behavior of ceramic products in electrical circuits. **Prerequisite:** Junior standing.

**Cerde 403—Glasses—3 cr. (3 and 0)**
Class structure and composition and their relation to the properties of glasses. Consideration is given to the processing variables which control the properties of glasses including glass products, enamels, glazes and vitreous bonds.

**Cerde 404—Ceramic Coatings—3 cr. (3 and 0)**
The raw materials, methods of manufacture, and properties of ceramic coatings. **Prerequisite:** Cerde 302.

**Cerde 406—Ceramic Project—2 cr. (0 and 6)**
The completion of an original research into a ceramic problem. **Prerequisite:** Cerde 302.

**Cerde 407—Plant Design—3 cr. (1 and 6)**
The application of the fundamentals of ceramic engineering to problems in plant design. **Prerequisite:** Senior standing in Ceramic Engineering.

**Cerde 410—Analytical Processes—3 cr. (2 and 3)**
An introductory course on the theory and use of X-ray diffraction and spectroscopic methods. **Prerequisite:** Junior standing.

**Cerde 412—Raw Material Preparation—3 cr. (3 and 0)**
The equipment and processes used in the crushing and grinding of raw materials, the separation and classification of particle sizes, and the separation and purification of minerals by mineral dressing methods.

**Cerde 416—Electronic Ceramics—3 cr. (3 and 0)**
The theory and measurement of the electronic properties of ceramic products.

**Cerde 418—Process Control—3 cr. (3 and 0)**
Process control techniques and apparatus with particular emphasis on temperature measurement and control systems. The application of laboratory techniques to the control of product quality and process efficiency is included. **Prerequisite:** Junior standing.

**Cerde 419—Science of Engineering Materials—3 cr. (3 and 0)**
This course is planned to acquaint engineers with the thermal, electrical, and chemical characteristics of engineering materials. It emphasizes fundamental consideration of the structure of matter in the solid and glassy states, solid state reactions, and the influence of particle and aggregate structure to speed of reaction and product properties. The reasons for the properties of materials at elevated temperatures and room temperatures are related to these fundamentals.

**Cerde 420—Science of Engineering Materials—3 cr. (3 and 0)**
A continuation of Cerde 419 with emphasis on applications of fundamentals in nuclear reactors and nuclear power plants. Consideration is given to the development of ceramics for fuel elements, moderator materials, control rods, shielding and in radioactive waste disposal.

**Cerde 702—Solid State Ceramics—3 cr. (3 and 0)**

**Cerde 703—Glasses—3 cr. (3 and 0)**

**Cerde 704—Ceramic Coatings—3 cr. (3 and 0)**

**Cerde 710—Analytical Processes—3 cr. (2 and 3)**
CHEMICAL ENGINEERING

Professors: C. E. Littlejohn, Head; G. F. Meenaghan
Associate Professors: F. C. Alley, W. B. Barlage, W. F. Beckwith, D. F. Bruley, J. W. Hall, R. C. Harshman
Assistant Professor: J. C. Mullins

ChE 204—INTRODUCTION TO CHEMICAL ENGINEERING I—2 cr. (1 and 3)
Designed to acquaint students with the profession of Chemical Engineering and to introduce them to certain basic concepts and methods used by the chemical engineer. Topics include the chemical engineering literature, graphical methods of presenting data, graphical solutions to problems, fundamental units and dimensions, process variables, stoichiometry, and PVT relations for gases. Prerequisite: Ch 102 and Math 205.

ChE 205—INTRODUCTION TO CHEMICAL ENGINEERING II—3 cr. (2 and 3)
A continuation of ChE 204. Topics include properties of mixtures of gases and vapors, material and energy balances, equilibria in chemical systems, dimensional analysis, economic considerations, and an introduction to stagewise calculations involving solvent extraction. Prerequisite: ChE 204.
CHE 210—Digital Computation and Numerical Methods—3 cr. (3 and 0)
An introduction to digital computational techniques using a specific procedure oriented language and the use of numerical methods for the solution of chemical engineering problems. The course will introduce students to computational methods to be used in subsequent chemical engineering courses. Prerequisite: CHE 204 and Math 205.

CHE 301—Unit Operations Theory I—3 cr. (3 and 0)
The general principles of Chemical Engineering and a study of the following unit operations: Fluid Flow, Fluid Transportation, Heat Transmission and Evaporation. Special emphasis is placed on theory and its practical application to design. Prerequisite: CHE 205 and Junior standing.

CHE 302—Unit Operations Theory II—3 cr. (3 and 0)
A study of selected unit operations based on diffusion. Both stagewise and differential contacts are studied for gas absorption, distillation, and gas-liquid contact operations. Prerequisite: CHE 301 and Junior standing.

CHE 306—Unit Operations Laboratory I—1 cr. (0 and 3)
Laboratory work in the unit operations of fluid flow, heat transfer, and evaporation. Stress is laid on the relation between theory and experimental results and on report writing. Prerequisite: CHE 301 and Junior standing.

CHE 307—Analog Computation—1 cr. (0 and 3)
An introduction to the theory and application of electronic analog computers. Prerequisite: Math 208.

CHE 331—Chemical Engineering Thermodynamics I—3 cr. (3 and 0)
A first basic course in static equilibria. Topics include the First and Second Law of Thermodynamics, real and ideal gases, thermodynamic properties of fluids, phase changes, and heats of reaction. Prerequisite: Ch 331, Math 208, and Junior standing; or permission of the Department Head.

CHE 401—Transport Phenomena—3 cr. (3 and 0)
Heat, mass, and momentum transport with emphasis being laid on how the three processes are related. A firmer theoretical foundation is laid for the previous work in unit operations. Prerequisite: CHE 302 and Senior standing.

CHE 407—Unit Operations Laboratory II—2 cr. (0 and 6)
Laboratory work for the diffusional unit operations. Competent technical reports are required. Prerequisite: Enrollment in CHE 401 and Senior standing.

CHE 410—Unit Operations Theory III—3 cr. (3 and 0)
A study of simultaneous heat and mass transfer, filtration, crystallization, size reduction, and other less common unit operations.

CHE 415—Introduction to Nuclear Engineering—3 cr. (3 and 0)
Designed to acquaint the non-nuclear engineer with some of the engineering aspects of nuclear science. Topics include a brief survey of particle physics; nuclear reactions; energy transformations; nuclear reactors, their design, construction and use; radiation damage to materials of construction; and special problems in nuclear engineering peculiar to the basic engineering disciplines. Prerequisite: Junior or Senior standing in Engineering, Chemistry or Physics.
CHE 416—INTRODUCTION TO NUCLEAR ENGINEERING—3 cr. (3 and 0)
A continuation of CHE 415; topics to include reactor principles, plutonium production, reactor types, materials of reactor construction, control instruments, and waste disposal. 

Prerequisite: CHE 415.

CHE 421—PROCESS DEVELOPMENT, DESIGN, AND OPTIMIZATION OF CHEMICAL ENGINEERING SYSTEMS I—3 cr. (2 and 3)
A study of the steps in creating a chemical process design from the original concept to successful completion and operation of the plant. Topics include engineering economics, systems analysis, simulation, optimization, process equipment sizing and selection, and the application of analog and digital computers. 

Prerequisite: Completion of all required 200 and 300 level courses in chemistry, chemical engineering, and mathematics.

CHE 422—PROCESS DEVELOPMENT, DESIGN, AND OPTIMIZATION OF CHEMICAL ENGINEERING SYSTEMS II—3 cr. (0 and 9)
A continuation of CHE 421. The principles of process development, design, and optimization are applied in a comprehensive problem carried from a general statement of the problem to detailed design and economic evaluations. 

Prerequisite: CHE 401, 421, 430, and 450.

CHE 423—THEORY OF BIO-OXIDATION PROCESSES—2 cr. (2 and 0)
Designed to cover the basic biochemical principles underlying bio-oxidation and their applications in activated sludge and trickling filter processes; basic theory of oxygen transfer and its application to the design of aeration equipment; and the design and operation of typical industrial waste treatment processes. 

Prerequisite: Ch 331 or permission of instructor.

CHE 425—CHEMICAL PROCESS ENGINEERING—3 cr. (3 and 0)
An advanced treatment of chemical engineering unit operations and unit processes. The course is designed to give the undergraduate more depth in these areas. 

Prerequisite: Permission of the instructor.

CHE 430—CHEMICAL ENGINEERING THERMODYNAMICS II—3 cr. (3 and 0)
A continuation of CHE 331. Subjects include heat engines, compressors, refrigeration, phase equilibria and chemical reaction equilibria. 

Prerequisite: CHE 331 and Senior standing.

CHE 440—SENIOR INSPECTION TRIP—0 cr.
A three or four day trip is made to visit selected chemical plants. Using lectures by plant personnel supplemented by conducted tours of chemical plant installations, the student is introduced to current industrial practice. 

Prerequisite: Senior standing in Chemical Engineering.

CHE 450—CHEMICAL ENGINEERING KINETICS—3 cr. (3 and 0)
An introduction to the kinetics of chemical reactions. Topics include homogeneous and heterogeneous reactions, batch and flow reaction systems, catalysis, and design of industrial reactors. 

Prerequisite: CHE 430 or permission of the Department Head.

CHE 452—MOLECULAR AND TURBULENT TRANSPORT—3 cr. (3 and 0)
A theoretical treatment of the fundamental mechanisms of molecular and turbulent heat, mass, and momentum transport with the major emphasis given to the interrelation of all three mechanisms. Evaluation and correlation of transport properties and both steady state and unsteady state processes are
considered. An elective course for non-chemical engineering students. *Pre-requisite:* Senior standing in Chemistry, Engineering, or Physics, and Math 208.

**CHE 453—Process Dynamics—3 cr. (3 and 0)**
Basic process control and the effect of feedback in various systems. The mathematical analysis of the dynamic response of process systems to step and sinusoidal changes. Determination of the optimum settings for various combinations of proportional, reset and derivative control. *Pre-requisite:* Junior or Senior standing in Engineering, Physics, or Chemistry, and Math 309 or permission of department head.

**CHE 701—Transport Phenomena—3 cr. (3 and 0)**
**CHE 707—Unit Operations Laboratory II—2 cr. (0 and 6)**
**CHE 715—Introduction to Nuclear Engineering I—3 cr. (3 and 0)**
**CHE 716—Introduction to Nuclear Engineering II—3 cr. (3 and 0)**
**CHE 723—Theory of Bio-Oxidation Processes—2 cr. (2 and 0)**
**CHE 730—Chemical Engineering Thermodynamics II—3 cr. (3 and 0)**
**CHE 750—Chemical Engineering Kinetics—3 cr. (3 and 0)**
**CHE 752—Molecular and Turbulent Transport—3 cr. (3 and 0)**
**CHE 802—Process Dynamics and Control—3 cr. (3 and 0)**
**CHE 803—Heat, Mass, and Momentum Transfer—3 cr. (3 and 0)**
**CHE 804—Chemical Engineering Thermodynamics—3 cr. (3 and 0)**
**CHE 805—Chemical Engineering Kinetics—3 cr. (3 and 0)**
**CHE 806—Chemical Engineering Calculations I—3 cr. (3 and 0)**
**CHE 807—Chemical Engineering Calculations II—3 cr. (3 and 0)**
**CHE 808—Chemical Engineering Design and Analysis—3 cr. (1 and 6)**
**CHE 809—Waste Treatment—3 cr. (3 and 0)**
**CHE 810—Biochemical Engineering—3 cr. (3 and 0)**
**CHE 820—Fluid Mechanics—3 cr. (3 and 0)**
**CHE 821—Heat Transport—3 cr. (3 and 0)**
**CHE 822—Mass Transfer and Differential Contact Operations—3 cr. (3 and 0)**
**CHE 823—Mass Transfer and Stagewise Contact Operations—3 cr. (3 and 0)**
**CHE 830—Chemical Technology—3 cr. (3 and 0)**
**CHE 840—Graduate Laboratory—Credit to be arranged.**
**CHE 845—Selected Topics in Chemical Engineering—3 cr. (3 and 0)**
**CHE 846—Selected Topics in Chemical Engineering—3 cr. (3 and 0)**
**CHE 847—Selected Topics in Chemical Engineering—3 cr. (3 and 0)**
**CHE 852—Air Pollution Control Processes—3 cr. (3 and 0)**
**CHE 853—Industrial Air Hygiene—3 cr. (3 and 0)**
CHE 854—Environmental Instrumentation and Measurements—3 cr. (2 and 3)

CHE 891—Research—Credit to be arranged.

CHE 902—Process Dynamics and Control—3 cr. (3 and 0)

CHE 903—Transport Phenomena—3 cr. (3 and 0)

CHE 904—Chemical Engineering Thermodynamics—3 cr. (3 and 0)

CHE 905—Chemical Engineering Kinetics—3 cr. (3 and 0)

CHE 945—Selected Topics in Chemical Engineering—3 cr. (3 and 0)

CHE 946—Selected Topics in Chemical Engineering—3 cr. (3 and 0)

CHE 947—Selected Topics in Chemical Engineering—3 cr. (3 and 0)

CHE 954—Environmental Systems Design—3 cr. (3 and 0)

CHE 991—Doctoral Research—Credit to be arranged.

CHEMISTRY


CH 101—General Chemistry—4 cr. (3 and 3)

Gives the student a general knowledge of the fundamentals of the science of chemistry through lectures, lecture experiments, and laboratory exercises. Consideration is given to the common substances.

CH 102—General Chemistry—4 cr. (3 and 3)

A continuation of Ch 101.

CH H102—General Chemistry—4 cr. (3 and 3)

Same as Ch 102 except that this honors section is open to students by invitation only.

CH 219—Chemical Principles—2 cr. (2 and 0)

The fundamental laws and theories pertaining to water and its solutions. The nature of chemical equilibria present in aqueous solutions is emphasized. Prerequisite: Ch 101 and 102.

CH 220—Elementary Organic Chemistry—4 cr. (3 and 3)

A one semester course in organic chemistry. Typical classes of organic compounds, both aliphatic and aromatic, are studied. Prerequisite: Ch 101 and 102.

CH 223—Organic Chemistry—3 cr. (3 and 0)

An introductory course covering the principles of organic chemistry and the derivation of these principles from a study of the properties, preparations, and interrelationships of the important classes of organic compounds. Prerequisite: Ch 101 and 102.

CH 224—Organic Chemistry—3 cr. (3 and 0)

A continuation of Ch 223.
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CH 225—Organic Chemistry Laboratory—2 cr. (0 and 3)
The laboratory techniques involved in the synthesis, separation and purification, and characterization of typical examples of the classes of organic compounds. Prerequisite: Registration in CH 223.

CH 226—Organic Chemistry Laboratory—2 cr. (0 and 6)
A continuation of CH 225. Prerequisite: Registration in CH 224.

CH 227—Organic Chemistry Laboratory—1 cr. (0 and 3)
The synthesis and properties of typical examples of the classes of organic compounds. Prerequisite: Registration in CH 223.

CH 228—Organic Chemistry Laboratory—1 cr. (0 and 3)
A continuation of CH 227. Prerequisite: Registration in CH 224.

CH 310—Elementary Biochemistry—4 cr. (3 and 3)
An introductory course consisting of a review of equilibrium reactions; a study of the chemistry of carbohydrates, proteins, and lipids, and their role in cell metabolism. The laboratory work parallels classroom study. Prerequisite: Organic Chemistry.

CH 313—Quantitative Analysis—3 cr. (3 and 0)
The fundamental principles of volumetric, gravimetric and certain elementary instrumental chemical analyses. Prerequisite: Organic Chemistry.

CH 315—Quantitative Analysis Laboratory—2 cr. (0 and 6)
The laboratory techniques of volumetric, gravimetric, and elementary instrumental analysis.

CH 317—Quantitative Analysis Laboratory—1 cr. (0 and 3)
The standard techniques of analytical chemistry—gravimetric, volumetric, and instrumental.

CH 331—Physical Chemistry—3 cr. (3 and 0)
Includes the gaseous state, thermodynamics, chemical equilibria, and atomic and molecular structure, from both experimental and theoretical points of view. Prerequisite: Math 206 and Physics.

CH 332—Physical Chemistry—3 cr. (3 and 0)
Continuation of CH 331 including chemical kinetics, liquid and solid state, phase equilibria, solutions, electrochemistry and surfaces.

CH 333—Physical Chemistry Laboratory—2 cr. (0 and 6)
Experiments designed to illustrate the physical chemistry theory studied in CH 331. Prerequisite: Registration in CH 331.

CH 334—Physical Chemistry Laboratory—2 cr. (0 and 6)
A continuation of CH 333. Prerequisite: Registration in CH 332.

CH 339—Physical Chemistry Laboratory—1 cr. (0 and 3)
Experiments are selected to be of maximum value to Chemical Engineering majors. Prerequisite: Registration in CH 331.

CH 340—Physical Chemistry Laboratory—1 cr. (0 and 3)
A continuation of CH 339. Prerequisite: Registration in CH 332.

CH 402—Inorganic Chemistry—3 cr. (3 and 0)
A comprehensive survey of the field of inorganic chemistry through lectures and lecture experiments. Development of modern theories of atomic structure
and valence, and a detailed study of the elements and their compounds, based on the periodic system and including both well-known and rarer elements. **Prerequisite:** Ch 331 and 332.

**CH 411—Instrumental Analysis—**4 cr. (2 and 6)
Demonstration and operation of modern optical and electronic precision measuring devices as they apply to the processes and analytical, physical and organic chemistry. **Prerequisite:** Physical Chemistry.

**CH 421—Qualitative Organic Analysis—**4 cr. (2 and 6)
Systematic identification of pure organic compounds and mixtures. **Prerequisite:** Ch 223 and 224.

**CH 423—Principles of Biochemistry—**3 cr. (3 and 0)
A review of the basic organic chemistry of the amino acids, saccharides, and fatty acids; relations of these acids to the chemistry of proteins, polysaccharides, and lipids. Study of kinetics of enzymes and nucleic acids. Metabolic pathways of amino acids, carbohydrates, fats, phospholipids, and nucleic acids; hormonal control of metabolism, vitamins, and growth factors. **Prerequisite:** Ch 223 and 224.

**CH 424—Principles of Biochemistry—**3 cr. (3 and 0)
A continuation of Ch 423.

**CH 425—General Biochemistry Laboratory—**1 cr. (0 and 3)
Experiments selected to illustrate current methods used in biochemical research.

**CH 426—General Biochemistry Laboratory—**1 cr. (0 and 3)
A continuation of Ch 425.

**CH 431—Atomic and Molecular Structure—**3 cr. (3 and 0)
An introductory study of the principles of wave mechanics, hydrogen atom structure, approximate methods, molecular orbital and valence bond treatments of bonding, hybridization, ligand-field theory, and relationships of structure to physical and chemical properties.

**CH 433—Physical Chemistry Laboratory—**1 cr. (0 and 3)
To be taken in conjunction with Ch 431. Laboratory work in spectroscopy and other related areas of atomic and molecular structure will acquaint the student with some of the instruments currently used in the elucidation of structure.

**CH 441—Glass Manipulation—**2 cr. (0 and 6)
A course designed to teach the fundamentals of glass manipulation and its application to the construction and repair of simple laboratory apparatus. **Prerequisite:** Senior standing.

**CH 442—Chemical Literature—**1 cr. (1 and 0)
This course is designed to give the student practice in the use of chemical literature, the writing of technical reports and the presentation of same before the faculty of the Department of Chemistry. **Prerequisite:** Junior standing in Chemistry.
Ch 443—Research Problems—3 cr. (0 and 9)
Original investigation of an assigned problem in a fundamental branch of Chemistry. This work must be carried out under the supervision of a member of the staff. Prerequisite: Senior standing in Chemistry.

Ch 444—Research Problems—3 cr. (0 and 9)
A continuation of Ch 443.

Ch 450—Review of General Chemistry I—3 cr. (3 and 0)
A lecture course designed to deal with the basic principles generally presented in a general chemistry course. Emphasis will be placed upon the explanation of observed facts in terms of modern atomic and molecular structure. Enrollment limited to secondary school teachers.

Ch 454—Inorganic Synthesis—2 cr. (0 and 6)
A laboratory course designed to acquaint the student with various methods and techniques employed in the preparation and handling of inorganic compounds.

Ch 472—Organic Synthesis—4 cr. (2 and 6)
A course designed to teach the student techniques and principles as applied in a research laboratory. Both macro and semi-micro methods are used in the preparation of several organic compounds. Prerequisite: Organic Chemistry.

Ch 491—Introduction to Radiochemistry—3 cr. (2 and 3)
The natural and synthetic radioisotopes, including the consideration of atomic and nuclear structure, properties of radiation and tracer techniques and their application. The laboratory is concerned with the methods of detection and measurement of the various types of radiation and the various applications of tracer techniques. Prerequisite: Senior or Graduate standing and permission of instructor.

Ch 613—Quantitative Analysis—3 cr. (3 and 0)
Ch 615—Quantitative Analysis Laboratory—2 cr. (0 and 6)
Ch 617—Quantitative Analysis Laboratory—1 cr. (0 and 3)
Ch 631—Physical Chemistry—3 cr. (3 and 0)
Ch 632—Physical Chemistry—3 cr. (3 and 0)
Ch 639—Physical Chemistry Laboratory—1 cr. (0 and 3)
Ch 640—Physical Chemistry Laboratory—1 cr. (0 and 3)
Ch 702—Inorganic Chemistry—3 cr. (3 and 0)
Ch 711—Instrumental Analysis—4 cr. (2 and 6)
Ch 721—Qualitative Organic Analysis—4 cr. (2 and 6)
Ch 723—Principles of Biochemistry—3 cr. (3 and 0)
Ch 724—Principles of Biochemistry—3 cr. (3 and 0)
Ch 725—General Biochemistry Laboratory—1 cr. (0 and 3)
Ch 726—General Biochemistry Laboratory—1 cr. (0 and 3)
Ch 731—Atomic and Molecular Structure—3 cr. (3 and 0)
Ch 750—Review of General Chemistry I—3 cr. (3 and 0)
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CH 754—Inorganic Synthesis—2 cr. (0 and 6)
CH 772—Organic Synthesis—4 cr. (2 and 6)
CH 791—Introduction to Radiochemistry—3 cr. (2 and 3)
CH 805—Theoretical Inorganic Chemistry—3 cr. (3 and 0)
CH 806—Special Topics in Inorganic Chemistry—1 to 4 cr.
CH 807—Chemistry of the Transition Elements—3 cr. (3 and 0)
CH 808—Chemistry of the Non-Metallic Elements—3 cr. (3 and 0)
CH 811—Analytical Chemistry—3 cr. (3 and 0)
CH 812—Chemical Spectroscopic Methods—3 cr. (2 and 3)
CH 821—Organic Chemistry I—3 cr. (3 and 0)
CH 822—Organic Chemistry II—3 cr. (3 and 0)
CH 823—Organic Reaction Mechanisms—3 cr. (3 and 0)
CH 824—Fundamental Principles of Polymer Chemistry—3 cr.
(3 and 0)
CH 825—Current Topics in Organic Chemistry—1 cr. (1 and 0)
CH 826—Chemistry of Enzymes—3 cr. (3 and 0)
CH 829—Chemistry and Metabolism of Carbohydrates—2 cr. (2 and 0)
CH 831—Chemical Thermodynamics—3 cr. (3 and 0)
CH 832—States of Matter—3 cr. (3 and 0)
CH 834—Statistical Thermodynamics—3 cr. (3 and 0)
CH 835—Chemical Kinetics—3 cr. (3 and 0)
CH 836—Topics in Colloid Science—3 cr. (3 and 0)
CH 837—Quantum Chemistry—3 cr. (3 and 0)
CH 841—Mathematical Aspects of Chemical Spectroscopy—3 cr.
(3 and 0)
CH 850—a Review of General Chemistry II—3 cr. (2 and 3)
CH 851—Chemistry Seminar—0 to 2 cr.
CH 891—Research—Credit to be arranged.
CH 921—Heterocyclic Compounds—3 cr. (3 and 0)
CH 922—Stereochemistry—3 cr. (3 and 0)
CH 923—Chemistry of Natural Products—3 cr. (3 and 0)
CH 924—Chemistry of Natural Products—3 cr. (3 and 0)
CH 930—Advanced Topics in Physical Chemistry—3 cr. (3 and 0)
CH 950—Microanalytical Techniques—3 cr. (1 and 6)
CH 991—Doctoral Research—Credit to be arranged.
CIVIL ENGINEERING

Professors: L. G. Rich, I. A. Trively


Assistant Professors: R. E. Elling, D. B. Stafford, W. A. Welsh, Jr.

Instructor: R. A. Coleman

CE 201—Surveying—3 cr. (2 and 3)
Elementary plane surveying for other than Civil Engineering students. Coverage includes measurement of distance, leveling, horizontal and vertical angles, stadia and topography, area and volume calculations, construction surveying. Field exercises provide practice in the use of surveying instruments. Prerequisite: Math 106.

CE 205—Civil Engineering Methodology—2 cr. (1 and 3)
Concepts of civil engineering analysis and design, case histories and project studies, introduction to theory and practice of plane surveying, measurements and errors, differential leveling, and topographic mapping. Laboratory includes typical design and construction problems. Prerequisite: Math 106.

CE 206—Geometrics—2 cr. (1 and 3)
Application of geometrics to civil engineering problems, computations and triangulation, coordinate systems, electronic methods of measuring distances, photogrammetry, introduction to digital computation and elementary programming. Prerequisite: CE 205.

CE 301—Introduction to Structural Science—3 cr. (2 and 2)
Analysis of statically determinate and indeterminate structural elements and systems. Influence lines for beams and trusses, calculation of rotations and deflections by integration, moment area, conjugate beam and unit load methods. Indeterminate analysis by force and displacement methods and moment distribution. Prerequisite: CE 206.

CE 302—Structural Design I—3 cr. (3 and 0)
Design and detail of components and connections for timber and metal structures. Prerequisite: CE 301.

CE 310—Transportation Engineering—4 cr. (3 and 2)
Planning, location, design, operation, and administration of highways, railroads, airports and other transportation facilities, including economic considerations, pavement design, and digital computer applications to geometric and earthwork computations. Prerequisite: CE 206; Corequisite: CE 331.

CE 320—Concrete and Bituminous Materials—2 cr. (1 and 3)
Investigation and selection of aggregates for Portland cement concrete and asphaltic concrete; latest methods of design of Portland cement mixes and asphaltic concrete mixes; field control and adjustments; field trips to nearby construction jobs. Prerequisite: EM 304 and Junior standing.

CE 331—Soil Mechanics—3 cr. (2 and 2)
Mechanical and physical properties of soils and their relation to soil action in problems of engineering, such as classification, permeability, shearing strength, consolidation, stress distribution and bearing capacity of soils. Prerequisite: EM 304 and Junior standing.
CE 341—ENVIRONMENTAL ENGINEERING—3 cr. (3 and 0)
An evaluation of the effects of the environment on man with special consider-
ation given to air and water contacts. The analysis and review of engineering systems used in Environmental Control. Prerequisite or Concurrent: EM 320, EM 322.

CE 399—SIMULATION TECHNIQUES—1 cr. (0 and 3)
Modeling of civil engineering problems with the electronic analog computer, with conductive sheet methods and by digest analog simulation. The emphasis is in use rather than the theory of the methods. Prerequisite: Math 208.

CE 402—STRUCTURAL DESIGN II—3 cr. (3 and 0)
Design and detail of reinforced concrete members using elastic and ultimate strength theories, introduction to prestressed concrete. Prerequisite: CE 301, CE 320.

CE 410—TRAFFIC ENGINEERING: OPERATIONS—3 cr. (3 and 0)
Basic characteristics of motor-vehicle traffic; techniques for making traffic engineering investigations; design and application of traffic control devices; traffic design of parking facilities; traffic laws and ordinances; public relations. Prerequisite: CE 310.

CE 412—URBAN TRANSPORTATION PLANNING—3 cr. (3 and 0) F
Urban travel characteristics; characteristics of transportation systems; transport and land-use studies; trip distribution and trip assignment models; city patterns and subdivision layout. Prerequisite: CE 311.

CE 417—AIR PHOTO INTERPRETATION OF SOILS—3 cr. (2 and 3)
A brief review of the basic geometry of aerial photographs, characteristics of geologic and topographic features identifiable from aerial photographs, and site characteristics related to soil profile. Laboratory work includes soil mapping, selection of construction sites, and location of soil deposits for engineering purposes.

CE 419—GENERAL PHOTOGRAMMETRY—3 cr. (2 and 3) S
Fundamentals of mapping by the use of aerial photographs; characteristics, production and use of aerial photographs; study of the operation of popular Photogrammetric instruments including aerial cameras, stereoscopic viewing and plotting equipment; practice in the use of stereocomparator and multiple plotting instruments; scale, tilt, and coordinate calculations; construction of photomosaics. Prerequisite: CE 202 and Junior standing.

CE 420—MECHANICAL PROPERTIES OF MATERIALS—3 cr. (3 and 0)
The course provides a comprehensive introduction to the analysis of mechanical response of materials. Emphasis is placed on the behavior of solid materials that are used in civil engineering structures but are not considered in depth in other undergraduate courses. Plastics, fibers, and composite materials are studied. Students are assisted in investigating a realistic problem in materials technology. Prerequisite: Permission of instructor.

CE 424—CONSTRUCTION METHODS—2 cr. (2 and 0)
A survey of the principal method and equipment used in the construction industry. Prerequisite: Senior standing.
CE 425—ENGINEERING RELATIONS—3 cr. (3 and 0)
Business, legal, and ethical relations in engineering practice. **Prerequisite:** Senior standing.

CE 431—APPLIED SOIL MECHANICS—3 cr. (2 and 2)
Relationship of local geology to soil formations, ground water, planning of site investigation, sampling procedures, laboratory determination of design parameters, foundation design and settlement analysis. **Prerequisite:** CE 331.

CE 434—CONSTRUCTION COSTS AND ESTIMATES—3 cr. (2 and 2)
Interpretation of specifications and plan reading necessary for the proper estimation of quantities of materials and costs of engineering structures. The course is presented from both the designer's and the constructor's viewpoint in order to fit the young engineer with the essential details an inspector or a construction engineer should have at his command. **Prerequisite:** Senior standing.

CE 435—ENGINEERING PROJECT ANALYSIS—3 cr. (2 and 2)
Advanced analysis of engineering projects. Theory of economic, financial and intangible analysis of large-scale construction projects. Practical exercises in cost-benefit studies and construction decisions. **Prerequisite:** Permission of instructor.

CE 441—WATER RESOURCES ENGINEERING—3 cr. (2 and 3)
The hydrologic and economic considerations involved in the control and utilization of water; analysis and design of water and waste water collection systems and water distribution systems. **Prerequisite:** CE 341, EM 320, and EM 322.

CE 453—ADVANCED STRUCTURAL ANALYSIS—3 cr. (3 and 0)
Slopes and deflections of beams and trusses by energy methods. Analysis of statically indeterminate structures and construction of influence lines by virtual-work method. Application of moment distribution and slope deflection methods. **Prerequisite:** CE 301.

CE 490—SPECIAL PROJECTS—1-3 cr. (1-3 and 0-0)
Studies or laboratory investigations on special topics in the Civil Engineering field which are of interest to individual students and staff members. Arranged on a project basis with a maximum of individual student effort and a minimum of staff guidance. **Prerequisite:** Senior standing.

CE 631—INTRODUCTORY SOIL MECHANICS—3 cr. (2 and 2) (Non-Civil Engineering students only.)

CE 699—SIMULATION TECHNIQUES—1 cr. (0 and 3)
CE 710—TRAFFIC ENGINEERING: OPERATIONS—3 cr. (3 and 0)
CE 712—URBAN TRANSPORTATION PLANNING—3 cr. (3 and 0)
CE 717—AIR PHOTO INTERPRETATION OF SOILS—3 cr. (2 and 3)
CE 719—GENERAL PHOTOGRAMMETRY—3 cr. (2 and 3)
CE 720—MECHANICAL PROPERTIES OF MATERIALS—3 cr. (3 and 0)
CE 731—APPLIED SOIL MECHANICS—3 cr. (2 and 2)
CE 734—CONSTRUCTION COSTS AND ESTIMATES—3 cr. (2 and 3)
CE 735—ENGINEERING PROJECT ANALYSIS—3 cr. (2 and 2)
Description of Courses

CE 753—Advanced Structural Analysis—3 cr. (3 and 0)
CE 801—Structural Engineering I—3 cr. (3 and 0)
CE 802—Prestressed Concrete Analysis and Design—3 cr. (3 and 0)
CE 803—Reinforced Concrete Structural Systems—3 cr. (3 and 0)
CE 804—Theory and Design of Thin Plates—3 cr. (3 and 0)
CE 805—Plastic Design of Steel Structures—3 cr. (3 and 0)
CE 806—Design of Steel Members—3 cr. (3 and 0)
CE 807—Numerical and Approximate Methods of Structural Analysis—3 cr. (3 and 0)
CE 808—Finite Element Methods in Structural Analysis—3 cr. (3 and 0)
CE 811—Traffic Engineering: Geometric Design—3 cr. (2 and 3)
CE 812—Air-Photo Interpretation for Transportation Planning—3 cr. (2 and 3)
CE 813—Highway and Airport Pavement Design—3 cr. (3 and 0)
CE 819—Highway Research—2 to 4 cr.
CE 820—Cement and Concrete—3 cr. (2 and 3)
CE 821—Bituminous Paving Materials—3 cr. (2 and 3)
CE 822—Aggregates as Construction Materials—3 cr. (2 and 3)
CE 823—Inelastic Behaviour of Engineering Materials—3 cr. (3 and 0)
CE 831—Foundation Engineering—3 cr. (2 and 3)
CE 832—Advanced Soil Mechanics—3 cr. (3 and 0)
CE 833—Physical and Physio-chemical Properties of Soils—3 cr. (2 and 3)
CE 835—Design of Earth Structures—3 cr. (3 and 0)
CE 889—Special Problems I—1-3 cr.
CE 890—Special Problems II—1-3 cr.
CE 891—Research—3 cr.
CE 901—Theory and Design of Shells—3 cr. (3 and 0)
CE 902—Structural Vibrations—3 cr. (3 and 0)
CE 991—Doctoral Research—Credit to be arranged.

COMPUTER SCIENCE

Professor: A. T. Hind, Jr.
Associate Professors: C. E. Kirkwood, Jr., M. C. Palmer, Director
Instructor: Eugenie V. Bartmess

Comp Sc 210—Algorithmic Processes for Engineers—3 cr. (3 and 0)
Concept and properties of an algorithm, language and notations for describ-
ing algorithms, analysis of computational problems, development of algorithms, and applications to include polynomial interpolation, zeros of equations, systems of equations, matrix manipulations, and solution of differential equations.

Comp Sc 310—Introduction to Algorithmic Processes—3 cr. (2 and 3)  
Concept and properties of an algorithm, language and notations for describing algorithms, analysis of computational problems, and development of algorithms for their solution, and application of a specific procedure-oriented language to solve simple numerical and non-numerical problems using a computer. Prerequisite: Math 206 or consent of instructor.

Comp Sc 311—Computer Organization and Programming—3 cr. (3 and 0)  
Logical basis of computer structure, machine representation of numbers and characters, flow of control, instruction codes, arithmetic and logical operations, indexing, input-output, subroutines, linkages, macros, interpretive and assembly systems, and storage organization. Prerequisite: Comp Sc 310.

Comp Sc 312—Numerical Algorithms for Engineers—3 cr. (3 and 0)  
Further discussion of algorithmic language, includes errors in computation, polynomial interpolation, zeros of function, quadrature, and numerical solution of ordinary differential equations and systems of differential equations. Prerequisite: Comp Sc 310, Math 208 or equivalent.

Comp Sc 409—Numerical Calculus—3 cr. (3 and 0)  
An introduction to numerical methods, including elementary discussion of errors, polynomial interpolation, matrix methods, linear systems of equations, solution of non-linear equations, and numerical solution of ordinary differential equations, and systems of differential equations. Prerequisite: Comp Sc 310, Math 305 or equivalent and Comp Sc 310.

Comp Sc 427—Computer Principles—3 cr. (3 and 0)  
Symbolic logic and Boolean algebra for description and analysis of switching circuits, simplification of switching circuits, error detecting and correcting codes, digital systems design principles. Prerequisite: Math 305 or equivalent and Comp Sc 310.

Comp Sc 428—Algorithmic Languages and Compilers—3 cr. (3 and 0)  
Formal description of algorithmic languages and the techniques used in their compilation, study of syntax, semantics, procedures, replication, iteration, and recursion in these languages, including comparisons of commonly used languages. Prerequisite: Comp Sc 310, Math 295 or equivalent.

Comp Sc 610—Introduction to Algorithmic Processes—3 cr. (2 and 3)  
Comp Sc 611—Computer Organization and Programming—3 cr. (3 and 0)  
Comp Sc 612—Numerical Algorithms for Engineers—3 cr. (3 and 0)  
Comp Sc 709—Numerical Calculus—3 cr. (3 and 0)  
Comp Sc 727—Computer Principles—3 cr. (3 and 0)  
Comp Sc 728—Algorithmic Languages and Compilers—3 cr. (3 and 0)
DAIRY SCIENCE

Professors: R. W. Henningson, V. Hurst, J. J. Janzen, W. A. King, Head; J. T. Lazar, Jr.

Associate Professors: C. C. Brannon, W. V. Chalupa

Assistant Professor: J. F. Dickey

DY Sc 201—Introduction to Dairy Science—3 cr. (2 and 3) F, S
A fundamental course designed to give the student a working knowledge of Dairy Science. Studies include history of dairying, dairy breeds and cattle evaluation, nutrition, physiology, housing, quality milk production, quality control and the evaluation of milk and its products, the manufacture of milk products and their value in the human food supply.

DY Sc 306—The Chemical and Physical Nature of Milk—3 cr. (2 and 3) S
The nature and properties of the major and minor constituents of milk, the effect of chemical and physical treatment on milk constituents, and analytical methods necessary to determine the composition and properties of milk and its constituents. The philosophy and development of quality control.

DY Sc 307—Market Milk—3 cr. (2 and 3) F, '68 and alternate years.
Composition, procurement, processing, distribution, quality control, public health aspects, basic chemistry and bacteriology of industrial milk supplies and cultured products.

DY Sc 310—Dairy Cattle Selection—1 cr. (0 and 3) S, '70 and alternate years.
Emphasis is placed upon the selection of dairy cattle for profitable herd operations. Evaluations of herd classifications, fitting, showing, and true type are made.

DY Sc 402—Dairy Manufactures—4 cr. (3 and 3) S, '70 and alternate years.
The principles and practice of the manufacture of ice cream and related dairy products, the principles of the manufacture of condensed and evaporated milks and milk powders, and the physical, chemical and biological factors involved.

DY Sc 404—Plant Management—3 cr. (2 and 3) S, '71 and alternate years.
The organization and operation of dairy and food plants and the coordination of all functions into an orderly business enterprise. Emphasis will be given to management's responsibility concerning the procurement, processing, quality control and distribution of food products. Business and industrial techniques are used to develop maximum efficiencies.

DY Sc 409—Dairy Science Seminar—2 cr. (2 and 0) F, '69 and alternate years.
Special research problems in production and manufactures are studied. Individual topics not fully covered in class work are assigned for special report before class and members of Dairy Science Staff.
Dy Sc 410—Dairy Science Seminar—2 cr. (2 and 0)
S, '70 and alternate years.
A continuation of Dy Sc 409 with emphasis on current research literature and research methods.

Dy Sc 452—Dairy Cattle Feeding and Management—3 cr. (2 and 3)
S, '71 and alternate years.
Fundamental principles in the care, feeding, and management of dairy cattle of all ages. Topics include general considerations in selecting a breed and the individual cow, calf raising, growth and development of dairy heifers, care and management of the milking herd and feeding for milk production.

Dy Sc 453—Animal Reproduction—3 cr. (3 and 0) F
Reproductive physiology and endocrinology of mammals with emphasis on farm animals and frequent reference to reproduction in laboratory animals and humans.

Dy Sc 455—Animal Reproduction Laboratory—1 cr. (0 and 3) F
This course will supplement Dy Sc 453. Practical work will include comparative anatomy and histology of the male and female reproductive organs; semen collection, evaluation and processing; techniques of artificial insemination, sexual behavior and the principles of pregnancy tests for humans. Prerequisite: To be taken concurrently or to follow Dy Sc 453.

Dy Sc 606—Chemical and Physical Nature of Milk—3 cr. (2 and 3)
Dy Sc 607—Market Milk—3 cr. (2 and 3)
Dy Sc 702—Dairy Manufactures—4 cr. (3 and 3)
Dy Sc 704—Dairy Plant Management—3 cr. (2 and 3)
Dy Sc 752—Dairy Cattle Feeding and Management—3 cr. (2 and 3)
Dy Sc 753—Animal Reproduction—3 cr. (3 and 0)
Dy Sc 755—Animal Reproduction Laboratory—1 cr. (0 and 3)
Dy Sc 801—Topical Problems—1 to 3 cr.
Dy Sc 802—Genetics of Dairy Cattle Improvement—3 cr. (3 and 0)
Dy Sc 803—Physiology of Reproduction and Milk Secretion—3 cr. (3 and 0)
Dy Sc 804—Endocrinology—3 cr. (3 and 0)
Dy Sc 805—Newer Knowledge of Dairy Nutrition—3 cr. (3 and 0)
Dy Sc 807—Fermented Dairy Products—3 cr. (2 and 3)
Dy Sc 808—Industrial Dairy Science—3 cr. (3 and 0)
Dy Sc 809—Rumen Metabolism—3 cr. (2 and 3)
Dy Sc 891—Research—Credit to be arranged.
ECONOMICS

Professors: H. H. Macaulay, Jr., W. C. Whitten, Jr.
Associate Professors: J. F. Pearce, B. R. Skelton, H. J. Wheeler, Head
Assistant Professors: F. A. Close, G. Christou, R. D. Shannon
Instructors: D. E. Shulenburger, Holley H. Ulbrich

ECON 201—PRINCIPLES OF ECONOMICS—3 cr. (3 and 0)
The fundamental principles of pricing, stabilization and growth in a modern
economy. Topics include supply and demand, employment theory and fiscal
policy, the banking system and monetary policy, and the economics of growth.

ECON 202—PRINCIPLES OF ECONOMICS—3 cr. (3 and 0)
Continuation of Econ 201 with an intensive study of the economics of the
firm, the pricing of resources, and international economic relations. The theory
is given relevance through the analysis of current economic problems. Prereq-
quisite: Econ 201.

ECON 301—ECONOMICS OF LABOR—3 cr. (3 and 0)
The economics of the labor market, the problems of the industrial worker,
and the methods of adjusting labor-management disputes. Prerequisite: Econ
201.

ECON 302—MONEY AND BANKING—3 cr. (3 and 0)
Considers the function of money and banking in both the product and
financial markets. Special emphasis is placed on monetary theory and current
problems of monetary policy. Prerequisite: Econ 201 and 202.

ECON 305—INVESTMENT ANALYSIS—3 cr. (3 and 0)
A study of techniques useful in analyzing alternative investment oppor-
tunities, with emphasis on corporate securities. Investment planning and
portfolio management are considered. Prerequisite: Econ 201.

ECON 306—RISK AND INSURANCE—3 cr. (3 and 0)
Studies the nature of risk and the role of insurance in risk management
from individual and business viewpoints by considering insurance carriers,
contracts, underwriting and regulation. Prerequisite: Econ 201.

ECON 308—COLLECTIVE BARGAINING—3 cr. (3 and 0)
The practices, procedures, legal foundations, and legal structure associated
with collective bargaining. The form and content of the labor contract, the
grievance machinery, and the mediation and arbitration institutions will also be
studied. Prerequisite: Econ 201.

ECON 309—GOVERNMENT AND BUSINESS—3 cr. (3 and 0)
The relationships between government and business, including, among other
topics, governmental efforts to enforce competition, to regulate public utilities,
and to protect the special interests of laborers, farmers, and consumers. Pre-
requisite: Econ 201.

ECON 314—INTERMEDIATE ECONOMIC THEORY—3 cr. (3 and 0)
An analytical study of the basic concepts of value and distribution under
alternative market conditions. Prerequisite: Econ 201 and 202.

* Part-time.
ECON 403—DEVELOPMENT OF ECONOMIC THOUGHT—3 cr. (3 and 0)
A study of the origin and evolution of ideas with some emphasis on the historical context, the problems which inspired these ideas, and the nature of the solutions which they provided: from ancient days to the present. Prerequisite: Econ 201 and 202.

ECON 404—COMPARATIVE ECONOMIC SYSTEMS—3 cr. (3 and 0)
A comparative analytical and historical study of the principal economic systems which have been important in the modern world including, among others, capitalism and socialism. Prerequisite: Econ 201 and 202.

ECON 407—NATIONAL INCOME AND EMPLOYMENT ANALYSIS—3 cr. (3 and 0)
An intensive study of selected economic theories with special emphasis on income and employment. Part of the course is devoted to the analysis of national income accounts and income. Prerequisite: Econ 201 and 202.

ECON 410—ECONOMIC DEVELOPMENT—3 cr. (3 and 0)
Consideration and analysis of economic and related problems of the underdeveloped countries. Attention will be given to national and international programs designed to accelerate solution of these problems. Prerequisite: Econ 201 and 202.

ECON 412—INTERNATIONAL TRADE—3 cr. (3 and 0)
A study of economic principles particularly applicable to trade between nations. Topics covered include the balance of payments, determination of foreign exchange rates, price and income effects on the composition and level of trade, and commercial policy. Prerequisite: Econ 314.

ECON 413—INTERNATIONAL FINANCE—3 cr. (3 and 0)
With primary emphasis upon international monetary relations, the course surveys history and theory. Topics covered include exchange-rate determination, exchange-stability conditions, the purchasing-power-parity doctrine, the effects of devaluation and exchange speculation. (Not open to students who have taken Econ 412.) Prerequisite: Econ 302.

ECON 416—DEVELOPMENT OF THE MODERN ECONOMY—3 cr. (3 and 0)
An analysis of the historical forces and influences which have contributed to the emergence and development of the modern economy. Prerequisite: Econ 201 and 202.

ECON 420—THE ECONOMICS OF TAXATION—3 cr. (3 and 0)
An intensive study of a limited number of problems in taxation with particular emphasis on the economic effects that cause and result from certain taxes. Topics include averaging, incentives to work, incidence, concepts of equity, excess burden, definitions of income, depletion, and capital gains. Prerequisite: Econ 314.

ECON 422—MONETARY THEORY AND POLICY—3 cr. (3 and 0)
An intensive study of the role of monetary factors in economic change. Modern monetary theories and their empirical relevance for policy are developed against a background of monetary history and institutions. Prerequisite: Econ 302 or permission of the instructor.

ECON 703—DEVELOPMENT OF ECONOMIC THOUGHT—3 cr. (3 and 0)
ECON 704—COMPARATIVE ECONOMIC SYSTEMS—3 cr. (3 and 0)
Description of Courses

Econ 707—National Income and Employment Analysis—3 cr. (3 and 0)
Econ 710—Economic Development—3 cr. (3 and 0)
Econ 712—International Trade—3 cr. (3 and 0)
Econ 713—International Finance—3 cr. (3 and 0)
Econ 716—Development of the Modern Economy—3 cr. (3 and 0)
Econ 720—Economics of Taxation—3 cr. (3 and 0)
Econ 722—Monetary Theory and Policy—3 cr. (3 and 0)
Econ 800—Advanced Economic Analysis—3 cr. (3 and 0)
Econ 802—Advanced Economic Concepts and Applications I—3 cr. (3 and 0)
Econ 803—Advanced Economic Concepts and Applications II—3 cr. (3 and 0)
Econ 810—Seminar in Economic Analysis—3 cr. (3 and 0)
Econ 811—Seminar in Labor Economics—3 cr. (3 and 0)
Econ 812—Seminar in the Development of Economic Thought—3 cr. (3 and 0)
Econ 813—Seminar in Public Goods and Economic Welfare—3 cr. (3 and 0)
Econ 821—Economic Theory I—3 cr. (3 and 0)
Econ 822—Economic Theory II—3 cr. (3 and 0)
Econ 891—Research—Credit to be arranged.
Econ 900—Seminar in Advanced Economic Theory—3 cr. (3 and 0)

EDUCATION

Professors: L. H. Davis, H. F. Landrith
Associate Professors: C. R. Freeze, G. W. Gray, M. A. Packer, R. E. Ware
Assistant Professors: L. L. Byrd, J. R. Harris, J. A. Hash, Barbara W. Morgan, T. H. Parry
Instructors: Gail S. Freeman, Elizabeth B. Galloway

Ed 100—Orientation—0 cr. (1 and 0)
Series of lectures and discussions on teaching and careers in education; personal and professional guidance. Required of all students in Elementary Education, Secondary Education, and Science Teaching.

Ed 101—Reading Improvement—0 cr. (0 and 2)
Developmental reading for University students who desire to improve reading skills; open to any University student, but priority given to referrals.

Ed 301—History of American Education—3 cr. (3 and 0)
Development of educational systems, theories and practices against a background of American social and intellectual history. Prerequisite: Junior standing or permission of the instructor.

Ed 302—Educational Psychology—3 cr. (3 and 0)
The nature, capacities, equipment, growth and development of the learner.
Prerequisite: Ed 302 or Psych 201.

**ED 335—Adolescent Growth and Development—3 cr. (3 and 0)**
The physical and emotional growth and development of the adolescent. *Prerequisite: Ed 302 or Psych 201.*

**ED 401—The Community College—3 cr. (3 and 0)**
History and philosophy of the junior college, its functions, organization and administration.

**ED 405—Principles of Guidance—3 cr. (3 and 0)**
Principles, procedures, and policies of the guidance services. For all personnel workers. *Prerequisite: 6 semester hours in Education or Psychology.*

**ED 406—History and Philosophy of Education—3 cr. (3 and 0)**
An analysis of the development of modern education practices and philosophies with emphasis upon the historical and philosophical development in the United States.

**ED 412—Directed Teaching in Secondary School Subjects—6 cr. (1 and 15)**
A program of supervised observation and teaching in cooperation with selected public schools in which opportunities are provided for prospective teachers to obtain experiences in the subject area. Students to be sectioned according to teaching fields: English, History and Social Sciences, Mathematics, Modern Languages, Science. (Enrollment is subject to individual approval of instructor in charge and is limited to seniors or graduates who have completed prerequisite courses and who have the accumulated grade-point ratio necessary for graduation.)

**ED 424—Methods and Materials in Secondary School Instruction—3 cr. (3 and 0)**
Development of instructional practices and materials appropriate for the secondary school; familiarization with curriculum materials. Students to be sectioned according to teaching area: English, History and Social Science, Mathematics, Modern Languages, Science.

**ED 458—Health Education—3 cr. (3 and 0)**
A study of the information needed for effective cooperation with parents, physicians and public health agencies in the promotion and improvement of community health, including problems of personal hygiene, health records, immunization, and control of communicable disease.

**ED 459—Fundamentals of Basic Reading—3 cr. (3 and 0)**
Study of reading skills in relation to the psychological bases; developmental principles; historical and current issues in reading practices.

**ED 460—Curriculum Development in the Elementary School—3 cr. (3 and 0)**
An analysis and evaluation of newer practices in curriculum planning in the elementary school.

**ED 461—Teaching Reading in the Elementary School—3 cr. (3 and 0)**
Study of the various phases of reading and their relation to the elementary program. Emphasis on modern practices in the classroom teaching of reading.
Description of Courses

Ed 462—Reading Diagnosis and Remediation—3 cr. (2 and 3)
A clinical course in diagnostic and remedial procedures in the teaching of reading. Practice in the use of diagnostic instruments, interpretation of results, and case studies, with recommended remediation. Laboratory hours to be arranged with each individual. Prerequisite: 3 semester hours in reading or permission of the Instructor.

Ed 471—The Exceptional Child—3 cr. (3 and 0)
Survey of exceptionality including handicapped and gifted children; nature, cause, and treatment of difficulties; educational problems.

Ed 472—Psychology of Mental Retardation—3 cr. (3 and 0)
Psychological aspects of mental retardation; learning, motivation, and personality development.

Ed 473—Teaching the Mentally Retarded—3 cr. (3 and 0)
Study, selection, and preparation of curricular materials; methods of teaching retarded children within the pre-adolescent and adolescent range. Prerequisite: Ed 472 or equivalent.

Ed 480—Methods and Materials in the Elementary School—3 cr. (3 and 0)
Study of the elementary program with emphasis upon materials, curriculum and methodology.

Ed 481—Directed Teaching in the Elementary School—6 cr. (1 and 15)
Supervised observation and teaching experiences in cooperation with selected elementary schools. (Enrollment is subject to individual approval of the instructor and is limited to seniors or graduate schools who have completed prerequisite courses and who have the accumulated grade-point ratio for graduation.)

Ed 482—Methods and Materials in Elementary School Music—3 cr. (3 and 0)
Materials, methods, and techniques in elementary school music. Prerequisite: Mus 400.

Ed 487—Methods and Materials in Speech Development—3 cr. (3 and 0)
Approved methods of teaching speech development; study of materials; experience in clinical methodology.

Ed 491—Descriptive Statistics—3 cr. (3 and 0)
Basic descriptive statistics and research methodology applicable to education, psychology and other social sciences.

Ed 494—School and Community Relationships—3 cr. (3 and 0)
A study of the interdependence of the school and community, with emphasis on educational implications.

Ed 497—Audio-Visual Aids in Education—3 cr. (3 and 0)
The techniques and uses of audio-visual aids in improving teaching effectiveness.

Ed 498—Teaching Secondary School Reading—3 cr. (3 and 0)
Methods and materials of teaching basic and developmental reading skills, programming special services in reading instruction. Demonstrations of tests and devices.
Ed 701—The Community College—3 cr. (3 and 0)
Ed 705—Principles of Guidance—3 cr. (3 and 0)
Ed 706—History and Philosophy of Education—3 cr. (3 and 0)
Ed 760—Curriculum Development in the Elementary School—3 cr. (3 and 0)
Ed 762—Reading Diagnosis and Remediation—3 cr. (2 and 3)
Ed 771—The Exceptional Child—3 cr. (3 and 0)
Ed 772—Psychology of Mental Retardation—3 cr. (3 and 0)
Ed 773—Teaching the Mentally Retarded—3 cr. (3 and 0)
Ed 787—Methods and Materials in Speech Development—3 cr. (3 and 0)
Ed 794—School and Community Relationships—3 cr. (3 and 0)
Ed 797—Audio-Visual Aids in Education—3 cr. (3 and 0)
Ed 798—Teaching Secondary School Reading—3 cr. (3 and 0)
Ed 801—Seminar in Human Growth and Development—3 cr. (3 and 0)
Ed 802—Human Development: Psychology of Learning—3 cr. (3 and 0)
Ed 803—Advanced Methods in Teaching—3 cr. (3 and 0)
Ed 808—Educational Tests and Measurements—3 cr. (3 and 0)
Ed 809—Analysis of the Individual—3 cr. (3 and 0)
Ed 810—Techniques of Counseling—3 cr. (3 and 0)
Ed 811—Public School Administration (Finance)—3 cr. (3 and 0)
Ed 813—Educational and Vocational Informational Services and Placement—3 cr. (3 and 0)
Ed 814—Field Experiences in Elementary School Guidance—3 cr. (2 and 3)
Ed 815—Field Experiences in Secondary School Guidance—3 cr. (2 and 3)
Ed 816—Field Experiences in Personnel Services in Higher Education—3 cr. (2 and 3)
Ed 817—Clinical Studies in Counseling and Guidance—1 to 3 cr.
Ed 830—Techniques of Supervision—The Public Schools—3 cr. (3 and 0)
Ed 831—Evaluation of Secondary School Instruction—3 cr. (3 and 0)
(Offered in Summer Sessions only.)
Ed 861—Organization and Supervision of Reading Programs—3 cr. (3 and 0)
Ed 862—Clinical Research in Reading—3 cr. (3 and 0)
Ed 863—Practicum in Reading—3 cr. (2 and 2)
Ed 890—Introduction to Research in Education—3 cr. (3 and 0)
ELECTRICAL ENGINEERING

Associate Professors: W. L. Ball, H. E. Broyles, T. L. Drake, C. P. Goodin, R. N. Kersey, Jr., H. V. Poe, R. W. Snelshire, L. C. Wilcox, Head; M. L. Wolla, W. T. Zink
Assistant Professor: B. E. Gilliland

EE 299—Digital Computation—1 cr. (0 and 3)
A programming course designed to prepare students for the efficient use of digital computers. Fortran and PL-1 languages are used. An ideal course for those desiring a rapid but comprehensive introduction to computing languages. Many examples are worked. Prerequisite: Math 205.

EE 303—Introduction to Electrical Engineering—3 cr. (3 and 0)
Electric and magnetic circuits, phasor algebra as applied to A.C. circuits, machinery, electronics. For students in Industrial Education and Industrial Management. Prerequisite: Math 106, Phys 202 and 204.

EE 307—Basic Electrical Engineering—3 cr. (3 and 0)
Electrical engineering for students who need a strong background in the subject, but who are not planning to specialize in the field. A firm foundation in circuit theory is provided in this course. Prerequisite: Math 206, Phys 222 and 224.

EE 308—Basic Electrical Engineering—3 cr. (3 and 0)
A continuation of EE 307, with emphasis on electronics, instrumentation, and basic electromechanics. Prerequisite: EE 307.

EE 310—Electrical Engineering Laboratory—1 cr. (0 and 2)
A laboratory course designed to accompany EE 308. Prerequisite: EE 308 or enrollment in EE 308.

EE 315—Information Theory—3 cr. (3 and 0)
A course designed for those interested in developing a precise definition of information, and then applying this definition to the study of communication. Coding and the effect of noise on the system will be discussed. In the last part of the course upper bounds on the rate at which a process can transmit information will be obtained. Prerequisite: Approval of department.

EE 320—Electronics I—2 cr. (2 and 0)
The fundamental principles of solid state electronic devices including the structural properties of semi-conductors, charge carrier motion, p-n junction theory, and electrical circuit models of transistors. Emphasis is given to the physical principles describing the operation of modern electronics components. Prerequisite: Phys 221, 222. Concurrent enrollment in EE 325.

EE 321—Electronics II—2 cr. (2 and 0)
Solid state circuit theory covering the design of small signal—low frequency amplifiers and multistage and feedback systems; applications involving operational amplifiers, field effect transistors and integrated circuits are covered. Prerequisite: EE 320, 330, 331. Concurrent enrollment in EE 326.
EE 323—Electric and Magnetic Fields—3 cr. (3 and 0)
An introduction to classical electromagnetics, including potential theory, electrical properties of isotropic media, and Maxwell’s equations. Prerequisite: Math 208, Phys 222, EM 101.

EE 325—Electronics and Electromagnetics Laboratory I—1 cr.
(0 and 2)
Laboratory projects dealing with instrumentation and measurement procedures associated with solid state electronic devices and electromagnetic fields. Prerequisite: Concurrent enrollment in EE 320 and 340.

EE 326—Electronics and Electromagnetics Laboratory II—1 cr.
(0 and 2)
Experimentation in electronics circuits design and electronic systems analysis, including integrated circuits. Projects relating to studies of time varying fields, transmission lines, wave guides, and antennas are included. Prerequisite: Concurrent enrollment in EE 321 and 341.

EE 329—Logic and Computing Devices—3 cr. (2 and 2)
A study of logic with an introduction to propositional calculus and Boolean Algebra. Number systems and representation of information. The use of digital devices to implement logic functions and computing elements. The organization and structure of computing systems. Prerequisite: Approval of department.

EE 330—Systems I—2 cr. (2 and 0)
The systems concept and system analysis methods are developed. The system model is developed through the study of functions and data forms, perfect drivers, response, two terminal elements, system geometry, linear algebra and subsystems. Branch, node, mesh and state models are considered. Solution methods include the use of the analog and digital computer. Non-linear components are introduced in simple systems. Prerequisite: Math 208 or approval of department.

EE 331—Electric Circuits Workshop I—2 cr. (0 and 4)
Computational sessions, demonstrations and laboratory projects are coordinated with EE 330 (Systems I) in the area of electrical phenomenon. Electrical instrumentation and measurement procedures are introduced to illustrate component modeling and network response. Applications involving both continuous and discrete behavior are discussed. Problem solving using digital and analog computers is emphasized. Prerequisite: Concurrent enrollment with EE 330.

EE 332—Systems II—2 cr. (2 and 0)
A continuation of Systems I. Transforms of equations and functions and formulation of system equations in the S-domain. Two-port and N-terminal components studies include input-output and transfer parameters, measurement procedures, and system reduction methods. Solution methods include the use of transforms, analog computers and digital computers. Optimization methods are introduced. Prerequisite: EE 330.

EE 333—Electric Circuits Workshop II—2 cr. (0 and 4)
A continuation of EE 331. Transfer function concepts, multi-terminal component modeling and computer simulations are among topics covered. A variety of electrical devices and systems are discussed including machinery.
and other energy conversion and solid state devices. Prerequisite: Concurrent enrollment in EE 332.

EE 340—Electric and Magnetic Fields I—2 cr. (2 and 0)
An introduction to classical electromagnetics. Topics include vector analysis, Coulomb’s law, electric field intensity, Gauss’s law, potential theory, solution of Laplace’s equation, D.C. magnetic fields, magnetic circuits and devices, and forces in magnetic fields. Prerequisite: Phys 222, Math 208.

EE 341—Electric and Magnetic Fields II—2 cr. (2 and 0)
Continuation of EE 340 to include time-varying fields, Maxwell’s equations, transmission lines, waveguides, and antennas. Prerequisite: EE 340.

EE 350—Digital Information Processing—3 cr. (2 and 2)
Introduction to the basic characteristics of general purpose digital computer systems. The computer is viewed as a discrete sequential processor operating on discrete data rather than as a high speed calculating device. Topics include: general machine organization and operation, information flow within the machine, internal and external data types and structures, data transfers and communication with external devices, and interrelations between software and hardware. The various levels of programming systems are reviewed, but the main emphasis is placed on lower-level languages which provide the means for more flexible control and utilization of the digital system. Prerequisite: Junior standing in engineering or physical sciences and consent of instructor.

EE 351—Real Time Applications of Digital Computers—3 cr. (2 and 2)
An introduction of the application and operation of digital computers in a real-time or near real-time environment. An extension of the topics of EE 350 with the main emphasis on real-time applications and on-line data acquisition and reduction. Topics include: hardware characteristics such as interrupt and data break facilities, analog-to-digital and digital-to-analog signal conversion, timing considerations, and programming systems. The utilization of the computer as a system control component is considered as well as its use in simulation. Prerequisite: EE 350 or approval of department.

EE 402—Engineering Analysis—1 cr. (1 and 0)
The application of engineering principles and methods to the study of typical problems that arise in the various fields of electrical engineering. Prerequisite: EE 401 and Senior standing.

EE 403—Energy Conversion—3 cr. (3 and 0)
Various methods of energy conversion, both electromechanical and direct. Fuel cells, magnetohydrodynamics, nuclear and other methods are discussed along with more conventional systems. Prerequisite: Approval of department.

EE 405—Special Problems—Variable credit.
Electrical Engineering problems assigned to the student according to his needs and capabilities. The purpose is to give students a chance to do projects, either theoretical or experimental, on subjects not covered in other courses. Prerequisite: Approval of department.

EE 409—Electrical Engineering Laboratory V—1 cr. (0 and 2)
A project-type laboratory with topics chosen from the fields of energy conversion, control systems, circuits and electronics. Prerequisite: Enrollment in EE 403 and EE 410.
EE 410—Systems III—3 cr. (3 and 0)
An extension of Systems II into more advanced topics including flow concepts, stability, synthesis, optimization, and analysis with digital machines using—CSMP-ECAP and other simulation programs. Prerequisite: EE 332.

EE 411—Electrical Systems Workshop III—2 cr. (0 and 4)
A continuation of EE 333. Larger more complex systems are considered. Projects illustrating state space and classical control theory are undertaken. Network synthesis and analysis through digital simulations is also covered. Prerequisite: EE 333.

EE 419—Electrical Machinery Laboratory I—1 cr. (0 and 2)
A laboratory course designed to accompany EE 421. Includes measurements of A.C. and D.C. machine parameters, analog computer simulation with emphasis on control. Prerequisite: Enrollment in EE 421.

EE 420—Power Systems Analysis—3 cr. (3 and 0)
Study of electric power system operation. Subjects covered include transmission lines, load-flow studies, economic dispatching, symmetrical components, fault calculations, and introduction to power system stability. Prerequisite: EE 312.

EE 421—Electrical Machinery—3 cr. (3 and 0)
Characteristics of A.C. and D.C. machines are studied with emphasis on dynamic operation and control. Prerequisite: EE 333.

EE 422—Electronics III—2 cr. (2 and 0)
An introduction to logic circuits, switching devices, and electronic storage systems. Frequency response of electronic components and systems, oscillator fundamentals, principles of modulation and power supply design are also covered. Prerequisite: EE 321, EE 333.

EE 423—Communications Theory—3 cr. (3 and 0)
Basic theory of information and its time domain and frequency domain interpretations of AM, FM, and pulse modulation techniques. Introduction to noise and statistical techniques in communications systems. Prerequisite: EE 315 and EE 321.

EE 429—Fundamentals of Digital Computer Design—3 cr. (3 and 0)
This course is designed for senior engineering and science students who are interested in the organization, logic, and circuit aspects of digital computers. Preliminary investigation of algorithms for performing digital arithmetic operations is followed by a study of logic circuits, switching matrices, computer elements and computer organization. The course is concluded with the design of a digital computer. Prerequisite: EE 321.

EE 431—Advanced Electronics—3 cr. (3 and 0)
Active and passive wave-shaping, memory, and switching circuits. Prerequisite: EE 321 and concurrent registration in EE 433.

EE 432—Instrumentation—3 cr. (3 and 0)
Theory and analysis of transducers and related circuits and instrumentation. Generalized configurations and performance characteristics of instruments will be considered. Transduction devices for measuring physical parameters such as motion, force, torque, pressure, flow, and temperature will be discussed. Prerequisite: EE 321 or approval of department.
EE 433—Advanced Electronics Laboratory—1 cr. (0 and 2)  
A laboratory course designed to accompany EE 431. Prerequisite: Concurrent registration in EE 431.

EE 436—Radiation and Wave Propagation—3 cr. (3 and 0)  
Electromagnetic waves, waveguides, and antennas. Prerequisite: EE 341.

EE 437—Optics of Coherent and Noncoherent Electromagnetic Radiations—3 cr. (3 and 0)  
Review of the properties of light and of basic geometrical and physical optics; operational Fourier transform and matrix treatment of optical image-forming processes, diffraction, spectroscopy and communications; optical filtering and computing; coherent light generation; amplification and control with optical lasers and masers. Similarities and relations with microwave and electronic systems techniques. Prerequisite: EE 341.

EE 450—Analog, Digital, and Hybrid Computation—3 cr. (3 and 0)  
Emphasis is placed on studies of non-linear systems. Transfer function simulation, hybrid analysis of sampled data systems, and an introduction to digital control procedures are examples of areas covered. Prerequisite: EE 410 or approval of department.

EE 451—System Design Workshop IV—2 cr. (0 and 4)  
A project oriented course which brings together electrical engineering students of dissimilar training into teams or project groups. Assignments are made to each group which are designed to help develop an appreciation for individual and creative thinking as well as team effort. Prerequisite: EE 411.

EE 703—Energy Conversion—3 cr. (3 and 0)

EE 709—Electrical Engineering Laboratory V—1 cr. (0 and 2)

EE 710—Feedback Control Systems—3 cr. (3 and 0)

EE 719—Electrical Machinery Laboratory—1 cr. (0 and 2)

EE 720—Power System Analysis—3 cr. (3 and 0)

EE 721—Electrical Machinery—3 cr. (3 and 0)

EE 729—Fundamentals of Digital Computer Design—3 cr. (3 and 0)

EE 728—Communications Theory—3 cr. (3 and 0)

EE 731—Electronics III—3 cr. (3 and 0)

EE 733—Electronics III Laboratory—1 cr. (0 and 2)

EE 736—Radiation and Wave Propagation—3 cr. (3 and 0)

EE 750—Analog, Digital and Hybrid Computation—3 cr. (3 and 0)

EE 801—Analysis of Linear Systems I—3 cr. (3 and 0)

EE 802—Analysis of Linear Systems II—3 cr. (3 and 0)

EE 803—Seminar—1 cr. (1 and 0)

EE 804—Network Synthesis I—3 cr. (3 and 0)

EE 805—Network Synthesis II—3 cr. (3 and 0)

EE 806—Nonlinear Networks and Systems I—3 cr. (3 and 0)

EE 807—Power System Stability—3 cr. (3 and 0)
EE 808—Energy Conversion—3 cr. (3 and 0)
EE 810—Modern Control Theory I—3 cr. (3 and 0)
EE 811—Modern Control Theory II—3 cr. (3 and 0)
EE 812—Sampled Data Systems—3 cr. (3 and 0)
EE 814—Nonlinear Automatic Controls—3 cr. (3 and 0)
EE 815—Random Data Measurements and Analysis—3 cr. (3 and 0)
EE 820—Theory of Communications I—3 cr. (3 and 0)
EE 821—Theory of Communications II—3 cr. (3 and 0)
EE 822—Information Theory—3 cr. (3 and 0)
EE 823—Integrated Circuits I—3 cr. (3 and 0)
EE 824—Integrated Circuits II—3 cr. (3 and 0)
EE 825—Solid-State Electronics—3 cr. (3 and 0)
EE 826—Large Scale Integration—3 cr. (3 and 0)
EE 827—Instrumentation and Measurements—3 cr. (3 and 0)
EE 830—Electromagnetics I—3 cr. (3 and 0)
EE 831—Electromagnetics II—3 cr. (3 and 0)
EE 832—Antenna Theory I—3 cr. (3 and 0)
EE 833—Antenna Theory II—3 cr. (3 and 0)
EE 834—Microwave Electronics—3 cr. (3 and 0)
EE 836—Optical Electromagnetics and Quantum Electronics—3 cr. (3 and 0)

BioE 846—Elements of Bioengineering I—3 cr. (3 and 0)
BioE 847—Elements of Bioengineering II—3 cr. (3 and 0)
EE 850—Computation and Simulation—3 cr. (3 and 0)
EE 851—Theory and Design of Digital-Analog-Machines—3 cr. (3 and 0)
EE 852—Digital Computers and Information Processing—3 cr. (3 and 0)
EE 858—Automata Theory—3 cr. (3 and 0)
EE 860—Engineering Application of Optimization—3 cr. (3 and 0)
EE 861—Foundation and Methodology of Systems Engineering—3 cr. (3 and 0)
EE 863—Advanced Physical Systems Analysis I—3 cr. (3 and 0)
EE 864—Advanced Physical Systems Analysis II—3 cr. (3 and 0)
EE 870—Biosystems Analysis—3 cr. (3 and 0)
EE 890—Selected Topics in Electrical Engineering—3 cr. (3 and 0)
EE 891—Research—3 cr.
EE 991—Doctoral Research—Credit to be arranged.
ENGINEERING

ENGR 101—ENGINEERING SYSTEMS—Non-Credit (1 and 0)
A series of lectures outlining the role and scope of engineering in service to mankind. Emphasis is placed on the difference between science and engineering, the emerging role of engineering in new technology, the important technological needs of mankind, and the importance of the humanities and social studies to the engineer.

ENGINEERING GRAPHICS

Professor: E. Laitala, Head
Associate Professors: B. E. Dunkle, A. F. Hammond, L. H. Jameson, C. M. McHugh, R. L. Perry
Assistant Professors: C. W. Carter, C. D. Meeks

EG 101—FREEHAND SKETCHING—1 cr. (0 and 3)
Principles of technical sketching, including the development of skills in technical lettering and freehand orthographic and pictorial drawing.

EG 103—ENGINEERING COMMUNICATIONS—3 cr. (1 and 6)
The role of engineering communication in engineering and management. Graphic communication includes lettering, sketching, orthographic projection, auxiliary projection, sections and conventional practices, dimensioning, working drawings. Architectural drawing, charts and graphs, presentation techniques. Manufacturing philosophy; interrelation between product design and production processes. For Industrial Management majors.

EG 104—ENGINEERING COMMUNICATION AND DESIGN—2 cr. (0 and 6)
The role of engineering communication from the manager’s point of view. Working drawings relating product design and production processes. Architectural drawing nomography, charts and graphs, presentation techniques. Prerequisite: EG 109 or consent of instructor.

EG 105—ENGINEERING GRAPHICS—2 cr. (0 and 6)
A course in graphical communication. Freehand sketching, orthographic and auxiliary projection, sectional views, and conventional practices, dimensioning, reading drawings.

EG 109—ENGINEERING GRAPHICAL COMMUNICATION—2 cr. (0 and 6)
Graphical methods of communicating ideas and information in engineering. Development of the student’s ability to visualize three dimensional forms and spatial relationships through the study of creative freehand sketching and basic fundamentals of engineering representation. Use of drafting aids, introduction to computer graphics, curve plotting, reproduction methods.

EG 201—ENGINEERING GRAPHICS FOR INDUSTRIAL EDUCATION—3 cr. (1 and 6)
A comprehensive study of Engineering Graphics fundamentals. The course includes lettering, use of instruments, technical sketching, multi-viewing drawing, auxiliary projection, descriptive geometry, sectional views, dimensioning, fasteners, detail and assembly drawings.

EG 202—GRAPHICAL TECHNOLOGY FOR INDUSTRIAL EDUCATION—3 cr. (1 and 6)
Continuation of EG 201 with emphasis on depth in graphical communication. Working drawings to include detail and assembly drawings. Inter-

EG 301—ADVANCED ENGINEERING GRAPHICS—2 cr. (0 and 6)
Application of the fundamental principles of Engineering Graphics to the solution of three dimensional spatial problems in the design of various engineering systems. Creative functional design, introduction to graphical kinematics and computer-aided design. Prerequisite: EG 109 or 202.

EG 302—GRAPHICAL COMPUTATION—2 cr. (1 and 3)
Graphic layouts of empirical equations. The application of graphical solution of equations, nomography, and the graphical calculus to the solution of problems in engineering and science. Graphical solution of differential equations. Prerequisite: EG 109, Math 106 or equivalent.

ENGINEERING MANAGEMENT
Professors: C. C. Davis, C. H. Whitehurst, Jr.
Associate Professors: F. R. Gray, E. A. LaRoche, S. O. Park,* C. O. Shuler, B. J. Todd, J. M. Wannamaker

EMgt 910—SEMINAR IN PRODUCTION MANAGEMENT—2 cr. (2 and 0)
EMgt 911—SEMINAR IN DECISION THEORY—2 cr. (2 and 0)
EMgt 912—SEMINAR IN FINANCE—3 cr. (3 and 0)
EMgt 913—SYSTEMS ANALYSIS—3 cr. (3 and 0)
EMgt 991—DOCTORAL RESEARCH—Credit to be arranged.

ENGINEERING MECHANICS
Professor: R. W. Moorman, Head
Assistant Professors: R. E. Elling, C. R. Mitchell, P. B. Zielinski

EM 201—ENGINEERING MECHANICS (STATICS)—3 cr. (3 and 0)
Forces and force systems and their external effect on bodies; principally the condition of equilibrium. The techniques of vector mathematics are employed, and the rigor of physical analysis is emphasized. Prerequisite: Phys 122, concurrent registration in Math 206.

EM 202—ENGINEERING MECHANICS (DYNAMICS)—3 cr. (3 and 0)
A continuation of EM 201. The principal topics are kinematics and kinetics of particles and bodies of finite size. Techniques of vector mathematics are employed. Prerequisite: EM 201, Math 206.

EM 304—MECHANICS OF MATERIALS—3 cr. (3 and 0)
The relationships between external loads on solid bodies or members and the resulting internal effects and dimension changes, including the derivation of rational formulas for stresses and deformations and the identification and use of important physical properties of engineering materials. Prerequisite: EM 201 and Math 206.

* On leave.
EM 305—Mechanics of Materials Laboratory—1 cr. (0 and 3)
Thoretical relationships considered in EM 304 are verified. Students observe the behavior under load and the failure of engineering materials; identify and evaluate physical properties of materials important to design and manufacturing processes; and are acquainted with various testing methods, testing machines, and instruments. Prerequisite: Must be accompanied or preceded by EM 304.

EM 320—Fluid Mechanics—3 cr. (3 and 0)
The behavior of fluids at rest or in motion. Emphasis is placed upon a rational, analytical approach from which are developed basic principles of broad applicability to all fields of engineering. Prerequisite: EM 202.

EM 322—Fluid Mechanics Laboratory—1 cr. (0 and 3)
The principles developed in EM 320 are verified and demonstrated. Familiarization with orderly techniques in organizing and reporting results of experimental investigations and with the use of instruments and equipment is afforded. Prerequisite: Must be accompanied or preceded by EM 320.

EM 420—Hydraulic Engineering—3 cr. (3 and 0)
Elements of hydrology and the application of principles of fluid mechanics to engineering problems. Topics included are open channel flow; flow in conduits under pressure; hydraulic machinery; and the broad principles of planning reservoirs, water supply systems, dams, spillways, and other hydraulic works. Prerequisite: EM 320.

EM 421—Hydrology and Hydraulics—2 cr. (2 and 0)
Elements of surface water and ground water hydrology are introduced and applied to engineering problems. Special topics of open channel hydraulics and water distribution systems are developed from the fundamentals of fluid mechanics. Prerequisite: EM 320.

EM 425—Advanced Mechanics of Materials—3 cr. (3 and 0)
Continuation of EM 304 to include theories of failure, shear center, unsymmetrical bending, curved flexural members and selected topics such as torsion of noncircular sections, stress concentrations, thick cylinders, energy methods, and elastic stability. Prerequisite: EM 304.

EM 450—Mechanical Vibrations—3 cr. (3 and 0)
Basic theory of mechanical vibrations with applications to problems including those of free vibrations with and without damping; forced vibrations, systems of one, two, and many degrees of freedom. Prerequisite: EM 202, EM 304, and Math 306 or Math 208.

EM 470—Experimental Stress Analysis I—3 cr. (2 and 3)
Experimental analysis of static and dynamic stress fields. Emphasis is on the techniques required to obtain data and the theoretical analysis required for proper interpretation. Methods and instrumentation associated with strain gages (including transducer applications), brittle laquers, and photoelasticity will be studied. Prerequisite: EM 304 and permission of instructor.

EM 720—Hydraulic Engineering—3 cr. (3 and 0)
EM 725—Advanced Mechanics of Materials—3 cr. (3 and 0)
EM 750—Mechanical Vibrations—3 cr. (3 and 0)
EM 770—Experimental Stress Analysis I—3 cr. (2 and 3)
EM 802—Experimental Stress Analysis II—3 cr. (2 and 3)
EM 821—Continuum Mechanics—3 cr. (3 and 0)
EM 823—Dimensional Analysis and Dynamic Similarity—3 cr. (3 and 0)
EM 827—Topics in Analytical Mechanics—3 cr. (3 and 0)
EM 829—Energy Methods and Variational Principles—3 cr. (3 and 0)
EM 831—Theory of Elasticity I—3 cr. (3 and 0)
EM 832—Theory of Elasticity II—3 cr. (3 and 0)
EM 834—Theory of Elastic Stability—3 cr. (3 and 0)
EM 845—Intermediate Dynamics—3 cr. (3 and 0)
EM 851—Fluid Dynamics—3 cr. (3 and 0)
EM 852—Theory of Ideal Fluid Flow—3 cr. (3 and 0)
EM 853—Theory of Viscous Fluid Flow—3 cr. (3 and 0)
EM 856—Flow in Open Channels—3 cr. (3 and 0)
EM 889—Seminar—0 or 1 cr. (1 and 0)
EM 890—Seminar—0 or 1 cr. (1 and 0)
EM 891—Research—Credit to be arranged.
EM 932—Theory of Plasticity—3 cr. (3 and 0)
EM 980—Special Topics in Mechanics—3 cr. (3 and 0)
EM 981—Special Topics in Mechanics—3 cr. (3 and 0)
EM 982—Special Topics in Mechanics—3 cr. (3 and 0)
EM 983—Special Topics in Mechanics—3 cr. (3 and 0)
EM 991—Doctoral Research—Credit to be arranged.

ENGLISH

Professors: R. J. Calhoun, H. M. Cox, Head; C. B. Green, M. A. Owings

ENGL 101—English Composition—3 cr. (3 and 0)
Training in correct and effective expression, in brief expository essays; review of the fundamentals of grammar and punctuation; instruction in common expository methods.

* On leave.
ENGL H101—ENGLISH COMPOSITION—3 cr. (3 and 0)
Honors section of Engl 101; admission by invitation.

ENGL 102—ENGLISH COMPOSITION—3 cr. (3 and 0)
Continued emphasis on correct and effective expression; an introduction to non-fiction prose, fiction, drama, and poetry; training in the organization and and writing of the research report. Prerequisite: Engl 101.

ENGL H102—ENGLISH COMPOSITION—3 cr. (3 and 0)
Honors section of Engl 102; admission by invitation

ENGL 111—ENGLISH FOR FOREIGN STUDENTS—3 cr. (5 and 0)
A special course for students learning English as a second language. Intensive study and drill in American English pronunciation and listening comprehension. Required of all foreign students who do not make a satisfactory grade on screening examinations in oral English.

ENGL 203—A SURVEY OF ENGLISH LITERATURE—3 cr. (3 and 0)
Chief British authors and works from Beowulf through the Romantic period; continued emphasis on composition. Prerequisite: Engl 102.

ENGL H203—SURVEY OF ENGLISH LITERATURE—3 cr. (3 and 0)
Honors section of Engl 203; admission by invitation.

ENGL 204—A SURVEY OF ENGLISH AND AMERICAN LITERATURE—3 cr. (3 and 0)
Chief British authors and works from the Victorian period to the present time, and selected readings from American literature. Proficiency in composition must be demonstrated. Prerequisite: Engl 203.

ENGL H204—SURVEY OF ENGLISH AND AMERICAN LITERATURE—3 cr. (3 and 0)
Honors section of Engl 204; admission by invitation.

ENGL 217—VOCABULARY BUILDING—3 cr. (3 and 0)
Development of a useful, discriminating vocabulary for writing, speaking, and reading. Student notebooks and proficiency quizzes. Prerequisite: Engl 101 and 102.

ENGL 221—THE CLASSICS IN TRANSLATION—3 cr. (3 and 0)

ENGL 223—CONTINENTAL FICTION IN TRANSLATION—3 cr. (3 and 0)
Selected fiction of the European masters, primarily Russian, French, German, and Spanish. Prerequisite: Engl 101, 102.

ENGL 231—INTRODUCTION TO JOURNALISM—3 cr. (3 and 0)
Instruction and practice in writing for mass media; editorial responsibilities. Prerequisite: Engl 102.

ENGL 300—JOURNALISM WORKSHOP—1 cr. (1 and 0)
Responsibilities and duties of students editing uncensored publications; criticism of student publications. Open only to members of publication staffs. Prerequisite: Engl 102.
ENGL 301—PUBLIC SPEAKING—3 cr. (3 and 0)
Practical training in public speaking; attention to diction, voice, and platform presence; an introduction to parliamentary procedure; practice in writing and delivering short speeches. **Prerequisite:** Engl 203 and 204.

ENGL 303—VOICE AND DICTION—3 cr. (3 and 0)
Practical training in speech, with emphasis on clarity, vocal variety, and tone quality.

ENGL 304—ADVANCED COMPOSITION—3 cr. (3 and 0)
Supervised writing for students of advanced standing, each student undertaking projects according to his interest; some attention to reports, business letters, research methods and materials. Weekly papers and some longer exercises. Limited enrollment. **Prerequisite:** Engl 203 and 204.

ENGL 305—ORAL INTERPRETATION OF LITERATURE—3 cr. (3 and 0)
Analysis and oral interpretation of selected poetry and prose; training in development of effective tone production. **Prerequisite:** Engl 101, 102.

ENGL 306—DEBATING—1 cr. (1 and 0)
The application of debating to contemporary problems. May be repeated until a maximum of three credits has been earned. **Prerequisite:** Permission of the instructor.

ENGL 311—THEATRE LABORATORY—1 cr. (0 and 3)
Participation in theatre production including stage management, direction, costume, makeup, lighting, sound, scenery, and business management. No formal class meetings. One credit. May be repeated for a total of three credits. **Prerequisite:** Sophomore standing and permission of the instructor.

ENGL 331—CREATIVE WRITING—3 cr. (3 and 0)
The technique of non-expository writing—narration, description, dramatization. **Prerequisite:** Sophomore standing or higher and permission of the instructor.

ENGL 332—CREATIVE WRITING—3 cr. (3 and 0)
A continuation of Engl 331. **Prerequisite:** Engl 331 or permission of the instructor.

ENGL 333—THE STRUCTURE OF FICTION—3 cr. (3 and 0)
A study of the short story, the novella, and the novel from the writer’s point of view. **Prerequisite:** Permission of the instructor.

ENGL 351—CHILDREN’S LITERATURE—3 cr. (3 and 0)
Wide reading in prose and verse suitable for children. **Prerequisite:** Engl 203 and 204.

ENGL 402—THE ENGLISH LANGUAGE—3 cr. (3 and 0)
Studies in English usage and the historical development of the language. **Prerequisite:** Engl 203 and 204.

ENGL 404—THE STRUCTURE OF MODERN ENGLISH—3 cr. (3 and 0)
Structural linguistic analysis; principles of phonology, morphology, and syntax as related to traditional, structural, and transformational grammars. Recommended for English teachers. **Prerequisite:** Engl 203, 204.
ENGL 405—SHAKESPEARE—3 cr. (3 and 0)
An introduction to Shakespeare’s plays through a study of the tragedies Hamlet, Othello, King Lear, Macbeth, Anthony and Cleopatra, and of the two tragic plays Romeo and Juliet and Julius Caesar. Prerequisite: Engl 203, 204.

ENGL 406—SHAKESPEARE—3 cr. (3 and 0)
A selective study of Shakespeare’s comedies and histories. Prerequisite: Engl 203 and 204.

ENGL 409—CHAUCER—3 cr. (3 and 0)
Chaucer as an artist; the “Prologue” for historical and linguistic orientation; “The Canterbury Tales,” “House of Fame,” “Parliament of Fowls,” and “Troilus and Criseyde” as art forms. Prerequisite: Engl 203 and 204.

ENGL 415—INTRODUCTION TO DRAMA—3 cr. (3 and 0)
Principles and progress of drama from Aeschylus to Ibsen, analysis of representative plays; critical reports; classroom reading of great scenes. Prerequisite: Engl 203 and 204.

ENGL 416—INTRODUCTION TO DRAMA—3 cr. (3 and 0)
Principles and progress of drama from Ibsen to the present; analysis of representative plays; critical reports; classroom reading of great scenes; discussion of important aspects of modern drama. Prerequisite: Engl 203 and 204.

ENGL 423—A SURVEY OF AMERICAN LITERATURE—3 cr. (3 and 0)
The colonial period to the Civil War, with emphasis on major authors. Prerequisite: Engl 203 and 204.

ENGL 424—A SURVEY OF AMERICAN LITERATURE—3 cr. (3 and 0)
From the Civil War to the present, with emphasis upon major authors. Prerequisite: Engl 203 and 204.

ENGL 425—THE ROMANTIC REVIVAL—3 cr. (3 and 0)
The eighteenth-century forerunners of Romanticism; Wordsworth, Coleridge, Byron, Shelley, Keats; the essayists. Prerequisite: Engl 203 and 204.

ENGL 427—VICTORIAN POETRY AND PROSE—3 cr. (3 and 0)
Representative works from the prose and poetry of Victorian writers; consideration of English intellectual, social, and political life of the period. Prerequisite: Engl 203 and 204.

ENGL 431—THE RESTORATION AND EIGHTEENTH CENTURY—3 cr. (3 and 0)
Readings in Dryden, Swift, Pope, and Dr. Johnson. Prerequisite: Engl 203 and 204.

ENGL 435—SOUTHERN LITERATURE—3 cr. (3 and 0)
The intellectual and literary achievement of the South from 1607 to the present, with emphasis upon the writers of the nineteenth century. Prerequisite: Engl 203 and 204.

ENGL 436—MILTON AND HIS AGE—3 cr. (3 and 0)
The development of Milton’s thought and art in relation to his times and to the writings of his contemporaries. Prerequisite: Engl 203 and 204.

ENGL 437—THE ENGLISH NOVEL—3 cr. (3 and 0)
A critical and historical study of the English novel from Defoe to Jane Austen. Prerequisite: Engl 203 and 204.
ENGL 438—TWENTIETH CENTURY POETRY—3 cr. (3 and 0)
The modern tradition in English and American poetry from Yeats to the present; relevant critical essays. Prerequisite: Engl 203 and 204.

ENGL 439—TWENTIETH CENTURY FICTION—3 cr. (3 and 0)
American and British novelists and short story writers of the twentieth century. Prerequisite: Engl 203 and 204.

ENGL 440—APPLIED LITERARY CRITICISM—3 cr. (3 and 0)
Major critical approaches to literature, in theory and practice, from Aristotle to the present. Prerequisite: Engl 203 and 204.

ENGL 441—A SURVEY OF WORLD LITERATURE I—3 cr. (3 and 0)
Translations from the Hellenic, Hebraic, and Oriental worlds, with emphasis on major authors. Prerequisite: Engl 203 and 204.

ENGL 442—A SURVEY OF WORLD LITERATURE II—3 cr. (3 and 0)
Translations from the Medieval, Renaissance and Modern worlds, with emphasis on major authors. Prerequisite: Engl 203 and 204.

ENGL 443—SEVENTEENTH CENTURY POETRY AND PROSE—3 cr. (3 and 0)
A survey of British authors of the seventeenth century other than Shakespeare and Milton.

ENGL 445—RENAISSANCE NON-DRAMATIC LITERATURE—3 cr. (3 and 0)
Tudor and Elizabethan poetry, prose fiction, translations, essays, and criticism. Prerequisite: Engl 204.

ENGL 447—THE AMERICAN NOVEL—3 cr. (3 and 0)
A survey of the most significant forms and themes of the American novel from its beginnings to 1920. Prerequisite: Engl 203 and 204.

ENGL 461—STUDIES IN ENGLISH LITERATURE TO 1700—3 cr. (3 and 0)
Selected readings in English literature from the beginnings to 1700, with emphasis on social and intellectual backgrounds. Prerequisite: Engl 203, 204.

ENGL 462—STUDIES IN ENGLISH LITERATURE SINCE 1700—3 cr. (3 and 0)
Selected readings in English literature from 1700 to the present, with emphasis on social and intellectual backgrounds. Prerequisite: Engl 203, 204.

ENGL H470—SENIOR DIVISION HONORS ENGLISH—3 cr. (3 and 0)
An intensive study of a period, topic, genre, or figure. Papers, reports, reading list, examination. Prerequisite: Engl 203, 204 or H203, H204 and approval of the Honors Council. May be repeated by arrangement with the Department for a total of twelve credits.

ENGL 481—DIRECTED READING—1, 2, or 3 cr. (1, 2, or 3 and 0)
Class and tutorial work for students with special interests or projects in American, British, or European literature outside the scope of existing courses. May be repeated for a maximum of six credits. Prerequisite: Engl 203, 204 or H203, H204 and invitation of the department.

ENGL 651—CHILDREN’S LITERATURE—3 cr. (3 and 0)
ENGL 702—THE ENGLISH LANGUAGE—3 cr. (3 and 0)
ENGL 704—THE STRUCTURE OF MODERN ENGLISH—3 cr. (3 and 0)
ENGL 705—SHAKESPEARE—3 cr. (3 and 0)
Description of Courses

ENGL 706—Shakespeare—3 cr. (3 and 0)
ENGL 709—Chaucer—3 cr. (3 and 0)
ENGL 715—Drama—3 cr. (3 and 0)
ENGL 716—Drama—3 cr. (3 and 0)
ENGL 723—A Survey of American Literature—3 cr. (3 and 0)
ENGL 724—A Survey of American Literature—3 cr. (3 and 0)
ENGL 725—The Romantic Revival—3 cr. (3 and 0)
ENGL 727—Victorian Poetry and Prose—3 cr. (3 and 0)
ENGL 731—The Restoration and Eighteenth Century—3 cr. (3 and 0)
ENGL 735—Southern Literature—3 cr. (3 and 0)
ENGL 736—Milton and His Age—3 cr. (3 and 0)
ENGL 739—Modern Fiction—3 cr. (3 and 0)
ENGL 738—Twentieth Century Poetry—3 cr. (3 and 0)
ENGL 739—Modern Fiction—3 cr. (3 and 0)
ENGL 740—Applied Literary Criticism—3 cr. (3 and 0)
ENGL 741—A Survey of World Literature—3 cr. (3 and 0)
ENGL 742—A Survey of World Literature—3 cr. (3 and 0)
ENGL 743—Seventeenth Century Poetry and Prose—3 cr. (3 and 0)
ENGL 745—Renaissance Non-Dramatic Literature—3 cr. (3 and 0)
ENGL 747—The American Novel—3 cr. (3 and 0)
ENGL 761—Studies in English Literature to 1700—3 cr. (3 and 0)
ENGL 762—Studies in English Literature since 1700—3 cr. (3 and 0)
ENGL 803—Seminar—3 cr. (3 and 0)
ENGL 805—Seminar—3 cr. (3 and 0)
ENGL 890—Introduction to Research—1 cr. (1 and 0)
ENGL 891—Research—Credit to be arranged.

ENTOMOLOGY

Professors: T. R. Adkins, Jr., J. H. Cochran, Head; R. C. Fox, E. W. King, J. K. Reed
Associate Professor: S. B. Hays
Instructors: R. F. Nash, F. L. Wallace

ENT 301—Elementary and Economic Entomology—3 cr. (2 and 3) F, S
A general introduction to Entomology with emphasis on anatomy, metamorphosis, life-histories of our most important species and methods of control. Prerequisite: Zool 101 and 103.
ENT 305—ECONOMIC ENTOMOLOGY—3 cr. (2 and 3) F, '69 and alternate years.
Identification and life-histories of injurious insects; their damage, and control measures. Common pests of the following are studied: cotton, corn, small grains, legume field crops, tobacco, sugar cane, stored grain and seed, livestock and man. Prerequisite: Zool 101, 103 and Ent 301.

ENT 306—ECONOMIC ENTOMOLOGY—3 cr. (2 and 3) S, '70 and alternate years.
Insecticide and other control measures for insects. This is followed by detailed study of habits, life-histories and approved control measures for insect pests of all fruit and vegetable crops. Prerequisite: Zool 101, 103 and Ent 301.

ENT 307—FOREST ENTOMOLOGY—3 cr. (2 and 3) F
Insects of economic importance to forests, forest products and shade trees, and their role in the practice of good forest management as well as their significance in the natural environment.

ENT 308—APICULTURE—3 cr. (2 and 3)
A detailed study of the honey bee and its economic importance in pollination and honey production. Attention will be given to bee behavior, colony management, equipment, honey plant identification, and honey production and processing. Prerequisite: Zool 101, 103 and permission of the instructor.

ENT 405—INSECT MORPHOLOGY—4 cr. (3 and 3) F
A study of insect structure in relation to function and of the variation of form in insects. Prerequisite: Ent 301.

ENT H405—INSECT MORPHOLOGY—4 cr. (3 and 3) F
Honors option for Ent 405, admission by special arrangement.

ENT 408—GENERAL AND TAXONOMIC ENTOMOLOGY—5 cr. (3 and 6) S, '69 and alternate years.
Lecture material includes a review of the bionomics of the principal families of insects. Laboratory work consists of practice in the identification of adults of the principal families in the major orders. Prerequisite: Zool 101, 103, Ent 301; Ent 405 desirable.

ENT H408—GENERAL AND TAXONOMIC ENTOMOLOGY—5 cr. (3 and 6) S, '69 and alternate years.
Honors option for Ent 408, admission by special arrangement.

ENT 455—MEDICAL AND VETERINARY ENTOMOLOGY—3 cr. (2 and 3) S
Insects and their arthropod relatives which are of considerable economic importance in their effect on man and animals.

ENT 461—SEMINAR—1 cr. (1 and 0) F
Students review the principal journals pertaining to insects and related animals; also review the lives and activities of prominent pioneer entomologists. Prerequisite: Zool 101, 103; Ent 301.

ENT 462—SEMINAR—1 cr. (1 and 0) S
Continuation of Ent 461.

ENT 468—INTRODUCTION TO RESEARCH—2 cr. (1 and 3) S
Principles, developments and changes in research methods related to certain fields of biological and agricultural research. The students obtain practice in
experimental techniques, scientific writing and the use and maintenance of various research instruments and equipment.

**Ent 605—Economic Entomology—3 cr. (2 and 3)**
**Ent 606—Economic Entomology—3 cr. (2 and 3)**
**Ent 705—Insect Morphology—4 cr. (3 and 3)**
**Ent 708—General and Taxonomic Entomology—5 cr. (3 and 6)**
**Ent 755—Medical and Veterinary Entomology—3 cr. (2 and 3)**
**Ent 768—Introduction to Research—2 cr. (1 and 3)**
**Ent 808—Taxonomy of Immature Insects—3 cr. (1 and 6)**
**Ent 809—Recent Advances in Entomology I—1 cr. (1 and 0)**
**Ent 810—Recent Advances in Entomology II—1 cr. (1 and 0)**
**Ent 856—Medical Entomology—3 cr. (2 and 3)**
**Ent 860—Principles of Insect Control—3 cr. (3 and 0)**
**Ent 861—Insect Toxicology—3 cr. (2 and 3)**
**Ent 862—Insect Physiology—3 cr. (2 and 3)**
**Ent 863—Special Problems in Entomology—3 to 6 cr.**
**Ent 890—Research Techniques in Agriculture—3 cr. (2 and 3)**
**Ent 891—Research—Credit to be arranged.**
**Ent 991—Doctoral Research—Credit to be arranged.**

**ENVIRONMENTAL HEALTH**

*Associate Professor: R. F. Borgman, Program Director*

**EnH 871—Environmental Health—3 cr. (3 and 0)**
**EnH 893—Environmental Health Seminar I—1 cr. (1 and 0)**
**EnH 894—Environmental Health Seminar II—1 cr. (1 and 0)**

**ENVIRONMENTAL SYSTEMS ENGINEERING**

*Professors: J. F. Andrews, Head; H. R. Bungay*

*Associate Professors: A. R. Abernathy, W. M. McLellon*

*Assistant Professor: B. C. Dysart*

*Adjunct Professor: W. M. Sanders*

**ESE 743—Environmental Engineering Chemistry I—2 cr. (2 and 0)**
**ESE 744—Environmental Engineering Chemistry Laboratory I—2 cr. (0 and 6)**
**ESE 842—Sanitary Engineering Processes—3 cr. (3 and 0)**
**ESE 843—Unit Operations of Sanitary Engineering—3 cr. (3 and 0)**
**ESE 846—Pollution of the Aquatic Environment—3 cr. (2 and 3)**
**ESE 848—Environmental Engineering Chemistry II—2 cr. (2 and 0)**
ESE 849—Environmental Engineering Chemistry Laboratory II—2 cr. (1 and 3)
ESE 851—Unit Operations and Processes Laboratory—2 cr. (1 and 3)
ESE 852—Water and Waste Treatment Systems—2 cr. (1 and 3)
ESE 853—Advanced Unit Operations and Processes—3 cr. (2 and 3)
ESE 854—Water and Waste Transport Systems—3 cr. (3 and 0)
ESE 855—Solid Wastes—3 cr. (3 and 0)
ESE 861—Environmental Systems Engineering Seminar—cr. (1 and 0)
ESE 873—Radiological Health—3 cr. (2 and 3)
ESE 874—Radiological Health Engineering—3 cr. (2 and 3)
ESE 881—Special Problems—1 to 4 cr.
ESE 883—Selected Topics in Environmental Engineering—3 cr. (3 and 0)
ESE 884—Selected Topics in Environmental Engineering—3 cr. (3 and 0)
ESE 891—Research—1-6 cr.
ESE 991—Doctoral Research—1-18 cr.

EXPERIMENTAL STATISTICS

Professor: W. P. Byrd
Assistant Professors: W. E. Johnston, C. B. Loadholt, J. S. Lytle

Ex St 301—Introductory Statistics—3 cr. (2 and 2) F, S, SS
Basic concepts and methods of statistical inference; organization and presentation of data, elementary probability, measures of central tendency and variation, tests of significance, sampling, simple linear regression and correlation. The role of statistics in interpreting research, and the general application of the methods are stressed.

Ex St 462—Statistics Applied to Economics—3 cr. (3 and 0) S
A continuation of Ex St 301 with emphasis on statistical methods used in the collection, analysis, presentation and interpretation of economic data. Special attention is given to time series analysis, the construction of index numbers and the designing of samples for surveys in the social science fields. Pre-requisite: Ex St. 301.

Ex St 601—Introductory Statistics—3 cr. (2 and 2)
Ex St 762—Statistics Applied to Economics—3 cr. (3 and 0)
Ex St 801—Statistical Methods—4 cr. (3 and 3)
Ex St 803—Regression and Least Squares Analysis—3 cr. (3 and 0)
Ex St 804—Sampling—3 cr. (3 and 0)
Ex St 805—Design and Analysis of Experiments—3 cr. (3 and 0)
FOOD SCIENCE

Professors: J. H. Mitchell, Jr., A. L. Shewfelt
Associate Professor: W. P. Williams, Head
Assistant Professor: L. E. Vereen

Fd Sc 212—MAN'S FOOD RESOURCES—2 cr. (2 and 0) S, '69 and alternate years.
Food material resources with reference to quality preservation, processing, and nutritional requirements. The role of science and technology in the modern food industry is emphasized. The need for food standards and grades is explained, and the functions of regulatory agencies are discussed. Prerequisite: Bot 101.

Fd Sc 305—DAIRY AND FOOD ENGINEERING—3 cr. (2 and 3) F, '69
A study of the basic engineering principles and their application to the dairy and food processing operations. The relationship between engineering principles and fundamentals of food processing is emphasized for the dairy and food technologist. Topics include material and energy balance, electricity and power, steam generation, refrigeration, transfer of heat, flow and mechanics of fluids, evaporation and distillation, strength of materials and kinetics of biological reactions.

Fd Sc 311—FOOD PROCESSING—3 cr. (3 and 0) F, '69 and alternate years.
Principles of food handling and processing by refrigerated storage, freezing, canning, fermentation, sugar concentration, and food additives. Prerequisite: Organic Chemistry and Physics.

Fd Sc 312—FOOD PROCESSING—3 cr. (3 and 0) S, '70 and alternate years.
Principles of dehydration. Unit processes and manufacturing methods used in the processing of cereal grains, dairy products, meats and fish, vegetable oils, beverages, and confectioneries. Importance of water supply and waste disposal in food manufacture. Prerequisite: Organic Chemistry and Physics.

Fd Sc 313—FOOD PROCESSING LABORATORY—1 cr. (0 and 3) F, '69 and alternate years.
Laboratory exercises dealing with equipment and processes used in food manufacture. Prerequisite: Registration in Fd Sc 311.

Fd Sc 314—FOOD PROCESSING LABORATORY—1 cr. (0 and 3) S, '70 and alternate years.
A continuation of Fd Sc 313. Prerequisite: Registration in Fd Sc 312.

Fd Sc 412—FOOD QUALITY CONTROL—2 cr. (2 and 0) S, '71
A comprehensive treatment of the philosophy and organization of, and the responsibility for food quality control function. Major emphasis is placed on principles, quality attributes, government and trade standards of identity and their development, acceptance sampling (inspection), recording and reporting, and production and inventory control.

Fd Sc 413—BIOCHEMISTRY OF FOODS—2 cr. (2 and 0) F, '69
Biochemical and enzymatic phenomena in relation to the color, texture, flavor, and nutritive value of foods, changes in biochemical constituents as a result of food processing and storage. Prerequisite: Ch 310 or 423 or permission of instructor.
Fd Sc 414—Food Quality Control Laboratory—2 cr. (1 and 3) S,'70
Fundamental aspects of sensory techniques employed in the quality evaluation of food products. A study of laboratory methods employed in product evaluation and grading of processed foods. A concept of quality is formed through examination of various grades of each food product. Actual practice in the selection and operation of taste panels illustrate their use in the industry.

Fd Sc 415—Human Nutrition—2 cr. (2 and 0) F,'69
Characteristics and functions of basic food nutrients and how they are affected by food processing, preservation and storage methods. Pathways for the conversion of nutrients into living tissue will be examined. Prerequisite: Ch 310 or 423 or permission of instructor.

Fd Sc 416—Food Analysis—2 cr. (1 and 3) S,'70
Application of quantitative procedures to the analysis of food products. Procedures include solids, protein, carbohydrates, lipids, vitamins, fiber, pigments, and other components. Prerequisite: Quantitative analysis or permission of instructor.

Fd Sc 417—Seminar—1 cr. (1 and 0) F,'69
Literature research and oral presentation of current food science topics.

Fd Sc 418—Seminar—1 cr. (1 and 0) S,'70
Literature research and oral presentation of current food science topics.

Fd Sc 712—Food Quality Control—2 cr. (2 and 0)

Fd Sc 713—Biochemistry of Foods—2 cr. (2 and 0)

Fd Sc 714—Food Quality Control Laboratory—2 cr. (1 and 3)

Fd Sc 715—Human Nutrition—2 cr. (2 and 0)

Fd Sc 716—Food Analysis—2 cr. (1 and 3)

FORESTRY

Professors: R. M. Allen, B. M. Cool, K. Lehotsky, Head; J. R. Warner

Associate Professors: M. H. Bruner, W. H. D. McGregor, R. E. Schoenike, W. A. Shain

Assistant Professors: C. L. Lane, T. E. Wooten

For 101—Introduction to Forestry—1 cr. (1 and 0) F
An informative sketch of forestry, forests, and forestry tasks of the nation; education in career opportunities of foresters.

For 205—Dendrology—4 cr. (3 and 3) F
Identification and nomenclature of the principal forest trees of the United States; their geographical distribution and economic importance; identification of many forest shrubs and commonly planted exotics. Prerequisite: Bot 101.

For 206—Silvics—2 cr. (2 and 0) S
Growth factors influencing the establishment and development of forest trees and stands. Prerequisite: Bot 101, Ch 102.

For 251S—Silvics—2 cr. (Summer Camp) SS
Field studies of growth factors influencing the establishment and development of forest stands. Prerequisite: Agron 202, Bot 356, For 205, For 206.
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For 252S—Forest Engineering—2 cr. (Summer Camp) SS
Field surveying, establishment of boundary lines, planning and construction of forest trails and roads. Prerequisite: CE 200, EG 105.

For 253S—Dendrometry—4 cr. (Summer Camp) SS
Elements of mensuration dealing with volume determination of standing and harvested trees as well as forest stands. Prerequisite: CE 200, EG 105, For 205.

For 254S—Forest Products—1 cr. (Summer Camp) SS
Field studies of logging methods and equipment; trips to selected wood-using industries. Prerequisite: For 205 or permission of instructor.

For 302—Dendrometry—3 cr. (2 and 3) S
Volume determination of trees, logs, and stands; statistical procedures applied to forest measurements. Prerequisite: Ex St 401 and Forestry Summer Camp.

For 304—Forest Economics—3 cr. (3 and 0) S
Economic problems and principles involved in the utilization of forest land and timber and in the distribution of forest products; cost analysis of integrated forest operations. Prerequisite: Econ 201.

For 306—Identification of Wood and Wood Fibers—1 cr. (0 and 3) S
Macroscopic and microscopic identification, properties, and uses of selected economically significant timbers. Prerequisite: Bot 101, Ch 102 or permission of instructor.

For 307—Elements of Forestry—3 cr. (2 and 3) F, S
A compendium of forestry subjects forming a foundation for the management and utilization of farm forests and especially those of South Carolina. Prerequisite: Bot 101 or permission of instructor.

For 308—Aerial Photographs in Forestry—3 cr. (2 and 3) S
Use of aerial photographs in forestry; elementary photographic measurements; aerial photo interpretations; mapping and timber estimating procedures. Prerequisite: CE 203 and Forestry Summer Camp or permission of instructor.

For 310—Silviculture—4 cr. (3 and 3) S
Maintenance, harvesting, natural and artificial regeneration of forest stands based on the interrelation of biotic characteristics of stands and their environment. Prerequisite: For 206 and Forestry Summer Camp.

For 401—Logging and Milling—4 cr. (2 and 6) F
Logging and milling methods and costs, their administration; analysis of logging and milling operations; seasoning, grading, and marketing of lumber. Prerequisite: Senior standing.

For 404—Management Plans—1 cr. (0 and 3) S
Analysis and assembling of factors entering into a forest working plan; drawing of maps corollary to forest regulation; preparation of management plans. Prerequisite: For 407.

For 406—Forest Policy and Administration—2 cr. (2 and 0) S
Development of public and private forest policy in the United States; administrative and executive tasks in forestry; principles of organization, personnel management, and budget. Prerequisite: Senior standing.
Correlation of production factors and yields of forests; normal and empirical forests; rotations and cutting cycles; regulation of cuts and growing stock in sustained yield management. **Prerequisite:** For 302, 310.

Capital investments in forestry and the returns derivable from them; valuation of land, timber, and other resources associated with forestry; appraisal of damage and stumpage values. **Prerequisite:** For 304, 407.

Primary forest products other than sawlogs, e.g., poles, pulpwood, veneer stock, excelsior; secondary forest products, e.g., naval stores, maple syrup, Christmas trees; utilization and marketing of forest products. **Prerequisite:** Phys 202 and Senior standing.

Causative and control factors of forest fires; fire prevention and suppression. Protection of forest resources against damages caused by man and animals. **Prerequisite:** Senior standing.
FRENCH

Associate Professor: J. A. Dean
Assistant Professors: D. Y. Brannock, Jr., R. R. McGregor, Jr.
Instructors: Mary J. Fazio, Dorothy F. Findler, Jo Ann McNatt, J. B. Macy, Elke M. Maron
Lecturer: R. H. McEntire
Visiting Instructor: Josette A. Eude

Fr 101—Elementary French—3 cr. (3 and 1)
A course for beginners in which, through conversation, composition, and dictation, the fundamentals of the language are taught and a foundation is provided for further study and the eventual ability to read and speak the language. Three hours a week of classroom instruction and one hour a week in the language laboratory.

Fr 102—Elementary French—3 cr. (3 and 1)
A continuation of Fr 101, in which a reader is also used. Three hours a week of classroom instruction and one hour a week in the language laboratory.

Fr 151—French for Graduate Students—0 cr. (0 and 0)
An intensive program for graduate students preparing to take the reading examination in French. Some previous study of the language is helpful but not essential.

Fr 201—Intermediate French—3 cr. (3 and 1)
Attention to grammar, with conversation, composition and dictation continued from Fr 102, and the beginning of more serious reading of French prose in short stories or novels. Three hours a week of classroom instruction and one hour a week in the language laboratory.

Fr 202—Intermediate French—3 cr. (3 and 0)
While attention is paid to writing and speaking French, more stress is laid on the rapid reading of more difficult French prose than in the earlier courses. Prerequisite: Fr 201.

Fr 303—Survey of French Literature I—3 cr. (3 and 0)
Literary movements and authors from the beginnings to the eighteenth century. Required of French majors. Prerequisite: Fr 201 and 202.

Fr 304—Survey of French Literature II—3 cr. (3 and 0)
Literary movements and authors of the nineteenth and twentieth centuries. Required of French majors. Prerequisite: Fr 201 and 202.

Fr 305—Conversational French—3 cr. (3 and 0)
Practice in the spoken language, with stress on vocabulary building, pronunciation, intonation, and comprehension; written work to increase accuracy. Assignments in the language laboratory. Required of French majors. Prerequisite: Fr 201 and 202.

Fr 306—Advanced Conversation and Composition—3 cr. (3 and 0)
A continuation of Fr 305, with additional emphasis on written composition. Required of French majors. Prerequisite: Fr 305.

Fr 403—Twentieth Century Prose—3 cr. (3 and 0)
The outstanding authors of the first half of the twentieth century: Proust, Gide, Mauriac, Saint-Exupéry, Sartre, Camus, and others. Reading of selected works, discussions, and reports. Prerequisite: Fr 303 and 304.
Fr 404—Twentieth Century Drama—3 cr. (3 and 0)
The French theater since 1900, with emphasis on the period after 1930. Readings, discussions, and reports. Prerequisite: Fr 303 and 304.

Fr 405—Nineteenth Century French Romanticism—3 cr. (3 and 0)
The romantic movement as expressed in the works of Chateaubriand, Hugo, Merimée, Vigny, Stendahl, Sand, and others. Readings, discussions, and reports. Prerequisite: Fr 303 and 304.

Fr 406—Nineteenth Century French Realism—3 cr. (3 and 0)
Realism as expressed in the works of Balzac, Flaubert, Daudet, Maupassant, Zola, and others. Selected works, discussions, and reports. Prerequisite: Fr 303 and 304.

Fr 407—Eighteenth Century French Literature—3 cr. (3 and 0)
The principal literary figures of the eighteenth century, with particular emphasis on Voltaire and Rousseau. Selected works, discussions, and reports. Prerequisite: Fr 303 and 304.

Fr 408—Seventeenth Century French Drama—3 cr. (3 and 0)
The French classical drama, with emphasis on Corneille, Racine, and Molière. Selected works, discussions, and reports. Prerequisite: Fr 303 and 304.

GENETICS

Professor: C. M. Jones
Assistant Professor: J. D. Maxwell

Gen 302—Genetics—3 cr. (2 and 3) F, S, SS
A general coverage of the basic principles of genetics. Examples illustrating the fundamentals of heredity and variation are given for plants and animals, including man. Prerequisite: Bot 101 and Zool 101, 103 or consent of instructor.

Gen 451—Genetics—3 cr. (3 and 0) F
Methods and concepts in classical and modern genetics. Topics will include advanced studies of linkage; variations in chromosome number and structure; natural and induced mutations; extranuclear inheritance; experimental evolution; population, biochemical and medical genetics. Principles will be illustrated by examples from plants, animals (including man), and microorganisms. Prerequisite: Gen 302.

Gen 602—Genetics—3 cr. (2 and 3)
Gen 751—Genetics—3 cr. (3 and 0)
Gen 801—Cytogenetics—3 cr. (2 and 3)

GEOGRAPHY

Assistant Professor: H. F. McMains

Geog 201—Introduction to Geography—3 cr. (3 and 0)
An introduction to the study of geography, including maps, the physical elements of the natural environment and their distribution, and world cultural patterns.

Geog 301—Political Geography—3 cr. (3 and 0)
A study of the geographical bases of the state and its problems and of the relevance of geographical patterns to international affairs.
Description of Courses

**GEOG 302—POLITICAL GEOGRAPHY—3 cr. (3 and 0)**
The geographical pattern of the major nations, empires, dominions, commonwealths and other dependencies, their boundaries, resources and strategic connections. The current principles of geopolitics, with their application to the United States, Europe and Asia will be examined. **Prerequisite:** Junior standing.

**GEOLOGY AND MINERALOGY**

*Associate Professor:* P. K. Birkhead

*Assistant Professors:* V. S. Griffin, Jr., G. M. Haselton, R. D. Hatcher, Jr., D. S. Snipes

**GEOL 201—PHYSICAL GEOLOGY—3 cr. (3 and 0)**
A study of the minerals and rock which compose the earth's crust, their origins and transformations. Emphasis is placed upon geological processes, both internal and external, by which changes are produced on or in the earth. **Prerequisite:** Registration in Geol 203.

**GEOL 203—PHYSICAL GEOLOGY LABORATORY—1 cr. (0 and 3)**
Common minerals and rocks are studied. Instruction is also provided in the interpretation of geologic processes through study of topographic maps. Field trips provide direct observation of processes and results. **Prerequisite:** Geol 201 or registration in Geol 201.

**GEOL 204—HISTORICAL GEOLOGY—3 cr. (3 and 0)**
Evolution, both organic and inorganic, is traced from the beginning of the record up through the ages to the present. **Prerequisite:** Geol 201 and registration in Geol 205 unless taken for elective credit.

**GEOL 205—HISTORICAL GEOLOGY LABORATORY—1 cr. (0 and 3)**
The student learns to recognize plants and animals which have left their record as fossils in the rocks of the earth's crust. Emphasis is placed upon geologic structures and the interpretation of geologic maps. Field trips are planned to demonstrate classroom concepts. **Prerequisite:** Geol 203 and simultaneous registration in Geol 204.

**GEOL 306—MINERALOGY—3 cr. (2 and 3)**
The student gains a working knowledge of crystallography and a comprehensive knowledge of determinative mineralogy. Identification of the minerals is based on their physical and chemical properties. **Prerequisite:** Geol 201 or 406.

**GEOL 307—OPTICAL MINERALOGY—3 cr. (2 and 2)**
The purpose of this course is to enable the student to identify minerals under the microscope on the basis of their optical properties. **Prerequisite:** Geol 306.

**GEOL 309—PETROLOGY—3 cr. (2 and 3)**
The genesis, evolution, and classification of rocks through lectures, laboratory exercises, and field trips. The occurrences, chemical relationships, and distribution of rock types are emphasized. **Prerequisite:** Geol 306.

**GEOL 311—STRATIGRAPHY AND SEDIMENTATION—3 cr. (3 and 0)**
The processes by which sediments are eroded, transported, and deposited (sedimentation), with major emphasis on relationships of the areal and time distribution of stratified rocks and their historical significances (stratigraphy). **Prerequisite:** Geol 201 and 204 or 406.
Geol 402—Structural Geology—3 cr. (2 and 2)
The diverse geological structures of the earth, their description, origin, and field recognition. Practical problems in interpreting geologic structures are utilized, in addition to theoretical considerations of the mechanics and causes of tectonism. Prerequisite: Geol 201 and 204 or 406.

Geol 403—Invertebrate Paleontology—3 cr. (2 and 3)
A study of life of past geologic ages, as shown by fossilized remains of ancient animals, with emphasis on the invertebrates. Prerequisites: Geol 201 and 204 or permission of the instructor.

Geol 404—Economic Geology—3 cr. (3 and 0)
This course concerns the description and classification of ore deposits and commercial non-metallic mineral deposits. The origin of mineral deposits and their occurrence is emphasized. Problem studies and field trips to nearby mines and quarries. Prerequisite: Geol 306.

Geol 405—Geomorphology—4 cr. (3 and 3)
A study of the surface features of the earth—their form, nature, origin, development, and the change they are undergoing. Prerequisite: Geol 201 and 203 or Geol 406 or permission of the instructor.

Geol 406—Engineering Geology—3 cr. (2 and 3)
This course is similar to Geol 201 except that progress is faster and emphasis is on the relationship of geology to engineering.

Geol 407—Glacial Geology—3 cr. (2 and 2)
Study of the types of glaciers, their distribution, nourishment and wastage. Continental and mountain glaciation, past and present, and the forms and deposits associated therewith. Ice contact forms, their significance and origins. Prerequisite: Geol 201 and 203, or Geol 406.

Geol 408—Geohydrology—3 cr. (3 and 0)
Study of the hydrologic cycle, aquifer characteristics, theory of ground water movement, mechanics of well flow, experimental methods, and subsurface mapping. Prerequisite: Geol 201 and 203, or Geol 406.

Geol 411—Research Problems—3 cr. (0 and 9)
A field, laboratory, or library study of an approved topic in geology. The topic would be one not normally covered in formal course offering, but may be an extension of a course. Prerequisite: Senior standing in geology or approval of the Department Head.

Geol 412—Research Problems—3 cr. (0 and 9)
A continuation of Geol 411.

Geol 606—Mineralogy—3 cr. (2 and 3)

Geol 607—Optical Mineralogy—3 cr. (2 and 2)

Geol 609—Petroleum—3 cr. (2 and 3)

Geol 611—Stratigraphy and Sedimentation—3 cr. (3 and 0)

Geol 702—Structural Geology—3 cr. (2 and 2)

Geol 703—Invertebrate Paleontology—3 cr. (2 and 3)

Geol 704—Economic Geology—3 cr. (3 and 0)

Geol 705—Geomorphology—4 cr. (3 and 3)
Description of Courses

GEOL 800—Earth Science I—3 cr. (2 and 3)
GEOL 850—Earth Science II—3 cr. (2 and 3)

GERMAN

Assistant Professor: Patricia W. Wannamaker
Instructors: E. P. Arnold, Margaret S. Graham, H. L. Laws

GER 101—Elementary German—3 cr. (3 and 1)
A course for beginners in which, through conversation, composition and dictation, the fundamentals of the language are taught and a foundation is provided for further study and the eventual ability to read and speak the language. Three hours a week of classroom instruction and one hour a week in the language laboratory.

GER 102—Elementary German—3 cr. (3 and 1)
A continuation of Ger 101, in which a reader is also used.

GER 151—German for Graduate Students—0 cr. (0 and 0)
An intensive program for graduate students preparing to take the reading examination in German.

GER 201—Intermediate German—3 cr. (3 and 1)
A short review of grammar, with conversation, composition and dictation continued from Ger 102, and the beginning of more serious reading of German prose in short stories or novels. Three hours a week of classroom instruction and one hour a week in the language laboratory.

GER 202—Intermediate German—3 cr. (3 and 0)
While attention is paid to writing and speaking German, more stress is laid on the rapid reading of more difficult German prose than in the earlier courses. Prerequisite: Ger 201.

GER 251—Scientific German—3 cr. (3 and 0)
An alternate course to Ger 202; readings in general science and some review of grammar and syntax. Prerequisite: Ger 201.

GER 303—Survey of German Literature I—3 cr. (3 and 0)
Literary movements and authors from the beginnings through romanticism, with emphasis upon Goethe and his contemporaries. Required of German majors. Prerequisite: Ger 201 and 202.

GER 304—Survey of German Literature II—3 cr. (3 and 0)
Literary movements and authors from the end of romanticism to the present. Required of German majors. Prerequisite: Ger 201 and 202.

GER 305—Conversational German—3 cr. (3 and 0)
Practice in the spoken language, with emphasis on vocabulary, pronunciation, and comprehension; written exercises for accuracy; assignments in the language laboratory. Required of German majors. Prerequisite: Ger 202 or 251.

GER 306—Advanced Conversation and Composition—3 cr. (3 and 0)
Continuation of Ger 305 with additional emphasis on written composition. Required of German majors. Prerequisite: Ger 305.
GER 403—NINETEENTH CENTURY GERMAN LITERATURE—3 cr. (3 and 0)
Selected works of Heine, Hebbel, Grillparzer, Keller, Meyer, Hauptmann, Schnitzler, and Hofmannsthal. Readings, discussions, and reports. Prerequisite: Ger 303 and 304.

GER 404—20TH CENTURY GERMAN LITERATURE—3 cr. (3 and 0)
Selected works from authors of the twentieth century. Prerequisite: Ger 303 and 304.

GER 406—FAUST—3 cr. (3 and 0)
An intensive reading of Goethe’s masterpiece accompanied by extensive critical research. Prerequisite: Ger 303 and 304.

HISTORY

Professors: C. W. Bolen, R. S. Lambert, E. M. Lander, Jr.
Associate Professors: Virginia O. Bardsley, J. E. Tuttle
Instructors: Bettina K. Beer, J. R. Beer, G. R. DiBenedetto, C. A. Grubb, A. D. McClare, Nancy A. Ratliff

Hist 101—AMERICAN HISTORY—3 cr. (3 and 0)
The political, economic and social development of the American people from the period of discovery to the end of the Civil War.

Hist H101—AMERICAN HISTORY—3 cr. (3 and 0)
Same as Hist 101 except that this honors section is open to students only by invitation.

Hist 102—AMERICAN HISTORY—3 cr. (3 and 0)
The political, economic and social development of the American people from the end of the Civil War to the present.

Hist H102—AMERICAN HISTORY—3 cr. (3 and 0)
Continuation of Hist H101.

Hist 104—WESTERN CIVILIZATION—3 cr. (3 and 0)
A survey of the history of the modern world and the forces which have shaped its political, economic, and social institutions. (Not open to those who have passed Hist 204.)

Hist H104—WESTERN CIVILIZATION—3 cr. (3 and 0)
Same as Hist 104 except that this honors section is open to students only by invitation.

Hist 203—HISTORY OF CIVILIZATION—3 cr. (3 and 0)
The political, economic and social movements of Western Civilization from ancient times to 1660.

Hist 204—HISTORY OF CIVILIZATION—3 cr. (3 and 0)
The political, economic and social movements of Western Civilization from 1660 to the present. (Not open to those who have passed Hist 104.)
HIST 301—History of the United States Since 1865—3 cr. (3 and 0)
An advanced study of the political, social, and economic development of the United States since the end of the Civil War. Prerequisite: Junior standing. Not open to students who have completed Hist 102.

HIST 306—American Economic Development—3 cr. (3 and 0)
The history of the economic development of the United States from 1492 to the present with emphasis on agriculture, transportation, banking, commerce, economic policies of the national government, and particularly the industrial revolutions. Prerequisite: Hist 101 and 102.

HIST 308—History of England to 1603—3 cr. (3 and 0)
The history of England to 1603. Prerequisite: Junior standing.

HIST 309—History of England Since 1603—3 cr. (3 and 0)
England and her people. Prerequisite: Junior standing.

HIST 310—Ancient Civilization—3 cr. (3 and 0)
From beginning of civilization to A.D. 476.

HIST 312—History of Russia—3 cr. (3 and 0)
A survey of the history of Russia from the earliest times to the present.

HIST 313—History of South Carolina—3 cr. (3 and 0)
The political, economic and social development of South Carolina from 1670 up to the present. Prerequisite: Junior standing.

HIST 314—History of the South—3 cr. (3 and 0)
Origins and development of political, economic, and cultural institutions of the South from the Colonel period to the present; and the role of the South in the nation's development. (Formerly Hist 403.)

HIST 315—Black History in America—3 cr. (3 and 0)
This course is an effort to define and understand the relationship of Black Americans with White Americans within American society after 1619. Prerequisite: Permission of the instructor.

HIST 331—Pre-Modern History of East Asia—3 cr. (3 and 0)
A survey of the history of China and Japan from earliest times to the arrival of Europeans in the sixteenth century. Prerequisite: Hist 102 or 204.

HIST 332—Modernization of East Asia—3 cr. (3 and 0)
A survey of the history of China and Japan from the Sixteenth Century to the present, with emphasis on the impact of Western culture. Prerequisite: Hist 102 or 104.

HIST 340—Indigenous and Colonial Latin America—3 cr. (3 and 0)
An introduction to the geography of the region; structure and accomplishments of pre-Columbian societies; Iberian background to overseas expansion; conquest and settlement of the New World; political, economic, and social patterns in the colonial era leading to the Wars of Independence. Prerequisite: Junior standing or permission of the instructor.

HIST 341—Mexico, Central America, and the Caribbean Since 1800—3 cr. (3 and 0)
An introduction to the geography of the region; origins and progress of the Independence movements; political, economic and social developments after
1825; current domestic and international problems. **Prerequisite:** 6 hours of history or permission of instructor.

**Hist 342—South America Since 1800—3 cr. (3 and 0)**
An introduction to the geography of the region; origins and progress of the Independence movements; political, economic and social developments after 1825; current domestic and international problems. **Prerequisite:** 6 hours of history or permission of instructor.

**Hist 356—Europe 1789-1850—3 cr. (3 and 0)**
A history of Europe from the outbreak of the French Revolutions through the Revolutions of 1848, with emphasis on the conflict between the forces of change and those of conservatism within the states and in Europe in general. **Prerequisite:** Hist 203, 204.

**Hist 357—Europe, 1850-1914—3 cr. (3 and 0)**
A history of Europe from the mid-nineteenth century up to the outbreak of the First World War, with emphasis placed on the social, economic and political development of the European states and the forces of nationalism, imperialism, and liberalism. **Prerequisite:** Hist 203, 204.

**Hist 402—Medieval History—3 cr. (3 and 0)**
A survey of the period from the eclipse of Rome to the advent of the Renaissance; emphasizing human migrations, feudalism, rise of towns, and the cultural life. **Prerequisite:** Hist 203 and 204.

**Hist 404—History of the Renaissance and Reformation—3 cr. (3 and 0)**
An examination of the transitional period of European civilization (circa 1302 to 1648) with emphasis being placed on institutional, cultural and religious developments. **Prerequisite:** Hist 203, 204.

**Hist 408—International Relations Since 1914—3 cr. (3 and 0)**
The great powers and world politics since 1914. **Prerequisite:** Hist 203, 204.

**Hist 410—History of Colonial America—3 cr. (3 and 0)**
The development of American institutions and customs in the period before 1776. Considerable emphasis is placed on the imperial relations between Great Britain and her colonies and upon the movement towards, and the philosophy of, the American revolution. **Prerequisite:** Hist 101, 102.

**Hist 411—United States, 1783-1850—3 cr. (3 and 0)**
The formation and growing pains of the new nation through the Federal and Middle periods of its history, with emphasis on economic and political development, the westward movement, and the conflicting forces of nationalism and sectionalism. **Prerequisite:** Hist 101, 102.

**Hist 412—United States, 1850-1900—3 cr. (3 and 0)**
A course dealing with the background causes of, developments during, and broad problems after, the Civil War in American history. **Prerequisite:** Hist 101, 102.

**Hist 413—United States History Since 1900—3 cr. (3 and 0)**
The history of the United States from 1900 to the present. **Prerequisite:** Hist 101, 102.

**Hist 499—Studies in History—3 cr. (3 and 0)**
An attempt to integrate the students' knowledge and understanding of the field of history by lectures, discussions, and readings on the broad themes of
history and their relevance to particular periods and geographical areas. Required of all history majors. *Prerequisite:* Hist 101, 102, 203, 204, and permission of the history adviser.

**Hist 702—Medieval History**—3 cr. (3 and 0)

**Hist 704—History of the Renaissance and Reformation**—3 cr. (3 and 0)

**Hist 708—International Relations Since 1914**—3 cr. (3 and 0)

**Hist 710—History of Colonial America**—3 cr. (3 and 0)

**Hist 711—United States, 1783-1850**—3 cr. (3 and 0)

**Hist 712—United States, 1850-1900**—3 cr. (3 and 0)

**Hist 713—United States Since 1900**—3 cr. (3 and 0)

**Hist 807—United States Diplomatic History Since 1877**—3 cr. (3 and 0)

**Hist 811—Introduction to Historical Research**—3 cr. (3 and 0)

**Hist 812—United States Historiography**—3 cr. (3 and 0)

**Hist 813—Medieval Historiography**—3 cr. (3 and 0)

**Hist 814—Modern European Historiography**—3 cr. (3 and 0)

**Hist 824—Seminar in the American South**—3 cr. (3 and 0)

**Hist 825—Seminar in the Civil War and Reconstruction**—3 cr. (3 and 0)

**Hist 861—Seminar in Medieval England**—3 cr. (3 and 0)

**Hist 862—Seminar in Medieval England to 1485**—3 cr. (3 and 0)

**Hist 863—Seminar in Tudor England**—3 cr. (3 and 0)

**Hist 864—Seminar in Stuart England**—3 cr. (3 and 0)

**Hist 865—Seminar in Modern England Since 1715**—3 cr. (3 and 0)

**Hist 866—Seminar in Modern England Since 1715**—3 cr. (3 and 0)

**Hist 891—Research—Credit to be arranged.**

**HORTICULTURE**

*Professors:* L. O. Van Blaricom, W. L. Ogle, T. L. Senn, Head

*Associate Professors:* P. M. Alexander, J. R. Haun, H. J. Sefick, E. T. Sims, Jr., G. E. Stembridge, F. W. Thode

*Assistant Professors:* J. P. Fulmer, W. S. Jordan, B. J. Skelton

**Hort 201—General Horticulture**—3 cr. (2 and 2) F, S

A working knowledge of the fundamental plant processes is developed, showing the influence of light, temperature, water and nutrients upon vegetative growth and reproduction of horticultural plants. Production practices, harvesting, storage and marketing of the principal fruit, vegetable and ornamental crops are discussed with demonstrations and practice in greenhouse and orchard. *Prerequisite:* Bot 101 and Ch 101.

**Hort 302—Principles of Vegetable Production**—3 cr. (3 and 0) F

The general principles of vegetable growing and handling. Phases receiving special emphasis are economic importance, producing areas, management prac-
tices, plant forcing, cultural practices, irrigation, quality factors, harvesting, grading, packing, storage, market inspection, transportation, refrigeration, exhibition and seed production. Prerequisite: Hort 201.

Hort 303—Plant Materials I—3 cr. (2 and 3) F
Woody, ornamental plants and their aesthetic and functional uses in landscape developments. The study covers habit of growth, ultimate size, texture effect, period of bloom, color, and cultural requirements.

Hort 304—Plant Materials II—3 cr. (2 and 3) S
Herbaceous, ornamental plants which are commonly used as garden flowers. This study covers habit of growth, size, period of bloom, color and cultural requirements.

Hort 305—Plant Propagation—3 cr. (2 and 3) F
Methods of propagation; time, manner and material for making cuttings; temperature and media for rooting cuttings or ornamental trees, shrubs and flowering plants; propagating structures, soils and fertilizers. Practical instruction given in field and greenhouse. Prerequisite: Hort 201.

Hort 306—Landscape Design—3 cr. (2 and 3) S
Landscape planning of residential and public properties in order to achieve best use and most enjoyment from a given piece of ground. Prerequisite: Hort 303.

Hort 310—Floriculture—3 cr. (2 and 2) S
Greenhouse production of commercial flower crops; soils; fertilizers; greenhouse diseases and insects; flower crops to be grown on benches and as pot plants; marketing and costs of production. Prerequisite: Hort 201.

Hort 352—Commercial Pomology—3 cr. (2 and 3) F
Fruit bud formation, rest period and water relations of fruit plants, soils, fruit setting; orchard soil management and responses of various fruits to fertilizers; principles of pruning, effect of climatic differences, freezing of tissues and means of avoiding injury; harvesting, transportation and storage. Prerequisite: Hort 201.

Hort 405—Nut Tree Culture—2 cr. (2 and 0) F, '68 and alternate years.
The production, harvesting and marketing of the principal nut crops with emphasis on the pecan. Prerequisite: Hort 201.

Hort 406—Nursery Technology—3 cr. (2 and 3) S
Principles and techniques in handling nursery crops. Prerequisite: Hort 303 and Hort 305.

Hort 407—Landscape Design—3 cr. (2 and 3) F
The first half of this course is a study of trees, shrubs, vines and ground covers used in landscape planting. Attention is given to cultural requirements, growth habits, period of bloom, texture and fall color. The second half of the course is devoted to landscape planning for small residential properties.

Hort 408—Floral Design and Retail Marketing—3 cr. (2 and 2) F
Studies of the retail flower business with relation to financing, floor plan, equipment, personnel, supplies, salesmanship, advertising, and other important areas. Floral designing for the retail trade will include corsage construction, wreath construction, funeral and wedding designs as well as home arrangements.
Description of Courses

HORT 409—SEMINAR—1 cr. (1 and 0) F
Recent research work on various phases of horticulture, methods of conducting investigations, and preparation of report of investigations.

HORT 410—SEMINAR—1 cr. (1 and 0) S
A continuation of Hort 409.

HORT 412—TURF MANAGEMENT—3 cr. (2 and 3) F
The identification, use, culture, and maintenance of turf grasses. Prerequisite: Junior standing.

HORT 451—SMALL FRUIT CULTURE—3 cr. (2 and 3) S
Varieties, soils, sites, culture, fertilizers, harvesting and preparation for marketing of grapes, strawberries, dewberries, blackberries, raspberries and other small fruits. Prerequisite: Hort 201.

HORT 456—VEGETABLE CROPS—3 cr. (3 and 0) S, '71 and alternate years.
The principles and practices employed in the commercial growing and marketing of vegetable crops. Emphasis is placed on temperature requirements, plant characteristics, varieties, soils, fertilizers, weed control, harvesting and preparation for market.

HORT 460—ADVANCED LANDSCAPE DESIGN—5 cr. (3 and 6) F
Landscape planning for larger residential properties, schools, industrial plants, real estate developments; detailed finished plans, costs; further study of materials used; original problems; field study. Prerequisite: Hort 308 or 407.

HORT 464—POST HARVEST HORTICULTURE—3 cr. (2 and 3) F
The handling of fruits, vegetables, and ornamental crops after harvesting. Subjects include spoilage problems, hydrocooling, common and cold storage of crops, packaging and processing procedures.

HORT 468—INTRODUCTION TO RESEARCH—2 cr. (1 and 3) S
Principles, developments and changes in research methods related to certain fields of agricultural research. The students obtain practice in experimental techniques, scientific writing and the use and maintenance of various research instruments and equipment. Prerequisite: Senior standing.

HORT 608—LANDSCAPE DESIGN—3 cr. (2 and 3)
HORT 610—FLORICULTURE—3 cr. (2 and 2)
HORT 652—COMMERCIAL POMOLOGY—3 cr. (2 and 3)
HORT 705—NUT TREE CULTURE—2 cr. (2 and 0)
HORT 706—NURSERY TECHNOLOGY—3 cr. (2 and 3)
HORT 707—LANDSCAPE DESIGN—3 cr. (2 and 3)
HORT 712—TURF MANAGEMENT—3 cr. (2 and 3)
HORT 751—SMALL FRUIT CULTURE—3 cr. (2 and 3)
HORT 756—VEGETABLE CROPS—3 cr. (3 and 0)
HORT 760—LANDSCAPE DESIGN—5 cr. (3 and 6)
HORT 764—POST HARVEST HORTICULTURE—3 cr. (2 and 3)
HORT 768—INTRODUCTION TO RESEARCH—2 cr. (1 and 3)
HORT 801—PROBLEMS IN SMALL FRUIT PRODUCTION—3 cr. (3 and 0)
Hort 802—Research Systems in Horticulture—3 cr. (2 and 3)
Hort 803—Experimental Olericulture—3 cr. (3 and 0)
Hort 804—Scientific Advances in Ornamental Horticulture—3 cr. (3 and 0)
Hort 805—Physicochemical Procedures for Determining Quality in Horticultural Crops—3 cr. (2 and 3)
Hort 806—Post-Harvest Physiology and Handling of Horticulture Crops—3 cr. (3 and 0)
Hort 807—Pomology—3 cr. (3 and 0)
Hort 808—Special Investigations in Horticulture—2 cr. (2 and 0)
Hort 809—Seminar I—1 cr. (1 and 0)
Hort 810—Seminar II—1 cr. (1 and 0)
Hort 891—Research—Credit to be arranged.
Hort 991—Doctoral Research—Credit to be arranged.

HOSPITAL AND HEALTH SERVICES ADMINISTRATION

Professor: F. A. Burtner
Associate Professor: C. O. Shuler
Visiting Lecturer: R. E. Toomey

H Adm 308—Hospital and Health Services Administration—3 cr. (3 and 0)
An introduction to the organization and operation of modern American hospitals, separate clinics and public health services. Included will be legal status, organizational peculiarities, and specific legislation effecting such agencies. Prerequisite: Junior standing.

H Adm 410—Hospital Internship—3 cr. (0 and 9)
The student will spend 9 hours per week on a specified program of observing, practicing and experiencing the duties of hospital administrators in selected local hospitals. The course will be specifically outlined along with the amount of time the student will spend in each phase or department of the hospital. Student progress will be constantly monitored by University faculty and hospital staff. Prerequisite: H Adm 308.

H Adm 710—Hospital Internship—3 cr. (0 and 9)
The student will spend approximately nine hours per week following a detailed plan of study consisting of observing, practicing and experiencing the duties of hospital administrators in selected local hospitals. Progress will be periodically evaluated by University and hospital staffs.

H Adm 800—The Function and Organization of Hospitals and Health Services Administration—3 cr. (3 and 0)
An overview of organization, function, place in the community and society of hospitals, individual health services and public health services. This course in conjunction with an administrative internship will prepare the student for major responsibilities in the area of health service administration.
Description of Courses

HUMANITIES
Hum 201—Introduction to the Humanities—3 cr. (3 and 0)
A general introduction to humanistic studies, stressing the interrelatedness of various humanistic disciplines. Such fields as art, architecture, music, literature, philosophy, and drama will be considered as they interact with, support, and develop each other in various cultural settings.

Hum 202—Introduction to the Humanities—3 cr. (3 and 0)
A continuation of Hum 201. Prerequisite: Hum 201.

INDUSTRIAL EDUCATION
Professor: A. F. Newton, Head
Associate Professor: D. E. Maurer
Assistant Professors: J. P. Crouch, M. S. Hahn, H. E. Morgan, Jr., J. E. Squyres
Instructor: J. J. Rohrbach

In Ed 101—Introduction to Industrial Education—1 cr. (1 and 0)
An introduction to the field of Industrial Education in terms of the underlying philosophies, the aims and goals, and the specific objectives of each area of study.

In Ed 102—Industrial Education Laboratory—3 cr. (1 and 6)
The properties of wood and woodworking practices. Prerequisite: In Ed 101.

In Ed 203—Industrial Education Laboratory—3 cr. (1 and 6)
Metal layout and forming, molding, casting practices, and welding. Prerequisite: In Ed 101.

In Ed 204—Graphic Arts—3 cr. (1 and 6)
Major emphasis is placed on projects involving composing, proofing, letter press work, bed press work, block printing, silk screen printing, offset printing and other processes in vogue at the present time.

In Ed 205—Power Technology—3 cr. (2 and 2)
A study of power in terms of sources of energy, generation, and transmission.

In Ed 220—Recreational and Avocational Crafts—3 cr. (2 and 3)
The basic tools, materials, and processes used in recreational and avocational craft activities are emphasized. Students develop proficiency in the use of common hand tools and machines.

In Ed 302—Dwelling Materials and Construction Methods—2 cr. (1 and 2)
The commonly used building materials and the methods of combining them in present day construction. Prerequisite: In Ed 102.

In Ed 303—Industrial Education Laboratory—3 cr. (1 and 6)
Exploratory activities of a laboratory nature are concerned with typical circuits, rotating equipment, and other associated electrical equipment.

In Ed 305—Industrial Education Laboratory—3 cr. (1 and 6)
Machining practices. Prerequisite: In Ed 203.

In Ed 310—Methods of Trade Teaching—3 cr. (3 and 0)
This course is designed to give basic instruction to beginning teachers in trade work. Psychological factors of learning; individual differences; methods
of teaching subjects; the special methods used in teaching skills; grading of students and keeping of proper records and reports. (Offered in Summer Sessions only.)

**IN Ed 312—Metal Processes in the General Shop—3 cr. (3 and 0)**

Major emphasis is placed on planning and development of projects in wrought iron, sheet metal, art metal, metal spinning, welding, heat treating and other aspects of metal work that fit into a general shop program. (Offered in Summer Sessions only.)

**IN Ed 313—Arts and Crafts—3 cr. (2 and 3)**

Emphasis on knowledge and skills in the industrial crafts by lecture, discussion and laboratory experiences. Stress is placed on several crafts basic to industrial production and popularity. Laboratory experience is required in at least four craft areas with an additional experience in one minor craft.

**IN Ed 314—Basic Electronics—3 cr. (1 and 6)**

Basic principles of electronics as applied in radio, television, and automatic controls involving vacuum tubes, semiconductors, integrated circuits, and other electronic devices and materials. *Prerequisite:* In Ed 303.

**In Ed 315—Construction Practices—3 cr. (3 and 0)**

This course covers brick, tile, concrete, plastering, and other construction materials and methods. (Offered in Summer Sessions only.)

**IN Ed 316—Plastics and Plastic Processes in the General Shop—3 cr. (3 and 0)**

The industrial, commercial and personal uses of plastics are discussed and demonstrated. In addition, the kinds of plastics, their properties, and special uses are studied. (Offered in Summer Sessions only.)

**IN Ed 318—Industrial Technology Techniques—3 cr. (3 and 0)**

Major emphasis is placed on casting, stamping and forming processes, forging and extrusion processes, machining processes, metal spraying or metallurgy, blast cutting, heating and case hardening, assembly processes, bending, finishing processes, inspection gaging. (Offered in Summer Sessions only.)

**IN Ed 320—Machine Woodworking—2 cr. (1 and 3)**

Basic characteristics of woodcutting, shaping, and finishing operations by use of machinery and auxiliary tools. Includes project work. *Prerequisite:* Junior standing. (Not for Industrial Education Students.)

**IN Ed 325—Industrial Safety—3 cr. (3 and 0)**

Accident prevention and control, with emphasis on industrial safety programs and development of safety attitudes while working with industrial machines, tools, materials, and processes.

**IN Ed 333—Design—3 cr. (2 and 3)**

The study of the principles of form and design elements in two or three dimensions as related to products in the several industrial arts areas. Lectures and laboratory projects stress creativity in the use of materials in reaching design solutions and in developing a personal design philosophy. Limited market and engineering research is conducted along with the study of significant figures in the field. *Prerequisite:* Basic courses in laboratory methods.
In Ed 372—Arts and Crafts for the Elementary Child—3 cr. (2 and 3)
Provides the elementary teacher with an opportunity to develop skills and knowledge in the use of a variety of media suitable for integrating the study of industry, technology, and the industrial society with the usual classroom procedures.

In Ed 402—Directed Teaching—6 cr. (0 and 18)
Supervised observation and teaching in cooperation with selected public schools in which opportunities are provided for securing experience in teaching industrial subjects. Prerequisite: In Ed 416, 425, and grade-point ratio required for graduation.

In Ed 405—Tests and Measurements in Industrial Education—3 cr. (3 and 0)
Methods used in measuring and evaluating pupil achievement in Industrial Education subjects. Emphasis is on developing tests, project evaluation, standardized testing, and statistical treatment of test scores. Prerequisite: Ed 302.

In Ed 408—Training Programs in Industry—3 cr. (3 and 0)
Basic concepts of supervision, administration, and management of training programs. Emphasis on determining training requirements, planning, directing, and evaluating training programs.

In Ed 416—Design and Operation of Industrial Education Laboratories—3 cr. (2 and 2)
Laboratory layout, selection and procurement of tools and equipment, budgeting, coordinating multiple activities in the general shop, and organizing course materials. Prerequisite: In Ed 303.

In Ed 422—Vocational Education Programs—3 cr. (3 and 0)
The types of vocational programs, financing, and administration and supervision. Prerequisite: In Ed 303.

In Ed 425—Teaching Industrial Subjects—3 cr. (3 and 0)
Effective methods and techniques of teaching industrial subjects. Emphasis is given to class organization, preparation of lesson outlines, and audio-visual aids. Prerequisite: Ed 335 and In Ed 303.

In Ed 432—Advanced Woodworking—2 cr. (1 and 3)
An advanced consideration of machine methods and developments, materials, quality factors, and evaluation of instructional materials and problems. Inspection trips and reports. Prerequisite: In Ed 102, In Ed 202.

In Ed 435—Advanced Welding—2 cr. (1 and 3)
An advanced consideration of studies originated in In Ed 203, new developments, and evaluation of instructional materials and problems. Inspection trips and reports. Prerequisite: In Ed 203.

In Ed 436—Advanced Material Forming—2 cr. (1 and 3)
Advanced consideration of studies initiated in In Ed 203, development, and evaluation of instructional materials and problems. Inspection trips and reports. Prerequisite: In Ed 203.

In Ed 438—Advanced Machining—2 cr. (1 and 3)
Advanced consideration of studies initiated in In Ed 305, new developments, industrial measurements, and evaluation of instructional materials and problems. Inspection trips and reports. Prerequisite: In Ed 305.
In Ed 440—Advanced Techniques of the Graphic Arts—3 cr. (1 and 6)
Students selecting to pursue the area of graphic arts will gain experience in the development of advanced techniques of layout and design; photographic copy preparation; cold type composition; line, halftone, duotone, and special effects photography, and advanced platemaking and pressmanship.

In Ed 441—Comprehensive General Shop Practices—2 cr. (2 and 0)
The problems and administration of the comprehensive general shop program. Objective is to consider planning multiple activity programs for the secondary school level. Prerequisite: In Ed 303.

In Ed 442—Competency Testing in Vocational Subjects—3 cr. (3 and 0)
This course is especially designed for trade teachers who have assisted in making trade tests for S. C. Certification program. Teachers who expect to assist in making trade tests are also urged to enroll in this course. The course is devoted to revising present trade tests and developing tests in new fields. (Offered in Summer Sessions only.)

In Ed 451—Special Projects—3 cr. (3 and 0)
The student is assigned a project in accordance with his needs and capabilities. Projects are either experimental, theoretical or developmental and cover subjects not thoroughly covered in other courses.

In Ed 496—Public and Professional Relations—3 cr. (3 and 0)
This course emphasizes the techniques and methods of effective public and industrial relations which contribute to understanding and cooperation of labor, business, professional, educational, and industrial groups.

In Ed 605—Industrial Education Laboratory—3 cr. (1 and 6)

In Ed 705—Tests and Measurements in Industrial Education—3 cr. (3 and 0)

In Ed 716—Design and Operation of Industrial Education Laboratories—3 cr. (2 and 2)

In Ed 722—Vocational Educational Programs—3 cr. (3 and 0)

In Ed 725—Teaching Industrial Subjects—3 cr. (3 and 0)

In Ed 732—Advanced Woodworking—2 cr. (1 and 3)

In Ed 735—Advanced Welding—2 cr. (1 and 3)

In Ed 736—Advanced Material Forming—2 cr. (1 and 3)

In Ed 738—Advanced Machining—2 cr. (1 and 3)

In Ed 741—Comprehensive General Shop Practices—2 cr. (2 and 0)

In Ed 796—Public and Professional Relations—3 cr. (3 and 0)

In Ed 815—Seminar in Industrial Education—1 cr. (1 and 0)

In Ed 820—Recent Process Developments—3 cr. (3 and 0)

In Ed 840—School Shop Design—3 cr. (3 and 0)

In Ed 845—Curriculum Development in Industrial Education—3 cr. (3 and 0)
Description of Courses

In Ed 860—Curriculum Planning and Development in Industrial Arts—3 cr. (3 and 0)
In Ed 861—Administration and Supervision of Vocational Education—3 cr. (3 and 0)
In Ed 865—American Industries—3 cr. (3 and 0)
In Ed 891—Research in Industrial Education—Credit to be arranged.
In Ed 895—Special Problems I—3 cr. (3 and 0)
In Ed 896—Special Problems II—3 cr. (3 and 0)

INDUSTRIAL ENGINEERING

Professor: E. Laitala, Head
Associate Professor: J. H. Couch

IE 301—Process Planning I—3 cr. (2 and 3)
Study of methods of conversion of raw materials into finished products. Emphasis is from the viewpoint of management and control of manufacturing operations. Includes basic terminology, interpretation and use of engineering plans, impact of production volume. This course will examine various manufacturing processes including material removal, casting, joining and forming of materials, and associated measurement techniques. Prerequisite: EG 103 or 109 and Phys 122.

IE 303—Job Evaluation and Wage Incentives—3 cr. (3 and 0)
Job description, specification, and classification. Systems employed for establishing relative ranks of jobs. Basic wage and salary determination. Wage incentive methods. Prerequisite: IE 307, 410 or consent of instructor.

IE 304—Methods and Standards—3 cr. (2 and 3)
Fundamentals relating to work methods design and analysis. Includes study of techniques necessary for determining efficient work methods. Work measurement as a basis for control of costs and scheduling. Prerequisite: Junior standing.

IE 306—Process Planning II—3 cr. (2 and 3)
Study of recent process developments and impact on planning and control of manufacturing operations. Numerical control of machines, computer-aided design, zero defects program, and others. Special laboratory investigations, and value engineering project. Prerequisite: IE 301.

IE 307—Survey of Engineering—3 cr. (3 and 0)
An examination of engineering in terms of types of fundamentals employed, governing parameters, basic plans, basic engineering functions, organization of divided engineering efforts, and measures of performance. Offered to students not majoring in engineering. Prerequisite: Phys 202 and Junior standing.

IE 403—Process Planning III—3 cr. (3 and 0)
Continuation of IE 306; study of latest process developments. Prerequisite: IE 306.

IE 404—Engineering Economic Analysis—3 cr. (3 and 0)
Basic principles and techniques of economic analysis of engineering projects. Consideration of time value of money, short- and long-term investments, re-
placement analysis, depreciation methods, cost allocation and measures of cost effectiveness. **Prerequisite:** Senior standing in Engineering or consent of instructor.

**IE 405—PLANT LAYOUT AND MATERIAL HANDLING—3 cr. (2 and 3)**

Fundamentals underlying the planning of factory layout for new products and increases in production volume. Layout by product and process. Scale model, template, and other planning techniques. Materials handling analysis and equipment decisions. **Prerequisite:** IE 301 and IM 408 or consent of instructor.

**IE 407—INDUSTRIAL APPLICATIONS OF STATISTICS—3 cr. (2 and 3)**

Application of statistical principles of analysis and control to production processes, studies of process capabilities, quality control, work sampling, reliability analysis, and machine interference. **Prerequisite:** Math 208 and Math 313.

**IE 408—PLANT DESIGN—2 cr. (1 and 3)**

Integration of unit operations into a total production system. Study of analytical procedures for determining layout of production and other facilities, line balance, manner in which operations shall be linked or material moved between them. Creation and analysis of alternative designs. **Prerequisite:** IE 304 and Senior standing.

**IE 410—ENGINEERING AND ORGANIZATION—3 cr. (3 and 0)**

The nature of industrial enterprise in terms of purpose, organization structure, governing criteria, responsibilities and relationships of various functional groups. Project engineering and organization. Analysis and coordination of engineering functions as foundation for engineering management.

**IE 411—WORK FLOW SYSTEMS AND CONTROL—3 cr. (3 and 0)**

Fundamentals underlying the determination of production capacity requirements, economic lot sizes, and the regulating of flow and storage of materials to, within, and from the production system. Elements of forecasting, determination of materials requirements, scheduling, inventory control, etc. Consideration of data processing methods. **Prerequisite:** Math 313 and IE 410 or consent of instructor.

**IE 412—SEMINAR—1 cr. (1 and 0)**

Library search and oral reports covering recent technological developments in the field of industrial engineering. Consideration of professional responsibilities and post graduation plans. A major term paper is required. **Prerequisite:** Senior standing in Industrial Engineering.

**IE 413—SEMINAR—1 cr. (1 and 0)**

Continuation of IE 412. **Prerequisite:** IE 412.

**IE 416—PROJECT SCHEDULING—3 cr. (3 and 0)**

Basic planning and plans underlying the design and control of work flow systems for diverse engineering projects. Systems design of schedule plans including design function, operations, materials procurement, facilities, equipment, etc. Fundamentals underlying critical path (PERT, C.P.M.) and data processing methods. **Prerequisite:** Senior standing in Engineering.

**IE 704—ENGINEERING ECONOMIC ANALYSIS—3 cr. (3 and 0)**

**IE 707—INDUSTRIAL APPLICATIONS OF STATICS—3 cr. (2 and 3)**
IE 710—Engineering and Organization—3 cr. (3 and 0)
IE 711—Work Flow Systems and Control—3 cr. (3 and 0)
IE 716—Project Scheduling—3 cr. (3 and 0)

INDUSTRIAL MANAGEMENT

Professors: C. C. Davis, C. H. Whitehurst, Jr., Head
Assistant Professors: Susan H. Brown, C. A. Burden, T. H. Gunter, Jr., G. D. Riggs, J. A. Turner
Visiting Lecturer: R. E. Toomey

IM 100—Introduction to Industrial Management—0 cr. (1 and 0)
A series of lectures by University and industry speakers in which the role of the industrial manager in society is examined and explained. Particular emphasis is placed on orienting the student to understanding the manager’s function in a market system economy.

IM 201—Introduction to Industrial Management—3 cr. (3 and 0)
An introductory survey of management’s role as a fourth factor of economic production.

IM 299—Computer Programming I—1 cr. (0 and 3)
An elementary operating course primarily designed to familiarize the student with the various capabilities of electronic computers. A demonstrated ability to write basic programs applicable to management areas is required. Prerequisite: Permission of instructor.

IM 304—Quality Control—3 cr. (3 and 0)
Basic control techniques in the field of industrial production, inspection and experimentation. Various sampling, control and inspection problems are studied with special reference to practical applications. Underlying theory, assumptions and limitations are presented. Prerequisite: Math 313.

IM 306—Corporate Finance—3 cr. (3 and 0)
The organization and operation of corporations with emphasis on the nature and influences of the various sources of funds. Prerequisite: Junior standing.

IM 307—Personnel Management—3 cr. (3 and 0)
An introductory course dealing with the principles and policies governing present day employee-employer relationships. Attention directed to methods of electing, training, placing, and promoting of employees to develop sound personnel techniques. Prerequisite: Junior standing.

IM 312—Commercial Law—3 cr. (3 and 0)
An introduction to business law with primary attention given to contracts, agency, negotiable instruments and sales. Prerequisite: Junior standing.

IM 313—Commercial Law—3 cr. (3 and 0)
Continuation of IM 312 with emphasis on business organization, personal and real property, estates and bankruptcy and security services.

* On leave.
IM 322—Legal Environment of Business—3 cr. (3 and 0)
A comprehensive study of the development of governmental regulation of business including both state and national regulations. Attention is given to the constitutional source and limitation of power in both governments; specific areas in which the governments have acted (production, labor, combinations, prices, etc.) and the regulations that have been imposed in these areas; and the scope of the administrative process.

IM 401—Marketing Analysis—3 cr. (3 and 0)
An examination of the activities involved in the flow of goods and services from producer to consumer. Stressed will be the application of quantitative techniques for predicting sales and evaluating alternative promotional strategies. Prerequisite: Senior standing in IM or permission of instructor.

IM 402—Operations Planning and Control—3 cr. (3 and 0)
The application of modern statistical and mathematical techniques to the planning and control of industrial operations. Emphasis will be placed on applications in forecasting, inventory, production scheduling and control, equipment selection and replacement, maintenance and materials handling. Prerequisite: IM 304 and senior standing.

IM 403—Special Problems—2 cr. (2 and 0)
Each student will plan and develop a research project related to the field of management. Prerequisite: Senior standing in Industrial Management.

IM 404—Managerial Economics—3 cr. (3 and 0)
Includes an introduction to statistical decision theory, econometrics, and quantitative applications of economic tools as related to the industrial manager in his role as decision maker and forward planner. Prerequisite: Econ 314 and Senior standing.

IM 405—Economics of Transportation—3 cr. (3 and 0)
History and structure of transportation systems of the United States; the nature of transportation costs and rates. Transportation systems as factors in industrial location. Government policy towards transportation. Prerequisite: Senior standing and permission of the instructor.

IM 406—Theory of Industrial Location—3 cr. (3 and 0)
A theoretical study of the general factors which determine plant location in a capitalist society. Particular attention is paid to the selection of location sites by small nonbranch manufacturing plants. A comparison of location theory and actual location patterns is stressed. Prerequisite: Senior standing and permission of instructor.

IM 407—Directed Research—1 cr. (1 and 0)
Each student will plan and develop a research project related to the field of management. Prerequisite: Senior standing in Industrial Management.

IM 408—Work Simplification and Standardization—3 cr. (2 and 3)
Principles and practices of motion and time as it is applied to industry. Emphasis is given to its application and its influence on methods, material handling, plant layout, and time study procedures.

IM 409—Management Simulation—0 cr. (0,3)
Practice in managerial decision-making under simulated competitive industry conditions. Guidance is furnished by the staff member administering the re-
quirement. The model is designed to derive maximum benefit from previous courses in economics, econometrics and statistics. Prerequisite: Senior standing and permission of instructor.

IM 410—MARKETING RESEARCH I—1 cr. (1 and 0)
A directed research course oriented toward those students interested in a career in marketing.

IM 411—MARKETING RESEARCH—2 cr. (2 and 0)
A directed research course oriented toward those students interested in a career in marketing.

IM 412—MARKETING ANALYSIS II—3 cr. (3 and 0)
A continuation of Marketing Analysis IM 401. Prerequisite: IM 401 or permission of instructor.

IM 415—MANAGERIAL DECISION MAKING—3 cr. (3 and 0)
Management problems and methods involved in the operation of manufacturing institutions, including location, equipment investment, organization structure, and budgets. Attention is given primarily to the above areas by the use of the case method. Emphasis on oral and written communication. Prerequisite: Permission of instructor.

IM 416—MANAGEMENT OF HUMAN RESOURCES—3 cr. (3 and 0)
A course designed to orient the student toward recent developments in enlightened uses of human resources with emphasis on procurement, training, development, rewarding and retention of such resources. Prerequisite: Permission of instructor.

IM 417—MANUFACTURING LOGISTICS—3 cr. (3 and 0)
A study of more advanced manufacturing and production techniques including predetermined motion time data systems, micromotion study analysis, work sampling or ratio delay studies, zero defects, materials handling techniques, machine interference, time study formula construction, machinery and equipment replacement calculations, economic lot size determination, development and use of standard data, cost reduction programs, operator training methods, charting of time study data, problems of machinery and equipment layout, and developing of complex time standards. Prerequisite: IM 408 or permission of instructor.

IM 499—COMPUTER PROGRAMMING II—1 cr. (0 and 3)
Each student will complete a research project relating to the accomplishment of some management function in which a computer program is now—or is expected to be—of cardinal importance. Prerequisite: IM 299 or equivalent.

IM 701—MARKETING ANALYSIS I—3 cr. (3 and 0)
IM 702—OPERATIONS PLANNING AND CONTROL—3 cr. (3 and 0)
IM 704—MANAGERIAL ECONOMICS—3 cr. (3 and 0)
IM 705—ECONOMICS OF TRANSPORTATION—3 cr. (3 and 0)
IM 706—THEORY OF INDUSTRIAL LOCATION—3 cr. (3 and 0)
IM 708—WORK SIMPLIFICATION AND STANDARDIZATION—3 cr. (2 and 3)
IM 712—MARKETING ANALYSIS II—3 cr. (3 and 0)
IM 715—Managerial Decision Making—3 cr. (3 and 0)
IM 717—Manufacturing Logistics—3 cr. (3 and 0)
IM 800—Management Simulation—1 cr. (0 and 3)
IM 801—Quantitative Economic Analysis—3 cr. (3 and 0)
IM 802—Finance—3 cr. (3 and 0)
IM 803—Operations Management—3 cr. (3 and 0)
IM 804—Managerial Policy—3 cr. (3 and 0)
IM 805—Quality Control—3 cr. (3 and 0)
IM 811—Advanced Marketing Analysis—3 cr. (3 and 0)
IM 816—Management of Human Resources—3 cr. (3 and 0)
IM 891—Thesis—3 cr.

MANAGEMENT SCIENCE

Professor: C. H. Whitehurst
Associate Professors: E. A. LaRoche, S. O. Park,* B. J. Todd
Assistant Professors: G. D. Riggs, C. L. Dyer.

Mgt Sc 311—Introduction to Econometrics—3 cr. (3 and 0)
An introduction to economic measurement. Emphasis is placed upon the mathematical formulation of economic theory, the application of calculus to economic theory, and the application of statistics with particular emphasis on the use of regression analysis in economics. Elementary econometric models are introduced. Prerequisite: Math 313 and Econ 314.

Mgt Sc 413—Management Science I—3 cr. (3 and 0)
An application of management science techniques—both operations research and econometric analysis—to decision making in business. Prerequisite: Permission of instructor.

Mgt Sc 414—Statistical Analysis—3 cr. (3 and 0)
The application of statistical techniques to management decision making. Topics include time series analysis, regression and correlation as tools of control and forecasting; analysis of variance and regression in planning, control and research; EVOP, response surfaces, and fractional factorial experiments. Prerequisite: Math 313 or equivalent.

Mgt Sc 611—Introduction to Econometrics—3 cr. (3 and 0)
Mgt Sc 713—Management Science I—3 cr. (3 and 0)
Mgt Sc 714—Statistical Analysis—3 cr. (3 and 0)
Mgt Sc 806—Regional Science Methods—3 cr. (3 and 0)
Mgt Sc 807—Econometric Methods I—3 cr. (3 and 0)
Mgt Sc 808—Econometric Methods II—3 cr. (3 and 0)
Mgt Sc 812—Management Science II—3 cr. (3 and 0)

* On leave.
MATERIALS ENGINEERING

Associate Professor: S. F. Hulbert, Program Coordinator

MAT 20—MECHANICAL PROPERTIES OF MATERIALS—3 cr. (3 and 0)
MAT 802—RESEARCH TECHNIQUES IN PHYSICAL METALLURGY—3 cr. (2 and 3)

MAT 805—PHYSICAL METALLURGY I—3 cr. (3 and 0)
MAT 806—PHYSICAL METALLURGY II—3 cr. (3 and 0)
MAT 810—DIFFUSION IN SOLIDS—3 cr. (3 and 0)
MAT 811—KINETICS OF HETEROGENEOUS REACTIONS—3 cr. (3 and 0)
MAT 820—DEFORMATION MECHANISMS IN SOLIDS—3 cr. (3 and 0)
MAT 821—STRENGTH MECHANISMS IN SOLIDS—3 cr. (3 and 0)
MAT 891—RESEARCH—Credit to be arranged.
MAT 991—DOCTORAL RESEARCH—Credit to be arranged.

MATHEMATICS

Professors: C. V. Aucoin, Head; A. T. Hind, Jr., A. F. Sobczyk


Instructors: Eugenie V. Bartmess, Louise G. Fulmer, Jeuel G. LaTorre

MAT 100—COLLEGE ALGEBRA—2 cr. (5 and 0).

Required of all freshmen who fail to make a satisfactory grade on the Mathematics Test, Level I (Standard). An intensified review of high school algebra and the topics listed under Math 103. Students enrolled in Math 100 must receive a passing grade in this course before they are eligible to enroll in any other mathematics course. Math 100 may be substituted for Math 103.

MAT 101—MATHEMATICAL ANALYSIS I—3 cr. (3 and 0)

Topics include: elementary set theory, relations and functions, counting methods, probability spaces, conditional probabilities and discrete random variables. Prerequisite: A satisfactory score on the Mathematics Test, Level I (Standard).

MAT 102—MATHEMATICAL ANALYSIS II—3 cr. (3 and 0)

Topics include: intuitive calculus (differentiation and integration), continuous random variables, normal distribution and other probability densities. Prerequisite: Math 101.

MAT 103—COLLEGE ALGEBRA—2 cr. (3 and 0)

Algebraic processes, functions, equations, inequalities, mathematical induction, theory of equations, determinants, and logarithms. Prerequisite: A satisfactory score on the Mathematics Test, Level I (Standard).
MATH 104—TRIGONOMETRY—2 cr. (3 and 0)
Trigonometric functions, equations, identities, and solution of triangles.
Logarithms and complex numbers. Prerequisite: A satisfactory score on the
Mathematics Test, Level I (Standard).

MATH 106—CALCULUS OF ONE VARIABLE—4 cr. (5 and 0)
Topics include: real numbers, analytic geometry, introduction to derivatives,
computation and application of derivatives, integrals, techniques of integration,
and approximations. Prerequisite: Math 103, 104, or a satisfactory score on
the Mathematics Test Level I (Standard).

MATH H106—CALCULUS OF ONE VARIABLE—4 cr. (5 and 0)
Same as Math 106 except that this honors section is open to students only
by invitation.

MATH 115—CONTEMPORARY MATHEMATICS FOR ELEMENTARY SCHOOL
Teachers I—3 cr. (3 and 0)
Logic, sets, and the properties of the counting numbers, numeration systems.

MATH 116—CONTEMPORARY MATHEMATICS FOR ELEMENTARY SCHOOL
Teachers II—3 cr. (3 and 0)
A continuation of Math 115. Subtraction, properties of the integers, ele-
mentary number theory, rational number system, real number system.

MATH 203—ELEMENTARY STATISTICAL INference—3 cr. (3 and 0)
A survey course in fundamental statistical principles with applications to
social sciences and other fields. The development of the course will assume
knowledge of finite probability. Major topics include: empirical frequency
distributions, computation of descriptive constants, statistical inference, re-
gression correlation, analysis of variance, and applications of Markov processes.
Prerequisite: Math 102 or a 3-credit course in finite probability.

MATH 205—CALCULUS AND LINEAR ALGEBRA—4 cr. (5 and 0)
Topics include: matrices and vectors, transformation and matrices, repre-
sentations of linear transformations and the topics in calculus are infinite series,
limits, differentiation and integration. Prerequisite: Math 106.

MATH H205—CALCULUS AND LINEAR ALGEBRA—4 cr. (5 and 0)
Same as Math 205 except this honors section is open to students only by
invitation.

MATH 206—CALCULUS OF SEVERAL VARIABLES—4 cr. (5 and 0)
Topics include: real valued functions of several variables, multiple inte-
gration, differential calculus of functions of several variables, applications,
vector field theory. Prerequisite: Math 205.

MATH H206—CALCULUS OF SEVERAL VARIABLES—4 cr. (5 and 0)
Same as Math 206 except this honors section is open to students only by
invitation.

MATH 207—MULTIPLE DIMENSION CALCULUS—3 cr. (3 and 0)
Principal topics include: differential and integral calculus for functions of
several variables, extreme values of functions, Lagrangian multipliers, differ-
ential equations and difference equations. Examples from the managerial and
social sciences. Prerequisite: Math 205.
Math 208—Engineering Mathematics I—4 cr. (5 and 0)
This course presents an introduction to the study of differential equations, linear algebra, complex variables, and the Laplace transforms. Prerequisite: Math 206.

Math 215—Algebra for Elementary School Teachers—3 cr. (3 and 0)
Linear equations and linear inequalities in one variable, functions and graphs, systems of linear equations and linear inequalities, quadratic equations, complex number system. Finite number systems, algebraic structures.

Math 216—Geometry for Elementary School Teachers—3 cr. (3 and 0)
An informal treatment of the basic concepts of geometry.

Math 295—Foundations of Analysis—3 cr. (3 and 0)
An introduction to the language and use of symbolic logic and the properties of the real number system with applications to the calculus. Prerequisite: Math 206.

Math 308—College Geometry—3 cr. (3 and 0)
Theorems and concepts more advanced than those of high school geometry. A treatment of the various properties of the triangle, including the notable points, lines, and circles associated with it. Prerequisite: Math 106.

Math 309—Engineering Mathematics II—3 cr. (3 and 0)
A continuation of Math 208. An introduction to Fourier Series, numerical methods, vector algebra, vector calculus, partial differential equations and certain special functions is given. Prerequisite: Math 208.

Math 313—Statistical Theory and Methods I—3 cr. (3 and 0)
Principal topics include: empirical distributions, random variables, probability space, normal distribution, chi-square distribution, t—distribution, F—distribution, test of hypothesis, estimation curve fitting. Prerequisite: Math 205.

Math 322—Symbolic Logic—3 cr. (3 and 0)
A consideration of the necessary logical structure of a very exact language in terms of modern relational logic. Quantification, Truth Functions, Propositional Functions, Properties of Relations, Arguments involving Relations, and some nonformal logical systems will be considered. Prerequisite: Math 205, Phil 302 or a computer programming course.

Math 402—Theory of Probability—3 cr. (3 and 0)
Principal topics include: combinatorial theory, random variables, expected values, jointly distributed random variables, correlation, conditional expectation, predictions, binomial distribution, poisson distribution, normal distribution, law of large numbers, central limit theorem, elementary markov chains.

Math 403—Statistical Inference—3 cr. (3 and 0)
Principal topics include: point estimation, linear hypothesis, correlation, regression, distribution free methods, sequential analysis. Prerequisite: Math 402.

Math 404—Introduction to Stochastic Processes—3 cr. (3 and 0)
Principal topics include—random variables, counting processes, stationary processes, ergodic processes, spectral distribution function, examples from scientific fields to indicate the use of stochastic processes in construction of models of physical and behavioral phenomena. Prerequisite: Math 402.
**Math 405—Statistical Theory and Methods II—3 cr. (3 and 0)**
Principal topics include contingency tables, goodness of fit, rank-sum tests, Kolmogorov-Smirnov tests, analysis of variance, factorial experimentation, applications to reliability and life testing, applications to quality assurance. **Prerequisite:** Math 313.

**Math 407—Partial Differential Equations—3 cr. (3 and 0)**
Partial differentiation and space geometry, origins of partial differential equations, linear and non-linear equations of the first order, Fourier series, linear equations of the second and higher orders. **Prerequisite:** Math 208.

**Math 408—Topics in Geometry—3 cr. (3 and 0)**
An introduction to topics in special geometries which include non-Euclidean space concepts, such as projective geometry, finite geometries, and intuitive elementary topology. A brief introduction to vector geometry. **Prerequisite:** Math 206.

**Math 409—Statistical Theory and Methods III—3 cr. (3 and 0)**
A continuation of Math 405 with equal emphasis on both the mathematical foundations and practical applications of advanced statistical methods. Principal topics include: experimental designs, fractionally replicated experiments, multiple regression and response surface analysis, evolutionary operations, simultaneous interference, analysis of covariance, and time series analysis.

**Math 411—Linear Algebra—3 cr. (3 and 0)**
An introduction to the algebra of matrices, vector spaces, polynomials and linear transformations. **Prerequisite:** Math 206.

**Math 412—Introduction to Modern Algebra—3 cr. (3 and 0)**
An introduction to the concepts of algebra. Topics included are the number system; elementary theory of groups; rings, integral domains, and fields; matrices over a field; determinants and matrices; groups, rings, and ideals. **Prerequisite:** Math 206.

**Math 413—Modern Algebra—3 cr. (3 and 0)**
A continuation of Math 412.

**Math 415—Introduction to Topology—3 cr. (3 and 0)**
An introduction to point set topology; Hausdorff, regular and normal spaces; metric connected and compact spaces; continuous mappings and homeomorphisms. **Prerequisite:** Math 295.

**Math 417—Mathematics Programs—3 cr. (3 and 0)**
Aspects of the new high school programs in mathematics. Open only to in-service teachers or students in the Mathematics Teacher Training Program. **Prerequisite:** Math 308; **corequisite:** Math 408.

**Math 422—Mathematical Logic—3 cr. (3 and 0)**
A detailed and rigorous study of a logical system as a foundation for mathematics. An analysis of basic concepts occurring in the foundations of mathematics. **Prerequisite:** Math 322 or sufficient mathematical background.

**Math 425—Intermediate Differential Equations—3 cr. (3 and 0)**
Second order linear differential equations, regular singular points, Bessel, Legendre and hypergeometric functions, general linear equations, existence and uniqueness theorems, plane autonomous systems and phase plane concepts, Sturm-Louville systems. **Corequisite:** Advanced Calculus.
Math 429—Introduction to Numerical Analysis—3 cr. (3 and 0)
Difference and summation calculus, round off noise, finite Fourier series, polynomial approximation, numerical solution of differential equations. Prerequisite: Math 208.

Math 452—Linear Programming—3 cr. (3 and 0)
An introduction to linear programming, using elementary matrix algebra and the theory of convex polygons. Applications to managerial problems, operations research, economic behavior, the theory of games and military strategy are considered. Prerequisite: Math 206 or permission of the instructor.

Math 453—Advanced Calculus I—3 cr. (3 and 0)
Limits, continuity, and differentiation of functions of one and several variables, the Riemann integral, and vector analysis. Prerequisite: Math 208 and Junior standing.

Math 454—Advanced Calculus II—3 cr. (3 and 0)
A continuation of Math 453. Transformations, multiple integrals, line and surface integrals, infinite sequences and series, and improper integrals.

Math 457—Applied Mathematics I—3 cr. (3 and 0)
Determinants and matrices, review of differential equations, finite differences, Fourier series and integrals, Laplace transformations, a large selection of applications. Prerequisite: Math 208.

Math 458—Applied Mathematics II—3 cr. (3 and 0)
A continuation of Math 457. Partial differential equations, Bessel functions and Legendre polynomials, analytic functions of complex variables, infinite series in a complex plane, the theory of residues, conformal mapping. Prerequisite: Math 457.

Math 463—Mathematical Analysis I—3 cr. (3 and 0)
Basic properties of the real number system, sequences and limits; continuous functions, uniform continuity and convergence. Integration, differentiation, functions of several real variables, implicit function theory. Prerequisite: Math 295.

Math 464—Mathematical Analysis II—3 cr. (3 and 0)
A continuation of Math 463.

Math 613—Statistical Theory and Methods I—3 cr. (3 and 0)
Math 702—Theory of Probability—3 cr. (3 and 0)
Math 703—Statistical Inference—3 cr. (3 and 0)
Math 704—Introduction to Stochastic Processes—3 cr. (3 and 0)
Math 705—Statistical Theory and Methods II—3 cr. (3 and 0)
Math 707—Partial Differential Equations—3 cr. (3 and 0)
Math 708—Topics in Geometry—3 cr. (3 and 0)
Math 709—Statistical Theory and Methods III—3 cr. (3 and 0)
Math 711—Linear Algebra—3 cr. (3 and 0)
Math 712—Introduction to Modern Algebra I—3 cr. (3 and 0)
Math 713—Introduction to Modern Algebra II—3 cr. (3 and 0)
Math 715—Introduction to Topology—3 cr. (3 and 0)
Math 717—Mathematics Programs—3 cr. (3 and 0)
Math 729—Introduction to Numerical Analysis—3 cr. (3 and 0)
Math 752—Linear Programming—3 cr. (3 and 0)
Math 753—Advanced Calculus I—3 cr. (3 and 0)
Math 754—Advanced Calculus II—3 cr. (3 and 0)
Math 757—Applied Mathematics I—3 cr. (3 and 0)
Math 758—Applied Mathematics II—3 cr. (3 and 0)
Math 763—Mathematical Analysis I—3 cr. (3 and 0)
Math 764—Mathematical Analysis II—3 cr. (3 and 0)
Math 801—General Linear Hypothesis I—3 cr. (3 and 0)
Math 802—General Linear Hypothesis II—3 cr. (3 and 0)
Math 803—Stochastic Processes I—3 cr. (3 and 0)
Math 804—Stochastic Processes II—3 cr. (3 and 0)
(3 and 0)
Math 807—Mathematical Statistics I—3 cr. (3 and 0)
Math 808—Mathematical Statistics II—3 cr. (3 and 0)
Math 821—Real Analysis I—3 cr. (3 and 0)
Math 822—Real Analysis II—3 cr. (3 and 0)
Math 823—Complex Analysis I—3 cr. (3 and 0)
Math 824—Complex Analysis II—3 cr. (3 and 0)
Math 825—Ordinary Differential Equations I—3 cr. (3 and 0)
Math 826—Ordinary Differential Equations II—3 cr. (3 and 0)
Math 831—Fourier Series—3 cr. (3 and 0)
Math 833—Operational Mathematics—3 cr. (3 and 0)
Math 835—Complex Variables—3 cr. (3 and 0)
Math 837—Calculus of Variations—3 cr. (3 and 0)
Math 839—Integral Equations—3 cr. (3 and 0)
Math 841—Applied Mathematics I—3 cr. (3 and 0)
Math 842—Applied Mathematics II—3 cr. (3 and 0)
Math 851—Abstract Algebra I—3 cr. (3 and 0)
Math 852—Abstract Algebra II—3 cr. (3 and 0)
Math 853—Advanced Linear Algebra—3 cr. (3 and 0)
Math 855—Combinatorial Analysis—3 cr. (3 and 0)
Math 861—Numerical Analysis—3 cr. (3 and 0)
Math 863—Calculus of Finite Differences—3 cr. (3 and 0)
Math 871—General Topology I—3 cr. (3 and 0)
Math 872—General Topology II—3 cr. (3 and 0)
Math 873—Algebraic Topology I—3 cr. (3 and 0)
Math 874—Algebraic Topology II—3 cr. (3 and 0)
Math 875—Convexity I—3 cr. (3 and 0)
Math 876—Convexity II—3 cr. (3 and 0)
Math 881—History of Mathematics—3 cr. (3 and 0)
Math 883—Theory of Numbers—3 cr. (3 and 0)
Math 885—Projective Geometry—3 cr. (3 and 0)
Math 901—Probability Theory I—3 cr. (3 and 0)
Math 902—Probability Theory II—3 cr. (3 and 0)
Math 903—Advanced Stochastic Processes—3 cr. (3 and 0)
Math 905—Decision Theory I—3 cr. (3 and 0)
Math 906—Decision Theory II—3 cr. (3 and 0)
Math 907—Multivariate Analysis—3 cr. (3 and 0)
Math 920—Introduction to Harmonic Analysis—3 cr. (3 and 0)
Math 921—Abstract Harmonic Analysis I—3 cr. (3 and 0)
Math 922—Abstract Harmonic Analysis II—3 cr. (3 and 0)
Math 923—Introduction to the Theory of Distribution I—3 cr. (3 and 0)
Math 924—Introduction to the Theory of Distribution II—3 cr. (3 and 0)
Math 925—Topics in Non-linear Differential Equations—3 cr. (3 and 0)
Math 927—Functional Analysis I—3 cr. (3 and 0)
Math 928—Functional Analysis II—3 cr. (3 and 0)
Math 929—Functional Analysis III—3 cr. (3 and 0)
Math 930—Functional Analysis IV—3 cr. (3 and 0)
Math 945—Potential Theory I—3 cr. (3 and 0)
Math 946—Potential Theory II—3 cr. (3 and 0)
Math 980—Special Topics in Probability—3 cr. (3 and 0)
Math 981—Special Topics in Mathematical Statistics—3 cr. (3 and 0)
Math 982—Special Topics in Analysis—3 cr. (3 and 0)
Math 983—Special Topics in Functional Analysis—3 cr. (3 and 0)
Math 984—Special Topics in Applied Mathematics—3 cr. (3 and 0)
Math 985—Special Topics in Algebra—3 cr. (3 and 0)
Math 986—Special Topics in Convexity—3 cr. (3 and 0)
Math 991—Research—credit variable.

MECHANICAL ENGINEERING

Professors: D. W. Bradbury, J. L. Edwards, T. C. Hardin, Head; E. Harrison, A. D. Lewis, S. M. Watson
Associate Professors: A. C. Elrod, W. G. Hudson, D. W. Lyons, T. Yang
Assistant Professors: J. A. Chisman, J. K. Johnson, Jr., C. S. Rudisill

ME 201—Engineering Design and Production—3 cr. (2 and 3)
An introduction to engineering design with emphasis on creativity, synthesis, participation in a realistic experience in design to satisfy human needs, experimentation and analysis commensurate with the student’s background in mathematics and science. Problems are authentic. The building of a prototype, at least of critical parts, is the consummation of the design. Non-technical aspects of engineering such as cost, market, contracts, and ethics are stressed. Engineering materials and methods of production are introduced to assist the student in making decisions concerning material selection and methods of production.
Corequisite: EG 109, Phys 122, and Sophomore standing.

ME 299—Digital Computation—1 cr. (0 and 3)
An introduction to digital computer programming for students majoring in mechanical engineering. Emphasis is placed on the computer languages in use at Clemson University, and their application to the solution of simple problems in mechanical engineering. Prerequisite: Sophomore standing.

ME 304—Heat Transfer I—3 cr. (3 and 0)
A comprehensive study of the principles of heat transmission with applications to engineering problems. Special emphasis is given to the following topics: heat conduction in the steady and unsteady states; dimensional analysis of convection; free and forced convection; the combined effects of conduction, convection and radiation. Prerequisite: Junior standing, ME 311, or ChE 331, and Math 208.

ME 307—Mechanical Engineering Laboratory—1 cr. (0 and 2)
For those curriculums requiring one course in Mechanical Engineering Laboratory. The course is intended to illustrate mechanical engineering theory and to develop experimental technique. Experiments in the first and second laws of thermodynamics are covered. Prerequisite: ME 311.

ME 311—Engineering Thermodynamics I—3 cr. (3 and 0)
A study of thermodynamics as an engineering science. Topics stressed are the first and second laws of thermodynamics, properties of the pure substance, ideal gases, and gaseous mixtures. Prerequisite: Math 208, Phys 222, and Junior standing.

ME 312—Engineering Thermodynamics II—3 cr. (3 and 0)
Chemical reactions and combustion, chemical equilibrium; analyses of processes and cycles; introduction to statistical thermodynamics, kinetic theory of gases, and irreversible thermodynamics. Prerequisite: ME 311.

ME 313—Instrumentation and Measurements—2 cr. (1 and 2)
Principles of measurements, accuracy of instruments, and data analysis. Modern instruments for measuring and recording static and dynamic pressures,
temperatures, fluid flow, speed, power, and torque. **Prerequisite:** Enrollment in ME 311.

**ME 314—Engineering Experimentation—2 cr. (1 and 2)**
Theoretical, analytic and statistical aspects of basic engineering experimentation. Error analysis, dimensional analysis, experimental plans, and data analyses. **Prerequisite:** Math 313 and ME 313.

**ME 316—Dynamic System Analysis—4 cr. (3 and 3)**
Principles of dynamic system response with emphasis on the determination of mathematical models for mechanical, electrical, electromechanical, fluid and thermal systems. Differential equations are developed from a consideration of physical laws, system arrangement, and constraints. The Lagrangian state function and Lagrange's equation are introduced. Transient and steady-state analyses make use of Laplace transforms and frequency response techniques. Computers are used extensively. **Prerequisite:** Math 208, Phys 221, EM 202. **Corequisite:** EE 330, EE 331.

**ME 321—Fluid Dynamics—3 cr. (3 and 0)**
A continuation of EM 320. Topics include: concepts from thermodynamics; analogy between heat transfer and momentum transfer; reversible adiabatic flow with variable area; normal and oblique shocks and expansion fans; one dimensional flow in constant area ducts with friction and heat transfer; similarity laws in subsonic, transonic, and supersonic regions. **Prerequisite:** EM 320.

**ME 401—Principles of Mechanical Engineering Design—3 cr. (3 and 0)**
Stress, strain and strength considerations in engineering design. Theories of failure for yielding, brittle fracture and fatigue fracture are presented. Design considerations for impact, creep, elastic deflection, stress concentration, contact stresses and reliability are studied. Engineering problems are assigned to implement applications of principles of design. **Prerequisite:** EM 304, ME 316. **Corequisite:** CrE 310, Senior standing.

**ME 402—Mechanical Engineering Analysis and Design—3 cr. (1 and 6)**
The student is given the opportunity to apply creatively his general knowledge and his knowledge of engineering in the analysis and design of one or more engineering systems, machines, or devices. Problems may be selected from two sources: A meritorious problem of the student's own choice or a problem assigned by appropriate authority. **Corequisite:** ME 401, Senior standing.

**ME 404—Automatic Control—3 cr. (3 and 0)**
Principles and techniques for the analysis and design of feedback control systems. State variable notation and modern control theory are introduced but emphasis is on the classical frequency domain and root locus techniques. Applications to electromechanical, hydraulic, and pneumatic systems. **Prerequisite:** ME 316, EE 332.

**ME 406—Physical Systems Analysis and Design—3 cr. (3 and 0)**
A general approach to the analysis and synthesis of physical systems based on state variable representation, Lagrange's equations, matrix solution to state equations, and the calculus of variations. Computer solutions are obtained for application to mechanical, electrical, fluid, and thermal systems. **Prerequisite:** ME 316.
ME 408—INTRODUCTION TO COMPUTER AIDED DESIGN—3 cr. (3 and 0)
Introduction to computer aided design, reliability, figures of merit, optimization techniques, search for extremes, and decision theory in design. Computer aided optimum design of engineering systems and the writing and use of problem-oriented languages will be emphasized. Prerequisite: Senior standing.

ME 411—GAS POWER—3 cr. (3 and 0)
A study of the effects of variation in specific heat, some fundamentals of compressible flow, the combustion process, and chemical dissociation. The theoretical and actual processes associated with the gas turbine, the thermal jet, the thermal rocket, and the spark ignition and compression ignition reciprocating engines are analyzed. Prerequisite: ME 312 and Senior Engineering standing.

ME 412—APPLIED THERMODYNAMICS—3 cr. (3 and 0)
Basic principles of first and second laws of thermodynamics applied to areas such as cryogenics, nonconventional energy conversion process, industrial process heat and electric power systems, etc. Prerequisite: ME 312.

ME 413—MECHANICAL ENGINEERING LABORATORY—1 cr. (0 and 2)
Experimental investigations in a wide variety of mechanical engineering areas, such as fluid dynamics, automatic control, heat and mass transfer, combustion, thermodynamics, and solid mechanics. Prerequisite: ME 313 and 314.

ME 414—MECHANICAL ENGINEERING LABORATORY—1 cr. (0 and 2)
Continuation of ME 413.

ME 415—UNDERGRADUATE RESEARCH—1 to 3 cr.
Individual research projects to be conducted under the direct supervision and guidance of a faculty member. Prerequisite: Consent of instructor.

ME 416—UNDERGRADUATE RESEARCH—1 to 3 cr.
Individual research projects to be conducted under the direct supervision and guidance of a faculty member. Prerequisite: Consent of instructor.

ME 422—PRINCIPLES OF TURBOMACHINERY—3 cr. (3 and 0)
The guiding principles underlying all forms of turbomachinery. A unified treatment of turbomachinery to include pumps, fans, compressors and steam, gas and hydraulic turbines. Dimensional analysis as applied to turbomachinery, Euler's Equation, concepts of specific speed and thermodynamics of turbomachinery processes and allied topics are covered. Prerequisite: ME 312, EM 320, and Senior standing.

ME 424—ENGINEERING ANALYSIS—3 cr. (2 and 3)
A senior-level course requiring the student to utilize his knowledge of mathematics, fluid and solid mechanics, thermodynamics, heat transfer, and other background work in solving engineering problems. Both analog and digital computers are utilized as tools contributing to these solutions. Prerequisite: ME 299, ME 312, ME 304, EM 320.

ME 429—AIR CONDITIONING—3 cr. (3 and 0)
A study of the principles of heating and air conditioning, including calculation of heat loss and heat gains for buildings, heating and cooling systems, psychrometric principles, air distribution, refrigeration and automatic control apparatus. Prerequisite: ME 304, 312, and Senior standing.
Description of Courses

ME 430—AIR CONDITIONING DESIGN—1 cr. (0 and 3)
An application of the theory covered in ME 429 to the design of air-conditioning systems. Prerequisite: Enrollment in ME 429.

ME 450—METHODS OF OPERATIONS RESEARCH I—3 cr. (3 and 0)
Applications and elementary theory of selected topics from Operations Research. Topics included are linear algebra, linear programming, transportation and assignment problems, network analysis, and game theory. Prerequisite: ME 299 or equivalent.

ME 451—METHODS OF OPERATIONS RESEARCH II—3 cr. (3 and 0)
A continuation of ME 454. Topics included are nonlinear programming, dynamic programming, queuing theory, and markov processes. Prerequisite: Math 313 or equivalent.

ME 481—ENGINEERING ECONOMIC ANALYSIS—3 cr. (3 and 0)
Basic principles and techniques of economic analysis of engineering projects. Consideration of time value of money, short- and long-term investments, replacement analysis, depreciation methods, cost allocation and measures of cost effectiveness. Prerequisite: Senior standing in Engineering or consent of instructor.

ME 485—INDUSTRIAL APPLICATION OF STATISTICS—3 cr. (3 and 0)
Application of statistical principles of analysis and control to production processes, studies of process capabilities, quality control, work sampling, reliability and analysis, and machine interference. Prerequisite: Math 313.

ME 486—WORK FLOW SYSTEMS AND CONTROL—3 cr. (3 and 0)
Fundamentals underlying the determination of production capacity requirements, economic lot sizes, and the regulating of flow and storage of materials to, within, and from the production system. Elements of forecasting, determination of materials requirements, scheduling, inventory control, etc. Consideration of data processing methods. Prerequisite: Math 313, consent of instructor.

ME 491—SELECTED TOPICS IN MECHANICAL ENGINEERING—3 cr. (3 and 0)
A comprehensive study of any topic in the field of Mechanical Engineering not covered in other courses.

ME 701—PRINCIPLES OF MECHANICAL ENGINEERING DESIGN—3 cr. (3 and 0)
ME 702—MECHANICAL ENGINEERING ANALYSIS AND DESIGN—3 cr. (1 and 6)
ME 704—AUTOMATIC CONTROL—3 cr. (3 and 0)
ME 706—PHYSICAL SYSTEMS ANALYSIS AND DESIGN—3 cr. (3 and 0)
ME 708—COMPUTER-AIDED DESIGN—3 cr. (3 and 0)
ME 711—GAS POWER—3 cr. (3 and 0)
ME 780—METHODS OF OPERATION RESEARCH I—3 cr. (3 and 0)
ME 781—METHODS OF OPERATION RESEARCH II—3 cr. (3 and 0)
ME 808—FLUID MECHANICS—3 cr. (3 and 0)
ME 809—AERODYNAMICS—3 cr. (3 and 0)
ME 810—ADVANCED THERMODYNAMICS—3 cr. (3 and 0)
ME 811—GAS DYNAMICS II—3 cr. (3 and 0)
ME 812—BOUNDARY LAYER THEORY I—3 cr. (3 and 0)
ME 813—Gas Dynamics III—3 cr. (3 and 0)
ME 814—Hypersonics—3 cr. (3 and 0)
ME 815—Kinetic Theory of Gases—3 cr. (3 and 0)
ME 830—Heat Transfer II—3 cr. (3 and 0)
ME 831—Heat and Mass Transfer III—3 cr. (3 and 0)
ME 840—Kinematics II—3 cr. (3 and 0)
ME 842—Advanced Mechanical Engineering Design I—3 cr. (3 and 0)
ME 843—Advanced Mechanical Engineering Design II—3 cr. (3 and 0)
ME 844—Dynamics of Elastic Mechanical Systems—3 cr. (3 and 0)
ME 860—Dynamic Programming—3 cr. (3 and 0)
ME 861—Nonlinear Programming—3 cr. (3 and 0)
ME 862—Analytical Methods of Systems Analysis—3 cr. (3 and 0)
ME 863—Advanced Physical Systems I—3 cr. (3 and 0)
ME 864—Advanced Physical Systems II—3 cr. (3 and 0)
ME 865—Modern Control Theory—3 cr. (3 and 0)
ME 866—Nonlinear Automatic Controls—3 cr. (3 and 0)
ME 867—Control System Components—3 cr. (3 and 0)
ME 868—Control of Aerospace Systems—3 cr. (3 and 0)
ME 870—Biosystems Analysis—3 cr. (3 and 0)
ME 880—Advanced Methods of Operations Research I—3 cr. (3 and 0)
ME 881—Advanced Methods of Operations Research II—3 cr. (3 and 0)
ME 882—Reliability Engineering—3 cr. (3 and 0)
ME 883—Operations System Simulation I—3 cr. (3 and 0)
ME 884—Operations System Simulation II—3 cr. (3 and 0)
ME 886—Operations Research in Production Control—3 cr. (3 and 0)
ME 891—Research—Credit to be arranged.
ME 893—Selected Topics in Mechanical Engineering—1-6 cr. (1-6 and 0)
ME 912—Boundary Layer Theory II—3 cr. (3 and 0)
ME 914—Magnetohydrodynamics—3 cr. (3 and 0)
ME 915—Energy Conversion—3 cr. (3 and 0)
ME 930—Conduction Heat Transfer—3 cr. (3 and 0)
ME 931—Convection Heat Transfer—3 cr. (3 and 0)
ME 932—Radiation Heat Transfer—3 cr. (3 and 0)
ME 940—Applied Plasticity—3 cr. (3 and 0)
ME 941—Theory of Lubrication and Wear—3 cr. (3 and 0)
ME 991—Doctoral Research—Credit to be arranged.
MEDICAL TECHNOLOGY

Anderson—Lecturers: J. W. Black, R. E. Jones, Jr., N. L. Long
Greenville—Lecturers: E. A. Dreskin, D. G. Kilgore, Jr.
Spartanburg—Lecturer: M. F. Patton

Med Tech 401—SEROLOGY AND IMMUNOLOGY—4 cr. (21,10,49)*
Prepresents the basic principles of serology and immunology and the tests
utilizing these principles to detect abnormalities helpful in the diagnosis of
disease.

Med Tech 402—MICROBIOLOGY—7 cr. (59,6,470)
The principles of microbiology—bacteriology, mycology, and parasitology.
Emphasis is placed on human pathogenic organisms, using both fresh and
prepared organisms.

Med Tech 403—HEMATOLOGY—5 cr. (12,32,276)
Information on blood as a tissue, the theory of hematological tests, factors
that affect test reliability. Knowledge of test results and knowledge of blood
dyscrasias. Skill in the performance of hematological tests is emphasized and
the use of automation techniques is covered.

Med Tech 404—BLOOD BANK—3 cr. (8,20,132)
History and principles of blood group systems and methods of cross match-
ing. Testing for, and quantitative determination of, Rh antibodies with all
available techniques. Selection, pre-testing and bleeding of donors and process-
ing of blood for transfusions.

Med Tech 405—CYTOLOGY—1 cr. (2,12,26)
An introduction to cytology and cytologic techniques in the diagnosis of
cancer. Definition and brief history, sources of material, collection and
preservation of specimens, together with practice in interpretation.

Med Tech 406—HISTOLOGY—3 cr. (20,30,190)
Histologic preparation, including actual preparation of tissue specimens de-
vised from surgical procedures and autopsies. Routine and special staining,
together with experience using the Cryostat.

Med Tech 407—URINALYSIS—2 cr. (10,8,102)
The study of renal function together with principles of urine analysis,
pregnancy tests and anatomy of the urinary system. Emphasis is placed on
laboratory procedures and their utilization to detect abnormalities helpful in
the diagnosis of disease.

Med Tech 408—CHEMISTRY—10 cr. (40,50,470)
Introduction to the chemistry of carbohydrates, nitrogen, calcium, and
phosphorus compounds, acid-base balance, etc., with emphasis on the chemis-
try of blood and urine using both qualitative and quantitative procedures in
the laboratory.

Med Tech 409—RADIOISOTOPES—1 cr. (2,0,7)
Introduction to principles of diagnostic radioisotope procedures and the use
of the scintillation detector, the well counter, and the scaler.

* First figure represents lecture hours, second figure represents seminar hours, and the
third figure represents clinical practice hours.
METALLURGICAL ENGINEERING

Associate Professors: S. F. Hulbert, Head; L. E. Poteat
Assistant Professors: D. A. Venkatu, F. A. Young, Jr.

MetE 202—INTRODUCTION TO METALLURGY—3 cr. (3 and 0)
A survey of the field of metallurgical operations, extractive, mechanical and physical. Designed to acquaint the student with the various fields of operation and provide basic information for more advanced courses.

MetE 220—EXTRACTIVE METALLURGY—3 cr. (3 and 0)
The processes used to reduce ore to metal. This course is a survey of both the ferrous and non-ferrous extractive processes. Pyrometallurgical, electrolytic, and hydrometallurgical processes will be studied.

MetE 301—PHYSICAL METALLURGY—3 cr. (2 and 3)
The first of two sequential courses to acquaint the student with the nature and properties of metals. The properties of metals are defined and studied in terms of solid state physics which explains how and why metals have the useful properties that they do possess. Basic metal forming processes involving these principles are studied. Prerequisite: MetE 202 or 302.

MetE 302—GENERAL METALLURGY—3 cr. (2 and 3)
Basic general metallurgy for students in Engineering and related curriculums. This course is designed to acquaint students with the properties of metals so that they may select intelligently for engineering applications. The nature of metals and of metal working processes are considered. Prerequisite: Junior standing in Engineering.

MetE 304—PHYSICAL METALLURGY—3 cr. (2 and 3)
A continuation of MetE 301. In this portion of the course alloys are considered particularly. The use of an equilibrium diagram to represent properties and phases is studied. The student learns to interpret and construct these diagrams. Solid state phase changes are studied, such as occur in the heat treating of steel and the age hardening of aluminum alloys. Prerequisite: MetE 301.

MetE 320—MECHANICAL METALLURGY—2 cr. (2 and 0)
The processes whereby useful shapes are formed in metal, and the response of the metal to the deformative forces. Rolling, forging, extrusion, drawing and “high energy” deformations are studied. The effects of these forces on the character and properties of the metal are evaluated. Prerequisite: MetE 304 or consent of instructor.

MetE 323—METALLOGRAPHY—2 cr. (1 and 3)
The development of techniques necessary for metallographic investigations. The selection, cutting, mounting and polishing of specimens; the use of the microscope; the techniques of etching, and of photography. Training in the use of laboratory equipment in evaluating metallic material. Prerequisite: MetE 304, or MetE 302 and consent of instructor.

MetE 350—METALLURGY OF CAST METALS—3 cr. (2 and 3)
The fundamentals of melting, fluxing, pouring, and the control of the solidification of metals in molds. The metallurgical aspects of the production of all kinds of castings—sand mold, permanent mold, shell mold, die casting, and centrifugal casting. Studies are made of the physical properties of castings. Prerequisite: MetE 302 or MetE 304.
METE 402—Metallurgical Literature—1 cr. (0 and 3)
To acquaint students with sources of information on metallurgy and to develop a background for the senior thesis. Prerequisite: Senior standing in Metallurgical Engineering.

METE 408—Heat Treating—3 cr. (2 and 3)
The phase changes in both ferrous and non-ferrous metals caused by changes in environment at significant times in the processing. Studies relating the time-temperature changes in metals with their physical properties. Prerequisite: MetE 302 or MetE 304.

METE 425—Senior Thesis—2 cr. (0 and 6)
The independent investigation of a project in Metallurgical Engineering. A competent bachelor thesis is required. Prerequisite: Senior standing in Metallurgical Engineering.

METE 430—Powder Metallurgy—3 cr. (2 and 3)
The production of metal powders and of articles from these powders. By powder metal techniques it is possible to produce controlled porosity, unconventional alloys and to produce complex parts of limited size rapidly, accurately, and economically. Combinations of metals and non-metals may be produced. Prerequisite: MetE 302 or MetE 304.

METE 440—Metallurgy of Reactor Materials—3 cr. (2 and 3)
The metallurgy of materials used in reactor construction. The physical metallurgy of metallic fuels, controls, reflectors, and shielding. The effects of radiation on structural metals will be considered. Prerequisite: Senior standing and the consent of the instructor.

METE 450—Metallic Corrosion—3 cr. (2 and 3)
The corrosion of metallic materials and means of preventing such corrosion. Environmental factors in corrosion are considered. Prerequisite: MetE 302 or MetE 304.

METE 455—Electrometallurgy—3 cr. (2 and 3)
The electrowinning and electrorefining of metals. Electrothermic cells will be studied. The principles and operation of electric furnaces will be considered. Electroplating, electropolishing and electromachining will be studied. Prerequisite: MetE 302 or MetE 304 and EE 308.

MICROBIOLOGY

Associate Professor: J. H. Bond
Assistant Professors: Ann W. Baxter, M. J. B. Paynter, Chairman

MICRO 301—General Microbiology—4 cr. (3 and 3) F, S, SS
Morphology, physiology, classification, distribution, and cultivation of microorganisms and health. Prerequisite: Bot 101 or Zool 101 and 103; Ch 101 Ch 102.

MICRO 401—Advanced Bacteriology—4 cr. (2 and 6) F
Metabolism, nutrition, growth, and death of bacteria; microbiological assay and industrial fermentation; emphasis on laboratory procedures for the identification of the more common taxonomic groups. Prerequisite: Micro 301 Ch 220 or 223 and 227.
Microbiology

Micro H401—Advanced Bacteriology—4 cr. (2 and 6) F
Honors option for Micro 401, admission by special arrangement.

Micro 402—Dairy Microbiology—3 cr. (2 and 3)
S, '70 and alternate years.
Morphology, physiology, and culturing of microorganisms of importance in dairy products; standard methods for the determination of numbers of bacteria, yeasts, and molds in various dairy products. Prerequisite: Micro 301.

Micro H402—Dairy Microbiology—3 cr. (2 and 3)
S, '70 and alternate years.
Honors option for Micro 402, admission by special arrangement.

Micro 404—Food Microbiology—3 cr. (2 and 3)
S, '71 and alternate years.
The microbiology of natural and processed foods. The nature of microorganisms involved in food processing, food spoilage, and food poisoning. Methods of isolating, enumerating and identifying these organisms are conducted in the laboratory. Prerequisite: Micro 301.

Micro H404—Food Microbiology—3 cr. (2 and 3)
S, '71 and alternate years.
Honors option for Micro 404, admission by special arrangement.

Micro 410—Soil Microbiology—3 cr. (2 and 3)
S, '70 and alternate years.
The role of microorganisms in the decomposition of organic substances; transformation of nitrogen and mineral substances in the soil; interrelationships between higher plants and microorganisms; importance of microorganisms in soil fertility. Prerequisite: Micro 301.

Micro H410—Soil Microbiology—3 cr. (2 and 3)
S, '70 and alternate years.
Honors option for Micro 410, admission by special arrangement.

Micro 411—Pathogenic Bacteriology—3 cr. (2 and 3) S
A study of pathogenic bacteria, their morphology, cultural requirements and classification; diagnostic tests, methods of differentiation, and the diseases caused. Prerequisite: Micro 301.

Micro H411—Pathogenic Bacteriology—3 cr. (2 and 3) S
Honors option for Micro 411, admission by special arrangement.

Micro 412—Bacterial Physiology—4 cr. (3 and 3) S
A consideration of the cytology, physiology, metabolism, and genetics of bacteria. Included will be studies of growth and death, reproduction and mutation, nutrition and metabolic pathways, regulatory mechanisms, and effects of environment. Prerequisite: Micro 301, Organic Chemistry.

Micro H412—Bacterial Physiology—4 cr. (3 and 3) S
Honors option for Micro 412, admission by special arrangement.

Micro 601—General Microbiology—4 cr. (3 and 3)

Micro 701—Advanced Bacteriology—4 cr. (2 and 6)

Micro 702—Dairy Microbiology—3 cr. (2 and 3)

Micro 704—Food Microbiology—3 cr. (2 and 3)

Micro 710—Soil Microbiology—3 cr. (2 and 3)
Description of Courses

Micro 711—Pathogenic Bacteriology—3 cr. (2 and 3)
Micro 712—Bacterial Physiology—4 cr. (3 and 3)
Micro 801—Bacterial Taxonomy—3 cr. (2 and 3)
Micro 802—Bacteriological Technic—4 cr. (2 and 6)
Micro 803—Special Problems in Microbiology—Credit to be arranged.
Micro 810—Soil Microbiology—3 cr. (2 and 3)
Micro 811—Bacterial Cytology and Physiology—3 cr. (3 and 0)
Micro 812—Bacterial Metabolism—3 cr. (3 and 0)
Micro 813—Bacterial Cytology and Physiology Laboratory—2 cr. (0 and 6)
Micro 814—Bacterial Metabolism Laboratory—2 cr. (0 and 6)
Micro 891—Research—Credit to be arranged.

MILITARY SCIENCE

Professor: Colonel George K. Maerens

MS 101—Fundamentals (Basic)—1 cr. (2 and 1)
A study of the evolution, organization, and mission of the Reserve Officers' Training Corps, individual weapons and marksmanship and the evolution of weapons and warfare. An introduction to First Aid, mass casualty treatment and Chemical Biological and Radiological Warfare and discussion seminar on current events. Laboratory periods provide training in basic drill, discipline, and leadership.

MS 102—The National Defense Establishment (Basic)—1 cr. (2 and 1)
A study of the organization of the Department of Defense and its role in national security. An introduction to the history, organization, equipment and mission of the United States Army, with detailed study of small units. A look at the principles and types of war and leadership traits. Current events seminar. Drill.

MS 201—American Military History (Basic)—1 cr. (2 and 1)
A survey of American military history from the origins of the American Army to the present, with emphasis on the factors which led to the organizational, tactical, logistical, operational, strategic, social, and similar patterns found in our present-day Army.

MS 202—Introduction to Operations and Basic Tactics and Map and Aerial Photograph Reading (Basic)—1 cr. (2 and 1)
An introduction to the organization, composition, and mission of infantry rifle squad and small infantry-tank teams. Interpretation and use of maps and aerial photographs in study and evaluation of terrain.
MS 300—Military Science (Advanced)—6 cr. (ROTC 3, Elective 3)
Study and practical application of Leadership; Military Teaching Principles; Branches of the Army; Small Unit Tactics and Communications. Further training for duty as officers by application of principles of leadership in actual command during drills, parades, reviews, inspections and ceremonies. One three-hour elective or required normal academic curriculum subject, presented by appropriate department, approved by the PMS to be of value in furthering the professional qualifications of the student as a prospective commissioned officer in the United States Army. Students have the option of taking the elective course or Advanced ROTC during either semester but must participate in Leadership Laboratory Training throughout the School Year.

Three class hours and two laboratory hours (presented by Military Science Department) each week in one semester and three class hours (elective presented by appropriate department) and two laboratory hours (presented by Military Science Department) each week in the other semester.

MS 400—Military Science (Advanced)—6 cr. (ROTC)
A study of Military Operations; Logistics; Administrative Management; Military Law; Service Orientation; World Change and Military Implications; Internal Defense/Development; and Leadership Laboratory. One three-hour elective or required normal academic curriculum subject, presented by appropriate department, approved by the PMS to be of value in furthering the professional qualifications of the student as a prospective commissioned officer in the United States Army. Students have the option of taking the elective or Advanced ROTC during either semester but must participate in Leadership Laboratory Training throughout the School Year.

Three class hours and two laboratory hours (presented by Military Science Department) each week in one semester and three class hours (elective presented by appropriate department) and two laboratory hours (presented by Military Science Department) each week in the other semester.

MUSIC

Assistant Professors: J. H. Butler, B. F. Cook
Instructors: Edith B. Card, J. E. Jackson, H. O. Kingsbury

Mus 310—Music Appreciation: Music in the Western World—3 cr. (3 and 0)
Designed to widen and deepen the student's appreciation of his musical heritage through a study of the development of music in Western culture from the time of the early Christians to the present.

Mus 315—Music History—3 cr. (3 and 0)
The development of Western music from antiquity to 1750, emphasizing representative literature from various styles and periods.

Mus 316—Music History—3 cr. (3 and 0)
Continuation of Mus 315. Music from 1750 to present. Prerequisite: Mus 315.

Mus 361—Marching Band—1 cr. (0 and 3)
Ensembles: Devoted to the musical training of ensemble members through reading and rehearsal of appropriate music; public performances given periodically in addition to the minimum rehearsal time; may be repeated for
Description of Courses

credit, with a maximum of four hours of ensemble credit allowable toward a degree. Fall semester only. Prerequisite: Consent of director.

Mus 362—Concert Band—1 cr. (0 and 3)
Ensembles: Devoted to the musical training of ensemble members through reading and rehearsal of appropriate music; public performances given periodically in addition to the minimum rehearsal time; may be repeated for credit, with a maximum of four hours of ensemble credit allowable toward a degree. Spring semester only. Prerequisite: Consent of director.

Mus 363—Men’s Glee Club—1 cr. (0 and 3)
Ensembles: Devoted to the musical training of ensemble members through reading and rehearsal of appropriate music; public performances given periodically in addition to the minimum rehearsal time; may be repeated for credit, with a maximum of four hours of ensemble credit allowable toward a degree. Prerequisite: Consent of director.

Mus 364—Women’s Glee Club—1 cr. (0 and 3)
Ensembles: Devoted to the musical training of ensemble members through reading and rehearsal of appropriate music; public performances given periodically in addition to the minimum rehearsal time; may be repeated for credit, with a maximum of four hours of ensemble credit allowable toward a degree. Prerequisite: Consent of director.

Mus 400—Music in the Elementary School Classrooms—3 cr. (3 and 0)
Designed to give the teacher in the elementary school a familiarity with music suitable for use with children at the elementary level. Recordings of appropriate music, pre-band instruments, unison and part singing will be included. No previous training in music is required.

Mus 405—Music Theory—3 cr. (3 and 0)
The principles of notation, its symbols and abbreviations, major and minor scales, intervals and chords, measure, rhythm and tempo, and the terminology of music are the principal topics covered in this course.

Mus 406—Music Theory—3 cr. (3 and 0)
Continuation of Mus 405 with emphasis on sight singing, melodic dictation, and secondary chord structure. Prerequisite: Mus 405.

Mus 411—American Music: Music Appreciation—3 cr. (3 and 0)
Music in America from 1620 to the present. Indigenous and borrowed influences will be examined.

Nursing
(Associate Degree Program)

Acting Director: Lida M. Williams
Assistant Professors: Dorothy C. Davenport, Aileen S. Prevost
Instructors: Judith A. Bouknight, Edith G. Gunter, Beverly D. Roberts
Lecturer: J. L. Henson

Nurs 101—Introduction to Nursing—6 cr. (3 and 9)
An introduction to nursing through historical concepts, interpersonal relations, health, hygiene, hospital community, basic nursing skills, asepsis, medications, assisting with diagnostic and therapeutic measures. Concurrent laboratory experiences are carefully selected.
Nursing 315

NURS 102—Acute Illnesses—Adult—6 cr. (2 and 12)
Built on the concepts of Nurs 101 with increasing depth to include—
beginning understandings of body responses to illness. Carefully selected
clinical experiences continue. Prerequisite: First semester courses in Nursing
with C standing.

NURS 103—Principles of Nutrition—4 cr. (3 and 3)
Nutrition is discussed in relation to the requirement and role of nutrients
in mammalian metabolism—nutrition and disease are emphasized. Laboratory
exercises demonstrate nutrient assay methods and the importance of selected
nutrients in mammalian diets.

NURS 104—Medical-Surgical Nursing I—5 cr. (3 and 6)
A continuation of Nurs 102. It is concerned with nursing care of adult
patients with long term illnesses and focuses on disruption of family living.
Prerequisite: Second semester courses in Nursing with C standing.

NURS 105—Integrated Science I—4 cr. (3 and 3)
A general course surveying chemistry, human anatomy, physiology, and
microbiology, and emphasizing the physical and chemical bases for physiology.

NURS 106—Integrated Science II—4 cr. (3 and 3)
Continuation of Nurs 105.

NURS 201—Psychodynamic Nursing—5 cr. (3 and 6)
Designed to develop basic understandings and skills in the nursing care of
patients with behavioral and anxiety problems. Lectures, discussions, field
trips and clinical experiences are used concurrently. Prerequisite: Nurs 202
and Nurs 206 with C standing.

NURS 202—Pediatrics—5 cr. (3 and 6)
This course presents the nursing care of children from infancy to adolescence.
It considers disease processes that cause deviations from normal through all
stages of growth and development. Prerequisite: Nurs 104 with C standing.

NURS 204—Maternal and Newborn Care—5 cr. (3 and 6)
This course deals with prenatal, labor, delivery, postpartum care of the
mother, and needs of the newborn infant. Prerequisite: Nurs 202 and Nurs 206
with C standing.

NURS 206—Medical-Surgical Nursing II—6 cr. (3 and 9)
This is a continuation of Nurs 104. Emphasis is placed on the planning and
executing care plans for groups of patients in conjunction with various co-
workers present in hospital settings today. The student is introduced to her
responsibilities as a graduate nurse. Prerequisite: Nurs 104 with C standing.

NURSING
(Baccalaureate Degree Program)

Director: Geraldine Labecki

NURS 207—Dynamics of Human Relations—3 cr. (2 and 3)
The purpose of this course is to further the student’s knowledge of behavioral
influences and serves to introduce the student to the nurse’s role in inter-
personal relationships; emphasis is placed on her role in the motivation of
individuals toward health. Laboratory practice with adults in clinic settings,
and with children attending pre-school agencies.
NURS 205—Problem Solving in Nursing—4 cr. (2 and 6)
Introduction to the concept of problem solving in nursing. Selected models are presented and analyzed. Relevant technical skills identified in the analysis are learned. Emphasis is on the creative approach to solving nursing problems and the utility of the technic to the solution. Laboratory experiences are with patients in the Greenville Hospital System and in the classroom. Successful completion of this course is prerequisite for all junior and senior level courses in Nursing.

**NUTRITION**

**Professors:** B. D. Barnett, W. A. King, R. F. Wheeler

**Associate Professors:** R. F. Borgman, W. V. Chalupa, R. L. Edwards, D. E. Turk, W. P. Williams

**Assistant Professors:** L. Crook, D. M. Henricks

(See courses listed under Animal Science, Biochemistry, Dairy Science, Food Science, and Poultry Science)

**Nutr 401—Fundamentals of Nutrition—3 cr. (3 and 0)**
Biochemical and physiological fundamentals of nutrition applicable to domestic animals and man. Considered are digestive processes, and absorption and metabolism of carbohydrates, lipids, proteins, water, minerals and vitamins. Energy metabolism and comparative anatomy and physiology of digestive systems are discussed.

**Nutr 701—Fundamentals of Nutrition—3 cr. (3 and 0)**

**Nutr 851—Nutrition Seminar I—1 cr. (1 and 0)**

**Nutr 852—Nutrition Seminar II—1 cr. (1 and 0)**

**Nutr 891—Research—Credit to be arranged.**

**Nutr 991—Doctoral Research—Credit to be arranged.**

**PHILOSOPHY**

**Assistant Professors:** R. B. Harris, J. L. McCollough, D. F. White, Jr.

**Phil 201—Introduction to Philosophy—3 cr. (3 and 0)**
An introduction to the basic issues involved in philosophical thinking, with special emphasis upon these issues as they occur in Greek philosophy. The systems of Plato and Aristotle will be considered in some detail.

**Phil 202—Logic—3 cr. (3 and 0)**
An introduction to the methods and techniques of logic and continuing to elementary symbolic logic.

**Phil 303—Philosophy of Religion—3 cr. (3 and 0)**
An analytical and critical consideration of the philosophical foundations of religion. Such topics as the existence of God, the problem of evil, theism and atheism, prayer, and immortality will be considered.

**Phil 304—Introduction to Ethical Theory—3 cr. (3 and 0)**
An examination of moral judgment: its concepts, criteria and relations to factual judgment. Classical theories and current issues are searched for an ideal of the good man and the life we prize. Construction of a model theory of obligation, value, justice, and punishment is attempted.
Phil 305—Aesthetics—3 cr. (3 and 0)
A study of the function of art in human life along with a consideration of
the various philosophical elements involved in art and art criticism. Various
historical types of aesthetic theory will be considered. Prerequisite: Junior
standing or permission of the instructor.

Phil 309—Religions of the Far East—3 cr. (3 and 0)
A study of the origin, evolution, and contemporary status of Hinduism,
Buddhism, Confucianism, and Taoism. Prerequisite: Junior standing.

Phil 312—Modern Philosophy—3 cr. (3 and 0)
The development of the modern mind as seen in the Renaissance and
Eighteenth Century philosophers. The writings of Hobbes, Locke, Spinoza,
Leibniz, Hume, and Kant will be considered along with the development of
Rationalism and Empiricism.

Phil 318—Contemporary Philosophy—3 cr. (3 and 0)
A study of some of the recent schools and movements in philosophy. Prag-
matism, Existentialism, Vitalism, Recent Realism, and some of the linguistic
schools will be considered.

Phil 322—Symbolic Logic—3 cr. (3 and 0)
A consideration of the necessary logical structure of a very exact language
in terms of modern relational logic. Quantification, Truth Functions, Proposi-
tional Functions, Properties of Relations, Arguments Involving Relations, and
some non-formal logical systems will be considered. Prerequisite: Phil 302
or Math 205 or a computer programming course.

Phil 344—Current Ethical Theory—3cr. (3 and 0)
An examination of present trends in ethical and meta-ethical theory for their
bearing upon the criteria of our judgments of human conduct and character
and upon current moral issues. Selected topics from the logic, epistemology,
and psychology of ethical judgment will be considered, with review of relevant
journal literature. Prerequisite: Phil 304 or permission of the instructor.

Phil 422—Mathematical Logic—3 cr. (3 and 0)
A detailed and rigorous study of a logical system as a foundation for mathe-
matics. An analysis of basic concepts occurring in the foundations of mathe-
matics. Prerequisite: Phil 322 or sufficient mathematical background.

Phil 425—Philosophy of Science—3 cr. (3 and 0)
A study of the presuppositions, categories, and implications of the physical
and social sciences with special reference to the concepts of Space and Time,
Matter, Causation, and Relativity. The logic of "scientific method" and the
unity of the sciences are considered. Prerequisite: Junior standing and per-
mission of the instructor.

Phil 825—Seminar in Philosophy of Science—3 cr. (3 and 0)
PHYSICAL SCIENCE

(Jointly administered by the Chemistry and Physics Departments)

Phys Sc 101—Physical Science I—4 cr. (3 and 2)
An introduction to the physical sciences. Selected topics will be discussed to illustrate the structure and meaning of the physical sciences.

Phys Sc 102—Physical Science II—4 cr. (3 and 2)
A continuation of Phy Sc 101.

PHYSICS

Professors: L. D. Huff, H. E. Vogel, Head
Instructor: J. A. Gilreath

Phys 101—Current Topics in Modern Physics—0 cr. (0 and 2)
Demonstrations and lectures supplemented by slides and motion pictures on current topics in physics such as superfluids, lasers, superconductors, elementary particles, etc., chosen from the fields of atomic, nuclear, solid state physics, and astrophysics. Several members of the staff will participate.

Phys 122—Mechanics and Wave Phenomena—3 cr. (3 and 0)
Vectors; laws of motion; rotation; vibratory and wave motion; mechanical properties of materials. Prerequisite: Registration in Math 205.

Phys H122—Mechanics and Wave Phenomena—3 cr. (3 and 0)
Honors section of Phys 122. Open by invitation only.

Phys 132—General Physics for Physics Majors—3 cr. (3 and 0)
Introduction to physical quantities, linear and rotational motion, conservation laws, gravitational and electric fields, and kinetic theory. Prerequisite: Registration in Math 205.

Phys 201—General Physics—3 cr. (3 and 0)
Motion; equilibrium; the conservation of momentum, mass and energy; vibrations; waves; temperature and heat. Prerequisite: Registration in Phys 203.

Phys 202—General Physics—3 cr. (3 and 0)
A continuation of Phys 201: Optics of lenses and mirrors; light waves; electric charges and currents, magnetism, electric and magnetic fields; properties of atomic particles; structure of atoms. Prerequisite: Phys 201 and registration in Phys 204.

Phys 203—General Physics Laboratory—1 cr. (0 and 3)
Experiments designed to test or exemplify the laws studied in Phys 201 and to introduce precision measuring instruments. Prerequisite: Registration in Phys 201.

Phys 204—General Physics Laboratory—1 cr. (0 and 3)
A continuation of Phys 203 using optical and electrical instruments. Prerequisite: Registration in Phys 202.

* On leave.
Phys 221—Thermal and Electrical Phenomena—3 cr. (3 and 0)
Thermal properties of matter; electric and magnetic fields; electric currents and circuits; motions of charged particles in fields. Prerequisite: Phys 122.

Phys H221—Thermal and Electrical Phenomena—3 cr. (3 and 0)
Honors section in Phys 221. Open by invitation only.

Phys 222—Optics and Modern Physics—3 cr. (3 and 0)
Theory of light waves and photons; optical instruments; relativity; atomic particles; nuclear physics. Prerequisite: Phys 221.

Phys H222—Optics and Modern Physics—3 cr. (3 and 0)
Honors section in Phys 222. Open by invitation only.

Phys 223—Electron Physics Laboratory—1 cr. (0 and 3)
An introduction to physical experimentation employing the Berkeley A laboratory course. Experiments are performed in acceleration and deflection of electrons, measurement of electron charge to mass ratio by helical motion and time of flight, oscillating systems involving capacitance, resistance and inductance, resonance, relaxation, and interference and diffraction, light polarization, gas laser optics, optical spectra, electron and X-ray diffraction, radioactive particle counting, Compton scattering of X-rays, radioactive decay and Mossbauer effect. Prerequisite: Registration in Phys 221 or 231.

Phys 224—Modern Physics Laboratory—1 cr. (0 and 3)
Continuation of Phys 223. Experiments in the areas of solid state, optical and modern physics. Experiments are performed on electrical carrier mobility in solids, minority carrier lifetime, transistor action, microwave optics, interference and diffraction, light polarization, gas laser optics, optical spectra, electron and X-ray diffraction, radioactive particle counting, Compton scattering of X-rays, radioactive decay and Mossbauer effect. Prerequisite: Registration in Phys 222 or 232.

Phys 231—General Physics for Physics Majors II—3 cr. (3 and 0)
A continuation of Phys 132. An introduction to the magnetic field, electric circuits, wave motion, reflection, refraction, diffraction of waves, electromagnetic waves. Prerequisite: Phys 132, registration in Phys 223.

Phys 232—General Physics for Physics Majors III—3 cr. (3 and 0)
A continuation of Phys 231. An introduction to thermodynamics, relativity, particle and wave descriptions of matter and light. Includes a description of experiments which were crucial to recent developments in physics. Prerequisite: Phys 231, registration in Phys 224.

Phys 304—Descriptive Astronomy—3 cr. (3 and 0)
The properties of the planets and their satellites, their actual and apparent motions; the properties of stars and galaxies; current theories and speculations. Prerequisite: Phys 202, 222 or 232.

Phys 321—Mechanics I—3 cr. (3 and 0)
Statics; motions of particles and rigid bodies; vibratory motion; gravitation; properties of matter, flow of fluids. Prerequisite: Phys 221 or 231.

Phys 322—Mechanics II—3 cr. (3 and 0)
Dynamics of particles and of rigid bodies, Lagrangian and Hamiltonian formulations, vibrations of strings, wave propagation. Prerequisite: Phys 321 or permission of instructor.
Phys 325—Experimental Physics I—4 cr. (2 and 6)
Introduction to laboratory techniques, measurement of fundamental constants, and performance of some of the experiments (Stern-Gerlach, Zeeman, Photoelectric, specific charge of electrons and protons, etc.) which are crucial to the development of our present concepts of physics. Prerequisite: Phys 321 or equivalent or enrollment in Phys 321 or by permission of the instructor.

Phys 326—Experimental Physics II—4 cr. (2 and 6)
Continuation of Phys 325.

Phys 341—Electricity and Magnetism—3 cr. (3 and 0)
Electric potential and electrostatic fields; solutions of Laplace's and Poisson's equations; properties of dielectrics and of capacitors; electrostatic energy; current and treatment of circuit problems. Vector analysis is used throughout after introduction. Prerequisite: Phys 221 or 231.

Phys 401—Senior Thesis—3 cr. (1 and 6)
The senior thesis is a semi-original piece of work performed under the direction of a member of the physics staff. Theoretical fields available include relativity, statistical mechanics, nuclear physics and astrophysics. Experimental work may be done in the fields of X-ray diffraction, elasticity, low-temperature thermal conductivity, super-conductivity, radiation damage in metals, and electron paramagnetic resonance. Prerequisite: At least three physics courses beyond General Physics.

Phys 404—Astrodynamics—3 cr. (3 and 0)
Astronomical coordinate systems, orbit determinations, multiple body problems, perturbations, non-gravitational and relativistic effects and observational theory. Special attention to problems of artificial satellites. Prerequisite: Phys 321.

Phys 432—Physical Optics and Introduction to Spectroscopy—3 cr. (3 and 0)
Theory and application of interference and diffraction phenomena, polarized light, magneto-optics and electro-optics. Introductory theory of spectroscopy. Prerequisite: Phys 222 or 232.

Phys 441—Electricity and Magnetism—3 cr. (3 and 0)
A continuation of Phys 341. Magnetic fields and energy; magnetic properties of materials; electromagnetic induction; A. C. circuit problems with vector methods and complex numbers; Maxwell's field equations with applications. Prerequisite: Phys 341 or equivalent.

Phys 446—Solid State Physics—3 cr. (3 and 0)
An introductory treatment of the crystal structure of solids and the properties of solids which depend on crystal structure; free electron model of metals; band theory of solids; Brillouin zones, crystalline defects and diffusion. Prerequisite: Phys 222 or 232 or permission of instructor.

Phys 452—Introductory Nuclear Physics—3 cr. (3 and 0)
Various phases of nuclear physics including natural and induced radioactivity; properties of alpha, beta and gamma-rays; cosmic rays; nuclear energy levels and decay schemes; particle accelerators, fission, fusion and nuclear reactors. Prerequisite: Phys 222 or 232.
Phys 454—Nuclear Physics Laboratory—1 cr. (0 and 3)
Techniques and instruments used in detection and measurement of nuclear radiation. Experiments include half-life determination, absorption measurements, neutron activation, coincidence measurements, decay schemes, and gamma-ray spectroscopy. Prerequisite: Registration in Phys 452.

Phys 455—Quantum Physics I—3 cr. (3 and 0)
Discussion of solutions of the Schroedinger equation for free particles, the hydrogen atom and the harmonic oscillator. Prerequisite: Phys 322 and 341 or permission of instructor.

Phys 456—Quantum Physics II—3 cr. (3 and 0)
Continuation of Physics 455. Application of principles of quantum mechanics as developed in Physics 455 to atomic, molecular, solid state and nuclear systems. Prerequisite: Phys 455.

Phys 460—Modern Physics for High School Teachers—3 cr. (3 and 0)
A study of later developments including the measurements of atomic particles. The formulation of new laws and the modifications of old ideas needed to describe the interactions of these particles.

Phys 465—Thermodynamics and Statistical Mechanics—3 cr. (3 and 0)
A study of temperature, development of the laws of thermodynamics and their application to thermodynamic systems. An introduction to low temperature physics is given. Prerequisite: Six hours of physics beyond Phys 222 or permission.

Phys 471—Electron Microscopy—3 cr. (2 and 3)
The theory and operation of the electron microscope. Magnetic lens theory. The technique of specimen mounting and the interpretation of electron micrographs and diffraction patterns. Each student may choose specimens from his major field. Prerequisite: General Physics, Math 206 and permission of instructor.

Phys 473—X-ray Crystallography—3 cr. (2 and 3)
A study of crystal symmetry, elementary space group theory, diffraction of X-rays by electronic charge distribution. Experimental methods of optical goniometry, powder diffraction and single crystal techniques are used to obtain diffraction intensities from a simple crystalline solid and electron charge distribution is determined. Applications of X-ray diffraction to chemical, physical and metallurgical investigations are discussed.

Phys 621—Mechanics I—3 cr. (3 and 0)
Phys 622—Mechanics II—3 cr. (3 and 0)
Phys 625—Experimental Physics—4 cr. (2 and 6)
Phys 626—Experimental Physics—4 cr. (2 and 6)
Phys 641—Electricity and Magnetism—3 cr. (3 and 0)
Phys 704—Astrodynamics—3 cr. (3 and 0)
Phys 732—Physical Optics and Introduction to Spectroscopy—3 cr. (3 and 0)
Phys 741—Electricity and Magnetism—3 cr. (3 and 0)
Phys 746—Solid State Physics—3 cr. (3 and 0)
Phys 752—Introductory Nuclear Physics—3 cr. (3 and 0)
Phys 755—Quantum Physics I—3 cr. (3 and 0)
Phys 756—Quantum Physics II—3 cr. (3 and 0)
Phys 760—Modern Physics for High School Teachers—3 cr. (3 and 0)
Phys 765—Thermodynamics and Statistical Mechanics—3 cr. (3 and 0)
Phys 771—Electron Microscopy—3 cr. (2 and 3)
Phys 773—X-ray Crystallography—3 cr. (2 and 3)
Phys 801—Physics for High School Teachers I—3 cr. (3 and 0)
Phys 802—Physics for High School Teachers II—3 cr. (3 and 0)
Phys 804—Astronomy for High School Teachers—3 cr. (3 and 0)
Phys 811—Methods of Theoretical Physics I—3 cr. (3 and 0)
Phys 812—Methods of Theoretical Physics II—3 cr. (3 and 0)
Phys 813—Thermodynamics and Statistical Mechanics—3 cr. (3 and 0)
Phys 821—Classical Mechanics I—3 cr. (3 and 0)
Phys 822—Classical Mechanics II—3 cr. (3 and 0)
Phys 841—Electrodynamics I—3 cr. (3 and 0)
Phys 842—Electrodynamics II—3 cr. (3 and 0)
Phys 845—Solid State I—3 cr. (3 and 0)
Phys 846—Solid State II—3 cr. (3 and 0)
Phys 853—Nuclear Physics I—3 cr. (3 and 0)
Phys 854—Nuclear Physics II—3 cr. (3 and 0)
Phys 856—Crystallography—3 cr. (3 and 0)
Phys 875—Seminar in Contemporary Physics—1 or 2 or 3 cr. (1 or 2 or 3 and 0)
Phys 885—Colloquium—1 cr. (1 and 0)
Phys 891—Research—Credit to be arranged.
Phys 922—Hydrodynamics—3 cr. (3 and 0)
Phys 951—Quantum Mechanics I—3 cr. (3 and 0)
Phys 952—Quantum Mechanics II—3 cr. (3 and 0)
Phys 955—Advanced Modern Physics I—3 cr. (3 and 0)
Phys 956—Advanced Modern Physics II—3 cr. (3 and 0)
Phys 966—Relativity—3 cr. (3 and 0)
Phys 991—Doctoral Research and Dissertation—Credit to be arranged.
PLANT PATHOLOGY

Professor: W. M. Epps, Head
Associate Professors: L. W. Baxter, J. E. Halpin, G. C. Kingsland, W. Witcher
Lecturer: W. M. Dowler*

PL Pa 401—Plant Pathology—3 cr. (2 and 3) F, S
The principles of the interrelationships between plant pathogens, their hosts, and the environment. Economically important plant diseases are used to illustrate these principles and the application of these principles to disease control. Prerequisite: Bot 101.

PL Pa H401—Plant Pathology—3 cr. (2 and 3) F, S
Honors option for Pl Pa 401, admission by special arrangement.

PL Pa 405—Forest Pathology—3 cr. (2 and 3) F
Principles of plant pathology as related to forest tree diseases; causal agents and their effects on the suspect; prevention and control and minimizing losses; relation of disease control to silviculture, management, and forest products utilization. Prerequisite: Bot 101 and Bot 352 or permission of instructor.

PL Pa H405—Forestry Pathology—3 cr. (2 and 3) F
Honors option for Pl Pa 405, admission by special arrangement.

PL Pa 456—Plant Virology—3 cr. (3 and 0) S, '70 and alternate years.
Plant viruses with emphasis on their morphology, biochemistry, purification and transmission; symptoms resulting from virus infection; virus-vector relationships; and serological procedures. The importance and control of plant virus diseases will be discussed. Prerequisite: Bot 101.

PL Pa H456—Plant Virology—3 cr. (3 and 0) S, '70 and alternate years
Honors option for Pl Pa 456, admission by special arrangement.

PL Pa 458—Plant Parasitic Nematodes—3 cr. (2 and 3) F, '70 and alternate years.
Morphology and taxonomy of stylet bearing nematodes and their relationship with plant diseases. Prerequisite: Bot 101 and Zool 101 and 103.

PL Pa H458—Plant Parasitic Nematodes—3 cr. (2 and 3) F, '70 and alternate years
Honors option for Pl Pa 458, admission by special arrangement.

PL Pa 701—Plant Pathology—3 cr. (2 and 3)
PL Pa 705—Forest Pathology—3 cr. (2 and 3)
PL Pa 756—Plant Virology—3 cr. (3 and 0)
PL Pa 758—Plant Parasitic Nematodes—3 cr. (2 and 3)
PL Pa 802—Control of Plant Diseases—3 cr. (3 and 0)
PL Pa 803—Plant Pathology—3 cr. (2 and 3)
PL Pa 804—Physiological Plant Pathology—3 cr. (3 and 0)
PL Pa 805—Special Problems in Plant Pathology—Credit to be arranged.

* On leave.
POLITICAL SCIENCE

Associate Professor: J. E. Tuttle
Assistant Professor: W. H. Owens, Jr.
Instructors: R. A. Fredland, M. W. Slann

POL Sc 101—INTRODUCTION TO POLITICAL SCIENCE I, AMERICAN GOVERNMENT—3 cr. (3 and 0)
A general introduction to public administration, political behavior, and public law, with a concentrated treatment of American institutions.

POL Sc 201—INTRODUCTION TO POLITICAL SCIENCE II—3 cr. (3 and 0)
A basic introduction to the study, analysis, scope, and sources of government. Emphasis is given to the comparative institutions of government, the international relations of government, the theoretical conceptions man has entertained about government, and analysis of the ways in which man has behaved in response to government. Prerequisite: Pol Sc 101 (or 202 or 301) or permission of instructor.

POL Sc 301—AMERICAN GOVERNMENT AND POLITICAL PARTIES—3 cr. (3 and 0)
The Constitution: powers and functions of the governmental activities; political parties and elections. Not open to those who have completed Pol Sc 101 or 202.

POL Sc 302—STATE AND LOCAL GOVERNMENT—3 cr. (3 and 0)
The structural features, functions, and legislative, executive and judicial processes of American state and local governments.

POL Sc 321—GENERAL PUBLIC ADMINISTRATION—3 cr. (3 and 0)
An introduction to public administration including the elements of organization, personnel and financial management, and administrative law and administrative responsibility. Prerequisite: Pol Sc 101 (or 202 or 301) and 201.

POL Sc 331—CONSTITUTIONAL DEVELOPMENT OF THE UNITED STATES—3 cr. (3 and 0)
The origin and growth of the Constitution of the United States. Prerequisite: Pol Sc 101 (or 201 or 202).

POL Sc 341—POLITICAL BEHAVIOR—3 cr. (2 and 3)
An introduction to behavioral methods. Identification of regularities in the type, degree, and direction of political participation. Laboratory training and field work in interviewing. Prerequisite: Junior standing and permission of instructor.

POL Sc 351—CLASSICAL POLITICAL THOUGHT—3 cr. (3 and 0)
Political philosophy from the pre-Socratic period to Machiavelli. Prerequisite: Pol Sc 101 (or 202 or 301) and 201.

POL Sc 352—MODERN POLITICAL THOUGHT—3 cr. (3 and 0)
The early theories of the nation state in the sixteenth century and the major political thinkers, problems and movements through the twentieth century. Prerequisite: Pol Sc 101 (or 202 or 301) and 201.
POL SC 361—INTERNATIONAL POLITICS—3 cr. (3 and 0)
An introduction to foreign policy, international law, and international organizations. Prerequisite: Pol Sc 101 (or 202 or 301) and 201.

POL SC 371—COMPARATIVE EUROPEAN GOVERNMENTS I; CONSTITUTIONAL SYSTEMS—3 cr. (3 and 0)
Major emphasis on the United Kingdom, France, Germany, and the U.S.S.R., with brief attention given to Italy and Switzerland. Current methods of comparison will be studied and applied to the formal and informal functioning of these governments. Prerequisite: Pol Sc 201, 202.

POL SC 372—COMPARATIVE EUROPEAN GOVERNMENT II; TOTALITARIAN SYSTEMS—3 cr. (3 and 0)
A continuation of Pol Sc 371. This course will deal specifically with the Soviet Union as an example of totalitarian political systems, with references made to Nazi Germany and the present Eastern European political systems. Prerequisite: Pol Sc 101 (or 202 or 301) and 201.

POL SC 409—DIRECTED STUDY IN AMERICAN INSTITUTIONS—3 cr. (3 and 0)
Supervised reading and/or research in selected areas of American government.

POL SC 432—AMERICAN CONSTITUTIONAL LAW—3 cr. (3 and 0)
A brief introduction to the judicial process followed by a detailed examination of leading cases pertaining to the Judiciary, the Congress, the Presidency, and the federal system. Prerequisite: Pol Sc 101 (or 202 or 301) and 201.

POL SC 433—AMERICAN CONSTITUTIONAL LAW II—3 cr. (3 and 0)
An examination of the relationship of the individual to his government; focusing on the safeguards of liberty and property including freedoms of speech, press and religion, and criminal procedure. Prerequisite: Pol Sc 101 (or 202 or 301) and 201.

POL SC 442—POLITICAL PARTIES AND POLITICS—3 cr. (3 and 0)
A study of the historical development of political parties, and the role they play in the organization and functioning of our national government, and the influence of politics in policy making. Prerequisite: Pol Sc 101 (or 202 or 301) and 201.

POL SC 443—PUBLIC OPINION AND PROPAGANDA—3 cr. (3 and 0)
This course examines the nature of public opinion, its social and political context, the social-psychological processes basic to it, the dynamics of its formation and change and its measurement. Prerequisite: Pol Sc 101 (or 301 or 301) and 201.

POL SC 462—INTERNATIONAL ORGANIZATIONS—3 cr. (3 and 0)
Emphasis on international organizations. Analysis of current problems and proposed solution. Prerequisite: Pol Sc 101 (or 202 or 301) and 201.

POL SC 463—UNITED STATES FOREIGN POLICY—3 cr. (3 and 0)
Focus on foreign policy in its historical perspective, examines the decision-making process in foreign policy; evaluates contemporary American capabilities, and analyzes specific issues. Prerequisite: Pol Sc 101 (or 202 or 301) and 201.

POL SC 732—AMERICAN CONSTITUTIONAL LAW—3 cr. (3 and 0)
POL SC 762—INTERNATIONAL ORGANIZATIONS—3 cr. (3 and 0)
POULTRY SCIENCE

Professors: B. D. Barnett, Head; M. A. Boone
Associate Professors: J. B. Cooper, D. E. Turk
Assistant Professor: J. Solis

PS 201—INTRODUCTION TO POULTRY SCIENCE—3 cr. (2 and 3) F, S
The application of the physical and biological sciences to modern poultry production and utilization. A study of the anatomy and physiology of the fowl and the economic aspects of poultry enterprises.

PS 354—POULTRY BREEDING—3 cr. (2 and 3) S, '70 and alternate years
The application of genetics to the improvement of poultry and the effectiveness of different selection methods and mating systems. Prerequisite: Gen 302.

PS 355—POULTRY PRODUCTS GRADING AND TECHNOLOGY—3 cr. (2 and 3) F, '69 and alternate years.
Factors important in the quality of poultry products will be considered. The effects of production, handling, packaging and storage on consumer acceptability will be discussed. Quality evaluation will be considered from the standpoint of tenderness, flavor, microbiology, and USDA grades.

PS 356—INCUBATION AND BROODING—2 cr. (2 and 0) F, '70 and alternate years.
Principles and practice of incubation of chicken and turkey eggs with consideration of hatchery management and embryology of the chick.

PS 358—INCUBATION AND BROODING LABORATORY—1 cr. (0 and 3) Demonstration of subjects covered in PS 356.

PS 401—ANIMAL ENVIRONMENTAL TECHNOLOGY—2 cr. (2 and 0) F, '70 and alternate years.
Demonstration of measurement and control of certain environmental factors with emphasis on light, temperature, and atmospheric gases. Demonstration of physiological response of animals to different environments.

PS 403—ANIMAL ENVIRONMENTAL TECHNOLOGY LABORATORY—1 cr. (0 and 3) F, '70 and alternate years.
Demonstration of subjects covered in PS 401.

PS 451—POULTRY NUTRITION—2 cr. (2 and 0) S, '70 and alternate years.
Nutrient requirements of the various classes of poultry and the use of feedstuffs in meeting these needs. Prerequisite: An Sc 301.

PS 458—AVIAN MICROBIOLOGY AND PARASITOLOGY—4 cr. (3 and 3) F, '70 and alternate years.
Agents causing poultry diseases; the diagnosis, prevention, and treatment of specific diseases and their economic and public health significance.

PS 460—SEMINAR—2 cr. (2 and 0) S, '69 and alternate years.
Current research reported in journals covering the various areas of poultry science. Students will practice scientific writing and interpretation of technical material for lay readers. Prerequisite: Permission of instructor.

PS 654—POULTRY BREEDING—3 cr. (2 and 3)
PS 655—POULTRY PRODUCTS GRADING AND TECHNOLOGY—3 cr. (2 and 3)
PS 656—INCUBATION AND BROODING—2 cr. (2 and 0)
PS 658—INCUBATION AND BROODING LABORATORY—1 cr. (0 and 3)
PS 701—ANIMAL ENVIRONMENTAL TECHNOLOGY—2 cr. (2 and 0)
PS 703—ANIMAL ENVIRONMENTAL TECHNOLOGY LABORATORY—1 cr.
(0 and 3)
PS 751—POULTRY NUTRITION—2 cr. (2 and 0)
PS 758—AVIAN MICROBIOLOGY AND PARASITOLOGY—4 cr. (3 and 3)
PS 760—SEMINAR—2 cr. (2 and 0)
PS 801—POULTRY NUTRITION AND METABOLISM—3 cr. (2 and 3)
PS 804—POULTRY PATHOLOGY—3 cr. (1 and 6)
PS 805—SEMINAR—1 cr. (1 and 0)
PS 891—RESEARCH—Credit to be arranged.

PSYCHOLOGY

Associate Professor: E. E. Waite, Jr.
Assistant Professors: C. B. Caffrey, S. N. Cole, J. D. Davenport
Instructors: Lia Kapelis, Barbara D. Turner

PSYCH 101—THE PSYCHOLOGY OF NURSING—3 cr. (3 and 0)
Based upon the fundamental principles of psychology, this course includes
a consideration of such problems as: psychology and the student nurse; the
psychology of efficiency; emotion and health; personality; conflicts, frustration,
and adjustment; the neuroses and psychoses; general patient nurse interaction;
pediatric and geriatric nursing; and so on.

PSYCH 201—GENERAL PSYCHOLOGY—3 cr. (3 and 0)
A survey of the field of psychology: development and adjustment, motivation,
emotions, intelligence, personality, the sensory experiences, perception, learning,
thinking, imagination and mental hygiene.

PSYCH 202—EXPERIMENTAL PSYCHOLOGY 1—3 cr. (2 and 2)
This course places emphasis on theoretical and practical problems of reporting
research. Required of psychology majors (and minors after May, 1969). Not open to those who have had Psych 362. Prerequisite: Psych 201.

PSYCH 211—GROWTH AND DEVELOPMENT—3 cr. (3 and 0)
A study of the physical and emotional growth of the child.

PSYCH 302—SOCIAL PSYCHOLOGY—3 cr. (3 and 0)
The interaction between the individual and the forces of society; the classical
theories, the psychobiological bases of human behavior, the sociocultural bases
of behavior, types of human behavior, overt and covert experiences, symbolism,
personality and social interaction. Prerequisite: Psych 201.

PSYCH 303—THE PSYCHOLOGY OF ADJUSTMENT—3 cr. (3 and 0)
A course in personal adjustment dealing with the appropriate and inappropriate reactions to frustration and stress, including ways of handling conflicts,
��xiety, fears, and the promotion of personal emotional adjustment. Prerequisite:
Psych 201, 202, or permission of instructor. Not open to psychology majors.
PSYCH 321—DEVELOPMENTAL PSYCHOLOGY—3 cr. (3 and 0)
A survey of current theory and research concerned with the psychological aspects of human growth and development. Prerequisite: Psych 201, 202.

PSYCH 331—THEORIES OF LEARNING—3 cr. (3 and 0)
An historical approach to the study of the major modern learning theories. Prerequisite: Psych 201, 202.

PSYCH 341—PHYSIOLOGICAL PSYCHOLOGY—3 cr. (3 and 0)
The study of human neuroanatomy, with an emphasis on the functions of the nervous system. Treats of the biological bases of behavior in both normal and abnormal dimensions.

PSYCH 351—HISTORY AND SYSTEMS OF PSYCHOLOGY—3 cr. (3 and 0)
A treatment of the science of psychology as understood in the light of the ideas of men who have been responsible for its development. Prerequisite: Psych 201, 202.

PSYCH 361—MOTIVATION—3 cr. (3 and 0)
The various aspects of motivation are considered through a study of contributions of biologists, sociologists, anthropologists, and psychologists. The orientation is empirical rather than theoretical, with emphasis on pertinent research and research methods, and on the measurement of motives. Prerequisite: Psych 201, 202.

PSYCH 363—EXPERIMENTAL PSYCHOLOGY II—4 cr. (3 and 3)
A continuation of Experimental Psychology I, with a stress on the carrying out of original research in the scientific study of human and animal behavior. Laboratory periods stress the refinement of techniques and the execution of research in a guided setting. Prerequisite: Psych 201, 202.

PSYCH 401—APPLIED PSYCHOLOGY—3 cr. (3 and 0)
A study of the concepts of psychology as applied to individual, business, and professional behavior. Prerequisite: Psych 201.

PSYCH 402—ABNORMAL PSYCHOLOGY—3 cr. (3 and 0)
Mental and emotional disorders: theories of causation and problems of treatment; special phenomena of consciousness and unconsciousness, e.g., dreams, dissociation, hypnosis; analysis of pathological behavior: alcoholism, drug addiction, suicide, criminality, neurosis, and psychoneurosis. Prerequisite: Psych 201.

PSYCH 403—PERSONALITY—3 cr. (3 and 0)
An analysis of the theories of personality: Freud, Adler, Jung, Sullivan, Horney, Allport, et al. Prerequisite: Psych 201, 202 and permission of instructor.

PSYCH 422—ADVANCED DEVELOPMENTAL PSYCHOLOGY—3 cr. (3 and 0)
A comparative study of the development of human behavior and personality emphasizing the contributions of learning theory, psychoanalysis, role theory and cultural anthropology. Prerequisite: Psych 201, 202, 321, 331 or 361, 402 or 403 or permission of the instructor.

PSYCH 442—PSYCHOLOGY OF SENSATION AND PERCEPTION—3 cr. (3 and 0)
Current experimental findings in the field of perception and sensation, along with theories of vision, audition, kinesthesis, vestibular function, the skin and chemical senses and theories of perception. Prerequisite: Psych 201, 202 and 341.
PSYCH 471—PSYCHOMETRICS—3 cr. (3 and 0)
An introduction to the theory of psychological testing. Emphasis is on essentials of testing with experience in administering, scoring and interpreting test, including those of scholastic achievement, mental ability, scholastic aptitude, interests and personality. Prerequisite: Nine hours of psychology (including 201, 202).

RECREATION AND PARK ADMINISTRATION

Associate Professor: H. Brantley, Head
Assistant Professors: R. M. Frye, L. W. Gahan, G. E. Howard, M. O. Keith, J. L. Stevenson
Instructor: J. R. Sellers

RPA 101—INTRODUCTION TO COMMUNITY RECREATION—3 cr. (3 and 0)
History and foundations of Community Recreation in public, private and commercial settings; job opportunities, specifications and demands.

RPA 102—HISTORY AND PRINCIPLES OF OUTDOOR RECREATION—3 cr. (3 and 0)
Includes the study of the history, present status and the principles of operation of parks and park systems in America; Outdoor Education Programs; implications for continued growth of this leisure phenomenon.

RPA 201—METHODS AND TECHNIQUES OF RECREATION LEADERSHIP—3 cr. (3 and 0)
Considers characteristics of the several levels of recreation leadership with special emphasis on supervision. Examination is made of the Group Processes. Also includes a study of community resources for leadership in specialized program areas.

RPA 202—MANAGEMENT OF AQUATIC FACILITIES—2 cr. (2 and 0)
Includes the organization of water safety programs and the maintenance of swimming pools and lake front facilities. Also trends and growth patterns of water-based recreation. Prerequisite: RPA 101 or permission of instructor.

RPA 203—PERSONAL AND COMMUNITY HEALTH—3 cr. (3 and 0)
The course deals with health problems, disease prevention and control, school health practices, public health administration, and other health information which may enable one to live intelligently in today's complex society.

RPA 301—SPORTS IN RECREATION—3 cr. (2 and 3)
Administrative and supervisory skills indigenous to public and/or private agency athletic programs are considered. Group instruction is given in individual and team sports and officiating techniques applicable to these sports are taught.

RPA 302—CAMP ORGANIZATION AND ADMINISTRATION—3 cr. (2 and 3)
Surveys the development and trends of camping in America. Considers programming for the operations of agency and private camps. Enables student to master the techniques of group living. Laboratory offers practical experience in camp craft including trips and outdoor cooking.
RPA 303—Program Planning for Recreation—2 cr. (2 and 0)
Course includes fields of activity available to participants; principles and methods of program development; utilization of time-blocks and facilities. **Prerequisite:** Junior standing.

RPA 304—Recreation in Modern Society—3 cr. (3 and 0)
An historical study of the growth of leisure with special attention given to the utilization of community resources for recreation.

RPA 305—Physical Aspects of Sports in Recreation—3 cr. (2 and 3)
The course considers the physiology of exercise as it relates to safety in recreational sports programs, the practice of first aid, and the treatment of athletic injuries.

RPA 306—Principles of Outdoor Education—3 cr. (3 and 0)
A study of the development of outdoor education in public, private and professional agencies with special emphasis on schools and park and recreation departments. Attention will be focused on our National land problems and on land needs for tomorrow.

RPA 401—Park Maintenance and Operation—3 cr. (3 and 0)
Maintenance techniques and materials, interpretive programs, job planning and scheduling, problems of overuse and preventive maintenance are included. **Prerequisite:** RPA 202 or permission of instructor.

RPA 402—Recreation Administration—3 cr. (3 and 0)
An analysis of the internal organization of a recreation department dealing with finances and accounting; records and reports; publicity and public relations; state and federal legislation; staff organization; coordination of community resources. **Prerequisite:** Senior standing.

RPA 403—Facility and Site Planning—3 cr. (2 and 3)
Trends in recreation facility development, planning principles involved in design of recreation buildings, and orientation of facilities to given area are integrated into sound planning programs. **Prerequisite:** RPA 401 or permission of instructor.

RPA 404—Methods of Recreation Research—3 cr. (3 and 0)
An analysis of the principal methods of recreation research; the development of experiments; use of questionnaires; research problem under the guidance of the instructor is developed. **Prerequisite:** Senior standing and Ed 491.

RPA 405—Field Training in Recreation—6 cr.
The student, in a ten-week program, has the opportunity to observe recreation programs in operation. He will also have responsibilities of organizing and conducting activities under supervision. Maintenance and operation of facilities will be observed and practiced. Total of 250 hours required. **Prerequisite:** Senior standing.

RPA 406—Recreation for the Ill and Handicapped—3 cr. (3 and 0)
Surveys the recreational opportunities and benefits available to the ill and handicapped citizens. Designed to provide the student with an awareness of the role of the professional recreator in serving the needs of such special groups as the mentally retarded, cerebral palsied, emotionally disturbed—institutionalized, hospitalized, etc. Particular emphasis will be given to program development applicable to each specific situation.
RELIGION

Assistant Professors: R. B. Harris, D. F. White, Jr.

REL 301—THE OLD TESTAMENT—3 cr. (3 and 0)
A survey of books of the Old Testament with special consideration given to the development of the concepts, institutions, and theology of the ancient Hebrews.

REL 302—A SURVEY OF NEW TESTAMENT LITERATURE—3 cr. (3 and 0)
A study of the books of the New Testament from the standpoint of their occasion, content, literary form and basic theology.

REL 306—RELIGIONS OF THE WEST—3 cr. (3 and 0)
A study of the origin, evolution, and contemporary status of Judaism, Christianity, and Islam. Prerequisite: Junior standing.

REL 309—RELIGIONS OF THE FAR EAST—3 cr. (3 and 0)
A study of the origin, evolution, and contemporary status of Hinduism, Buddhism, Confucianism, and Taoism. Prerequisite: Junior standing.

RURAL SOCIOLOGY

Professor: W. J. Lanham, Head
Associate Professor: V. A. Boyd

RS 301—RURAL SOCIOLOGY—3 cr. (3 and 0) F, S
A study of human social relationships as influenced by life in the open country and in small towns and villages including considerations of the rural population, rural social institutions, processes of change in agricultural technology, and community area planning and development.

RS 359—THE COMMUNITY—3 cr. (3 and 0) F
An examination of the sociological aspects of contemporary communities and of their growth and development. The structural relations of social class, status and power and the relationships among social institutions within the community are examined. Emphasis is placed on the organization and development of communities in a constantly changing environment.

RS 461—RURAL LEADERSHIP—3 cr. (3 and 0) S
A consideration of the social and psychological factors involved in leadership including an examination and analysis of characteristics of the successful leader. Particular attention is paid to the role of the leader in the process of economic and social development of rural communities and small towns.

RS 659—THE COMMUNITY—3 cr. (3 and 0)
RS 761—RURAL LEADERSHIP—3 cr. (3 and 0)
RS 801—RURAL SOCIAL SYSTEMS—3 cr. (3 and 0)

RUSSIAN

Lecturer: Ludmila A. Savitsky

RUS 101—ELEMENTARY RUSSIAN—3 cr. (3 and 1)
Training in pronunciation, grammatical forms, and syntax with a view of giving the student the fundamentals necessary to read simple Russian texts. Three hours a week classroom instruction and one hour a week in the language laboratory.
Russ 102—Elementary Russian—3 cr. (3 and 1)
A continuation of Russ 101. Three hours a week classroom instruction and one hour a week in the language laboratory.

Russ 201—Intermediate Russian—3 cr. (3 and 1)
The reading of simple Russian prose; a review of grammar and syntax. Drill on vocabulary and idiom. Three hours a week classroom instruction and one hour a week in the language laboratory. Prerequisite: Russ 101 and 102.

Russ 202—Intermediate Russian—3 cr. (3 and 0)
A continuation of Russ 201.

Sociology

Professor: F. A. Burtner
Assistant Professors: W. C. Capel, Jr., R. J. Knapp
Instructor: K. D. Birtman
Lecturer: G. W. Mull

Soc 101—Sociology for Nurses—3 cr. (3 and 0)
Basic sociological concepts: group life, socialization, environment, urban growth, population factors, social change. Institutions such as family, economic, religion and others are treated in an introductory manner.

Soc 201—Introductory Sociology—3 cr. (3 and 0)
The basic principles of sociology: culture, biological factors, the influence of geographical environment, human nature, group life, social stratification, communities, social institutions and social change. Prerequisite: Sophomore standing.

Soc 202—Social Problems—3 cr. (3 and 0)
A survey of the major social problems, including problems of industry, education, religion, disease and public health, poverty, dependency and factors affecting social adjustment. Required of all students presenting Sociology as the primary or secondary field of concentration. Prerequisite: Soc 201.

Soc 311—The Family—3 cr. (3 and 0)
The family as one of the basic institutions of society. The history of the family, and a study of its functions in early and modern social structures. A comparative study of family life in other cultures is made. Prerequisite: Soc 201, 202.

Soc 321—Cultural Anthropology—3 cr. (3 and 0)
Recent and contemporary man, as a social and culture-bearing animal, with emphasis on the constants and variants in human behavior involved in technology, social relations, language, religion, art, and other aspects of cultures. Prerequisite: Soc 201, 202.

Soc 331—Urban Sociology—3 cr. (3 and 0)
A survey of the history and development of modern urban organization; rise of the city; problems of modern urban life. Prerequisite: Soc 201, 202 (for Sociology majors and minors).

Soc 341—Population Analysis—3 cr. (3 and 0)
Soc 351—Industrial Sociology—3 cr. (3 and 0)
Industry as a social organization; the factory as a social system; personality in industrial relations; power groupings within industry; and industry and the community. Prerequisite: Soc 201 and permission of the instructor.

Soc 361—Collective Behavior—3 cr. (3 and 0)
Examination of the nature, development and consequences of human behavior in situations where usual social norms and behavior do not apply. Particular attention to such collective behavior phenomena as crowds, mobs, mass, cults, publics, and the initial states of social movements. Prerequisite: Soc 201, 202.

Soc 371—Research Methods—3 cr. (3 and 0)
Analysis of scientific methods in social research and consideration of various techniques, methodological approaches and research designs. Prerequisite: Soc 201, 202, Math 203.

Soc 411—History of Social Thought—3 cr. (3 and 0)
A survey of social thought from ancient times to the nineteenth century. Required of all students presenting sociology as a primary or secondary field of concentration. Prerequisite: 9 hours of sociology.

Soc 421—Sociological Theory—3 cr. (3 and 0)
A survey of the growth of sociological theory considered from the viewpoint of the development of representative schools, their interrelationships, and convergencies in mid-twentieth century theory. Required of all students presenting sociology as a secondary field of concentration. Prerequisite: Soc 411.

Soc 451—Complex Organizations—3 cr. (3 and 0)
An examination and comparison of theories of formal organization; and analysis of the structure and function of specific organizations illustrating various theoretical approaches. Prerequisite: 12 semester hours in Sociology.

Soc 441—Social Stratification—3 cr. (3 and 0)
Analysis of social structure in terms of class, status, prestige, rank and function. Attention is given to the social role of the elite, bureaucracies, the professional, and middle classes. Prerequisite: 12 semester hours in Sociology.

Soc 451—Sociology of Medicine—3 cr. (3 and 0)
Consideration of the major contributions of sociology to medicine; an exploration of patterned social relationships in the field of health and medicine. Prerequisite: 12 semester hours in Sociology.

Soc 481—Race Relations—3 cr. (3 and 0)
The study of the problem of racial and ethnic groups in adjusting to American society. The nature and causes of prejudice and discrimination. Programs for the reduction of intergroup tensions and conflicts are evaluated in the light of observed facts and sociological principles. Prerequisites: Soc 201, 202 (or permission of the instructor).

Soc 711—History of Social Thought—3 cr. (3 and 0)
Soc 721—Sociological Theory—3 cr. (3 and 0)
Soc 731—Complex Organizations—3 cr. (3 and 0)
Soc 741—Social Stratification—3 cr. (3 and 0)
Soc 751—Sociology of Medicine—3 cr. (3 and 0)
SPANISH

Assistant Professors: G. J. Fernandez, R. F. Mixon


Lecturer: Elena G. Fernandez

SPAN 101—ELEMENTARY SPANISH—3 cr. (3 and 1)
A course for beginners in which the essentials of grammar are taught and a foundation is provided for a conversational and reading knowledge of the language. Three hours a week of classroom instruction and one hour a week in the language laboratory.

SPAN 102—ELEMENTARY SPANISH—3 cr. (3 and 1)
A continuation of Span 101, with a reader.

SPAN 201—INTERMEDIATE SPANISH—3 cr. (3 and 1)
Grammar, vocabulary, and idioms; conversation, composition, and translation. Three hours a week classroom instruction and one hour a week in the language laboratory. Prerequisite: Span 102.

SPAN 202—INTERMEDIATE SPANISH—3 cr. (3 and 0)
Introduction to Spanish literature: representative short stories, essays, novels, poetry, and plays. Prerequisite: Span 201.

SPAN 303—SURVEY OF SPANISH LITERATURE I—3 cr. (3 and 0)
Literary movements, influences, and authors from the beginnings to the end of the seventeenth century. Representative works, discussions. Required of Spanish majors. Prerequisite: Span 201 and 202.

SPAN 304—SURVEY OF SPANISH LITERATURE II—3 cr. (3 and 0)
Literary movements, influences, and authors from the eighteenth century to the present. Required of Spanish majors. Prerequisite: Span 303.

SPAN 305—CONVERSATIONAL SPANISH—3 cr. (3 and 0)
Practice in spoken Spanish with emphasis on vocabulary, pronunciation, intonation, and comprehension. Some written work to increase accuracy. Required of Spanish majors. Assignments in the language laboratory. Prerequisite: Span 201 and 202.

SPAN 306—ADVANCED CONVERSATION AND COMPOSITION—3 cr. (3 and 0)
A continuation of Span 305 with more emphasis on written Spanish. Required of Spanish majors. Prerequisite: Span 305.

SPAN 401—CONTEMPORARY SPANISH LITERATURE—3 cr. (3 and 0)
Literary trends and representative authors since 1898. Prerequisite: Span 303 and 304.

SPAN 402—CONTEMPORARY SPANISH DRAMA—3 cr. (3 and 0)
The Spanish theater from Benavente to the present. Prerequisite: Span 303 and 304.

SPAN 405—NINETEENTH CENTURY SPANISH LITERATURE—3 cr. (3 and 0)
Representative authors and movements of the nineteenth century; romanti- cism, costumbrismo, and the regional novel. Prerequisite: Span 303 and 304.

SPAN 406—CERVANTES AND THE GOLDEN AGE—3 cr. (3 and 0)
A study of Cervantes and the theater of the Golden Age of Spanish literature. Prerequisite: Span 303 and 304.
TEXTILE CHEMISTRY

Professors: T. A. Campbell, Head; T. D. Efland
Associate Professors: R. H. Barker, J. L. Lundberg, D. W. Lyons, E. S. Olson, J. J. Porter
Instructor: C. A. Vaughan
Visiting Professor: F. T. Simon

TC 303—TEXTILE CHEMISTRY—3 cr. (3 and 0)
Fundamental principles of physical and organic chemistry with emphasis on those areas most frequently encountered in the textile industry including thermodynamics, kinetics, and solution properties. These concepts will be applied to the study of aliphatic organic compounds and organic reaction mechanisms. The basic principles of stereochemistry and conformational analysis will be developed. Prerequisite: Ch 102, Math 206.

TC 304—TEXTILE CHEMISTRY—3 cr. (3 and 0)
A study of the properties and reactions of aliphatic and aromatic organic compounds. Emphasis will be placed on mechanistic interpretations and the development of synthetic schemes leading to polyfunctional compounds of the types encountered in the textile industry. Prerequisite: TC 303.

TC 305—TEXTILE CHEMISTRY LABORATORY—1 cr. (0 and 3)
An introduction to the techniques used in the synthesis of organic compounds and the measurement of their physico-chemical properties. To be taken concurrently with TC 303.

TC 306—TEXTILE CHEMISTRY LABORATORY—1 cr. (0 and 3)
The techniques used in the synthesis and characterization of organic compounds. To be taken concurrently with TC 304.

TC 315—INTRODUCTION TO POLYMER SCIENCE AND ENGINEERING—3 cr. (3 and 0)
The chemistry of monomers and polymers and the chemical and physical properties of polymers are discussed emphasizing fiber forming, synthetic polymers. Kinetics of polymerization, molecular characterization, structure, morphology, and mechanical properties of polymers are studied demonstrating design of polymer systems for end use in textiles.

TC 316—CHEMICAL PREPARATION OF TEXTILES—3 cr. (2 and 3)
The chemicals used in the preparation of fabric for dyeing and finishing. Oxidizing and reducing agents and their control and effect on various fibers. Colloidal and surface active properties of various compounds and the fundamental factors influencing these properties. Prerequisite: TC 315.

TC 317—POLYMER AND FIBER LABORATORY—1 cr. (0 and 3)
High polymers, prepared from monomers, are characterized and spun to make fibers. Chemical and physical properties of fiber forming polymers are measured as functions of parameters critical to properties of textiles.

TC 457—DYING AND FINISHING I—3 cr. (3 and 0)
The kinetics and equilibria of dyeing processes. The use of conductivity, diffusion, and other methods useful for measuring adsorption isotherms and dyeing rates and the general thermodynamic relationships applicable to dyeing operations. Fiber properties such as zeta potential, dye sites, relative amorphous area available will be included. Prerequisite: TC 315.
TC 458—DYEING AND FINISHING II—3 cr. (3 and 0)
The chemical finishing of textile fabrics and the use of spectrophotometry as a control device for dyeing and finishing. The mechanism of reaction of various finishing agents with different substrates will be presented as well as the color measurement of textile fabrics.

TC 459—DYEING AND FINISHING LABORATORY I—1 cr. (0 and 3)
To be scheduled concurrently with TC 457. The course will introduce the student to common dyeing and printing methods and to some of the machinery necessary to carry out dyeing operations.

TC 460—DYEING AND FINISHING LABORATORY II—1 cr. (0 and 3)
To be scheduled concurrently with TC 458. The course will cover finishing in addition to dyeing operations and their instrumental control.

TC 461—SEMINAR AND RESEARCH—3 cr. (1 and 6)
An investigation by each textile chemistry senior of an assigned problem related to textile processing. A formal written report is required. Prerequisite: Senior standing.

TC 466—TEXTILE UNIT OPERATIONS—3 cr. (3 and 0)
Designed to cover some of the principles behind textile equipment operation such as heat transfer in drying and dyeing processes and fluid flow in pressure and open dye operations and polymer production.

TC 475—CELLULOSE CHEMISTRY—2 cr. (2 and 0)
The organic chemistry of cellulose and its derivatives is developed from the basic principles of carbohydrate chemistry. Emphasis is placed in the substitution and degradation reactions which are of particular importance in textile applications. Fiber morphology is treated in relation to its effect on textile chemical processing. Prerequisite: TC 315 or permission of instructor.

TC 615—INTRODUCTION TO POLYMER SCIENCE AND ENGINEERING—3 cr. (3 and 0)

TC 616—CHEMICAL PREPARATION OF TEXTILES—3 cr. (2 and 3)

TC 617 POLYMER AND FIBER LABORATORY—1 cr. (0 and 3)

TC 757—DYEING AND FINISHING I—1 cr. (0 and 3)

TC 759—DYEING AND FINISHING LABORATORY I—1 cr. (0 and 3)

TC 766—TEXTILE UNIT OPERATIONS—3 cr. (3 and 0)

TC 775—CELLULOSE CHEMISTRY—2 cr. (2 and 0)

TC 811—THE THEORY OF FIBER-FORMING HIGH POLYMERS I—3 cr. (3 and 0)

TC 812—THE THEORY OF FIBER-FORMING HIGH POLYMERS II—3 cr. (3 and 0)

TC 821—ADVANCED CELLULOSE CHEMISTRY—3 cr. (3 and 0)

TC 831—THE PHYSICAL CHEMISTRY OF DYEING—3 cr. (3 and 0)

TC 891—RESEARCH—Credit to be arranged.
TEXTILE SCIENCE

Professors: T. A. Campbell, Jr., Head; T. D. Efland, J. V. Walters
Assistant Professor: H. B. Wilson
Instructors: C. G. Vaughan, E. A. Vaughan, W. P. Greene
Visiting Professor: F. T. Simon

Text 122—Introduction to Textiles—1 cr. (1 and 0)
An introduction to the various areas involved in the scientific processing of fibrous materials, and the production of yarns and fabrics. The finishing, fabrication and market potential textile materials.

Text 201—Fiber Processing I—3 cr. (2 and 3)
A study of fibrous materials and their relationship to the fiber processing systems. The objectives, theories, principles, and mechanisms of the machines used in the earlier stages of fiber processing. The course is directed primarily to the staple fiber processing systems. Mechanical and mathematical fundamentals are applied to the machines concerned.

Text 202—Fiber Processing II—3 cr. (2 and 3)
Continuation of Text 201 emphasizing the later stages of fiber processing for the ultimate yarn strand. Prerequisite: Text 201.

Text 303—Fiber Processing III—3 cr. (2 and 3)
The concepts of current fiber processing machines, techniques, practices, and their validity are investigated. Student group and individual problems are assigned that require use of acquired knowledge, textile testing equipment, and processing machines. Study and examination of the cause and effect relations of fibrous material properties and processing dynamics on the fiber assemblies produced. Prerequisite: Text 201 and 202.

Text 304—Fiber Processing IV—3 cr. (2 and 3)
Continuation of Text 303 with respect to the various fiber assemblies and yarn structures encountered in the fiber processing systems. Emphasis is placed on the machines and their fiber assemblies. Prerequisite: Text 201, 202, and 303.

Text 305—Yarn Structure I—3 cr. (2 and 3)
Basic study of materials used for manufacturing yarns. Machine mechanisms, theory and operations for the opening, picking, carding, and combing of fibers. Draft, production, and waste at these machines are analyzed. Other factors concerned with this portion of a textile plant covered generally, including organization and layout. Prerequisite: Junior standing. Non-textile majors.

Text 306—Yarn Structure II—3 cr. (2 and 3)
Machine mechanisms, theory, and operations for the drawing, roving, spinning, and twister frames. Emphasis is on the drafting, twisting, and winding components for these processes. Brief survey of the silk, and worsted system for yarn production. Prerequisite: Text 305. Non-textile majors.

* On leave.
TEXT 311—FABRIC DEVELOPMENT I—3 cr. (2 and 3)
The theory of mechanisms as applied to weaving machines together with the application of the theory of elementary textile designs used in the construction of woven fabrics.

TEXT 312—FABRIC DEVELOPMENT II—3 cr. (2 and 3)
A continuation of Text 311 with emphasis on special and compound materials fabrication. Prerequisite: Text 311.

TEXT 313—FABRIC STRUCTURE I—3 cr. (2 and 3)
Theory and practice involved in the application of design to textile end uses. Principles involved in converting yarns to fabrics, including loom mechanics. Prerequisite: Junior standing. Non-textile majors.

TEXT 314—FABRIC STRUCTURE II—3 cr. (2 and 3)
Continuation of Text 313, emphasizing fabric layout and analysis, cover factor, production analysis and scheduling. Prerequisite: Text 313.

TEXT 321—FIBER SCIENCE—3 cr. (2 and 3)
Fiber properties and the methods for scientific evaluation of these properties. Prerequisite: Math 206.

TEXT 322—PROPERTIES OF TEXTILE STRUCTURES—3 cr. (2 and 3)
The analysis and significance of yarn and fabric properties and a study of methods of determining these properties.

TEXT 324—TEXTILE STATISTICS—3 cr. (3 and 0)
An introduction to statistics with particular application to the Textile Industry. Measures of central value and variation, probability, the normal curve, tests of hypotheses, elementary correlation and regression. Prerequisite: Junior standing.

TEXT 411—FABRIC DEVELOPMENT III—3 cr. (2 and 3)
The principles concerning the specifications required for the production of fabrics to include layouts, designs, construction, warping, and slashing. Prerequisite: Text 312.

TEXT 412—FABRIC DEVELOPMENT IV—3 cr. (2 and 3)
Production and analysis of woven patterns. Fabric development, analysis and cloth order problems. Prerequisite: Text 411.

TEXT 413—FABRIC DEVELOPMENT V—3 cr. (2 and 3)
A continuation of Text 412 covering more complex weaves for double cloths, pile fabrics, and jacquard effects. Prerequisite: Concurrent with Text 412.

TEXT 414—NON-WOVEN AND KNITTED STRUCTURES—3 cr. (3 and 0)
A survey of non-woven and knitted structures dealing with the principles and mechanisms involved. Various systems are covered with emphasis on yarn requirements and fabric properties.

TEXT 421—TEXTILE COSTING I—3 cr. (2 and 3)
Actual and standard cost principles as they apply to the manufacture of textiles. Allocating the cost of material, labor and overhead; determining the cost of individual yarns and fabrics; valuing the inventory; making of cost reports, payroll analysis and the use of data processing. Prerequisite: Acct 201 and Senior standing or permission of instructor.
**TEXT 426—INSTRUMENTATION—3 cr. (3 and 0)**
The principles of industrial and process instrumentation and process control. Static and dynamic characteristics of measurement devices. Transducer techniques for measurement of physical properties such as pressure, temperature, flow, weight, etc. Principles of process controllers.

**TEXT 428—TEXTILE RESEARCH—0 to 3 cr.**
The student will conduct an individual research problem in the textile or textile chemistry area under the direct supervision and guidance of a faculty member.

**TEXT 429—TEXTILE RESEARCH—0 to 3 cr.**
Same as Text 428.

**TEXT 440—COLOR SCIENCE—3 cr. (2 and 3)**
The application of the science of color to industrial practice in textiles, plastics, paints, lighting and ceramics. The laboratory work will be performed on modern instruments and computers.

**TEXT 460—TEXTILE PROCESSES—3 cr. (3 and 0)**
Survey of machinery and processes of textile manufacturing from fiber formation through fabric finishing. (For students with a non-textile background.)

**TEXT 603—FIBER PROCESSING III—3 cr. (2 and 3)**

**TEXT 604—FIBER PROCESSING IV—3 cr. (2 and 3)**

**TEXT 621—FIBER SCIENCE—3 cr. (2 and 3)**

**TEXT 622—PROPERTIES OF TEXTILE STRUCTURES—3 cr. (2 and 3)**

**TEXT 711—FABRIC DEVELOPMENT III—3 cr. (2 and 3)**

**TEXT 712—FABRIC DEVELOPMENT IV—3 cr. (2 and 3)**

**TEXT 726—INSTRUMENTATION—3 cr. (3 and 0)**

**TEXT 740—COLOR SCIENCE—3 cr. (2 and 3)**

**TEXT 760—TEXTILE PROCESSES—3 cr. (3 and 0)**

**TEXT 821—FIBER PHYSICS I—3 cr. (3 and 0)**

**TEXT 822—FIBER PHYSICS II—3 cr. (3 and 0)**

**TEXT 830—TEXTILE PHYSICS—3 cr. (3 and 0)**

**TEXT 840—SPECTROPHOTOMETRY—3 cr. (3 and 0)**

**TEXT 870—ADVANCES IN TEXTILE MANUFACTURING—3 cr. (3 and 0)**

**TEXT 880—SELECTED TOPICS—3 cr. (3 and 0)**

**TEXT 891—RESEARCH—Credit to be arranged.**

**VISUAL STUDIES**

*Professor: R. H. Hunter, Head*

*Associate Professors: J. T. Acorn, I. G. Regnier*

*Assistant Professor: S. Wang*

**VIS 203—VISUAL ARTS STUDIO—2 cr. (0 and 6)**

Studio work in drawing, painting, graphics, photography and related media. To be taken concurrently with Arch 403 or Prerequisite: Arch 403.
Vis 205—Drawing—2 cr. (0 and 6)
Studio work in drawing and related media. **Prerequisite:** Arch 102 or Vis 203 or permission of instructor.

Vis 207—Beginning Painting—2 cr. (0 and 6)
Studio work in painting and related media. **Prerequisite:** Arch 102 or Vis 203.

Vis 209—Beginning Sculpture—2 cr. (0 and 6)
Studio work in sculpture and related media. **Prerequisite:** Arch 102 or Vis 203 or permission of instructor.

Vis 211—Beginning Printmaking—2 cr. (0 and 6)
Studio work in lithography, silk screen, wood cuts, and graphics and related media. **Prerequisite:** Arch 102 or Vis 203 or permission of instructor.

Vis 213—Beginning Photography—2 cr. (0 and 6)
Studio work in photography and related media. **Prerequisite:** Arch 102 or Vis 203 or permission of instructor.

Vis 215—Beginning Graphics—2 cr. (0 and 6)
Studio work in graphic composition, letterpress, photo lithography, silk screen process and related media. **Prerequisite:** Arch 102 or Vis 203 or permission of instructor.

Vis 305—Life Drawing—2 cr. (0 and 6)
Studio work in life drawing and related subject matter. **Prerequisite:** Vis 205, or Vis 207, or Vis 209.

Vis 306—Life Drawing—2 cr. (0 and 6)
Continuation of Vis 305. **Prerequisite:** Vis 305.

Vis 307—Painting—2 cr. (0 and 6)
Studio work in water color and related media. **Prerequisite:** Vis 207.

Vis 308—Painting—2 cr. (0 and 6)
Continuation of Vis 307. **Prerequisite:** Vis 307.

Vis 309—Sculpture—2 cr. (0 and 6)
Studio work in sculpture and related media. **Prerequisite:** Vis 209.

Vis 310—Sculpture—2 cr. (0 and 6)
Continuation of Vis 309. **Prerequisite:** Vis 309.

Vis 311—Printmaking—2 cr. (0 and 6)
Studio work in lithography, silk screen, etching, wood cuts and related media. **Prerequisite:** Vis 211.

Vis 312—Printmaking—2 cr. (0 and 6)
Continuation of Vis 311. **Prerequisite:** Vis 311.

Vis 313—Photography—2 cr. (0 and 6)
Studio work in still photography and related media. **Prerequisite:** Vis 213.

Vis 314—Photography—2 cr. (0 and 6)
Continuation of Vis 313. **Prerequisite:** Vis 313.

Vis 315—Graphics—2 cr. (0 and 6)
Studio work in graphic composition, letterpress, photo lithography, silk screen process, and related media. **Prerequisite:** Vis 215.
Vis 316—Graphics—2 cr. (0 and 6)
Continuation of Vis 316. Prerequisite: Vis 316.

Vis 405—Drawing—3 cr. (0 and 9)
Studio work in advanced drawing and related media. Prerequisite: Vis 306 or Vis 308 or Vis 312 or Vis 316.

Vis 406—Drawing—3 cr. (0 and 9)
Continuation of Vis 405. Prerequisite: Vis 405.

Vis 407—Painting—3 cr. (0 and 9)
Studio work in advanced painting and related media. Prerequisite: Vis 308 or Vis 312 or Vis 314, Vis 316.

Vis 408—Painting—3 cr. (0 and 9)
Continuation of Vis 407. Prerequisite: Vis 407.

Vis 409—Sculpture—3 cr. (0 and 9)
Advanced studio work in sculpture and related media. Prerequisite: Vis 310.

Vis 410—Sculpture—3 cr. (0 and 9)
Continuation of Vis 409. Prerequisite: Vis 409.

Vis 411—Printmaking—3 cr. (0 and 9)
Advanced studio in Printmaking and related media. Prerequisite: Vis 312.

Vis 412—Printmaking—3 cr. (0 and 9)
Continuation of Vis 411. Prerequisite: Vis 411.

Vis 413—Photography—3 cr. (0 and 9)
Advanced studio work in photography. Prerequisite: Vis 314.

Vis 414—Photography—3 cr. (0 and 9)
Continuation of Vis 413. Prerequisite: Vis 413.

Vis 415—Graphics—3 cr. (0 and 9)
Advanced work in graphic arts. Prerequisite: Vis 316.

Vis 416—Graphics—3 cr. (0 and 9)
Continuation of Vis 415. Prerequisite: Vis 415.

Vis 503—Contemporary Art Criticism—3 cr. (3 and 0)
A seminar course dealing with Twentieth Century visual art forms in relation to the factors that have influenced the artist and the consequence of his production on society. Prerequisite: Vis 305 or 307 or 309 or 311 or 313 and Arch 415.

WATER RESOURCES ENGINEERING

Professor: L. G. Rich, Program Director

WRE 811—Climatology—3 cr. (3 and 0)
WRE 812—Meteorology—3 cr. (3 and 0)
WRE 822—Water Movement in Soils—3 cr. (3 and 0)
WRE 861—Hydrology—3 cr. (3 and 0)
WRE 862—Advanced Hydrology—3 cr. (3 and 0)
WRE 864—Ground-Water Hydrology—3 cr. (3 and 0)
WRE 881—Special Topics in Water Resources—3 cr. (3 and 0)
WRE 891—Research—Credit to be arranged.
WRE 981—Special Topics in Water Resources—3 cr. (3 and 0)
WRE 982—Special Topics in Water Resources—3 cr. (3 and 0)
WRE 991—Doctoral Research—Credit to be arranged.

WILDLIFE BIOLOGY

Professor: J. H. Cochran
Associate Professors: R. E. Ware, L. G. Webb
Assistant Professors: G. W. Folkerts, D. J. Forrester

WB 306—Wildlife Resources of the Southeastern United States—2 cr. (2 and 0) F, S
A study of the wildlife resources of the Southeastern States, including population trends, life histories and economic importance. Conservation and proper utilization by man is emphasized.

WB 412—Wildlife Management—3 cr. (2 and 3) F, S
Basic principles and general practices of wildlife management and conservation will be covered. This course deals with the major problems concerning the management of wildlife resources, with emphasis on upland game species. The laboratory work includes practical work on the Clemson University Woodlands and field trips to several areas where wildlife management is being practiced.

WB 712—Wildlife Management—3 cr. (2 and 3)
WB 809—Wildlife Biology Seminar I—1 cr. (1 and 0)
WB 810—Wildlife Biology Seminar II—1 cr. (1 and 0)
WB 815—Principles of Wildlife Biology—3 cr. (2 and 3)
WB 816—Applied Wildlife Biology—3 cr. (2 and 3)
WB 891—Research—1-6 cr.

ZOOLOGY

Professors: E. W. King, J. K. Reed
Associate Professors: G. W. Anderson, A. S. Tombes, Chairman; R. E. Ware
Assistant Professors: G. W. Folkerts, D. J. Forrester, Ruth L. Hays, W. K. Willard
Instructors: J. M. Barrier, H. T. Coss, F. L. Wallace

Zool 101, 103—General Zoology—4 cr. (3 and 2) F, S, SS
Thorough training in fundamental animal types and zoological principles. The morphology, physiology, behavior, reproduction, ecology, embryology, zoogeography, evolution and palaeontology of each phylum are presented.

Zool 201—Invertebrate Zoology—4 cr. (3 and 3) F, S
A survey of the phyla of invertebrate animals, including their taxonomy, morphology, development and evolution. Prerequisite: Zool 101, 103 or permission of instructor.
Zool 301—Comparative Vertebrate Anatomy—3 cr. (2 and 3) F, S, SS
Advanced training in zoological principles, physiology and comparative vertebrate anatomy.  **Prerequisite:** Zool 101, 103.

Zool 302—Vertebrate Embryology—3 cr. (2 and 3) F, S, SS
Fundamentals of developmental anatomy of the organ systems as illustrated by the chick and pig.  Students prepare histological sections and mounts to acquire practice in laboratory procedures and knowledge of vertebrate microscopic anatomy. Identification of the various tissues is stressed.  **Prerequisite:** Zool 101, 103 and 301 or permission of the instructor.

Zool H302—Vertebrate Embryology—3 cr. (2 and 3) F, S, SS
Honors option for Zool 302, admission by special arrangement.

Zool 304—Animal Ecology—3 cr. (2 and 3) F
Marine, fresh water and land animal communities as they exist in South Carolina.  Students will gain a knowledge of the common animal associations as they are related to land use through lectures, reading, films and field trips.

Zool H304—Animal Ecology—3 cr. (2 and 3) F
Honors option for Zool 304, admission by special arrangement.

Zool 307—Animal Anatomy and Physiology—3 cr. (2 and 3) F
Anatomy, and physiological processes of ingestion, secretion, excretion, respiration, circulation, reproduction and metabolism of warm-blooded animals. This course is designed for students majoring in Pre-Medicine, Pre-Veterinary, Animal Science, Dairy Science, and Poultry Science.  **Prerequisite:** Zool 101, 103.

Zool 403—Protozoology—3 cr. (2 and 3) S
Taxonomy of the sub-kingdom protozoa with special reference to the parasitic forms directly affecting man. Representative types of free-living forms are surveyed with emphasis on their morphology, physiology and distribution.  **Prerequisite:** Zool 101, 103.

Zool H403—Protozoology—3 cr. (2 and 3) S
Honors option for Zool 403, admission by special arrangement.

Zool 404—Animal Pathology—3 cr. (2 and 3) S
Designed to inform students in the causes, treatments, and prevention of animal diseases. Those transmissible to man are considered in detail. Emphasis is placed on hygiene and care of the sick.

Zool 405—Animal Histology—3 cr. (2 and 3) F
Microscopic structures of tissues and organs of the animal body. This course is for students in Pre-Veterinary, Pre-Medicine and the Animal Science courses.  **Prerequisite:** Zool 101, 103.

Zool 410—Limnology—3 cr. (2 and 3) F
This course is designed to familiarize the student with interrelationships between fresh-water organisms and their abiotic environment.  **Prerequisite:** Zool 101, 103, Ch 101, 102.

Zool H410—Limnology—3 cr. (2 and 3) F
Honors option for Zool 410, admission by special arrangement.
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Zool 456—Parasitology—3 cr. (2 and 3) F
An introduction to the phenomenon of parasitism in the animal kingdom with emphasis on basic principles. Classical and experimental approaches to the study of parasitism are examined in reference to the protozoa, helminths and arthropods.

Zool H456—Parasitology—3 cr. (2 and 3) F
Honors option for Zool 456, admission by special arrangement.

Zool 458—Cell Physiology—3 cr. (2 and 3) F
An introduction to the fundamental processes of physiology as exemplified by the cell. Dynamic cellular environment, irritability and response, metabolism, respiration and growth and differentiation will be studied. Prerequisite: Zool 101, 103, Organic Chemistry.

Zool H458—Cell Physiology—3 cr. (2 and 3) F
Honors option for Zool 458, admission by special arrangement.

Zool 460—General Physiology—3 cr. (2 and 3) S
Systematic study of the physiology of nervous activity, hormonal control, neuro-hormonal interrelations, circulation, respiration, digestion, renal control, muscular activity and reproduction. Effort in the laboratory will be concentrated toward acquainting the student with methods of obtaining information about these systems. Prerequisite: Zool 101, 103 or permission of instructor.

Zool 461—Anatomy—3 cr. (3 and 0) F
Those aspects of anatomy related to the skeletal, circulatory, muscular, nervous, endocrine, respiratory, digestive and excretory systems will be covered. Emphasis will be placed on gross anatomy with some work in micro-anatomy. Prerequisite: Zool 101, 103 or permission of instructor.

Zool 462—Herpetology and Ichthyology—4 cr. (3 and 3) S, '69 and alternate years.
Taxonomy, ecology and behavior of amphibians, reptiles and fish with emphasis on species occurring in the Southeast. Prerequisite: Zool 101, 103 or permission of instructor.

Zool 602—Vertebrate Embryology—3 cr. (2 and 3)
Zool 604—Animal Ecology—3 cr. (2 and 3)
Zool 703—Protozoology—3 cr. (2 and 3)
Zool 704—Animal Pathology—3 cr. (2 and 3)
Zool 705—Animal Histology—3 cr. (2 and 3)
Zool 710—Limnology—3 cr. (2 and 3)
Zool 756—Parasitology—3 cr. (2 and 3)
Zool 758—Cell Physiology—3 cr. (2 and 3)
Zool 760—General Physiology—3 cr. (2 and 3)
Zool 761—Anatomy—3 cr. (3 and 0)
Zool 762—Herpetology and Ichthyology—4 cr. (3 and 3)
Zool 801—Animal Histology—3 cr. (2 and 3)
Zool 802—Histological Techniques—3 cr. (1 and 6)
Zool 803—Animal Ecology—4 cr. (2 and 6)
Zool 804—Ornithology—3 cr. (2 and 3)
Zool 805—Animal Pathology—3 cr. (3 and 0)
Zool 806—Comparative Animal Physiology—3 cr. (3 and 0)
Zool 807—Use of Radioisotopes in Biological Research—3 cr. (2 and 3)
Zool 808—Radiobiology—3 cr. (2 and 3)
Zool 809—Toxicology—3 cr. (2 and 3)
Zool 810—Mammalogy—3 cr. (2 and 3)
Zool 811—Recent Advances in Zoology I—1 cr. (1 and 0)
Zool 812—Recent Advances in Zoology II—1 cr. (1 and 0)
Zool 813—Evolution—3 cr. (3 and 0)
Zool 852—Principles and Methods of Systematic Zoology—2 cr.
(2 and 0)
Zool 856—Economic Zoology—3 cr. (2 and 3)
Zool 863—Special Problems—1 to 4 cr.
Zool 891—Research—Credit to be arranged.
Zool 991—Research—Credit to be arranged.
PUBLIC SERVICE ACTIVITIES

PART VI
COLLEGE OF AGRICULTURE AND BIOLOGICAL SCIENCES STAFF

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J. T. Gillingham, Ph.D.† Assistant Chemist
H. Jurecek, B.S.† Chemistry Assistant
E. E. Leslie, B.S.† Associate Chemist

* Teaching staff.
† Research staff.

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College of Agriculture and Biological Sciences Staff

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Mary Lee McCrackan, A.B.†  Assistant Chemist
B. H. Phillips, Jr., B.S.†  Chemistry Assistant
J. J. Starnes, B.S.†  Chemistry Assistant
M. M. Shirer, B.S.†  Chemistry Assistant

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W. C. Bowen, M.S.‖  Associate Professor
E. T. Carpenter, Ed.D.‖†  Associate Professor

* Teaching staff.
† Research staff.
‡ Extension staff.
§ On leave.
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A. K. Jensen, Ph.D.° .............................................. Assistant Professor
F. E. Kirkley, M.S.° .............................................. Associate Professor

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J. T. Ligon, Ph.D.°‡ ................................................ Associate Professor
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M. C. McKenzie, B.S.‡ .......................................... Extension Specialist, Principal Specialist
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J. M. Williams, M.S.‡ ............................................ Agricultural Engineer (USDA)
T. V. Wilson, M.S.°‡ .............................................. Professor

Agronomy and Soils
U. S. Jones, Ph.D.°†† .............................................. Head of Department, Professor
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L. P. Anderson, Ph.D.‡ .......................................... Extension Specialist, Principal Specialist
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E. B. Eskew, M.S.°‡ ................................................ Associate Professor
Z. T. Ford, B.S.‡ ................................................... Associate Agronomist, Pee Dee Station (USDA)
A. D. Fore, B.S.‡ ................................................... Assistant, Pee Dee Station
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R. F. Suman, M.S.† ................................................ Associate Professor, Edisto Station
J. R. Woodruff, Ph.D.°† ........................................... Assistant Professor

* Teaching staff.
† Research staff.
‡ Extension staff.
### Animal Science

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<th>Name</th>
<th>Title</th>
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<td>R. F. Wheeler, Ph.D.</td>
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<td>C. W. Ackerman, M.S.</td>
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### Botany, Bacteriology, and Plant Pathology

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<td>A. C. Mathews, Ph.D.</td>
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<td>W. C. Nettles, M.S.</td>
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<td>M. J. B. Paynter, Ph.D.</td>
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<td>R. W. Rutledge, Ph.D.</td>
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<td>W. R. Sitterly, Ph.D.</td>
<td>Professor, Truck Station</td>
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<td>F. H. Smith, M.S.</td>
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<td>N. W. Thompson, M.S.</td>
<td>Instructor</td>
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<td>J. B. Whitney, Jr., Ph.D.</td>
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<td>Wesley Witcher, Ph.D.</td>
<td>Associate Professor</td>
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### Crop Pest Commission

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<td>J. H. Cochran, Ph.D.</td>
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<td>W. M. Epps, Ph.D.</td>
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<td>R. C. Fox, Ph.D.</td>
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<td>F. J. Howard, Jr., M.S.</td>
<td>Research Assistant</td>
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<td>H. B. Jackson, M.S.</td>
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<td>V. H. McCaskill, M.S.</td>
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<td>L. R. Morgan, B.S.</td>
<td>Entomology Assistant</td>
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<td>D. C. Weeks, M.S.</td>
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<tr>
<td>Wesley Witcher, Ph.D.</td>
<td>Associate Professor</td>
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* Teaching staff.  
† Research staff.  
‡ Extension staff.  
§ Part time.  
¶ On leave.
Public Service Activities

Dairy Science

W. A. King, Ph.D.††  Head of Department, Professor
C. W. Brandt, Ph.D.†  Associate Professor
C. C. Brannon, B.S.††  Associate Professor
W. V. Chalupa, Ph.D.††  Associate Professor
J. H. Clark, Ph.D.†  Post Doctorate Research Associate
W. C. Cook, M.S.††  Extension Assistant
J. F. Dickey, Ph.D.††  Assistant Professor
R. W. Henningson, Ph.D.††  Professor
J. C. Heustess, B.S.†  Assistant in Dairy Science
Victor Hurst, Ph.D.††  Professor
J. J. Janzen, Ph.D.††  Professor
J. W. Kelly, M.S.†  Professor
J. T. Lazar, Jr., Ph.D.††  Professor
C. H. Lomas, M.A.†  Associate Extension Specialist
S. L. Moore, D.V.M.††  Assistant State Veterinarian
W. L. Northern, M.S.†  Associate Extension Specialist, Principal Specialist
G. D. O’Dell, M.S.†  Assistant Professor
F. E. Pardue, M.S.†  Assistant Extension Specialist
C. B. Reeves, M.S.†  Associate Extension Specialist
M. W. White, B.S.†  Dairy Science Assistant

Entomology and Zoology

J. H. Cochran, Ph.D.††  Head of Department, Professor
T. R. Adkins, Jr., Ph.D.†  Professor
H. R. Agee, Ph.D.†  Research Entomologist, Pee Dee Station (USDA)
G. W. Anderson, D.V.M., M.S.†—
  Associate Professor of Zoology and Veterinary Medicine
J. V. Bell, M.S.†  Research Mycologist, Truck Station (USDA)
C. S. Creighton, B.S.†  Research Entomologist, Truck Station (USDA)
F. P. Cuthbert, Jr., B.S.†  Research Entomologist, Truck Station (USDA)
Augustine Day, B.S.†  Entomologist, Truck Station (USDA)
J. A. DuRant III, Ph.D.†  Assistant Professor, Pee Dee Station
R. C. Fox, Ph.D.††  Professor
Ruth L. Hays, Ph.D.†  Assistant Professor
S. B. Hays, Ph.D.††  Associate Professor
A. R. Hopkins, M.S.†  Research Entomologist, Pee Dee Station (USDA)
D. A. Johnson, B.S.†  District Supervisor, Bureau of Sport Fisheries and Wildlife
W. S. Kinard, B.S.†  Assistant Entomologist, Pee Dee Station (USDA)
J. B. Kissam, Ph.D.†  Associate Extension Specialist—Entomology
E. W. King, Ph.D.††  Professor
Frances McAlister, B.A.†  Entomology Assistant
R. F. Moore, Jr., Ph.D.†  Research Entomologist, Pee Dee Station (USDA)
W. C. Nettles, M.S.†  Extension Specialist, Principal Specialist—Entomology and Plant Pathology
J. K. Reed, Ph.D.†  Professor
L. M. Sparks, Jr., M.S.†  Associate Extension Specialist—Entomology
H. M. Taft, Ph.D.†  Leader, Cotton Insects Investigations, Pee Dee Station (USDA)
C. A. Thomas, Jr., Ph.D.†  Associate Extension Specialist—Entomology
A. S. Tombes, Ph.D.†  Associate Professor
S. G. Turnipseed, Ph.D.†  Associate Professor, Edisto Station
R. E. Ware, B.S.†  Associate Professor
L. G. Webb, Ph.D.††  Associate Professor, Leader, Clemson Wildlife Research Project
W. K. Willard, Ph.D.†  Assistant Professor

* Teaching staff.
† Research staff.
‡ Extension staff.
§ Part time.
College of Agriculture and Biological Sciences Staff

Farms
John S. Evans, B.S.†  Head of Department

Food Science and Biochemistry
W. P. Williams, Ph.D.‡  Head of Department, Associate Professor
R. F. Borgman, D.V.M., Ph.D.‡†  Associate Professor
L. Crook, Ph.D.‡†  Assistant Professor
D. M. Henricks, Ph.D.‡†  Assistant Professor
J. H. Mitchell, Jr., Ph.D.‡†  Professor
A. L. Shewfelt, Ph.D.‡†  Professor
L. E. Vereen, Ph.D.‡†  Assistant Professor

Forestry
Koloman Lehotsky, Ph.D.‡¶  Head of Department, Professor
R. M. Allen, Ph.D.‡†  Belle W. Baruch Professor
W. J. Barker, B.S.§  Principal Extension Specialist
M. H. Bruner, M.F.¶†  Associate Professor
B. M. Cool, Ph.D.¶†  Professor
N. B. Goebel, M.F.¶†  Associate Forester
C. W. Hall, B.S.§  Associate Extension Specialist
C. L. Lane, Ph.D.¶†  Assistant Professor
W. H. D. McGregor, Ph.D.¶‡  Associate Professor
S. A. Marbut, B.S.§  Associate Extension Specialist
L. D. Reamer, M.S.§†  Assistant in Forestry
R. E. Schoenike, Ph.D.¶†  Associate Professor
W. A. Shain, Ph.D.¶†  Associate Professor
A. T. Shearin, B.S.§†  Assistant
J. R. Warner, D.F.¶†  Professor
T. E. Wooten, Ph.D.¶†  Assistant Professor

Four-H Club Work
J. B. Williams, B.S.§†  State 4-H Club Agent
G. H. Baker, B.S.§†  Associate 4-H Club Agent, Florence
Wayman Johnson, M.S.§†  Associate 4-H Club Agent
Altamese B. Pough, B.S.§†  Assistant 4-H Club Agent
E. Joyce Richardson, M.S.§†  Assistant 4-H Club Agent
Georgia T. Roberson, M.Ed.§†  Associate 4-H Club Agent
J. T. Rogers, B.S.§†  Associate 4-H Club Agent

Home Economics
Julia B. Taylor, M.S.§†  Extension House Furnishings Specialist
Marie S. Hindman, M.S.§†  Extension Nutritionist
Frances H. Odom, M.A.§†  Extension Housing Specialist
Vela M. Smith, M.S.§†  Extension Clothing Specialist
Ann N. Rogers, M.Ed.§†  Rural Civil Defense Specialist
W. L. Yates, M.S.§†  Extension Family Life Specialist

Horticulture
T. L. Senn, Ph.D.¶‡†  Head of Department, Professor
P. M. Alexander, Ph.D.¶‡†  Associate Professor
W. C. Barnes, Ph.D.¶†  Superintendent and Professor, Truck Station
R. A. Baumgardner, Ph.D.¶†  Associate Extension Specialist
Guy L. Buckner †  Horticultural Assistant, Truck Station
W. P. Cook, M.S.§†  Assistant Extension Specialist
J. H. Crawford, M.S.§†  Assistant Professor
D. O. Ezell, Ph.D.¶†  Assistant Extension Specialist
R. J. Ferree, M.S.§†  Extension Specialist, Principal Specialist
J. P. Fulmer, M.S.§†  Assistant Professor

* Teaching staff.
† Research staff.
‡ Extension staff.
Public Service Activities

C. E. Gambrell, Jr., M.S.† Assistant Horticulturist, Sandhill Station
M. G. Hamilton, Ph.D.† Associate Professor, Edisto Station
M. B. Hughes, Ph.D.† Professor, Edisto Station
E. V. Jones, M.S.† Assistant Extension Specialist
W. S. Jordan, Ph.D.° Assistant Professor
J. A. Martin, B.S.† Associate Professor
W. L. Ogle, Ph.D.°† Professor
H. J. Sefick, M.S.°† Associate Professor
E. T. Sims, Jr., Ph.D.°† Associate Professor
B. J. Skelton, Ph.D.°† Assistant Professor
G. E. Stembridge, Ph.D.°† Associate Professor
F. W. Thode, M.S.° Associate Professor
C. W. Thompson, M.S.† Area Agent—Ornamentals, Truck Station
L. O. Van Blaricom, M.S., Ch.E.°† Professor

Poultry Science
B. D. Barnett, Ph.D.°†† Head of Department, Professor
B. W. Bierer, V.M.D.°† Professor, Laboratory Director, Columbia
M. A. Boone, Ph.D.† Professor
J. B. Cooper, M.S.°† Associate Professor
Douglas Hamm, Ph.D.† Principal Specialist, Associate Extension Specialist
B. J. Maw, B.S.† Poultry Science Assistant
C. F. Risher, B.S.† Associate Extension Specialist, York
J. Solis, Ph.D.°† Assistant Professor
T. C. Stewart, Sr., B.S.† Associate Extension Specialist
D. E. Turk, Ph.D.°† Associate Professor
W. S. Walker, M.Ed.† Associate Extension Specialist, Columbia

Seed Certification
R. H. Garrison, B.S.† Head of Department, Associate Plant Breeder
J. O. Black, Jr., M.S.† Assistant Agronomist
R. A. Jameson, M.S.† Assistant Agronomist

Statistical Services
W. P. Byrd, Ph.D.°† Professor
W. E. Johnston, M.S.°† Assistant Professor
C. B. Leadholt, M.S.†§ Assistant Statistician
L. E. Warlick, B.S.† Statistical Assistant

° Teaching staff.
† Research staff.
‡ Extension staff.
§ On leave.
## COUNTY AGENTS

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<tr>
<th>County</th>
<th>Name</th>
<th>Post Office</th>
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<td>Abbeville</td>
<td>L. H. Bull, B.S.</td>
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<td>Area Agent—Livestock</td>
<td>J. E. Barker, M.S.</td>
<td>Anderson</td>
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<td>Area Agent—Com. and Res.</td>
<td>A. L. Padgett</td>
<td>Charleston</td>
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<td>C. W. Thompson, M.S.</td>
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<td>J. H. Phillips, Jr., M.S.</td>
<td>Chester</td>
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<td>H. L. Eason, B.S.</td>
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<td>Area Agent—Agronomy</td>
<td>R. L. Stephens</td>
<td>Florence</td>
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<td>J. F. Welter, M.S.</td>
<td>Greenville</td>
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<td>Area Agent—Livestock</td>
<td>C. W. Dean, M.S.</td>
<td>Orangeburg</td>
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<td>Area Agent—Horticulture</td>
<td>J. D. Ridley</td>
<td>Spartanburg</td>
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<tr>
<td>Area Agent—Livestock</td>
<td>B. W. Sherer, B.S.</td>
<td>Spartanburg</td>
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## ASSOCIATE AND ASSISTANT COUNTY AGENTS

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<td>R. C. McDaniel, Assoc., M.S.§</td>
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**EXTENSION HOME ECONOMISTS**

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## Public Service Activities

### County | Name | Post Office
--- | --- | ---
Greenwood | A. Louise McColl, B.S. | Greenwood
Hampton | Darlena D. Mixson, B.S. | Hampton
Horry | R. Violet Navy, B.S. | Conway
Jasper | Elizabeth B. Berry, B.S. | Ridgeland
Kershaw | Dean H. Lucas, B.S. | Camden
Lancaster | Nancy C. Patterson, B.S. | Lancaster
Laurens | Helen C. Camp, B.S. | Laurens
Lee | Carolyn Meares, B.S. | Bishopville
Lexington | Margaret G. McFadden, B.S. | Lexington
McCormick | Evelyn C. Mattison, B.S. | McCormick
Marion | Sallie M. Smith, B.S. | Marion
Marlboro | Louise Heriot, M.Ed. | Bennettsville
Newberry | Mildred K. Holliday, B.S. | Newberry
Oconee | Julia D. Herron, B.S. | Walhalla
Orangeburg | Huldah P. McKnight, B.S. | Orangeburg
Pickens | Sarah G. Cureton, B.S. | Pickens
Saluda | Catherine S. Boozer, B.S. | Saluda
Spartanburg | Nancy M. Rasor, B.S. | Spartanburg
Sumter | Evangeline T. Thompson, B.S. | Sumter
Union | Nancy E. Smith, B.S. | Union
Williamsburg | Mary A. Thompson, B.S. | Kingstree
York | Jennie M. Riddle, B.S. | York

### County | Name | Post Office
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Aiken | Lonieal H. Jackson, Assoc., B.S. | Aiken
Allendale | Kathy L. Littlefield, B.S. | Allendale
Anderson | Annie M. Butler, Assoc., B.S. | Anderson
Anderson | Joyce G. Banks, B.S. | Anderson
Anderson | Nancy Vermillion, B.S. | Anderson
Anderson | Cynthia W. Williford, Assoc., M.S. | Anderson
Bamberg | Lillie J. Limehouse, Assoc., B.S. | Bamberg
Barnwell | Edna K. DuPree, Assoc., B.S. | Barnwell
Beaufort | Lillie B Crosby, Asst., B.S. | Beaufort
Berkeley | Doris T. Dauphin, B.S. | Moncks Corner
Charleston | Dorthula B. Bonds, B.S. | Charleston
Charleston | Irma K. Bell, B.S. | Charleston
Cherokee | Leota S. Littlejohn, B.S. | Gaffney
Chesterfield | Phyllis Bradham, B.S. | Chesterfield
Chesterfield | Queen E. Bowman, B.S. | Chesterfield
Clarendon | Claudette L. Greene, B.S. | Manning
Colleton | Emily E. Bridges, B.S. | Walterboro
Colleton | Gussie M. Gouldock, Assoc., B.S. | Walterboro
Darlington | Frances K. Mitchell, B.S. | Darlington
Darlington | Wilhelmina P. Johnson, B.S. | Darlington
Dorchester | Bernice H. Brown, Assoc., M.S. | St. George
Edgefield | Mary H. Ouzts, B.S. | Edgefield
Fairfield | Coy Smith, M.Ed. | Winnsboro
Florence | Judith E. Spiers, B.S. | Florence
Florence | Joyce D. Byrd, B.S. | Florence
Florence | Hattie P. Lowery, Assoc., M.S. | Florence
Florence | Sallie M. Moore, B.S. | Florence
Georgetown | Janie Lancaster, M.S. | Georgetown
Greenville | Mary M. Stone, M.S. | Greenville
Greenville | Alma A. Devore, B.S. | Greenville
Greenwood | Madge W. Hardy, Assoc., B.S. | Greenwood
Hampton | Leona B. Mungin, Assoc., B.S. | Hampton
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**EXTENSION SERVICE EMERITI**

Lora Warner Alford, B.S. ........................................ County Agent Emeritus
Caroline Simonton Alston ........................................ Home Demonstration Agent Emeritus
John Chipley Anthony, B.A. ...................................... County Agent Emeritus
Delphena Wilkerson Arnold, L.L., Assoc. Home Demonstration Agent Emeritus
Ophelia Sue Barker, B.S. ........................................ Home Demonstration Agent Emeritus
Benjamin Barnwell .................................................. Associate County Agent Emeritus
George Washington Bonnette, B.S. ................................ County Agent Emeritus
Hugh Asbury Bowers, M.S. ......................................... Extension Horticulturist—Truck Crops Emeritus
Elizabeth DuBose Boykin, A.B. ................................. Home Demonstration Agent Emeritus
Harry Gilmore Boylston, B.S. ................................. Extension Cotton Improvement Specialist Emeritus
Lillian Watts Brown, L.L. ...................................... Associate Home Demonstration Agent Emeritus
George Dewey Butler ............................................ Assistant County Agent Emeritus
Odil Williams Cain, B.S. ........................................ County Agent Emeritus
Charles Babb Cannon, B.S. ...................................... County Agent Emeritus
Claude William Carraway, B.S. ................................ County Agent Emeritus
Eleanor DeVeaux Carson, A.B., M.S. ............................ Home Demonstration Agent Emeritus
Mattie Lee Cooley, B.S. ........................................ Home Demonstration Agent Emeritus
Carl Golden Cushman, B.S. ...................................... Leader Emeritus, Dairy Extension Work
George Washington Daniels, L.L. .............................. Associate County Agent Emeritus
James Ervin Dickson, B.S. ...................................... Associate County Agent Emeritus
Spencer Cholier Disher, L.L. .................................. Associate County Agent Emeritus
Augustus Lowery DuRant, B.S., M.S. ............................ Leader, Livestock Work Emeritus
James Malcolm Eleazer, B.S. ................................ Extension Information Specialist Emeritus
Silas Wightman Epps, B.S. ..................................... County Agent Emeritus
Samuel Ernest Evans, B.S., M.S. ................................ County Agent Emeritus
Paul Bryson Ezell, B.S. ......................................... County Agent Emeritus
Margaret Barron Fewell, B.A. .................................. Home Demonstration Agent Emeritus
Rosa Gibbs Gadson, L.L. ....................................... Associate Home Demonstration Agent Emeritus
Minnie Estha Gandy ............................................... Associate Home Demonstration Agent Emeritus
Paul Matthew Carvin, B.S. ...................................... County Agent Emeritus
360 Public Service Activities

Percy Harold Gooding, B.S., M.S. . .Leader, Poultry Extension Work Emeritus
Cecil Pound Goodyear, B.S. ..........Associate County Agent Emeritus
William Roy Gray, B.S. .............County Agent Emeritus
Mary Catherine Haynie, B.A. .......Home Demonstration Agent Emeritus
Elizabeth Herbert, B.A. ............Home Demonstration Agent Emeritus
Ellie Lanham Herrick, B.S. ........Family Life Specialist Emeritus
Jesse Howard Hopkins, Sr., B.S. .....County Agent Emeritus
Julia Stebbins Howerton ............Home Demonstration Agent Emeritus
Ralph Alexander Jackson, B.S. .....County Agent Emeritus
Harriett Frazier Johnson, A.B., B.S., M.A....State Girls' Club Agent Emeritus
Vernon Morris Johnston, B.S. .....County Agent Emeritus
Jane Ketchen, B.A. ..................Assistant State Home Demonstration Agent Emeritus
Lonny Inge Landrum, B.S. ..........State Home Demonstration Agent Emeritus
Jamie Tarlton Lazar, B.S. ..........District Agent Emeritus
Thomas Brougham Lee, B.S. .....County Agent Emeritus
Robert Howe Lemmmon, B.S. ......County Agent Emeritus
Janie Letitia McDill, A.B., B.S., M.S. .Nutritionist Emeritus
Henry Abner McGee ................Extension Tobacco Specialist Emeritus
Elizabeth McNab, A.B. .............Home Demonstration Agent Emeritus
John Doby Marshall, B.S. ..........Associate County Agent Emeritus
Margaret Martin, B.A., M.A. ..Extension Food Production and Conservation Specialist Emeritus
Booker Talifero Miller, B.S. ......Associate County Agent Emeritus
John Dalton Miller, B.S. ..........County Agent Emeritus
Izora Miley .......................Home Demonstration Agent Emeritus
T. W. Morgan, M.S. .................Associate Director of Extension Emeritus
Sallie P. Musser, B.A., M.A. ...State Home Demonstration Agent Emeritus
Juanita Henderson Neely, A.B., M.S., State Home Demonstration Agt. Emeritus
Marian Baxter Paul, B.S. .......Assistant in Home Economics Extension Emeritus
Houston Stafford Person, B.S. ....Associate County Agent Emeritus
Theodosia Dargan Plowden ......District Agent Emeritus
Portia Seabrook, A.B., M.S. ....Extension Clothing Specialist Emeritus
Etta Sue Sellers, B.A. ............Home Demonstration Agent Emeritus
Mahala Jane Smith, B.S. ..........Home Demonstration Agent Emeritus
Stiles Conger Stribling, B.S. ....Agriculture Editor Emeritus
Lena Elizabeth Sturgis ..........Home Demonstration Agent Emeritus
Marguerite Spearman Summer, B.S. .Home Demonstration Agent Emeritus
Van Buren Thomas, B.S.A. .......Assistant County Agent Emeritus
William Thompson, B.S. ..........Associate County Agent Emeritus
Carrie Carson Tomlinson, B.S., M.A. .Home Demonstration Agent Emeritus
Ernest Craig Turner, B.S. ..........Extension Conservationist Emeritus
Larkin Vandiville Walker, B.S. ....Associate County Agent Emeritus
Audley Hoffman Ward, B.S., M.S. ..District Agent Emeritus
Mabel Price Washington, B.S., Associate Home Demonstration Agent Emeritus
David Wayne Watkins, B.S., M.A. ....Director Emeritus
Ernest Nesbit Williams, B.S. ....Assistant in Agricultural Extension Emeritus

LIVESTOCK-POULTRY HEALTH DEPARTMENT
P. O. Box 1771
COLUMBIA, SOUTH CAROLINA 29202

Director and State Veterinarian
C. E. Boyd, D.V.M. ..............................Columbia

State Associate Director
John B. Thomas, D.V.M. ..................Columbia

Federal Assistant Director
John A. Kimsey, D.V.M. ................Columbia
Meat Inspection Program

George D. Batchelor, Sr., D.V.M., Chief ........................................ Columbia
Lloyd V. Fry, D.V.M., Assistant Chief ........................................ Columbia

Supervisory Area Veterinarians—Meat Inspection Program

A. F. Allison, D.V.M. ................................................................. Florence
William Ginn, D.V.M. .................................................................... Columbia
A. R. Griffith, D.V.M. ................................................................. Orangeburg

Assistant State Veterinarians

O. E. Baker, D.V.M. ................................................................. Columbia
Bert W. Bierer, V.M.D. .............................................................. Columbia
H. Gaffney Blalock, D.V.M., Ph.D. ................................................. Columbia
Walter T. Carll, D.V.M. .............................................................. Columbia
W. R. Chastain, D.V.M. .............................................................. Columbia
W. T. Derieux, D.V.M. ................................................................. Columbia
T. H. Eleazer, D.V.M. ................................................................. Columbia
D. E. Goodman, D.V.M. ............................................................. Turbeville
S. L. Moore, D.V.M. ................................................................. Clemson
W. H. Rhodes, D.V.M. .............................................................. Columbia

State Livestock Law Enforcement Officers

James C. Epps, Jr., B.Sc. .............................................................. Columbia
Charles L. Fleming, B.Sc. ............................................................ Columbia
Charles E. Grant, B.Sc. ............................................................... Columbia

Federal Veterinary Livestock Inspectors

G. A. Baker, D.V.M. ................................................................. Columbia
John N. Dalton, D.V.M. ............................................................. Bamberg
M. L. Gunnels, D.V.M. ............................................................... Walterboro
Joseph B. Hendricks, D.V.M. ..................................................... Columbia
Malcolm C. Johnson, D.V.M. ...................................................... Camden
H. A. Jordan, D.V.M. ................................................................. Florence
J. M. Love, D.V.M. ................................................................. Chester
Herbert Racoff, D.V.M. .............................................................. Columbia
Thomas J. Wheelin, D.V.M. ....................................................... Saluda
K. N. Wiser, D.V.M. ................................................................. Greer

Technical Livestock Committee

C. E. Boyd, D.V.M., Chairman .................................................. Box 1771, Columbia
W. L. Abernaty ................................................................. Charleston Highway, Orangeburg
Harold D. Jackson ................................................................. Cheraw
T. C. Moss ................................................................. Cameron
W. C. Smith ................................................................. Shop Road, Columbia
Hart Spears ................................................................. Darlington
John Warner ................................................................. Greenwood
THE SOUTH CAROLINA AGRICULTURAL EXPERIMENT STATION

The South Carolina Agricultural Experiment Station is the research branch of the College of Agriculture and Biological Sciences. The nucleus of its research planning and efforts are performed by scientists in 16 departments and two special units located on the campus at Clemson. Each department conducts specific research projects in its own field. The findings from these projects are made known to the public through special publication and news releases. Five branch experiment stations, each located in a different area of the state, operate as separate units under the direction and organization of the Clemson station.

The goal of the station is to provide, through research, needed materials, techniques, and information which can result in more effective agricultural production and marketing. The farmer's work can be made easier, cheaper, and more profitable by applying the information obtained through research designed to learn what effect current farm practices have on the financial return he gets. Newer agricultural methods, not yet put into use by farmers, are also studied with the appropriate release of findings.

The opportunity is available, to a limited number of undergraduate students in most of the departments, to work and gain experience in research methods and procedures. Many of the departments also offer Graduate Research Assistantships to students interested in working on a research program while pursuing a graduate degree program in the corresponding discipline.

Laboratories of the station are open for inspection by students, farmers, and the public in general. Information may be requested on any specific problem encountered in Agriculture by writing to the station Director. A full report of the work and expenditures of the South Carolina Agricultural Experiment Station is published annually. This and other publications of the station will be sent, upon request, free of charge.

FOUNDATION SEED AND SEED CERTIFICATION

The South Carolina Foundation Seed Association is charged with the responsibility of increasing breeder seed of adapted Experiment Station and USDA varieties to foundation and registered seed in order that seedsmen and farmers might obtain these varieties at the earliest possible time. There are 16 crops and 55 varieties in the Foundation Seed Program.
The South Carolina Crop Improvement Association inspects and certifies fields for farmers where foundation and registered seed is planted in order that certified seed can be produced.

**FERTILIZER INSPECTION AND ANALYSIS**

The Fertilizer Inspection and Analysis Division functions as one of the five divisions in the College of Agriculture and Biological Sciences, Clemson University. Since 1893 this division has been procuring official samples and analyzing them to see that the guaranteed analysis has been met, inspecting for proper bag printing and weights of fertilizer. Before any fertilizer is offered for sale in South Carolina, it must be registered with the Fertilizer Inspection and Analysis Division. The director and eight part-time inspectors, who are also deputized as insecticide inspectors, visit all fertilizer and insecticide manufacturing plants. Samples are procured at plants, farms and dealers' warehouses, and as far as possible, in proportion to the sales of individual companies.

Some 6,400 fertilizer samples and 1,800 to 2,000 insecticide samples are procured annually. Normally, the percentage of samples deficient in analysis for fertilizers averages about 8 to 12 per cent, with refunds amounting to some $50,000. The penalty refund is made to the ultimate user. In the case of a deficiency in nitrogen the penalty is three times the actual value of the shortage, while for phosphoric acid and potash it is four times the value of the shortage.

The Annual Bulletin contains the following principal items: Fertilizer usage data; the average analytical findings by brand and grades of those samples meeting the guarantee and those not meeting the guarantees—deficient—along with the names, addresses and telephone numbers of all inspectors.

The Agricultural Chemical Services Department performs the analytical work for both fertilizers and insecticides.

**THE CLEMSON UNIVERSITY EXTENSION SERVICE**

The Clemson University Extension Service is a branch of Clemson University and is a cooperative service supported by the counties, the State, and the Federal government. The Extension Service is responsible for conducting, with all people of South Carolina, the cooperative educational and demonstration programs in agriculture and home economics of Clemson University and the United States Department of Agriculture.
The function of the Extension Service is to make available to farmers, homemakers, and rural boys and girls, through on-the-farm service, demonstrations, meetings, newspaper articles, publications, radio and television broadcasts, and other suitable methods, the results of research and successful farm and home experience. The Service also assists, through interpretation, practical demonstrations and otherwise, in applying and using this information to improve farms, farm homes, and communities, to the end that a safe, sound, and progressive rural life and agriculture may be built.

The annual plan of agricultural and home economics extension work is developed and carried out with close cooperation between the Extension Service and the farm and home leadership of the State, the counties, and the rural communities and neighborhoods.

The Staff of Agricultural Extension Workers includes the director, 2 associate directors, 3 district supervisory agents, an administrative assistant, an assistant to the director, 46 county agents—one in each county, 11 area agents, 47 associate county agents, 57 assistant county agents, and 62 agricultural specialists in agricultural economics, agricultural engineering, agronomy, 4-H club work, dairying, crop insects and diseases, cotton ginning, forestry, horticulture, animal science, marketing, poultry and turkeys, publications, community and resource development, soil conservation, visual instruction, and television.

The Extension Home Economics Staff includes a state home economics leader, 3 associate district supervisory agents, an assistant to the state home economics leader, 46 home economists—1 in each county—20 associate home economists, 44 assistant home economists, and 10 specialists in clothing, family life, 4-H club work, home management, consumer information, nutrition, housing, and house furnishings.

LIVESTOCK-POULTRY HEALTH DEPARTMENT

The Clemson University Livestock-Poultry Health Department is consolidated under one Director with the United States Department of Agriculture, Agricultural Research Service, Animal Disease Eradication Division, and is known as the State-Federal Livestock Disease Eradication Program. This department is charged with the control and eradication of contagious, infectious and communicable diseases of livestock and poultry, and with the inspection of meat and meat by-products at slaughtering and processing plants under state inspection. When requested investigations are made, con-
sultations are held and assistance in diagnosis is rendered. This department further organizes, develops, and carries on education programs for the control and eradication of diseases. Quarantine measures are employed to prevent, as far as possible, the introduction or spread of livestock diseases into this state.

The Clemson Livestock Laboratory, a fully equipped modern laboratory staffed with highly trained personnel, is maintained 14 miles northeast of Columbia on U. S. Highway No. 1, at the site of the Sandhill Experiment Station. This laboratory is prepared to assist veterinarians and owners of livestock and poultry in making post-mortem laboratory examinations and bacteriological and pathological studies to aid in the diagnosis of diseases. If necessary, sufficient equipment can be sent into the field to diagnose and control disease on the spot.

The administrative office is located in the Livestock Laboratory. Adequate records and identification of livestock are kept. A staff of veterinarians works from the Columbia office, and field veterinarians are located in various sections of the State. In addition to the regular field force of veterinarians directly connected with the Columbia office, practicing veterinarians are commissioned as State-Federal Accredited Veterinarians and assist in the eradication of infectious diseases of livestock. At present there are 132 veterinarians so commissioned and their locations are such that the Clemson University Livestock-Poultry Health Department is in a position to control and eradicate disease promptly and completely in all sections of the State.

This department is required by legislative enactment and supported by legislative appropriation.

THE SOUTH CAROLINA STATE CROP PEST COMMISSION

The act creating the State Crop Pest Commission was passed by the legislature in 1912. According to the act, five members of the Board of Trustees of Clemson University shall compose the Commission.

The purpose of the Commission is to prevent, as far as possible, the introduction into South Carolina of injurious plant pests and to limit the spread of those already within the State. The Commission is also charged with the enforcement of the Bee Disease Act and the South Carolina Economic Poison Law.

The work is performed by the promulgation and enforcement of certain rules and regulations which in the judgment of the Com-
mission are necessary to protect the agricultural interest of South Carolina. The enforcement of the regulations is the responsibility of the State Entomologist, State Plant Pathologist, and their agents.

**THE OFFICE OF ENGINEERING RESEARCH**

The Office of Engineering Research of Clemson University was established in the College of Engineering in July 1962. Its purpose is to coordinate and stimulate the research activities in the College of Engineering. These activities include the contribution of new knowledge in engineering science by prosecuting a vigorous program of basic research, the conduct of programs of developmental and applied research as a service to the industries of the State, and the determination of uses for the material resources of the State and thereby to encourage the growth of new industries.

The active research staff consists essentially of the faculty members of the College of Engineering and other divisions of the University. The laboratories of all departments, as well as the newly constructed 60,000-square-foot Rhodes Engineering Research Center, are available to the Office of Engineering Research in its investigations.

Research is the foundation for progress in a modern society. The well-equipped physical facilities and the thoroughly competent professional staff available to the Office of Engineering Research constitute extremely valuable resources for continuing and expanding this research effort.

**OFFICE OF INDUSTRIAL AND MUNICIPAL RELATIONS**

**COLLEGE OF ENGINEERING**

Seminars, workshops, institutes, short courses, and conferences are conducted for engineers of South Carolina and neighboring states. These activities are designed to keep the engineer abreast of changes in modern technology through a non-credit continuing engineering education program sponsored by the Departments of the College of Engineering.

The Office of Industrial and Municipal Relations, in close relation with each engineering department, determines the current need and coordinates the various programs.

Typical programs which have been presented include: “Why Machine Parts Fail,” “Experimental Stress Analysis,” “Graphics for Schools and Industry,” “Air and Water Pollution Control,” “Simulation and Control of Power Systems,” “Engineering Applications
of Digital Computing,” and “Quality Control and Materials Testing for Highway Engineers.”

All Engineering Departments participate in the Junior Engineers’ Scientists’ Summer Institute (JESSI) in which talented high school students receive a 2-week orientation in the Sciences and Engineering.

Refresher courses are coordinated for the National Engineers-in-training and the Professional Engineer examinations for engineers employed in the Piedmont region of South Carolina.

**TEACHER EDUCATION**

_Agricultural Education._ The members of the staff of Agricultural Education visit all beginning teachers for the purpose of assisting them on the job and also for the purpose of collecting information which may prove helpful in improving the work of teacher education at the University. In addition, conferences of teachers are held and consulting services made available in the interest of the professional growth of agricultural teachers, the rendering of service to agricultural communities, and the development of leadership among agricultural youth through the program of the Future Farmers of America.

Information concerning any phase of the in-service education activities in Agricultural Education may be secured by contacting the Head, Department of Agricultural Education, Clemson University.

_Trades and Industrial Education._ The University, in cooperation with the State Department of Education, is glad to assist those who teach vocational subjects in day trade schools and evening trade and industrial classes by supplying a trained man to assist in the work of organizing classes, organizing courses of study, making plans for teaching evening classes, and actually teaching vocational subjects. Requests for information regarding this service should be addressed to Dr. A. F. Newton, Head, Department of Industrial Education, Clemson University, Clemson, South Carolina 29631.

**SHORT COURSES AND CONFERENCES**

The facilities of the University are made available for special meetings, such as farm groups, rural ministers, religious organizations, and scientific societies; and arrangements are made for special short courses in poultry science, beekeeping, food preservation, cotton classing, dairy science, forestry, water supply and sanitation,
ornamental nurseries, etc. Such activities, undertaken in the interest of the general welfare, are encouraged by the University.

CERAMIC ENGINEERING FORUM

The Ceramic Engineering Department, in cooperation with North Carolina State University, sponsors an annual Ceramic Engineering Forum for Ceramic Manufacturers of the Southeast. The meeting place alternates between Clemson University and North Carolina State. This meeting is intended to provide the latest scientific and engineering developments pertinent to Ceramic Manufacturers and to provide a forum for the stimulation of creative thinking.
STUDENT REGISTER

PART VII
BACHELORS' DEGREES CONFERRED MAY 4, 1968

COLLEGE OF AGRICULTURE AND BIOLOGICAL SCIENCES

BACHELOR OF SCIENCE DEGREE

Agricultural Economics

<table>
<thead>
<tr>
<th>Name</th>
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<tbody>
<tr>
<td>Joseph McCord Bates, Jr.</td>
<td>Eastover</td>
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<tr>
<td>Allison Ervin Brown</td>
<td>Kingstree</td>
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<tr>
<td>Carlos Julio Garcia</td>
<td>Caracas, Venezuela</td>
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<td>Fred James Gassaway</td>
<td>Donalds</td>
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Agronomy

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<tr>
<td>Artemas Porcher Hane, Jr.</td>
<td>Ft. Motte</td>
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<td>Edgar Lowndes Ready III</td>
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Animal Science

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<tr>
<td>John Anthony Baker</td>
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<tr>
<td>Jerry Cox Glenn</td>
<td>Anderson</td>
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<td>Robert Tripp Merritt</td>
<td>Easley</td>
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<td>Mitchel Ozias Newton</td>
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Agronomy

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<td>David Millard Bartles</td>
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<td>Frank Warren Breazeale</td>
<td>Anderson</td>
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<td>Richard Phillip Dellingier</td>
<td>Marion</td>
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<td>Eddie Carroll DuRant, Jr.</td>
<td>Sumter</td>
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<tr>
<td>David Gragg Ebenhack</td>
<td>Aiken</td>
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<tr>
<td>James Thompson Hunter</td>
<td>Charlotte, N. C.</td>
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<td>John Elliott Kneee</td>
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Biology

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<tr>
<td>John David Lyle, Jr.</td>
<td>Walhalla</td>
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<tr>
<td>Brenda Donita Merck</td>
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<tr>
<td>James Joseph Poland</td>
<td>Pittsburgh, Pa</td>
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<tr>
<td>Arthur Laurie Pope</td>
<td>Hemingway</td>
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<td>Herbert Earle Riddle, Jr.</td>
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<tr>
<td>Teresa Charles Ritchie</td>
<td>Spartanburg</td>
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<td>Julian Ray Shockley, Jr.</td>
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<tr>
<td>Crispin Peter Spencer</td>
<td>Anderson</td>
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Dairy Science

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<th>Name</th>
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<tbody>
<tr>
<td>Claude Wayne Satterwhite</td>
<td>Newberry</td>
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Entomology

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<tr>
<th>Name</th>
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<td>Thomas Gordon Wilson</td>
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Forestry

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<td>Randall Ellis Brooks</td>
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<tr>
<td>William Gary Coleman, Jr.</td>
<td>Darlington</td>
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<tr>
<td>James Wayne Creech</td>
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<td>Philip Olin Epps</td>
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<td>James Miles Knight</td>
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Horticulture

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<tr>
<td>William Brunson Ballard</td>
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<tr>
<td>Reba Louise Carroll</td>
<td>Beaufort</td>
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SCHOOL OF ARCHITECTURE

BACHELOR OF ARTS DEGREE

Pre-Architecture

<table>
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<tr>
<th>Name</th>
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<tbody>
<tr>
<td>Patsy Irene Gallimore</td>
<td>Newton, N. C.</td>
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BACHELOR OF ARCHITECTURE DEGREE

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<thead>
<tr>
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<tbody>
<tr>
<td>George Jan Andreve</td>
<td>Greensboro, N. C.</td>
</tr>
<tr>
<td>Robert Evans Berman</td>
<td>Levittown, N. Y.</td>
</tr>
<tr>
<td>Robert Louis Caricato</td>
<td>Plainview, N. Y.</td>
</tr>
<tr>
<td>Jimmy Michael Cobb</td>
<td>Anderson</td>
</tr>
<tr>
<td>Leslie Linn Day</td>
<td>Wilmington, Del.</td>
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<tr>
<td>Andre George Fontaine</td>
<td>Agawam, Mass.</td>
</tr>
<tr>
<td>Donald Angus Gardner</td>
<td>Thomasville, Ala.</td>
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<tr>
<td>Donald Edward Golightly</td>
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<tr>
<td>Horace Russell Hopper</td>
<td>North Augusta</td>
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<tr>
<td>Morelle Cook Jones</td>
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<tbody>
<tr>
<td>William David Kelly, Jr.</td>
<td>Kingston</td>
</tr>
<tr>
<td>Arthur Joel Lidsky</td>
<td>Flushing, N.</td>
</tr>
<tr>
<td>John Marion Lineberger, Jr.</td>
<td>Greenville</td>
</tr>
<tr>
<td>Robert Carleton London</td>
<td>Johnson City, Ten</td>
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<tr>
<td>Richard Lowell Powell</td>
<td>Anderson</td>
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<tr>
<td>Benjamin Thomas Rook</td>
<td>Newberg</td>
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<tr>
<td>Harron Eugene Rudisill</td>
<td>Denver, N.</td>
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<tr>
<td>Donald Allen Sebastian</td>
<td>Washington, D.</td>
</tr>
<tr>
<td>Ted Howell Taylor</td>
<td>Columbia</td>
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<tr>
<td>John Pressley Watkins</td>
<td>Spartanburg</td>
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</tbody>
</table>
BACHELOR OF BUILDING CONSTRUCTION DEGREE

Aiken Hayne McDaniel .......... Aiken
Frank Wheeler Mondell, Jr. .... Weems, Va.

BACHELOR OF ARTS AND SCIENCES

COLLEGE OF ARTS AND SCIENCES

BACHELOR OF ARTS DEGREE

* Barbara Ann Alverson .......... Pelzer
  lenn Walter Ayers .......... Turtle Creek, Pa.
  ary Martin Bowen .......... Westminster
  avid Martin Wayne Brown .... Stevensburg, Va.
  once Neron Channell, Jr.
  arn Warner Robins, Ga.
  hristopher Shawn Clancy ........ Barnwell
  lonius Curtis Clinksciles III .... Greenville
  Joan Marie Combes .......... Pickens
  hnn Benjamin Dozier .......... Florence
  nva Cornelia Edens .......... Sumter
  mes Allen Finley .......... Laurens
  alph William French .......... Clemson
  ubert Samuel Gleaton III .... Springfield
  hilip Hartley Grant .......... Tampa, Fla.
  obert Melburn Guerrieri .......... Six Mile
  nes Elizabeth Mcgowan Higginbotham
  sument
  obert Sewall Householder, Jr. .. Ridge Spring
  ron Ellen Jackson .......... Huntington, N. Y.
  nan Elizabeth Lancianese .......... Greenville
  thleen Elizabeth Lawrence .......... Liberty
  mes McCrorey Lawton .......... Greenville
  mes Keith Lee .......... Charleston
  aegaret Elizabeth Mcarthur .......... North Augusta
  Wade Hampton Macie, Jr. ........ Winnsboro
  ontie Catherine Martin .......... Clemson
  enneth Marett Mattison .......... Clemson
  athryn McQuilkin Meadowcroft ........ Pikesville, Md.
  John Forrest Miller, Jr. .... Marianna, Ark.
  ristel Schonberg Minotti .......... Clemson
  Beverly Rose Norris .......... Gastonia, N. C.
  Janice Bolt Phillips .......... Anderson
  James Killis Phillips III .......... Belton
  Joe Allen Poston .......... Johnsonville
  Paulette Ann Prochaska ...... Lafayette, La.
  Charles Thomas Rogers .......... Denmark
  Clark Theodore Rogers .......... North Charleston
  Donald Lee Sain .......... Fort Mill
  William David Shirley .......... Williamston
  David Luther Sibert .......... Atlanta, Ga.
  Daniel Mouzon Smith .......... Edgefield
  Boston Miels Smith, Jr. .... Anderson
  Zachaeus Hatton Suber III .......... Whitmire
  Paul Wallner Thurston .......... Clemson
  James Lanier Wannamaker .... St. Matthews
  Keith Hopkins Waters .......... North Augusta
  Robert Hamilton Welborn .......... Anderson
  David Charles Whitney .......... Clemson
  David Horton Wilkins .......... Greenville

BACHELOR OF SCIENCE DEGREE

Chemistry

William Eugene Chandler III .......... Greenville
  James Paul Driscoll .......... Easley
  Barry Rufus Edwards .......... Greenwood
  George Little Johnson .......... Newberry
  Larry Hughey McAmish .......... Greenwood
  Kenneth Boone Wagener .......... Clemson

Mathematics

Joseph Larry Avant .......... Charleston
  ** Gordon Lee Bailes, Jr. .......... Greenwood
  obert Wolfe Comer .......... Union
  ry Alan DeFoster .......... Syracuse, N. Y.
  Robert Norris Ewell .......... Greenville
  h Michael Flynn .......... Charleston
  mes Alexander Fowler .......... Bennettsville
  eth Brown Grace, Jr. .......... Charleston
  mes William Helms, Jr. .......... Lancaster
  ohn Jasper Kimball III .......... Silver Spring, Md.
  ***Herbert Thomas Littlejohn III
  Edward Pinckney .......... Awendaw
  Charles William Probst II .... Montourville, Pa.
  ** Anthony Mario Scialdone
  * Linda Grace Sorrells .......... Seneca
  Harrell Hudson Whitfield, Jr. .... Greenville

Medical Technology

Mary Julia Hawkins .......... Hendersonville, N. C.
  Joseph Leighton Saunders .......... North Augusta

Physics

* Robert Lee Gardner .......... Cheraw
  ** David Boyce Greene .......... Greenville
  Larry Harwell Noble .......... Saxonburg, Pa.
  James Ronald Smith .......... Greer
  ** Richard Michael Williamson .......... Clemson

Note: The asterisk (*) indicates additional courses required for graduation.
William Deal Anderson III         Myrtle Beach
William Alan Axson                  Seneca
* Julius Wistar Babb III           Greenwood
* Edward Daniel Biggstaff III      Charleston
Paul Sigmund Bobinski               Darien, Conn.
William Seaphus Brewer, Jr.        Belton
*** Donna Simpson Cantrell        Westminster
* William Benjamin Clark III       Rock Hill
Arland Hasty compton, Jr.          Sumter
Richard Douthitt Davis             Inman
James David Dick                    Baltimore, Md.
* Michael Earl Donald               Seneca
John Wesley Freeman III            Greenville
Jonathan Coleman Glenn             Frogmore
Richard Earl Heath, Jr.            Greenville
Charles Frederick Kelley            Greenville

Pre-Medicine

Frank Norbert Roma III             Santurce, Puerto Rico
Robert Wyman Moss, Jr.            Charleston
* Charles Frank O'Chin            Orangeburg
George Darrell Orr                 Clinton
James Graham Padgett, Jr.          Columbia
Randolph Herbert Radke             New York City, N. Y.
* William Steven Ray               Charleston
Robin Bryan Rhodes                 Sumter
* James Dee Smith                  Belton
*** Charles Edward Stevenson      Jackson, N. J.
William Robert Stoddard, Jr.      Taylors
* John Howard Swirchord           Moncks Corner
Winfield Chamberlain Towsle         Mt. Pleasant
Ronald Edward Trescot             Charleston
* Michael Allen Watts              Camden
Rodger Norman Weller               Greenville
Richard Harold Wells               Anderson

ASSOCIATE IN ARTS DEGREE

Nursing

Deborah Massey Arnold              Greenwood
Joyce Elaine Bowman                 Iva
Andrea Fay Clinton                  Spartanburg
Beverly Ann Davis                   Wilmington, N. C.
Donna Louise Dolby                  Easley
Sherry Beth Gambrell                Belton
Terry Ann Hayes                     Belton
Phyllis Irene Houx                  Anderson
Mary Caroline Hughes                Honea Path
* Priscilla Kay Johnson             Scaly Mountain, N. C.
* Cynthia Richards Kahler           Kershaw
* Janice Melody Landers             Anderson

Jo Anne Latimer                    Anderson
Cheryl Louise Lee                   New Haven, Conn.
Kathryn Anne Lusk                  Honea Path
* Sylvia Ann McCentre               Cleveland, Ga.
Cheryl Anne Michel                  Greenville
Janie Elizabeth Neel                Williamsburg
Gloria Jean Rentz                   Greenwood
Merle Louise Singleton Reynolds     Newberry
** Beverly Ann Sanders             Spartanburg
Emmie Elizabeth Steadman           Moore
* Marian Dale Styron                Greenwel
Rickey Norris White                 Plum Branch
* Patsy Ann Wilson                  Belton

SCHOOL OF EDUCATION

BACHELOR OF ARTS DEGREE

Secondary Education

** Ralph James Bishop               Taylors
Dewey Clinton Craig                 Anderson
* Linda Jane Race                   Belvidere, N. J.

BACHELOR OF SCIENCE DEGREE

Agricultural Education

(Agricultural Education is jointly administered by the College of Agriculture and Biological Sciences and the School of Education.)

Don Kirkland Gannels             Clarkesville, Ga.
Carson Vereen Hardwick             Galivants Ferry
Larry Michael Keys                  Cartersville, Ga.
Roy Daniel Long                   Saluda

* Johnny William Nobles             Galivants Ferr
Jackie Rodgers Phillips            Pagegan
Keith Lee Smith                    Woodstock, Conn.

Industrial Education

Frederick Arnold Sargent           Lakeland, Fl.
George Charles Williams, Jr.      Hanah

Science Teaching

Lacy Harris Collins               North Charleston
John Michael Mandeville           Condon AFS, Oreg.

Thomas Arthur Merrell, Jr.        Myrtle Beach
John Ferdinand Willson, Jr.        Brooklawn, N.
COLLEGE OF ENGINEERING

BACHELOR OF SCIENCE DEGREE

(Agricultural Engineering is jointly administered by the College of Agriculture and Biological Sciences and the College of Engineering.)

Spartanburg

David Taylor Ballenger ----- Gray Court
James Luther Carpenter ----- Easley
da Fulton Fortson ----- Elberton, Ga.
hermon Laverne Gibbons, Jr.

Spartanburg

Evans Allen LaRoche, Jr. ----- Anderson
** Charles Richard Reese ----- Union
Richard Baxter Scott ----- Spartanburg
Leonard Anthony Senerote, Jr. ----- Belvedere

Columbia

David William Detwiler ----- Columbia
William Daniel Holder ----- Greenwood
** Richard Wayne Rice ----- Greenwood
James Merle Rieker ----- Lansdale, Pa.
William Macon Sheppard ----- Orangeburg
* Dave Robinson Stokely, Jr. ----- Kingsport, Tenn.

Rowesville

Clemson

* Neil Arden Smoak ----- Orangeburg
Wayne Anthony Sturgis ----- North Augusta
Lawrence Charles Troapea, Jr. ----- Buffalo, N. Y.
Ted Stennett Valentine ----- Jackson
Daniel Bailey Vaughan ----- Anchorage, Alaska
James Charles Ward ----- Lugoff
William Floyd Wolter ----- Asheville, N. C.
John Mack Woods, Jr. ----- Greenville

Laurens

Newberry

George Wilson Jenkins ----- Simpsonville
* Sidney Prentiss Kersey, Jr. ----- Chester
Warren Edward Leddon ----- Columbia
Jerry Nelson McMullan ----- Miami, Fla.
Allen Brown Meaders ----- Greenville
William Hugh Millen ----- Chester
* Charles Bradford Nelson ----- Ninety Six
* Robert Sidney Rearden, Jr. ----- North Augusta
Michael Eugene Rice ----- Greer
Frederick Hobbs Robbins ----- Coral Gables, Fla.
William Carl Smyre, Jr. ----- Columbia
** James Wayne Steiffe ----- Greenwood
** Gary Thomas Whitfield ----- Anderson
Claude Donald Wilson ----- Anderson

Columbia

Ripley, Ohio

Industrial Engineering

Richard Donald Trapp ----- Hanahan

Clemson

Electrical Engineering

Robert Daniel Bowen ----- Ripley, Ohio
William Martin Boyce ----- Cross Hill
Vilter Richard Brandt ----- Walhalla
lex Grady Gamble III ----- Chattanooga, Tenn.
* James Rhett Hendricks, Jr. ----- Pelzer
James Francis Jackson ----- Downingtown, Pa.
Arthur Donald Krudener ----- Bradfordwoods, Pa.
Marion Clare Miller Cox ----- Greer

Columbia

Chemical Engineering

*David William Detwiler ----- Columbia
William Daniel Holder ----- Greenwood
** Richard Wayne Rice ----- Greenwood
James Merle Rieker ----- Lansdale, Pa.
William Macon Sheppard ----- Orangeburg
* Dave Robinson Stokely, Jr. ----- Kingsport, Tenn.

Greer

Richard Donald Trapp ----- Hanahan

Industrial Engineering

Mechanical Engineering

* Sheldon Moseley Jeter ----- Carlisle
Francis Martin King, Jr. ----- Greenville
Joe Albert McCarty ----- Columbia
** Carl Donner Nelson, Jr. ----- Charleston
John Anthony Pearce ----- North Augusta
Philip Brian Pegram ----- Coral Gables, Fla.
William Morriss Putnam, Jr. ----- Greenville
* Robert Ray Wilson ----- Anderson

Laurens

Geoffrey Dixon Beam ----- Charlotte, N. C.

Spartanburg

James Allen Marler ----- Fountain Inn

Spartanburg

John Quincy Adams III ----- Charleston
William Haynes Barnett ----- Campobello
Ienn Wayne Brannen ----- Great Falls
enry Clayborne Cranford, Jr. ----- Norwood, Ga.
Joseph William Culp ----- Rock Hill
Marion Daniel Hancock II

Durham

Richmond

Winston-Salem, N. C.

** Sheldon Moseley Jeter ----- Carlisle
Francis Martin King, Jr. ----- Greenville
Joe Albert McCarty ----- Columbia
** Carl Donner Nelson, Jr. ----- Charleston
John Anthony Pearce ----- North Augusta
Philip Brian Pegram ----- Coral Gables, Fla.
William Morriss Putnam, Jr. ----- Greenville
* Robert Ray Wilson ----- Anderson

Laurens

Theodore Dixon Beam ----- Charlotte, N. C.
**SCHOOL OF INDUSTRIAL MANAGEMENT AND TEXTILE SCIENCE**

**BACHELOR OF ARTS DEGREE**

**Arts and Sciences**

<table>
<thead>
<tr>
<th>Name</th>
<th>City</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>James Warren Addison</strong></td>
<td>Fairfax, Ala.</td>
</tr>
<tr>
<td>Oscar Allen Alexander</td>
<td>Darlington</td>
</tr>
<tr>
<td>Wise Henry Batten</td>
<td>Estill</td>
</tr>
<tr>
<td>William George Bentley</td>
<td>Atlanta, Ga.</td>
</tr>
<tr>
<td>Edward Allen Boyd</td>
<td>Spartanburg</td>
</tr>
<tr>
<td>Frank Howell Chapman</td>
<td>Saluda</td>
</tr>
<tr>
<td>Jackson Edward Fields, Jr.</td>
<td>Rock Hill</td>
</tr>
<tr>
<td>Donald Asendorf Harper</td>
<td>Andrews</td>
</tr>
<tr>
<td>Harold Herbert Harrison, Jr.</td>
<td>Greenville</td>
</tr>
<tr>
<td><em>John Aiken Horton III</em></td>
<td>Durham, N. C.</td>
</tr>
<tr>
<td>Stephen Ford Hutchinson</td>
<td>Summerville</td>
</tr>
<tr>
<td>Stephen Lane Jones</td>
<td>Andrews</td>
</tr>
<tr>
<td>Clifford Bruce Kavan</td>
<td>Garden City, N. Y.</td>
</tr>
<tr>
<td>Robert Frank Kolb II</td>
<td>Liberty</td>
</tr>
<tr>
<td><em>Joseph Barry McCracken</em></td>
<td>Branchville</td>
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<tr>
<td>John Paul Mattison</td>
<td>Anderson</td>
</tr>
<tr>
<td>John Michael Milam</td>
<td>Sandy Springs</td>
</tr>
<tr>
<td>Christopher Gill Olson</td>
<td>Clemson</td>
</tr>
<tr>
<td>John Elliott Parker</td>
<td>Hampton</td>
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<tr>
<td>Douglas Edward Patterson</td>
<td>Anderson</td>
</tr>
<tr>
<td>Adger Smyth Reeves</td>
<td>Greenville</td>
</tr>
<tr>
<td>Eugene Corrington Robinson</td>
<td></td>
</tr>
</tbody>
</table>

**BACHELOR OF SCIENCE DEGREE**

**Industrial Management**

<table>
<thead>
<tr>
<th>Name</th>
<th>City</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cecil Wayne Bell</td>
<td>Greenwood</td>
</tr>
<tr>
<td>Edward Kenneth Burdette III</td>
<td>Charleston</td>
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<tr>
<td><em>Cabot Robison Caskie</em></td>
<td>Arlington, Va.</td>
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<tr>
<td>Ernest Altman Commins</td>
<td>Charleston</td>
</tr>
<tr>
<td>William Bruce Cutts</td>
<td>Georgetown</td>
</tr>
<tr>
<td>Raymond Wayne Davies</td>
<td>Saddle Brook, N. J.</td>
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<tr>
<td>John Alan Dickerson</td>
<td>Hartwell, Ga.</td>
</tr>
<tr>
<td>Michael Claude Farmer</td>
<td>LaFrance</td>
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<td>Perrin Thompson Cleaton</td>
<td>Columbia</td>
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<tr>
<td>Foster Scott Hardigree</td>
<td>Hartwell, Ga.</td>
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<tr>
<td>Roger Michael Hazelwood</td>
<td>Hamilton, Ohio</td>
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<tr>
<td>Lykes Shelton Henderson, Jr.</td>
<td>Clinton</td>
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<tr>
<td><em>John Lawton Jeffcoat, Jr.</em></td>
<td>Swansea</td>
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<tr>
<td>Bruce Lowell Kalley</td>
<td>Rockville Center, N. Y.</td>
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<tr>
<td><em>Edward Eostick LaRoche, Jr.</em></td>
<td>Gray Court</td>
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<tr>
<td>Floyd Shealy Long</td>
<td>Mauldin</td>
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<tr>
<td>Joe Hinson Lynn</td>
<td>Lancaster</td>
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<tr>
<td>Peter Campbell McKinney</td>
<td>Denmark</td>
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<tr>
<td>William Earl Pinson, Jr.</td>
<td>Ware Shoals</td>
</tr>
<tr>
<td>Victor Hudson Poore</td>
<td>Marietta</td>
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<tr>
<td>Marion Graham Pritchard, Jr.</td>
<td></td>
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<tr>
<td>Marion Douglas Rice</td>
<td>Chesapeake Beach, Md.</td>
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<tr>
<td>Benny Carlton Smith</td>
<td>Clinton</td>
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<tr>
<td>John Edgar Stepp</td>
<td>Williamson</td>
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<tr>
<td><em>Kenneth Stephenson Stepp</em></td>
<td>Clemson</td>
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<tr>
<td><em>Jerry Wayne Vaughn</em></td>
<td>Lancaster</td>
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<tr>
<td>Robert Milton Wilder, Jr.</td>
<td>Anderson</td>
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**Textile Chemistry**

<table>
<thead>
<tr>
<th>Name</th>
<th>City</th>
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<tbody>
<tr>
<td>George Dukes Crosby</td>
<td>Walterboro</td>
</tr>
</tbody>
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**Textile Management**

<table>
<thead>
<tr>
<th>Name</th>
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<tbody>
<tr>
<td>John Gary Grubbs, Jr.</td>
<td>Greenville</td>
</tr>
<tr>
<td>James Richard Hinson</td>
<td>Lancaster</td>
</tr>
<tr>
<td>Stephon Spencer McCrorey</td>
<td>Rock Hill</td>
</tr>
<tr>
<td>Philip Nelson Odom, Jr.</td>
<td>Charleston</td>
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<tr>
<td>David Milton Wilkinson</td>
<td>Charlotte, N. C.</td>
</tr>
</tbody>
</table>

**Textile Science**

<table>
<thead>
<tr>
<th>Name</th>
<th>City</th>
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<tbody>
<tr>
<td>Dennis Ryan Bozard</td>
<td>Bennettsville</td>
</tr>
</tbody>
</table>

**Textiles**

<table>
<thead>
<tr>
<th>Name</th>
<th>City</th>
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<tbody>
<tr>
<td>Fred Keith Linder</td>
<td>Clifton</td>
</tr>
<tr>
<td>James Michael Marcengill</td>
<td>Williamson</td>
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<tr>
<td>Jerry Code Parker</td>
<td>Cades</td>
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<tr>
<td>Richard Edward Phillips, Jr.</td>
<td>Chester</td>
</tr>
<tr>
<td>William Melvin Sharp</td>
<td>Honea Path</td>
</tr>
</tbody>
</table>

* With honor
** With high honor
*** With highest honor
† With departmental honors
MASTERS' DEGREES CONFERRED MAY 4, 1968

COLLEGE OF AGRICULTURE AND BIOLOGICAL SCIENCES

MASTER OF SCIENCE DEGREE

Agricultural Economics
William Rufus Clayton Columbia
John David Mckittrick Ninety Six

Agronomy
Robert Lorin Stephens Dillon

Animal Science

Thomas Mikell Leland Summerville
James Leland Summerville
William Chad Stanford Greer

Entomology

Philip High Darst Pinehurst, N. C.
Harry Chad Stanford Greer

Forestry
Francis Asbury Lawton, Jr. Greenville

Horticulture

Charles Dwain Altman Gresham
James Ralph Ballington, Jr. Lexington

Microbiology

Dwain Lemuel Anderson Greenville
Noel McKay Hurley Lancaster

Plant Pathology

Alfred Arthur Graves Naples, Fla.
James Frederick Moore, Jr. Louisa, Ky.

Zoology

Dennis Woodrow Newton, Jr. Newberry
Colleen Louise Rose Charleston Heights
Fred Gray Shealy, Jr. Seneca

SCHOOL OF ARCHITECTURE

MASTER OF ARCHITECTURE DEGREE

Charles Frederick Bischoff Mobile, Ala.
John Thomas Pfiegl Cincinnati, Ohio

COLLEGE OF ARTS AND SCIENCES

MASTER OF ARTS DEGREE

English

William Plews Baldwin III McClellanville
by Hutcheson Steele Greenville

Ann Marie Young Ft. Lauderdale, Fla.

MASTER OF SCIENCE DEGREE

Chemistry

John Landrine Eggers Boone, N. C.
William Thomas Hendrix, Jr. Spartanburg

Thomas Roch Nasser III Fall River, Mass.
Bruce Coleman Rudy Harrisburg, Pa.
<table>
<thead>
<tr>
<th>Mathematics</th>
<th>Master of Agriculture Education Degree</th>
</tr>
</thead>
<tbody>
<tr>
<td>Stephen Flythe Buff.. Rutherfordton, N.C.</td>
<td>Bill Larry Neal, Metairie, La.</td>
</tr>
<tr>
<td>John Benjamin Cartledge.. College Park, Ga.</td>
<td>William Jawoyne Padgett, Pickens</td>
</tr>
<tr>
<td>Marlin Don Logan.. Decatur, Ala.</td>
<td></td>
</tr>
</tbody>
</table>

**SCHOOL OF EDUCATION**

**Master of Agricultural Education Degree**

(Agricultural Education is jointly administered by the College of Agriculture and Biological Sciences and the School of Education.)

David Nielson Coile.. Lakeland, Fla.

**Master of Education Degree**

| Jacob Patrick Cromer, Jr., Seneca          | Nancy Larsen Turner, Greenville       |
| Martha Ray Sullivan, Anderson             |                                        |

**COLLEGE OF ENGINEERING**

**Master of Science Degree**

(Agricultural Engineering is jointly administered by the College of Agriculture and Biological Sciences and the College of Engineering.)

William Kenneth Whitehead.. Comer, Ga.

<table>
<thead>
<tr>
<th>Ceramic Engineering</th>
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<tbody>
<tr>
<td>John Fields Duncan, Berea, Ohio</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Chemical Engineering</th>
</tr>
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<tbody>
<tr>
<td>Leslie Jerome Cribb, Sumter</td>
</tr>
<tr>
<td>Robert Vincent Hendriks, Jr., Georgetown</td>
</tr>
<tr>
<td>Prakash Ramchand Mulchandani, Bombay, India</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Civil Engineering</th>
</tr>
</thead>
<tbody>
<tr>
<td>Willard Wayne Ganter, New Martinsville, W. Va.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Environmental Systems Engineering</th>
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<tr>
<td>Leonard John Hasty, Jr., Camden</td>
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</table>

<table>
<thead>
<tr>
<th>Mechanical Engineering</th>
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<tr>
<td>James Webb White, Rock Hill</td>
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</tbody>
</table>

**SCHOOL OF INDUSTRIAL MANAGEMENT AND TEXTILE SCIENCE**

**Master of Science Degree**

<table>
<thead>
<tr>
<th>Industrial Management</th>
</tr>
</thead>
<tbody>
<tr>
<td>Elmer Earl Burch, Jr., Spartanburg</td>
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<tr>
<td>Frederick Hayes Cone III, Cincinnati, Ohio</td>
</tr>
<tr>
<td>Leon James Hendrix, Jr., Ridgeland</td>
</tr>
<tr>
<td>Thomas Kent Langley, Greenwood</td>
</tr>
<tr>
<td>Klaus Reiner Konrad Schumann</td>
</tr>
<tr>
<td>Konstanz, Germany</td>
</tr>
</tbody>
</table>
DOCTORS' DEGREES CONFERRED MAY 4, 1968

COLLEGE OF AGRICULTURE AND BIOLOGICAL SCIENCES

DOCTOR OF PHILOSOPHY DEGREE

Agronomy

Donald Austin Addison ........................................ Haines City, Fla.
B.S., University of Florida; M.S., Clemson University
Dissertation: Effects of Soil Microorganisms and Soil Properties on the Dissipation of Selected Pesticides

Charles Richard Lee ........................................ North Tarrytown, N. Y.
B.S., University of Tampa; M.S., Clemson University
Dissertation: Factors Affecting Plant Growth in High Zinc Media

Entomology

B.A., Shorter College; M.S., Clemson University
Dissertation: Potential of Aleochara tristis in Controlling the Face Fly

Nutrition

Leon William Davis ........................................ Parchment, Mich.
B.S., Rutgers University; M.S., Clemson University
Dissertation: Biochemical and Biological Evaluation of High-Protein Inbred Lines of Corn

Robert Myron Lavker ........................................ White Plains, N. Y.
B.S., University of Delaware; M.S., Clemson University
Dissertation: Fine Structure of Bovine Fore-Stomach Mucosa

Plant Pathology

Duangchai Choopanya .......................................... Bangkok, Thailand
B.S., Chulalongkorn University; M.S., Clemson University
Dissertation: Studies on Peanut Stunt Virus on Trifolium Species, especially Trifolium repens L

Zoology

Jane Austell Wilson ........................................ Gaffney
B.S., Limestone College; M.S., Clemson University

COLLEGE OF ARTS AND SCIENCES

DOCTOR OF PHILOSOPHY DEGREE

Chemistry

Jerry Thomas Charles ......................................... Spartanburg
B.S., Wofford College
Dissertation: Alkali Metals in Liquid Ammonia

Robert Austin Lloyd, Jr. ..................................... High Point, N. C.
B.S., High Point College; M.S., Clemson University
Dissertation: On the Configurational Stability of Ketenimines
John Hughes Reynolds IV ............................ Winston-Salem, N. C.
B.A., Shorter College; M.S., Clemson University
Dissertation: Reaction of Oxygen Atoms With Some Substituted Cyclopropanes

Physics

Ronald Henry Fowler .................................. Athens, Ga.
B.S., University of Georgia; M.S., Clemson University
Dissertation: A Theoretical Study of Three-Body Effects in Fluids and Bound Dimer Concentrations in Rare Gases

Randolph Earl Longshore ................................ Greenwood
B.S., M.S., Clemson University
Dissertation: Electron Irradiation and Isochronal Annealing of Single Crystals of Aluminum at Low Temperatures

SCHOOL OF INDUSTRIAL MANAGEMENT AND TEXTILE SCIENCE

DOCTOR OF PHILOSOPHY DEGREE
Engineering Management

Philip Foy Rice ........................................ Pine Bluff, Ark.
B.S., M.B.A., University of Arkansas

COLLEGE OF ENGINEERING

DOCTOR OF PHILOSOPHY DEGREE
Engineering

Kenneth Robert Dunipace ............................ Boulder, Colo.
B.S., The Ohio State University; B.S., Massachusetts Institute of Technology; M.S., University of Florida
Dissertation: Optimization of Control Systems Having Cross-correlated Signals (Field of Specialization: Electrical Engineering)

Eugene Perritt Willimon, Jr. ........................ Spartanburg
B.S., M.S., Clemson University
Dissertation: Application of the Multi-Stage System to a Biological Waste Treatment Process (Field of Specialization: Bio-Engineering)
HONORARY DEGREES CONFERRED MAY 4, 1968

DOCTOR OF SCIENCE DEGREE

Herman John Nimitz .......................... Cincinnati, Ohio

DOCTOR OF LAWS DEGREE

Ernest Mason Allen ................................ Bethesda, Md.

Wilbur Daigh Mills ................................ Kensett, Ark.

James Pierce Mozingo III .......................... Darlington, S. C.

Robert Edward Toomey .......................... Greenville, S. C.

DEGREES AWARDED IN 1968 BY MAJOR COURSES

ASSOCIATE DEGREES AWARDED IN 1968

College of Arts and Sciences .................................. 25
  Nursing .................................. 25

Total Associate Degrees Awarded in 1968 .................................. 25

BACHELORS' DEGREES AWARDED IN 1968

College of Agriculture and Biological Sciences .................................. 99
  Agricultural Economics .................................. 12
  Agronomy .................................. 7
  Animal Science .................................. 14
  Biology .................................. 35
  Dairy Science .................................. 3
  Entomology .................................. 1
  Food Science .................................. 3
  Forestry .................................. 15
  Horticulture .................................. 8
  Poultry Science .................................. 1

School of Architecture .................................. 39
  Architecture .................................. 27
  Building Construction .................................. 6
  Pre-Architecture .................................. 6
BACHELORS' DEGREES CONFERRED DEC. 19, 1968

COLLEGE OF AGRICULTURE AND BIOLOGICAL SCIENCES

BACHELOR OF SCIENCE DEGREE

Agricultural Economics

Belton Kelly Smith ____________ Hartsville

Agronomy

Thomas Cooper Bishop __________ Kingstree
Charles Edward Mills ___________ Clarks Hill

Henry McCall Swink ____________ Effingham

Animal Science

Lewis Robert Beckham __________ St. Matthews
*Clyde Robert Cone ____________ Ridge Spring

Walter Kirkland Fosser, Jr. __________ Cameron
James Michael Thomas ___________ Hampton

Biology

David Roy Alverson ____________ Spartanburg
**Shelley White Barbary __ Washington, D. C.
John Alex Bass ________________ Helena, Ga.
George Russell Creech ___________ Charleston
Joseph Edwin Evans ____________ Murfreesboro, N. C.
Henry Pinckney Moore III _______ Orangeburg

Maida Anne Owen ____________ Berkeley, Calif.
*Linda Fay Ridgeway ___________ Greenville
Herbert Wayne Smith, Jr. __________ Spartanburg
John Francis Suber ____________ Holly Hill
Charles George White, Jr. __________ Greenwood

Food Science

Joseph Conrad Leyh, Jr. __________ North Charleston
*Bill Dale Roebuck ____________ Marysville, Ohio

Karl E. Weingartner __________ New York, N. Y.

Forestry

Gerald Ingersoll Carlson II ______ Chalkhill, Pa.

Robert Harvey Ford __________ Great Falls

Horticulture

*Rembert Clark DuBose ___________ Ridge Spring
*Tristan Albert DuBose __________ Monetta

Anna Kathryn Martin __________ North Charleston

SCHOOL OF ARCHITECTURE

BACHELOR OF ARTS DEGREE

Pre-Architecture

Thomas Crisp Hipp ____________ Spartanburg
John Butler LaFoy ____________ Greenville

Russell John Morse ___________ Turtle Creek, Pa.

BACHELOR OF ARCHITECTURE DEGREE

Richard Lynn Doane __________ Kingsport, Tenn.
John Albert Hemphill ___________ Charlotte, N. C.
Richard Lee Nygard ____________ Duluth, Minn.

Warren North Patterson __________ Greenwood
Sven Ulvedal ___________ Stamford, Conn.

BACHELOR OF BUILDING CONSTRUCTION DEGREE

William Blaine Beauchene _______ Summerville

Henry Albert Garbelman __________ Oxon Hill, Md.

COLLEGE OF ARTS AND SCIENCES

BACHELOR OF ARTS DEGREE

Brenda Gall Addis ____________ Walhalla
*Bjorn Arne Ingvar Anzen __ Fagersta, Sweden
Martha Carrie Atkins __________ Boonville, Ind.
Furman Daniel Bryant __________ Sumer
Philip Arrington Chovan __________ Clinton, Md.
Linda Sue Fowler ____________ Ft. Lee, Va.
Evangeline Becky Georgeo ____________ Mt. Pleasant
Nelson Kinsey Gibson ____________ Hartsville
*Frances Nash Harmon ___________ Clemson
Patrick Ryan Hawkins __________ Greer
*Madeline Morgan Knowles __ Spartanburg
Grayson Poats Lane ___________ Clemson
**Kathy Harrell Merritt ___________ Clemson
Benjamin Thomas Michael ___________ Clemson

*Jerry Arthur Mobley __________ North Charleston
Alan Frederick Mohrmann __ Ridge Manor, Fla
Donna Divincenzo Moore

_____________________________ Bowling Green, Ky.
Marilyn Ann Ott ____________ Greenville
Richard Alan Pederson ___________ Alexandria, Va.
Jeffrey King Randel ___________ Clemson
Mathias Bealy Richardson __________ Pendleton
Carol Thompson Rodgers __________ Greenville
***Margaret-Sara Uller __________ Miami Beach, Fla.
Michael William Vento III __________ Beaver, Pa.
*Dolores Ann Violette __________ Lake City
Wilbert Ronald Williams __________ Camden
BACHELOR OF SCIENCE DEGREE

Geology

Terry Lowell Jackson Greenville
Frank Xavier Kuhn III Springfield, Va.

Mathematics

William Dever Davis Gaffney
John Henry Reeves, Jr. Greenville

Medical Technology

Emma Jane Buckland Boone, N. C.

Physics

*Herbert Eugene Boyd, Jr. West Asheville, N. C.

Pre-Medicine

Richard Lemont Dales Columbia
Paul Douglas Fernandez Englewood, N. J.
Charles Rogers Hook Manning
William Jay McAninch Spartanburg

SCHOOL OF EDUCATION

BACHELOR OF ARTS DEGREE

Elementary Education

**Susan Lindsay Bishop Clemson
Teresa Francine Matthews Greenville
Rebecca Timmerman Payne Greenville

**Sally Masters Seigler Anderson
***Elizabeth Lewis Stanzione Hartsville
Jean Tooley Wade Duncan

Secondary Education

Richard Glenn Dodson Piedmont
Kary Ellen Fins Columbia
Kristen Maureen Garrett Spartanburg
Rika Andrea Heller Columbia

BACHELOR OF SCIENCE DEGREE

Agricultural Education

(Agricultural Education is jointly administered by the College of Agriculture and Biological Sciences and the School of Education.)

John Robert Crawford Saluda
Roger Dale Hayes Travelers Rest
Joy Patton McFadden Catawba
Richard Lewis Minchew Saluda

Richard Himes Bellflower Asheville, N. C.
Samuel Hilton Bishop Spartanburg
Marshall Wayne Condrey Inman
Dundell Bellinger Goregte III Easley

Industrial Education

George Henry Theodore Hoffmeyer Florence
Samuel Boyd Sexton Woodruff
Jimmy Dunlap Snoddy, Jr. Wellford

Recreation and Park Administration

Island Earle Anderson, Jr. Clemson
George Franklin Baughman Abbeville
Wallace Charlton Brittain Hendersonville, N. C.
James Harley Burton Leesville
David Martin Hansen Charleston

Science Teaching

Van French Kelley III North Charleston

James Hiram Lowe Edgefield
COLLEGE OF ENGINEERING

BACHELOR OF SCIENCE DEGREE

Ceramic Engineering
John Frederick Alexander, Jr. ....... Clemson
Gary Robert Alfred ............ Easley
Johnny Hopper Blackmon ......... Lancaster
Woods Wannamaker Burnett ....... Columbia

John Weston Cotton ............ Columbia
Kenneth Rodney Dunham ......... Nutley, N. J.
Ben Colclough Jeffords .......... Orangeburg
James Edmond Vissage, Jr. .... Greenville

Chemical Engineering
Albert Eugene Johnston III .... Greenville

Lewis Eldridge Aston ......... Charleston Heights
Michael Keith Bantz .......... North Charleston
Robert Field Binford, Jr. ....... Charleston
Muhammad Tufail Chaudhri ......... Lahore, West Pakistan
Thomas Joe Coyle ............ Easley
Charles Richard Donohoe ......... Pendleton, S. C.
Robert Fredrick Edmonds, Jr. ..... Pickens
Robert McPherson Glenn, Jr. .... Hartwell, Ga.

George Frank Bell, Jr. ............ Hartsville
Norbert John Borke, Jr. ............ Charleston
James Howard Brandon, Jr. ....... Clover
Arthur Franklin Cochcroft, Jr. .... Newberry
Patrick Warren Huntley ......... Asheville, N. C.
Kenneth Morrison ............. Anderson
William Ray Phillips, Jr. ............ Taylor, S. C.

Emile N. Rasheed ............ Bett Mery, Lebanon
John Felix Shouse, Jr. ............ Clemson
Andrew Paul Smith, Jr. .......... Pinopolis
*Kip Jerry Townsend ........... Abbeville
James Harold Tuck ............ Greenville
James Uzell Watts III .......... Darlington

Industrial Engineering
Donald Floyd Collins ........... Toccoa, Ga.
Richard Allan Conklin .......... Clearwater, Fla.
Charles Dean Hardister ............ Easley

Herbert Alford Johnson, Jr. .... Simpsonville
*Karl Franklin Stroup .......... Gastonia, N. C.

Mechanical Engineering
Roy Henry Bredal, Jr. ............ Spartanburg
Roland Lee Brown ............... Spartanburg
John Steven Coons ............. Glenview, Ill.
John Daniel Fralick ............ Walterboro
Theodore Edward Jones, Jr. ...... Anderson
Robert Cranston Justis, Jr. .... Wilmington, Del.
Thomas Preston Lane, Jr. ........ Greenville
*Lynn Robert Lease ......... Clemson
Thomas Broome Lee .............. North Augusta

Eldon David Luft ............ Penrose, N. C.
Kenneth Michael Montjoy .. Woodruff
Thomas Clifton Newman .......... Sumter
Robert Edward Pruett ............ North Augusta
William Evans Reynolds, Jr. .... Sumter
David Elwood Strickland .......... Jacksonville, Fla.
Joseph Jordan Tankersley .......... Greenville

SCHOOL OF INDUSTRIAL MANAGEMENT AND TEXTILE SCIENCE

BACHELOR OF ARTS DEGREE

Arts and Sciences
William Charles Biediger ........ Greenville
Harry Frederick Byers, Jr. .... Hendersonville, N. C.
David Lee Campbell .............. Haddonfield, N. J.
Dennis Gerald Danko .......... Pittsburgh, Pa.
James William Engram ........ Columbia
Gary William Engstrom .......... Cedar Grove, N. J.
Jack William Erter, Jr. .......... Sumter
Hans Charles Otto Feige ........ Ft. Lauderdale, Fla.
James Curtis Floyd ............. Georgetown
Calvin Lewis Hudson .......... Asheville, N. C.
Larry Ronald Huffman ............ Greenville
Harold Lemoine Johnson ........ Alexandria, Va.

Wiley Harris Johnson, Jr. ........ Spartanburg
Robert Joseph King ............. River Edge, N. J.
Jerry Eugene McGee ............ Langley AFB, Va.
Kenneth Vander Madren, Jr. ...... Charleston
Roger Leroy Pedrick .......... Anderson
Daniel Harlan Rhodes .......... Anderson
Bruce Trimble Rhyme .......... College Park, Ga.
Truman David Roper ............ Columbia
Jon Emmett Shuler ............ Clemson
Jack Bruce Sweirling .......... Belleville, N. J.
Douglas Len Walker ............. Kershaw
BACHELOR OF SCIENCE DEGREE
Industrial Management
Russell Hiles Abernethy ..... Garden City Beach
       Peter William Angelakos ..... Laurens
       Larry Kay Aughty ..... Lyman
       John Randolph Bettis, Jr. ..... Charleston
       Gay Craft Bobo ..... Anderson
       Thomas Olin Brock ..... Hodges
       Harvey Ronnie Burgess ..... York
       Charles Fredrick Busch ..... Walhalla
       Dwight Benton Cochran ..... Ware Shoals
       Carol Duckett Copeland ..... Clinton
       James Franklin Cox III ..... Charleston
       Peter Alexander Crawford ..... College Park, Ga.
       William Lloyd Crosby ..... Cedar Grove, N. J.
       Joseph Edgar Crosland, Jr. ..... Greenville
       James Harvey Evans ..... Charleston Heights
       William Folk Evans, Jr. ..... Alexandria Va.
       Timothy Powell Finn ..... Greenville
       James Felton Folsom ..... Adel, Ga.
       Elbert Elmor Gilliard ..... Greenville
       Thomas Elmo Hall ..... Martinsville, Va.
       Keith Frederic Heintz ..... New Providence, N. J.
       John Kirkland Hind ..... Clemson
Charles Henry Houck ..... Allendale
       Michael Ralph Howard ..... Apollo, Pa.
       Charles Wesley Hunter ..... Hendersonville, N. C.
       William Joseph James ..... Toms River N. J.
       Daniel Ray Johnson ..... Augusta, Ga.
       Ronald Wayne Jones ..... Greenville
       Michael Sidney Lipscomb ..... Roebuck
       George Michael Long ..... Augusta, Ga.
       Gerald Kenneth McAllister ..... Anderson
       Michael Fleming Mickelson ..... Perry, Fla.
       James Arthur Mischke ..... Columbia
       Jimmy Earl Nolan ..... Easley
       Hodgdon Christian Nuckols, Jr. ..... Columbia
       Lester Pete Sherbert ..... Woodruff
       Gilmer Lee Snipes, Jr. ..... Seneca
       Carl Leslie Tarpley II ..... North Charleston
       Henry Stephen Trammell ..... Charlotte, N. C.
       Jerry Eugene Trapnell ..... Metter, Ga.
       Gerald Luther Truluck ..... Lynchburg
       Bob Louis Wielenga ..... Paterson, N. J.

Textile Chemistry
Paul John Kozma ..... Staten Island, N. Y.
       Robert William Millar ..... Pickens

Textile Management
William Joseph Kennedy III ..... Beaufort

Textiles
Ioland Lee Connelly ..... Spartanburg
       Lawrence Oliver Goldstein ..... Spartanburg
       Raymond Dean McDonald ..... Rock Hill
       Herbert Bays Moore, Jr. ..... Rock Hill
       Victor Neil Robertson ..... Taylors
       Roy Allen Smith ..... Pageland

*With honor
**With high honor
***With highest honor

MASTERS' DEGREES CONFERRED DEC. 19, 1968
COLLEGE OF AGRICULTURE AND BIOLOGICAL SCIENCES

MASTER OF SCIENCE DEGREE
Agricultural Economics
Clayton Grant ..... Dahlonega, Ga.
       John William McAlhany ..... Reevesville

Agronomy
Charles William Robinson ..... McDonald, Pa.

Entomology
Allan Travers Bullard ..... Mount Kisco, N. Y.

Forestry
Woodrow Greene Strock, Jr. ..... Cope

Horticulture
Larry Julian Smith ..... Lake View
       James Brice Waters ..... Rodman

Zoology
William Kenneth Reisen ..... Little Silver, N. J.
       Pamela Jean Ely Rhyne ..... Narberth, Pa.
       Lawrence Harvey Robinson ..... Columbia
SCHOOL OF ARCHITECTURE
MASTER OF ARCHITECTURE DEGREE
John Murphy Crowell Columbia

COLLEGE OF ARTS AND SCIENCES
MASTER OF ARTS DEGREE

English
Faye Penland Cowan Iva Kathleen English Jennings South St. Paul, Minn.

History
Albert Easton Glenn, Jr. Statt

MASTER OF SCIENCE DEGREE

Mathematics
Daniel Bruce McCallum Shreveport, La. Dwight Wilson Folk Charleston

Physics

SCHOOL OF EDUCATION
MASTER OF EDUCATION DEGREE

Ronnie Dan Daddy Taylors James Clark Magee Greenville
Mary Anne Herndon Clemson Royce Milton Melvin Anderson

MASTER OF INDUSTRIAL EDUCATION DEGREE

Carroll Eugene Garrison Greenville Arthur Stiefel West Columbia
Jack Lamar Hunter Easley George Clayton Whelchel Norris

COLLEGE OF ENGINEERING
MASTER OF SCIENCE DEGREE

Bioengineering
Wayne Douglas Torrey Denver, Colo.

Ceramic Engineering
James Robert Booth New Kensington, Pa. James Elmer Williamson, Jr. Ware Shoals
William Otis Callum, Jr. Columbia

Chemical Engineering
John Reeves Grubbs, Jr. Kingstree Lexie Daniel Walters Greenville
Gary Norman Mock Spartanburg Thomas Benton Young Greenville

Civil Engineering
Neil Frederick Katz Pittsburgh, Pa.

Electrical Engineering
Aaron Strother Collins Walthalla William Albert Larsen, Jr. Greenville
Dudley Columbus Edgemon Englewood, Tenn.

Engineering Mechanics
John Jin-Jau Shi Taipei, Taiwan

Environmental Systems Engineering
Frank Patrick Gallagher III New Orleans, La. Colin George Gieves Stockton-on-Tees, England
William Earl Gilbert Greenwood Daniel Charles Stanzione Hartsville

Mechanical Engineering
Robert Fleetwood Epps III Lake City

Water Resources Engineering
Richard Martin Greening East Northport, N. Y.
SCHOOL OF INDUSTRIAL MANAGEMENT AND TEXTILE SCIENCE

MASTER OF ARTS DEGREE
Economics
John Foster Bean ................................ Lynchburg

MASTER OF SCIENCE DEGREE
Industrial Management
Serge William Benedict ............................ Duquesne, Pa.
Michael Jones Maxwell ........................... Greenville
Muel Claude Martin ............................... Easley
Juan Gustavo Moreno ......................... Medellin, Colombia

Textile Chemistry
Robert Jennings Booth ......................... Hartsville
James Easton Hendrix ........................... Pensacola, Fla.

Textiles
Ramesh Chander Jain ............................. New Delhi, India

DOCTORS' DEGREES CONFERRED DEC. 19, 1968

COLLEGE OF AGRICULTURE AND BIOLOGICAL SCIENCES

DOCTOR OF PHILOSOPHY DEGREE
Agricultural Economics
Hugh Robinson ...................................... Fairfax, Va.
B.S., Berea College; M.S., North Carolina State University
Thesis: An Economic Analysis of the Effect of Changing Technology and Government Cotton Program on Farm Income and Organization, Upper Coastal Plain, South Carolina

COLLEGE OF ARTS AND SCIENCES

DOCTOR OF PHILOSOPHY DEGREE
Chemistry
Ashley Allford .................................. Conway
B.S., University of South Carolina; M.S., Clemson University
Thesis: Stereochemistry of Abietic Acid Derivatives

Mathematics
Milton Bardwell .................................. Robert, La.
B.S., Southeastern Louisiana College; M.S., Clemson University
Thesis: Combinatorial Designs and Geometric Constraints

Physics
Thomas Parker Bishop .......................... Richland, Ga.
B.S., Carson Newman College; M.S., Emory University
Thesis: Optical Reorientation of Vx Centers in Potassium Chloride

B.S., M.S., John Carroll University
Thesis: A Study of Relativistic Many Particle Systems

B.S., Pfeiffer College
Thesis: Production and Recovery of Electron Radiation Damage in Aluminum

COLLEGE OF ENGINEERING

DOCTOR OF PHILOSOPHY DEGREE
Engineering
Lyle Holland ........................................ Holland, Va.
B.Ch.E., University of Virginia; M.S., Clemson University
Thesis: The Effect of Mixing on the Growth Kinetics of Chlorella Pyrenoidosa Tx71105 in a Parallel Plate Flow Photosynthetic Gas Exchanger Under Conditions of Low Intensity Illumination (Field of Specialization: Chemical Engineering)

Gary Sprawls, Jr. ................................ Williston
B.S., M.S., Clemson University
Thesis: The Development and Analysis of a Computer Method for the Interpretation of Radiosotope Distribution Patterns (Field of Specialization: Bioengineering)
BACHELORS’ DEGREES CONFERRED AUG. 3, 1968

COLLEGE OF AGRICULTURE AND BIOLOGICAL SCIENCES

BACHELOR OF SCIENCE DEGREE

Agricultural Economics

Jacob Lawson McLeod, Jr. — Manning
James Calvin Rivers, Jr. — Chesterfield

Jose Francisco Serrano — Quito, Ecuador
Joseph George Sursavage, Jr. — Andrews, N. C.

Agronomy

Robert Patrick Gambrell — Seneca

Animal Science

* Don Avell Ballington — Lexington
James Norman McGill, Jr. — Anderson

Patricia Marian Vallentine — Orangeburg

Biology

Lawrence Willis Blakely — Simpsonville
Carolyn Bannister Colt — Rock Hill
Charles Willard Mims — Greenville
Jesse Eugene Owens — Clinton

Stanley Marshall Strickland — Spartanburg
Michael Daniel Sullivan — Ardsley, N. Y
Flournoy Colzey Walker III — North Charleston
Deryl Don Young — Hemingway

Dairy Science

Edward Wornall Talbot, Jr. — Salisbury, N. C.

Forestry

Johnny William Barfield — Hartsville
Van Butler Hoffman — Cayce

Richard Thomas Pimlott — Trenton, N. J.

Horticulture

Ashley Douglas Clemmons II — Jacksonville, Fla.

Poultry Science

Buddy Lee Hughes — Dunnellon, Fla.

SCHOOL OF ARCHITECTURE

BACHELOR OF SCIENCE DEGREE

Building Construction

William Addison Stuckey, Jr. — Sumter

BACHELOR OF ARCHITECTURE DEGREE

Joseph Archer Todd, Jr. — Pigeon Forge, Tenn.


BACHELOR OF BUILDING CONSTRUCTION

LeRoy Richard Turner — Greenville

COLLEGE OF ARTS AND SCIENCES

BACHELOR OF ARTS DEGREE

Joseph James Beck — Johnson City, N. Y.
Joel Eddy Bense — Barrington, R. I.
Wendell Gale Cantrell — Easley
Margaret Yvonne Gambrell — Anderson
Claude Nunnally Garrett — Waynesboro, Va.
Janet Eve Bowman Glenn — Iva
Garland Graham Gooden, Jr. — North Augusta
Joseph Thomas Hinson, Jr. — Jefferson
Diane Elizabeth Jacks — Simpsonville
William Gus Johnson — Columbia
Robert Bain Kaulakis — Chatham, N. J.

Stanley Rufus Kellett — Enoree
Tyre Douglas Lee, Jr. — Chester
Thomas Moultrie McKevlin, Jr. — Charleston
Jerry Alvin Owen — Clarksville, Ga.
Benjamin Cicero Pittman, Jr. — Spartanburg
Danny Lynn Rhodes — Rock Hill
Marvin Richbourg Robertson — Belton
Philip Hayne Stanley — Hampton
Christopher George Witaszek — Charlotte, N. C.
BACHELOR OF SCIENCE DEGREE
Geology

Myron William Payne .......................... Aiken

Anthony Whitfield Aldebol ........................ Greenville
Robert Dean Moyer ............................ Evans City, Pa.
William Frederick Smith ........................ Chesterfield

Medical Technology

Shirley Lou Thompson Bannister ........................ Anderson

Pre-Medicine

John Wesley Thompson, Jr. ........................ Spartanburg
Julia Wood Tilley .............................. Atlanta, Ga.

Vernon Aiken

SCHOOL OF EDUCATION

BACHELOR OF ARTS DEGREE

Elementary Education

* Ann Lindsay Pearce ............................. Clemson
Deanna Pennington .............................. Starr
Linda Joyce Stevens ............................. Clemson

Secondary Education

* Robert Vernon Perry .......................... Pamplico
Nancy Wolfe Strickland .......................... Jacksonville, Fla.

Carolyn Rodgers Anderson ........................ Sumter
Carol Lynn Britton .............................. Salters
Carol Lance Hyman .............................. Pamplico

BACHELOR OF SCIENCE DEGREE

Agricultural Education

William Ronald Williamson
Harrys Winfield Hicks ............................ Clover

Industrial Education

Paul Henry Sanders ............................. Summerville
John Orville Schleig, Jr. ........................ Long Branch, N. J.

Recreation and Park Administration

Keith Douglas Neely ............................. New Cumberland, Pa.
Wayne William Parmer ........................... Tendlly, N. J.
David Miller Putnam ............................. Greenville
* Melton Derrick Shealy .......................... Chapin
Ronald Cherry Way .............................. Santee

Science Teaching

Theodore Lester Smoak .......................... Yorges Island

Randall Dean Payne

Clemson
COLLEGE OF ENGINEERING

BACHELOR OF SCIENCE DEGREE

Ceramic Engineering
Danny Earl Allen _______ Charleston Heights
Dennis Arthur Carlson _______ Rock Hill
Russell Lee Dixon _______ Lando

* William Darien Faust _______ Greensboro, N. C.
** Robert Norman Watson _______ Greenvill

Chemical Engineering
James Emmette Chinners, Jr. _______ Moncks Corner

Noel McHenry Moore _______ North August
William Thomas Pool, Jr. _______ Greenvill

Civil Engineering
Odell Bazel Blume _______ Barnwell
Harry Charles Coldreck III _______ Livingston, N. J.
Roger O'Neil Hall _______ Asheville, N. C.
Edgar Cason McGee _______ Orangeburg

George Purvis Nelson Jr. _______ Charleston
Sidney Jackson Shrum _______ Pagelan
Ricky Lamar Thomas _______ Senec

Electrical Engineering
Robert Dennis Ervin _______ Greenville
Robert Douglas Moffat _______ Florence

Hugh Thomas Wilson, Jr. _______ Greenvill

Industrial Engineering
James Heyward Clarkson _______ Sumter

John David Crenshaw _______ Clemson

Mechanical Engineering
Charles Larry Dalton _______ East Flat Rock, N. C.
Delno Rex Gleason _______ Seneca

* Thomas Andy Grizzle _______ North Charleston

Charles Wesley Jennings _______ Spartanburg
James Keith Mayfield _______ Simpsonville

Metallurgical Engineering
Virgil Clifford Meyers, Jr. _______ Charleston

SCHOOL OF INDUSTRIAL MANAGEMENT AND TEXTILE SCIENCE

BACHELOR OF ARTS DEGREE

Arts and Sciences
* Warren Alexander Burgess _______ Greenville
David Wayne Burton _______ Corbin, Ky.
Edwin August Lodgek _______ Collingswood, N. J.
John D. Merrill, Jr. _______ Greenville
Eugene Dwight Seiter _______ Westfield, N. J.

Francis John Tollon III _______ Boynton Beach, Fla.
James Christopher Allen Tomlin _______ Chevy Chase, Md.
Raymond Lee Weathers, Jr. _______ Anderson
Charles Henry West _______ Charleston
George Lucius Williams, Jr. _______ Oglethorpe, Ga.

BACHELOR OF SCIENCE DEGREE

Industrial Management
Edward Legare Bailey, Jr. _______ Miami, Fla.
Joe Tom Brooks, Jr. _______ La Grange, Ga.
* James William Butler _______ Greenville
Sammy Earl Crouch _______ Saluda
Joseph Russell Dendy, Jr. _______ Laurens
Terry Dean Houston _______ Pickens
Harold Dwaine Jackson, Jr. _______ Myrtle Beach
John Ronald Jones _______ Rock Hill

William Don Langford _______ Columbia
Richard Charles Mente _______ Union, N. J.
Charles Sachsenmaier III _______ Marmora, N. J.
William Dee Smith _______ Columbus, N. C.
Charles Joseph Snyder, Jr. _______ Greenwood
Malcolm Bennie Ward _______ Darlington
Lenair Francis Wolfe II _______ Orangeburg

Textiles
Harry Phillip Maynard, Jr. _______ Belmont, N. C.

Danny Allen Shive _______ Elberton, Ga.

* With honor
** With high honor
MASTERS' DEGREES CONFERRED AUG. 3, 1968

COLLEGE OF AGRICULTURE AND BIOLOGICAL SCIENCES

MASTER OF SCIENCE DEGREE

Agricultural Economics
Gaines Howard Liner ... Efland, N. C.

Agronomy
Ronald Dean Oliphant ... Kingsville, Texas
Herbert Ernest Raab ... Edroy, Texas

Animal Science
Clifton Oliver Tennant, Jr. ... Hampton

Botany
Ellen Payne Hellwig ... Rome, Ga.

Dairy Science
William Capers Cook ... Clemson
Robert Stanley Thompson ... Brooklyn, N. Y.
Onder Labbe ... Opelousas, La.

Entomology
James Tyrus Darby, Jr. ... Summerton
Julian Eugene Keil ... Charleston

Forestry
Miin Ming Chen ... Hsinchu, Taiwan

Horticulture
Mary Limehouse Altman ... Charleston
James Thomas Woodham ... Bishopville
James Durham Martin, Jr. ... Columbia

Zoology
Abelle Secrest Mims ... Starr
Henry Franklin Percival ... Columbia
Robert Mack Shealy ... Seneca
Deirdre Jill Spencer ... Anderson

SCHOOL OF ARCHITECTURE

MASTER OF ARCHITECTURE DEGREE

Jeremy Philip Hungerford Pike ... New South Wales, Australia

COLLEGE OF ARTS AND SCIENCES

MASTER OF ARTS DEGREE

English
Michael Addison Douglas ... Central

History
David Henry Villers ... London, England

MASTER OF SCIENCE DEGREE

Chemistry
Stephen Maxwell Karesh ... Charleston
Edward McGill ... Smyrna

Mathematics
Hiram Bridges Ausburn ... Easley
J.arilyn Janet Breen ... Anderson
Jan Reece Grissom ... Rock Island, Tenn.

Physics
Albert Bruce Pruitt ... Anderson

Harry Michael McGuire ... Hillsborough, N. C.
Glenn Keith Jacobs ... Jackson, Miss.
George William Marrah ... Woonsocket, R. I.
Marcus Jerry Thornhill ... Columbia, La.
SCHOOL OF EDUCATION

MASTER OF AGRICULTURAL EDUCATION DEGREE
(Agricultural Education is jointly administered by the College of Agriculture and Biological Sciences and the School of Education.)

Lloyd Houston Blanton
Nichols

MASTER OF EDUCATION DEGREE

Ralph Zeigler Boroughs  Pickens
Brenda Lowry Cromer  Seneca
Mary Lou Winant Edens  River Edge, N. J.
Patricia Gail Scurry Freeman  Sumter
Ronald Duane Grace  McKeesport, Pa.
Helen Carol Guthrie  Altavista, Va.
Lia Kapelis  West Beach, South Australia
Juby Milford McKinley  Anderson
Carol Anderson Malcom  Social Circle, Ga.
James Roy Martin III  Cheraw
Nick Milasnovich  Youngstown, Ohio
John Zeph Moseley III  Anderson
Frances Harley Sandifer  Seneca

MASTER OF INDUSTRIAL EDUCATION DEGREE

James Malloy Buffkin  Heath Springs
Henry Ernest Ramey  Walhalla

COLLEGE OF ENGINEERING

MASTER OF SCIENCE DEGREE
(Agricultural Engineering is jointly administered by the College of Agriculture and Biological Sciences and the College of Engineering.)

Riaz Ahmed  Karachi, Pakistan
Herman Pinkney Lynn  Clemson
Denis Albert Brosnan  Atlanta, Ga.

Ceramic Engineering
Judson Riley Hightower  Charlotte, N. C.
Samuel Joseph Jeffords  Orangeburg

Chemical Engineering
David Eugene Huff  Livonia, N. Y.

Civil Engineering
Nuri Akkas  Tavsanli, Turkey
Richard David James  Atlanta, Ga.
John Jerdone Mikell  Charleston

Environmental Systems Engineering

Mechanical Engineering

SCHOOL OF INDUSTRIAL MANAGEMENT AND TEXTILE SCIENCE

MASTER OF SCIENCE DEGREE

Industrial Management
Joseph Rhodes Hodgson, Jr.  Lake Worth, Fla.
Shelly Bronson Parker, Jr.  Cades

Textile Chemistry
Bruce Raymond Edwards  Tryon, N. C.
DOCTORS’ DEGREES CONFERRED AUG. 3, 1968

COLLEGE OF AGRICULTURE AND BIOLOGICAL SCIENCES

DOCTOR OF PHILOSOPHY DEGREE

Agricultural Economics

Aaron Andrew Hutcheson ........................................................ Clarksville, Tenn.
B.A., M.A., University of Florida
Dissertation: Socio-Economic Characteristics of Consumers and the Demand for Fresh Peaches

Animal Physiology

Clyde Lee Lewis ............................................................... Morrison, Tenn.
B.S., Tennessee Technological University; M.S., Louisiana State University
Dissertation: An Electron Microscope Study of the Bovine Spermatid at Several Stages of Spermiogenesis

Entomology

Grady Malcolm Amerson ....................................................... Gordon, Ga.
B.S., Berry College; M.S., Clemson University
Dissertation: The Effects of Four Chemosterilants on Reproduction of the Tobacco Hornworm *Manduca sexta* (Johannson)

James Richard Holman ...................................................... Lebanon, Tenn.
B.S., Tennessee Polytechnic Institute

Richard Fuller Nash, Jr. ..................................................... Fairfax, Ala.
B.S., M.S, Auburn University

COLLEGE OF ARTS AND SCIENCES

DOCTOR OF PHILOSOPHY DEGREE

Chemistry

Julie Han ................................................................. Rangoon, Burma
B.S., Rangoon Institute of Technology, Burma; M.S., Clemson University
Dissertation: A Thermodynamic Study of the Adsorption of 1-Amino-4-Hydroxyanthraquinone by Polyethelene Terephthalate in a Solvent System

Wallace Edgar McN ew, Jr. .............................................. Portsmouth, Va.
B.S., University of Virginia; M.S., University of Georgia
Mathematics

Patrick Carlton Bowie ...................................................... Liberty
B.S., Georgia Institute of Technology; M.S., Clemson University
Dissertation: Uncertainty and Entropy Inequalities for Hankel and Untraspherical Transforms

Robert Silber ................................................................. Huntsville, Ala.
B.A., Vanderbilt University; M.S., University of Alabama
Dissertation: Linear Isometries and Normal Forms

Physics

Gordon Lee Parks ......................................................... Ayer, Mass.
B.S., North Georgia College; M.S., Clemson University
Dissertation: The Crystal and Molecular Structure of Telluracyclohexane-3, 5-Dione

COLLEGE OF ENGINEERING
DOCTOR OF PHILOSOPHY DEGREE

Engineering

John Conrad Muehlbauer .................................................. Norfolk, Va.
B.S., M.S., Virginia Polytechnic Institute
Dissertation: Transient One-dimensional Heat Transfer for Alloys During Solidification (Field of Specialization: Mechanical Engineering)
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- Bioengineering: 1
- Ceramic Engineering: 6
- Chemical Engineering: 13
- Civil Engineering: 10
- Electrical Engineering: 4
- Engineering Mechanics: 1
- Environmental Systems Engineering: 7
- Mechanical Engineering: 5
- Water Resources Engineering: 1

**School of Industrial Management and Textile Science**
- Economics: 1
- Industrial Management: 12
- Textile Chemistry: 3
- Textiles: 1

**Total Masters' Degrees Awarded in 1968**: 189

**DOCTORS' DEGREES AWARDED IN 1968**

**College of Agriculture and Biological Sciences**
- Agricultural Economics: 2
- Agronomy: 2
- Animal Physiology: 1
- Entomology: 4
- Nutrition: 2
- Plant Pathology: 1
- Zoology: 1

**College of Arts and Sciences**
- Chemistry: 7
- Mathematics: 3
- Physics: 6

**College of Engineering**
- Bioengineering: 2
- Chemical Engineering: 1
- Electrical Engineering: 1
- Mechanical Engineering: 1

**School of Industrial Management and Textile Science**
- Engineering Management: 1
- Mechanical Engineering: 1

**Total Doctors' Degrees Awarded in 1968**: 35

**Total Number Degrees Awarded in 1968**: 1,036
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Animal Husbandry and Agricultural Education ......................................................... 3
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Animal Husbandry and Dairy .......................................................................................... 2
Architectural Engineering and Architecture, five-year ............................................... 1
Architecture and Architectural Engineering .................................................................. 11
Architecture and Civil Engineering ............................................................................... 1
Architecture, four-year, and Architecture, five-year ................................................. 18
Arts and Sciences and Agricultural Economics ............................................................ 1
Chemical Engineering and Chemistry and Chemistry-Engineering ........................... 3
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Chemistry and Chemical Engineering ........................................................................... 1
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Chemistry and General Science ..................................................................................... 1
Chemistry and Industrial Physics .................................................................................... 1
Chemistry and Agricultural Chemistry ............................................................................ 1
Civil Engineering and Architecture ............................................................................... 1
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Electrical Engineering and Mechanical Engineering ..................................................... 17
Electrical Engineering and Textile Engineering ............................................................. 1
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General Science and Electrical Engineering ................................................................... 1
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Industrial Engineering and Mechanical Engineering .................................................... 1
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Textile Engineering and Mechanical and Electrical Engineering .............................. 1
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Textile Engineering and Weaving and Designing ......................................................... 1
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**Masters'**

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Total Degrees Awarded from 1896 through 1968: 20,814
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