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ANNUAL REPORT
1982-83
CLEMSON UNIVERSITY
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Clemson University is pleased to present this record of the University for the 1982-83 fiscal year. The period covered was one of the most eventful in Clemson history.

During the year Clemson made significant moves to develop a strong private-support complement to its state funding base. While state appropriations must always form the core of Clemson’s ability to fulfill its unique responsibilities within state government, the University realizes that it must augment the taxpayers’ contribution with private support if Clemson is to reach the level of excellence South Carolinians deserve from their land-grant university. This commitment was evidenced during the year by the kickoff of the national fund-raising effort for The Strom Thurmond Center, which is the first phase of Clemson’s “Challenge to Greatness” capital campaign, and by the beginning in June of a national search for a vice president to head our academic fund-raising programs.

This was the year Clemson joined the other two state universities in South Carolina, the Governor’s Office, and the General Assembly in laying plans for three highly sophisticated research parks in the state, a “research axis” stretching from Clemson, through Columbia, to Charleston. Establishment of the South Carolina Research Authority, Inc., is a major step forward in the development of this state as an attractive site for clean, high-paying new industry. Clemson is proud to be a part of that growth, and proud of the strong, positive relationship we already have with business and industry. The 14th annual report of the National Science Board lists Clemson third among Southeastern universities in percentage of research-and-development expenses underwritten by industry and eighth in the region in total corporate dollars spent for research. Clemson is the only South Carolina institution listed among the nation’s top 100 universities ranked in terms of percentage of total R&D expenditures underwritten by industry.

Clemson’s successful partnership with both the public and the private sectors is a result, we believe, of our determination to stay on the cutting edge of new technology and our commitment to respond to South Carolina’s changing needs. An indication of that determination and commitment is our College of Education’s “ComputerVantage” project launched last spring. With major gifts from private industry and our alumni, the college has equipped and staffed a van that will carry computer technology and instruction directly to the state’s high school teachers and administrators at a time when computer literacy and quality education are at the top of the public agenda.
These are but a few highlights of the '82-83 year. Many more are documented in this report. Above them all, though, Clemson's most important success in 1982-83, as during every other year, was the contribution of another class of top-quality graduates to the mindpower pool of our state and nation.

Bill L. Aiken
President
ACADEMICS 1982-1983

Graduate School
Arnold E. Schwartz, Vice Provost and Dean

Undergraduate Studies
Jerome V. Reel, Vice Provost

College of Agricultural Sciences
Luther P. Anderson, Dean

College of Architecture
Harlan E. McClure, Dean

College of Commerce and Industry
Ryan C. Amacher, Dean

College of Education
James E. Matthews, Dean

College of Engineering
J. Charles Jennett, Dean

College of Forest and Recreation Resources
Benton H. Box, Dean

College of Liberal Arts
Robert A. Waller, Dean

College of Nursing
Mary Lohr, Dean

College of Sciences
Henry E. Vogel, Dean
COLLEGE OF AGRICULTURAL SCIENCES

Agricultural Instruction

The mission of the instructional programs in agriculture at Clemson University remains unchanged from the mandate of the will of Thomas Green Clemson, "to afford thorough instruction in agriculture and the natural sciences connected therewith." Programs have grown, and students are being prepared to face the challenges of the full spectrum of today's agriculture and tomorrow's problems. In keeping with the intent and philosophy of land-grant institutions, programs are service oriented. As the only institution in the State authorized to offer degrees in agriculture at or above the bachelor's level, full emphasis must be placed on program quality.

Agricultural remains a field of critical importance to humankind. Its traditional role of providing food and fiber to humans and feed for domestic animals constantly assumes added importance. The world's population continues to grow, and space for production shrinks. Conservation and environmental protection, complicated by government restraints, have become part of the responsibility of agriculture. Soil erosion remains the nation's leading conservation problem.

Business aspects of agriculture have always been important; producers must make a profit if this backbone of our nation is to survive. The importance of the business aspects of agriculture are clearly evident in the fact that agriculture has the greatest positive effect on our international balance of payment. Finally, agriculture is dynamic. The continued success of the high-technology fields of production, processing and marketing requires well-educated men and women. The programs in the College of Agricultural Sciences are integrated to serve the people of South Carolina, the South, the nation and the world. All programs must grow and evolve, or the joint, fundamental goals of the University and the college cannot be achieved.

To meet the mission of the College of Agricultural Sciences:

- Instruction is principles-based and oriented toward recognizing and solving problems. This requires a careful balance between stressing practical information while avoiding becoming overly "vocational."

- Courses and curricula are constantly reviewed, evaluated and revised with input from students and nonacademic professionals to help ensure the most thorough, meaningful education for each student.

- Faculty members, through scholarly activities and research efforts, remain abreast of the most current agricultural concepts and discoveries.

- Expansion of graduate programs reflects the growth and maturity of Clemson as a widely recognized university.

- Efforts to attract more, highly qualified students at all degree levels have been intensified in response to national surveys that indicate im-
pending shortages of adequately trained agriculturalists.

— Special instructional programs are offered to meet the changing needs of agriculturalists throughout the State.

— Efforts in service to agriculture on an international level have been expanded.

Over the past three years, enrollments in agriculture have declined nationwide. In some instances, declines have approached 35 percent. This is a cyclic phenomenon and has been evident at Clemson. However, in looking at the 1983-84 academic year, the trend seems to be stabilized, if not reversing. Recruiting efforts for qualified students will be intensified as a new informational brochure is completed and high school visitations by student/faculty teams from agriculture are intensified.

Students in agricultural sciences come more and more from urban areas. Employers seek students with practical experience, a quality frequently lacking among the majority of current students. All departments in the college now have approved internship programs, and collegewide guidelines allow awarding minimal credit for specific, noninstructional, educational experiences. In 1982-83 the internship program grew by approximately 100 percent. Continued growth is anticipated.

The College of Agricultural Sciences is committed to affirmative action efforts in all program areas. Special recruiting efforts are made to present specific career information to potential students representing ethnic minorities. In 1982-83 the college obtained and managed two grants (one from USDA and the other from the Department of Health and Human Resources) to provide research experience and incentive to minority high school students. These grants have been renewed for the current year. Minority representation in the instructional programs of the college has increased.

In terms of new instructional programs, the college continues to seek approval for the proposed Ph.D. in food technology. The proposal has been redrafted and submitted through channels and is again in editing. A coordinator for the Integrated Pest Management (IPM) program was appointed. In the near future, a formal curriculum in IPM will be proposed.

Off-campus offerings of graduate-level courses remained successful at Florence and are continuing. There is increasing demand for such programs throughout the State.

International Agriculture

The College of Agricultural Sciences serves agriculture on an international scale. During the 1982-83 academic year, 22 foreign students were registered in degree programs in agriculture. Most are externally sponsored and in graduate programs. In addition, more than 100 foreign visitors were formally hosted by the college for visits ranging from one
day to several months. Finally, the College of Agricultural Sciences is involved in three International Contract Programs through SECID (in the Seychelle Islands, Mali and Thailand), which involved foreign travel by five faculty members in 1982-83.

Continuing Education

Professional agriculturalists of all disciplines need help to keep pace with today's rapidly changing technology. All are interested in diverse types of in-service training programs, short courses, and/or technical conferences and seminars. Continuing education activities sponsored by the College of Agricultural Sciences serves personnel in the Cooperative Extension Service, various types of agricultural technicians and sales representatives, vocational agriculture teachers and veterinarians. Continuing education units were granted to more than 300 individuals for completion of several different courses. A wide variety of conferences and workshops was also conducted, including the South Carolina Dairy Conference, a National Symposium on Farm and Food Policy, an International Congress on Trichoptera and a symposium on Low-Cost Wastewater Treatment. The annual Pesticide Chemical School was continued, along with a variety of other programs, including the summer Flower Day. Many tours and field days are held annually at off-campus facilities.

Agricultural Technology Programs

The College of Agricultural Sciences continues to cooperate with the State Board for Technical and Comprehensive Education and the State Department of Education in guiding agricultural technology programs at selected technical colleges in the State. Guidance is provided on curricular matters, and facilities are shared at Clemson and other locations throughout the State. Agricultural technology comprises 13 programs — 12 two-year curricular and a single one-year certificate program. Eight institutions are involved. Enrollment in these programs declined slightly in 1982-83, but demand for graduates remains good.
COLLEGE OF ARCHITECTURE

Just 25 years ago, architecture at Clemson was established as an independent school. That event marked a point of fresh opportunity, affording a greater freedom for innovation and creativity in education. This was justified by the rapid changes and improvements that had occurred in Clemson architectural programs during the preceding three years. It had become evident to the institution that very strong educational support and collaboration was in process from the practicing architects of the State. While many regional schools enjoy some professional support and communications with their professionals, the intensity and continuing nature of aid from the building industry to architecture at Clemson is rare. Perhaps most notable is that it has been a two-way collaboration of great vigor since 1955-56 and especially after 1958.

The dedication of the school to the current and future needs of the profession of architecture was at the root of early determination to graduate the best prepared professionals available anywhere and to seek whatever it took to do so. This involved striking in some new directions, perhaps undertaking things not yet generally adopted by other schools. It also meant an expectation of quality performance from everyone in the college. Some fundamental program changes were required if this pursuit of excellence was to succeed. Thus, in 1967, curricula were revised and the award of professional degrees was moved almost entirely to graduate level. As the school grew in quality and size, its spectrum of offerings also became more inclusive. Building Science and Management was formed in 1970 to manage the technical and administrative instruction of architects and other design students as well as prepare professional students to be entrepreneur constructors.

The Department of Planning Studies was formed in 1968, and its educational offerings provide preparation for professional careers in a growing field.

The Department of History and Visual Arts, organized in 1967, provides core courses to professional students in each area of the college and undertakes the graduate instruction of students in the Master of Fine Arts program.

Each of these departments, together with Architectural Studies, has evolved fundamental emphases in community service projects as instruments of instruction. Research as a major emphasis in each area of the college is developing as this report will show.

On October 14-15, 1983, the architects of South Carolina held a major celebration in honor of the Quarter Century of Service which the College of Architecture at Clemson has rendered to the State of South Carolina, the environmental design professions and Clemson University. It also marked Dean Harlan E. McClure’s leadership of the college since its
inception. Well-known national and international leaders from the United States, Europe and Mexico spoke at these symposia.

Students and Awards

The students of the College of Architecture have been selected, at both undergraduate and graduate levels, on the basis of general academic aptitude, creativity and demonstrated motivation. Applicant screening has been possible because of the demand for admission to the college. During 1982/83, architecture students were awarded prestigious national honors and selected for a number of local awards. The more significant of these are: Christine M. Gomes, The National AIA School Medal; Thomas H. Bast, National AIA/AHA Hospital Design Graduate Fellowship; Virginia D. Lane, National Endowment for the Arts Grant for Historic Preservation; Nancy J. Knoepp, 2nd Prize — National Architecture Competition for a Performing Arts Center for Milwaukee, Wis.; Gregory Fitzpatrick, Selected Mention — National Student Pre-cast Competition.

Graduate students Scott Baker and Rebecca Weigman were awarded R. C. Edwards Research Fellowships for 1983-84, and Jeff Bulla received an Alumni Graduate Fellowship. Timothy D. Farrell, a student in construction management, was awarded an Abney Foundation Scholarship, and John Patrick Henry of the same department, a Daniel International Scholarship. Scholarships from the NAHB were won by David Buzzell, Joe M. Pazdan and Joel M. Carter. Christine Tedesco was selected as a recipient of the Women in Construction Scholarship, and Robert F. Goodwin as winner of the Professional Construction Estimators Association Scholarship. An AGC Kyle C. Ellen Memorial Scholarship was presented to Brad Smith.

Faculty Honors

In 1982 Professor Joseph L. Young (Design Studies) was advanced to Fellowship in the American Institute of Architects for “Distinguished Service in Education.” Professor Young was also offered a Teaching Fulbright Fellowship for 1983-84, for which he requested deferment.

Professor Martin A. Davis (Design Studies) was elected regional chairman of the American Section of the International Solar Energy Society. Professor Gayland B. Witherspoon (Design Studies) was advanced to Colonel in the United States Air Force Reserve. He served in 1982 as chairman of a National Design Symposium on Air Force Establishments in the U.S. Air Force Academy. Professor Sam Wang (Visual Arts) received the Purchase Award for his work in the Guild of South Carolina Artists Annual Exhibition at the Columbia Museum of Art. He also received a Merit Award at the Southeast Photographic Exhibition at the Greenville County Museum of Art. His work was honored with a one-man exhibition at the Oregon State University Art Gallery.
Professor John Acorn, head of the Department of History and Visual Studies, was appointed to the Grants Review Board of the South Carolina Arts Commission. He was one of the select group of artists in 1982 to teach at the Governor’s School for the Arts and received several notable art commissions.

Professor Thomas Dimond (Visual Arts) and Sydney A. Cross (Visual Arts) prepared a Clemson National Print and Drawing Exhibition, which brought the works of 575 selected artists from states around the nation. The exhibition, after its opening in Lee Hall Gallery, was circulated to other galleries in the country.

Professor Joseph L. Young, recorder, and Dean Harlan E. McClure, grand chapter master of Tau Sigma Delta, International Honor Fraternity for Architecture and the Allied Arts, conducted the annual meetings of that body in Santa Fe, N. M.

Professor Cesare Fera, resident professor at the Clemson/CAF Charles E. Daniel Center in Genoa, Italy, served as visiting professor at Clemson in the spring of 1983. Professor Giuseppe Gerster, noted Swiss architect, served as visiting professor during the other half of that term.

Professor M. David Egan (Building Science) was elected national vice president of the Council of Acoustical Consultants. During 1981/82, Professor Ralph Knowland, head of the Department of Building Science and Management, served as professor at the Charles E. Daniel Center for Building Research and Urban Study, and Professor Lamar Brown chaired the department during that year.


As the college is deeply involved in professional affairs, faculty members have provided active service on State and national boards and commissions for many years. Current services are rendered by eight faculty members.

Public Service

The Graduate Health Care Facilities Studio in Architecture prepared alternate proposals for upgrading and expanding the Highlands Cashiers Hospital in Highlands, N. C. These measures followed a formal request for research and analysis from the Hospital Board. Similar studies for the Clarendon County Hospital in Manning also occurred in 1982-83. The college is also studying the facility needs of the York County Alcohol and Drug Addiction Center.

Architectural graduate students developed master planning and design proposals to accommodate long-range physical needs of the U. S. Air Force Academy, Colorado Springs, Co. Major public service projects of
graduate students also included alternative Charleston Waterfront Development Studies sponsored as a collaborative effort of the City of Charleston and the Sea Pines Corporation.

A team prepared campus master planning studies for the Horry-Georgetown Technical College in Conway, while another graduate team made thorough downtown revitalization strategy schemes for Seneca. Later in 1983, plant expansion analyses were prepared for the Anderson Independent Daily Mail Publishing Company. Graduate students in City and Regional Planning developed downtown revitalization studies for Walhalla and Liberty. Planning students also were involved in aspects of the Charleston Waterfront Project undertaken in Architectural Studies.

For many years, on the basis of these completed public service and research projects, the town or agency has been able to embark on active participation in a second phase employing professional architects. In addition to 1982-83 contracted research and public service projects at fourth, fifth and sixth year levels, design students at lower levels undertake the solution of real problems more suited to their skills. These have residual benefits to towns, institutions and other clients.

CAF/Lectures and Exhibitions

For 28 years, the Clemson Architectural Foundation has sponsored an annual lecture series in the college, open to students, faculty and the general public. During the past year, the series brought to campus 15 national and international lectures. In addition, seven Clemson faculty members delivered 12 lectures nationwide.

Eight exhibitions were funded during the same period by the Clemson Architectural Foundation.

Charles Daniel Graduate Center for Building Research and Urban Study

During the spring of 1982-83, the Center completed its tenth year as a facility of the College of Architecture in Genoa, Italy. Nearly 300 students have been in residence there for periods of at least one semester of intensive study, public service and coordinated travel. Dr. Cesare Fera has been resident professor there for the entire period and is joined each year by a rotating member of the college faculty from Clemson, this year Professor Ralph Knowland, head of the Department of Building Science and Management.

In the fall semester, the students undertook a problem dealing with the redevelopment of the dense area of Genoa around the “Teatro San Agata.” These studies dealt with architectural as well as planning development, including the provision of much-needed public open space. In the spring semester, resident graduate students at the Center studied an area across the river from the fall project, involving adaptive re-use of the
"Sito Enel," a property of the State Electric Company, for new community facilities.

Following the practice of previous years, the CAF Daniel Center cooperated with the University of Genoa and the city in sponsoring an architectural and planning lecture series in Genoa. Distinguished professionals from Europe and America gave public lectures in the city and stayed at the Center as visiting professors.

During May of 1983, the college and the Foundation jointly sponsored its Fifth Annual Study-Tour to the Genoa Center and to historic Italian towns and city centers and architecturally significant gardens. Participants were architects, planners and landscape architects.
COLLEGE OF COMMERCE AND INDUSTRY

The College of Commerce and Industry comprises the School of Accountancy, the School of Business and the School of Textiles. The college is also responsible for the Office of Professional Development and the Small Business Development Center, separate entities reporting directly to the dean.

The School of Accountancy and the School of Textiles have completed their first year as separate schools within the college. This year the School of Accountancy has continued to offer its traditional undergraduate curricula in accounting as well as the beginning of a master’s in accountancy program.

The School of Textiles gives special attention to textile programs while providing a unique opportunity to integrate the business component into the textile industry. The school began accepting students into its new textile management curriculum in fall 1983.

This year the college was visited by a team from the American Assembly of Collegiate Schools of Business. The college’s master’s programs in the School of Business were accredited, and its undergraduate programs were reaccredited.

The college continues to grow in the number of students majoring in its 14 curricula. In fall 1982, 2,582 undergraduates were enrolled. The graduate programs include 94 master’s and Ph.D. students. The Clemson at Furman MBA program enrolled 173 students.

The total perspective of the college is best shown through descriptions of its major components.

School of Business

Department of Economics

The 1982-83 academic year was an extremely productive year for the Department of Economics. The faculty conducted a significant amount of scholarly research, provided quality education for the Clemson students and served the citizens of South Carolina in a variety of ways.

The research of the faculty culminated in seven books, 63 articles, three completed grants, 10 book reviews or contributions to books, more than 12 papers presented at professional meetings, and numerous columns and editorials in local and national newspapers.

Enrollment in the undergraduate and graduate courses remained constant from the previous year. Rex Cottle won the Alumni Master Teacher Award, which exemplifies the quality of instruction being offered to our students by the economics faculty. David Bowles, Dennis Placone and Myles Wallace were awarded Provost Research Grants to continue their research. These grants are awarded on a competitive basis within the University.
Robert Tollison, the first holder of the Abney Chair of Free Enterprise, joined our faculty in the spring. In addition to his many scholarly accomplishments, Professor Tollison was named president-elect of the Southern Economics Association. This marks the first time a Clemson economist has held such a high position in a professional economics organization.

Two other faculty members continued to bring national recognition to Clemson University. Bruce Yandle completed his first year as the executive director of the Federal Trade Commission, Washington, D. C. Richard B. McKenzie served as a visiting scholar at the Heritage Foundation, Washington, D. C.

Professor Hugh Macaulay, Wallace Trevillian and William Whitten announced their retirements this year. Each of these gentlemen has served the Department of Economics with distinction for more than 30 years. Two assistant professors have joined the faculty — Clark Nar­dinelli, economic historian, and William Shughart, monetary theorist.

The Department of Economics continued its extensive public service program by giving more than 120 speeches to civic clubs and professional organizations this year. The Center for Economic Education offered courses, workshops and in-service training programs to public school teachers in South Carolina. With recent changes in high school curricula that require each student to take an economics course, the economic education program will take on an even more important role in the future.

The prospects for the future look even brighter. Dun and Bradstreet Inc. has endowed the J. Wilson Newman Professor of Economics. With this endowment, we will be able to attract a top scholar who will add significantly to the national reputation of the Department of Economics at Clemson University. Research continues to be ongoing in a wide variety of areas. More than 30 articles are under review by professional journals. The department is taking the necessary steps to continue advancing the frontiers of knowledge and providing South Carolinians with the best education possible.

Department of Finance

During the year, the Department of Finance continued to enhance its reputation through faculty research and professional publications. The department had no faculty turnover, which has helped to establish the faculty interrelationships, especially in the area of coauthored publications. Also, faculty members undertook new research projects that took them throughout the United States. Programs, presentations and seminars were made in Florida, Louisiana, California and New York, just to name a few.

The department began a search for a permanent department head. Several candidates were interviewed and a new head is expected to be
named next fall. The large number of applicants for the position indicates
the interest in Clemson’s financial management program.

The enrollment in the finance major program continued to grow
during the year. More than 150 freshmen were admitted, bringing the
number of majors to 525. The department developed a new student
organization during the year, the Investment Club, which was as popular
with the faculty as with the students. The Finance Club continued to be
one of the most productive organizations in the School of Business.
Membership continued to grow, and interest by the professional commu-
nity reached an all-time high. The club heard talks by several executives
from major corporations and also made field trips to Atlanta and Wash-
ington, D. C.

Department of Management

The names of two of our graduate degrees were changed last year. Our
Ph.D. in engineering management is now the Ph.D. in industrial manage-
ment. Likewise, our M.S. in management is now the M.S. in industrial
management. The department continues to offer B.S. degrees in indus-
trial and administrative management. During the year, the department
acquired six additional computer terminals, bringing the total to 16.

The department continues to emphasize high-quality programs and
excellent training. Although excellence in teaching is a primary objective,
research, consulting and public service also continue to be important
goals. The addition of two new faculty members this year further en-
hances the quality of teaching and publishing the department strives to
maintain.

Enrollment in the six degree programs administered by the department
continues at about the same level, with some increase in the number of
majors by categories:

<table>
<thead>
<tr>
<th>Category</th>
<th>Number</th>
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<tbody>
<tr>
<td>Undergraduate</td>
<td>1,312</td>
</tr>
<tr>
<td>Graduate Resident</td>
<td>52</td>
</tr>
<tr>
<td>Clemson at Furman MBA*</td>
<td>173</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>1,537</strong></td>
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Degrees awarded by type:

<table>
<thead>
<tr>
<th>Degree</th>
<th>Number</th>
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<tbody>
<tr>
<td>Bachelor of Science</td>
<td>275</td>
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<tr>
<td>Master of Science</td>
<td>8</td>
</tr>
<tr>
<td>Master of Business Administration*</td>
<td>4</td>
</tr>
<tr>
<td>Doctor of Philosophy</td>
<td>3</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>290</strong></td>
</tr>
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* Taught and administered by Furman University.

Management graduates are highly recruited by both regional and
national firms. A large number find employment in production and marketing. However, they are by no means limited to these since they also are prepared to work in areas such as personnel, labor relations and finance. The nature of the industries that recruit our graduates and the opportunities available to graduates in management are diverse.

The department helps the University Placement Office arrange interviewing sessions with companies specifically interested in management graduates. A resume booklet is prepared each year to provide graduates with as much exposure to employment opportunities as possible.

Department of Marketing

The 1982-83 academic year was the first year of operation for the Department of Marketing. On March 1, 1983, Dr. Gerald L. Waddle was named head. Dr. Waddle has been a faculty member in the Management Department for 10 years. During the year, Jacquetta McClung and Robert Landry were recruited to join the department faculty from the University of Oklahoma and Louisiana State University, respectively.

New courses in sales management, retail management, industrial marketing, international marketing and senior seminar were approved to be added to the curriculum effective this academic year.

The Clemson University Student Chapter of the American Marketing Association was founded during fall 1982 and has 40 members.

School of Accountancy

Since the creation of the School of Accountancy in December 1981, the work on the Master of Accountancy program has been completed. During the 1982-83 school year, the first students were admitted. Although the program was initially started with on-campus courses, it expanded in the summer of 1983 to Greenville TEC, where selected courses are offered during the evening. Interest in the new professional program continued to be strong throughout the year, and by the summer term enrollment exceeded 20 students.

The undergraduate program continued strong during the year. Although accounting majors increased by only 1 percent, the demand for accounting courses increased approximately 7 percent. The primary reason for the increased course demand was twofold. First, the accounting majors took more electives in accounting to strengthen their basic accounting knowledge. Second, as the overall job market tightened, students in other majors sought accounting courses as areas of minor concentration.

During the fall term, more than 2,700 students were enrolled in accounting courses.

The fund drive for the professional program that began in 1981 ended during the year. Contributions and pledges during the drive exceeded $93,000. These funds have been earmarked for such areas as the develop-
ment of the professional program, increased library holdings, faculty development, and student recruiting and placement. Although the funds were received and pledged from many sources, the major commitment was made by CPA firms.

To begin the year, the school hired three new faculty members in the areas of taxes and managerial and financial accounting. These additions increased our faculty to 20, of which 18 are permanent positions.

The major effort in student activities was the establishment of a Beta Alpha Psi chapter on campus. Beta Alpha Psi is the national honorary fraternity that admits students who meet minimum grade requirements and are at least of junior standing.

School of Textiles

As the academic arm of South Carolina’s basic industry, the School of Textiles has demonstrated productivity leadership in teaching, research and service activities. Freshmen enrollment in textile programs is again anticipated to double, and we are pleased to begin accepting students into our new textile management curriculum. Even during the recent recession, our students have been successful in entering the career work force, as we have observed that, without exception, every Clemson textile graduate has received at least one job offer.

Our research accomplishments exhibit strong technical breadth as well as demonstrated success in meeting research objectives. On a per faculty member basis, we rank among the leaders at the University in obtaining industrially funded projects. Current research in progress ranges from the fundamental to the highly applied. We are at the forefront in areas of major concern to the textile industry, such as the rapid evaluation of cotton fiber properties and their optimum utilization; the determination of scientific evidence linking causative agents and symptoms of respiratory ailments among workers involved with cotton processing; and the assessment of new generation fiber processing, nonwoven, spinning, weaving, dyeing, finishing and measurement technologies.

Major development research work involves activated carbon fabrics, composite materials, medical structures, color systems, and fundamental studies of chemical and polymer structure mechanisms. This work has yielded positive recognition for our faculty from the textile community.

In serving the textile industry through our facilities and individual expertise, we have achieved over the past year much of what we have strived to accomplish during the past decade, namely, establishing stronger interaction with industrial leaders to the extent that major short-term and long-term problems are constantly brought to the University for discussion. This interaction has resulted in our involvement in helping solve manufacturing and technical problems, assisting with product and process analyses, and contributing to industry structure and future growth.
studies. A direct benefit of these activities has been the upgrading of our laboratory capabilities through contributions of equipment from machinery producers and regional textile manufacturers.

Indirectly and for the future, knowledge gained through closer ties with our constituency should result in an even stronger appreciation and understanding of the benefits of textile education and a premier textile program at Clemson University.

Office of Professional Development

The Office of Professional Development is South Carolina’s largest provider of continuing professional education for business and industry (based on preliminary 1982-83 enrollment figures). During 1982-83, some 14,000 people from throughout the Southeast and across the nation attended more than 370 Professional Development seminars, conferences and short courses. These figures represent increases of more than 150 percent over 1981-82 levels, both in the number of programs offered and in the number of individuals served. This quantum increase in service was achieved — following long-standing Professional Development policy — at no cost to the South Carolina taxpayers; all Professional Development programs are run on a self-sustaining basis.

Textile Conference

Professional Development offers a wide range of two- and three-day conferences on general and technical textile topics. These conferences, bringing together leading industry experts and textile faculty from Clemson, N. C. State, Georgia Tech and top research institutes, provide regular updates on textile technology and process developments for textile managers, supervisors and executives from throughout the United States and overseas. New conferences are developed and presented as advances in technology create new problems — and new opportunities — for the American textile industry. In 1982-83, 26 textile conferences on topics ranging from basic processes (dyeing and finishing, weaving, knitting, slashing, spinning) to advanced textile technologies (electronics in textiles, vacuum technology, shuttleless weaving) drew more than 1,000 textile managers and executives from throughout North America to the Clemson campus.

One-Day Management Program

Professional Development entered the one-day management seminar market in fall 1982, responding to the needs of business and industry in the Southeast for more economical training alternatives. Each of these seminars covers a topic in seven hours. Located in major cities across the Southeast, the seminars offer business people the opportunity to attend quality training programs as easily as they might commute to their own
jobs with no more expenses for travel or accommodations. In the academic/fiscal year 1982-83, more than 12,000 people from nine states and the District of Columbia attended 290 of these seminars. At present, 275 seminars are scheduled for fall 1983; at least another 275 programs will be conducted in the spring of 1984 in the Carolinas, Georgia, Florida, Alabama, Mississippi, Arkansas, Tennessee, Kentucky, Virginia, West Virginia, Maryland, Delaware and the District of Columbia.

Two-Day Management Programs

Professional Development presents a limited number of two-day management seminars on such vital and timely topics as productivity improvement, employee involvement and quality circles, computer applications, construction management and other topics aimed at the executive level. These seminars provide in-depth updates on the continuing evolution of American management theory, style and philosophy. In June 1983, more than 110 executives, managers and productivity experts attended Professional Development’s conference on “Employee Involvement as a Management Commitment” at Atlanta’s Peachtree Plaza.

Special Events

Professional Development offers special programs featuring unique approaches to continuing education, notable speakers and up-to-the-minute exploration of fast-breaking issues. The annual “Professional Development for Women” conference held each spring in Greenville regularly draws more than 300 business and professional women for a full day of workshops, briefings and mini-seminars on topics geared toward the upwardly mobile businesswoman.

A program scheduled for October 1983 will apply this successful format to another area, “Professional Development for the First-Line Manager.”

Executive briefings are also offered, bringing the vanguard of American management thinkers to Clemson for fresh and innovative approaches to the problems facing business and industry. The most recent executive briefing brought representatives from McKinsey & Company to Greenville to lead a heavily attended briefing on the No. 1 nonfiction bestseller “In Search of Excellence.” In addition, some 200 attendees filled briefings on Phil Crosby’s “Quality is Free” in October and December 1982.

These and other special programs underline Professional Development’s commitment to meeting the needs of its constituency, even when meeting those needs involves breaking new ground and forging ahead in unprecedented directions.
In-Plant Programs

Professional Development has been one of the Southeast’s pioneers in the fast-growing area of in-plant training, having presented seminars and extended training programs on-site for some of the region’s leading companies, as well as the Department of Defense and NASA. These in-plant programs will become an increasingly large part of Professional Development’s total mission as business and industry become more and more attuned to the economic, educational and sociodynamic advantages of in-plant presentations.

Training Centers

The training center course, which runs from one to several weeks, combines intensive, specific training in a core discipline, such as first-line management, data processing implementation, employee involvement, with a package of general management topics. These total training workshops can be aimed at discrete target groups or tailored for specific companies. In spring 1983 for example, Professional Development hosted 16 British managers from Courtaulds Ltd., the world’s second largest textile firm, for a two-week training center; Courtaulds has already expressed its intention to repeat this program in 1984.

Small Business Development Center

The Small Business Development Center of South Carolina is a consortium of four universities in the State. During the year, the regional center at Clemson conducted 30 continuing education courses attended by nearly 1,122 small-business persons. Each course addressed the basic needs of small businesses, such as accounting and payroll procedures, inventory control, cost reduction and computer management. In addition, more than 255 clients used the consulting services offered by the center. These services included market research, business startups, initiating recordkeeping processes and general management advice. Research and consulting for small-business persons was handled by graduate students and faculty members from the College of Commerce and Industry.

Clemson’s Basic Service Center is located in Sirrine Hall. The satellite office in Spartanburg is located on the U.S.C.S. campus. With demand for SBDC services increasing, a new satellite office is being planned for the Greenwood area.
The College of Education prepares teachers, special services personnel and school leaders; provides professional services for educators in South Carolina; and carries out basic and applied research in education.

During 1982-83, the college put special emphasis on developing computer-related instructional programs, programs to assess and improve the basic skills of future teachers, and programs to improve math and science education in South Carolina.

Degree Programs

Two of the newest degree programs in education are closely related to the University's technical and scientific mission. The first students were admitted to the Doctor of Education (Ed.D.) program in vocational/technical education in 1981. This program prepares graduates to exercise leadership roles in vocational/technical education in school districts, technical colleges, State agencies and industry in South Carolina, as well as in colleges and universities throughout the South. Thus far, more than 20 highly qualified students have been admitted to the program.

In response to an identified industrial need, the degree program in graphic communications was implemented in 1982. The Printing Industry of the Carolinas (PICA) provided advice and considerable financial assistance in the development of the program. To date, equipment, materials and cash contributions with an estimated value of $267,000 have been given to the program by industrial concerns. The program is recognized as a primary resource for educating those already in the graphic communications field as well as students in school settings. In the spring 1983 semester, 46 majors were enrolled in the program, and an additional 24 candidates were admitted to the program for fall 1983.

Instruction and Teaching

Over the past year the College of Education has made a major effort to improve the delivery system in teacher education with more emphasis on technology. In particular, matters related to computer-assisted instruction and computer literacy training have received attention. Through the generosity of the Clemson Athletic Department, which contributed in excess of $100,000 to the project, a Learning Resources Laboratory has been established. Twenty-five microcomputers and an extensive assortment of software have been purchased so that individualized computer-assisted instruction will be available in reading, mathematics, English and composition. The laboratory will be open to all students.

A task force in the college is reviewing all teacher education programs to determine revisions needed in courses or programs so all graduates will be prepared to deal with computer-related instruction in the schools.
The curriculum changes required by the implementation of South Carolina Act 187 have been completed, and all teacher education programs are in compliance with the act. All courses place emphasis on competency-based education and laboratory experiences, in campus laboratories and in public schools.

Faculty members involved in teacher education laboratory courses completed the required state training program on the use of the South Carolina Assessment of Performance in Teaching system. This system is now used in all student teaching programs.

The first phase in the renovation of Godfrey Hall was completed, and three instructional laboratories were placed in service in January 1983. The arts and crafts, plastics and power technology programs are serving more than 300 students per year in the newly renovated facilities.

In-Service

During the past year, the college provided both credit and non-credit in-service and staff development programs to teachers and other professional educators. The college taught 102 off-campus courses for University credit at 35 different locations and enrolled 1,176 teachers who were upgrading their professional skills. Cooperating colleges — Lander and Presbyterian — taught courses for teachers who received graduate credit at Clemson. The college also offers special institute courses for credit, as well as non-credit staff development activities.

Through contributions in the form of equipment, materials and cash with an estimated value of $60,000 from Texas Instruments, $8,000 from Scott, Foresman Company, and $15,000 from the Clemson Alumni Association, a mobile van equipped to provide computer literacy training has been acquired. The van will enable the College of Education to provide on-site assistance to South Carolina teachers who need help in the area of computer literacy or computer-assisted instruction. The computer van is scheduled for full operation this fall. Considerable interest has been generated in nearby school districts.

Research and Grants

The Department of Agricultural Education continued to assist high school agricultural departments in program evaluation through a Standardized Achievement Testing program designed to measure the cognitive ability of students enrolled in off-farm occupation courses. This service provided standardized pre-tests and post-tests for agricultural mechanics, ornamental horticulture, forestry, and environmental and natural resources; developed new and revised standardized tests in pulpwood harvesting, turf and lawn management, sales and services, and other areas as the need arose.

During 1982-83, the pulpwood harvesting test was administered to
collect additional data for performing item analyses and selecting the best 100 items from the 200-item preliminary form. Usually, these tests are administered as pre- and post-tests by the vocational agriculture teachers, and the answer sheets are returned to Clemson for scoring and interpretation. Each teacher receives feedback on how much progress students make from fall to spring and can compare the performance of the students and the school with others throughout the State by percentile ranks. Almost 800 students were tested this past year.

A major publisher accepted an American history secondary school textbook with one of our faculty members as senior author.

The on-going grant from PICA supported the continuing research activities in progress and field testing of computer software for two programs. The “MAT” (make a test) program was designed to utilize the computer in assisting the teacher to make a test. “Quick Score” is a program that uses the computer to score and analyze the results of tests. Both programs can be used by any teacher in any teaching area.

During 1982-83 the Department of Industrial Education received equipment and supply grants valued at more than $200,000. These grants are providing machinery in areas that would be impossible to equip without industries’ help. Efforts are being made to seek further help from industry in updating the instructional equipment throughout all teaching areas.

**Special Activities and Services**

A comprehensive self-study and an interim accreditation visit by a team from the National Council for the Accreditation of Teacher Education were successfully completed. All education programs were accredited for five years.

The college participated in the program of the South Carolina Board of Education and the State Superintendent of Education to study the status of science education in South Carolina public schools. This study group analyzed and made recommendations on South Carolina math and science program requirements and incentives to attract students to careers in math and science education. With the nationwide shortage of mathematics and science teachers, a concerted effort has been made to attract students into mathematics education and science education programs. In the fall 1982 semester, 116 students were enrolled as mathematics or science education majors. Clemson will continue to be a primary source of those teachers for South Carolina public schools.

The college conducted a Basic Skills Assessment and Improvement program in compliance with legislation enacted by the South Carolina General Assembly in 1977. Besides the selective admission procedures, which apply to all candidates for admission to Clemson, teacher education students must pass an Educators Entrance Examination before they are
admitted to the professional level of study. In the February administration of the test, which deals with basic skill areas of reading, writing and mathematics, all Clemson students who took the examination passed. Prior to certification, all teacher education graduates must also pass an area examination of the National Teachers Examination, which tests competence in a subject area. Clemson graduates, when compared with graduates of other teacher education institutions in the State, have consistently scored at or near the top based upon the percentage passing the test.

As mandated by State legislation, teacher educators for agricultural education from Clemson University participated in reviewing and evaluating the local programs of vocational agriculture in 19 school districts and area vocational centers.

The Department of Elementary and Secondary Education once again hosted the Clemson Reading Conference, which involved approximately 800 people over a three-day period. A number of nationally known participants were on campus for the conference.

Some 28 schools participated in the 11th Annual Tiger Drill Meet, cosponsored by the departments of Aerospace Studies and Military Science.

The Department of Agricultural Education sponsored the 56th annual Future Farmers of America State Convention in June 1983. A total of 347 conferees participated.

The College of Education participated in the pilot phase of the South Carolina Assessment Center Program conducted under the auspices of the State Department of Education Administrators Leadership Academy. The purpose of this program is to help public school districts select and train candidates for school administrative positions and provide a continuous professional development program for South Carolina public school administrators.
Most engineering schools were founded in this country following the Civil War in an unbridled belief that Man had the ability to improve his lot in life by changing the world around him. Due partly to this belief and its application in a friendly economy, the United States has come to enjoy the highest and most comfortable standard of living in the history of the human race.

Technological preeminence has been the backbone of this nation's economic and social achievements. The past few years have seen a growing recognition of the critical role that qualified engineering manpower plays in maintaining that preeminence. Qualified engineers are in great demand in industry, government and education. In its efforts to meet the demand for more engineers and yet maintain quality in education, research and public service, Clemson University's College of Engineering — the leader in engineering degree production in South Carolina — has continued to improve the efficiency and excellence of both its faculty and curriculum.

Between July 1982 and June 1983, the College of Engineering created a new department, Industrial Engineering, with James A. Chisman as acting head. This new department was formed to satisfy the increasing demand for industrial engineers within South Carolina's existing industry and to meet the needs of the anticipated expansion in the State's industry.

Another accomplishment during the fiscal year was the appointment of two new department heads, Russell H. Brown and Andreas F. von Recum, in Civil Engineering and Interdisciplinary Studies (Bioengineering), respectively. A new director of Continuing Engineering Education, Thomas H. Oswald, was also appointed last year.

Instruction

The fiscal year 1982-83 saw the addition of an undergraduate program in industrial engineering. (The present graduate division of Industrial Engineering had existed under the name "Systems Engineering" and was incorporated into the new department when it was formed.) With this additional undergraduate program, there now exist 10 undergraduate, 11 master's and nine doctorate degree programs. Six basic engineering programs, one advanced-level program, and the Engineering Technology Program are accredited by the Accreditation Board for Engineering and Technology.

The College of Engineering is the largest academic unit on campus. Fall 1982 enrollment reached an all-time high of 3,292 students, of which 2,987 were undergraduates and 305 were graduate students. For 1982-83, 500 baccalaureate degrees were awarded in addition to 69 master’s and 18 doctorate degrees.
An increasingly important educational component is the Cooperative Education program. Nearly 86 percent of all participants in the Cooperative Education program at Clemson were engineering students. The program, which provides students with challenging and planned industrial work experience related to their college curriculum, was and continues to be sponsored by approximately 200 Southeastern companies.

Another option some engineering students chose was to study engineering in the Clemson at Greenville TEC program. Clemson University's College of Engineering offers courses at Greenville TEC in computer engineering, electrical engineering, engineering technology and mechanical engineering. These courses can lead to either an Associate of Science degree from Greenville Technical College or a Bachelor of Science degree from Clemson University. Between the summer of 1982 and spring of 1983, 11 engineering courses were offered in this program. An average of 12 students enrolled in each course.

Rapidly escalating salaries for B.S. graduates continued to provide a negative incentive for graduate school attendance. This has caused shortages at the faculty level and created strong competition among companies for B.S. graduates. The average starting salary for a 1983 Clemson engineering graduate was $24,349 per year.

Due to budget cuts and lack of equipment, space and other resources, Clemson University's College of Engineering had to limit enrollment last year. Although the College of Engineering is being challenged to meet the demands of industry, quality education to all of its students remains a primary objective.

The demand for women and minority engineers also continued to increase in the past year. In response to this, minority enrollment increased from 97 in fall 1981 to 144 in fall 1982. Enrollment of women in engineering also increased. Fall 1982 figures show that women comprised more than 17 percent of the total enrollment in the college and about 25 percent of the freshman class.

Clemson University was officially accepted into membership in the National Consortium for Graduate Degrees for Minorities (GEM) in October 1982. The primary purpose of this organization is to increase minority enrollment in engineering graduate schools. The first GEM student will be enrolled at Clemson in the fall of 1983.

The sixth year of the Summer Engineering Minority Program for high school students continued that program's record of success. More than 400 qualified students have attended this program, which is sponsored by industry and foundations.

Industry provides considerable support to the College of Engineering to enhance educational opportunities for students. One example of this support is a major gift by the Digital Equipment Corporation to Clemson University of two VAX 11/780 computer systems. These computer sys-
tems, acquired last year, will permit state-of-the-art instruction and research in computer-aided design and graphics.

Within the Department of Electrical and Computer Engineering, the summer Master of Engineering program, begun in 1980, is funded totally by the Western Electric Co. Thirty-nine students were enrolled for the first session during the summer of 1983. Twelve students will receive M.E. degrees in August 1983 and are the first to graduate from this program. Another program in this department which has been successful is the Industrial Graduate Fellowship program. Presently, 10 master’s students participate in this program. Each student receives a fellowship of $3,000 to $5,000, a summer job and a graduate assistantship, providing total support ranging from $8,000 to $10,000 for the academic year.

In the 1980-81 fiscal year, the Department of Chemical Engineering set as a goal the strengthening of its graduate program. Three new programs were implemented: the Master of Science Industrial Residency program, a program for Teaching and Research in Process Automation, and a new Industrial-Graduate Fellowship program. During 1982-83, nine companies and 13 students participated in one or more of these programs with financial commitments from industry in excess of $180,000.

Another program developed in the past year and expected to be successful is the new internship program offered by the Department of Interdisciplinary Studies (Bioengineering). The program will allow students in this discipline to work as bioengineering interns at the Medical University of South Carolina and at the Professional Medical Products Company in Greenwood.

In the Department of Civil Engineering, a cooperative graduate program with The Citadel has been implemented. The first Clemson University graduate course was taught at The Citadel in spring 1983, and three Citadel graduates from this program entered Clemson this fall.

College of Engineering faculty dedication to quality education can be seen in the number of awards presented to the faculty for excellence in instruction. Dean J. Charles Jennett was awarded the 1983 Outstanding Engineering Educator Award by the Piedmont Chapter of the South Carolina Society of Professional Engineers. In Environmental Systems Engineering, L. G. Rich assumed the position of Alumni Professor of environmental systems engineering. In Civil Engineering, B. L. Sill was awarded the Chi Epsilon Outstanding Teacher Award, and Robert F. Nowack was awarded the first annual E. F. Byars Prize for his excellence in teaching engineering mechanics.

Research
Clemson University continues to be the leader in engineering research among institutions of higher education in South Carolina. Engineering
research at Clemson has three essential objectives: to seek new knowledge, to seek answers to both the short- and long-term problems of the State and nation, and to support advanced-level educational programs by providing research experience for students.

The College of Engineering at Clemson traditionally receives a greater percentage of research funds (30 to 40 percent) from industry than do engineering departments at most other universities. A poor economy has caused funds for research at Clemson to fall slightly to a level of about $6 million in terms of grants and contracts in force. However, more faculty members were engaged in research in 1982-83 than in previous years. During the past year 81 faculty were engaged in research. Their efforts were supported by 145 graduate and 75 undergraduate students.

With approval from the South Carolina Commission on Higher Education, the College of Engineering established in 1981 the Engineering Center for Automated Manufacturing Technology. This research center continued to grow this year under the direction of Frank W. Paul, and also welcomed its first industrial sponsor, Reliance Electric Company.

Another research center, the South Carolina Energy Research and Development Center, also experienced continued success. This center, directed by J. Charles Hester, has the following missions: (1) to promote and encourage energy conservation, education, research and development in and for the State of South Carolina; (2) to be a liaison for energy activities involving local, State and federal agencies, and industry and educational institutions; (3) to help transfer energy technologies to South Carolina; and (4) to contribute to national energy issues in selected areas of excellence.

With the addition of 2,162 square feet of laboratory space, the Engineering Technology Department began plans to create a center of excellence in manufacturing engineering technology. Two new faculty members last year brought with them qualifications which will enhance the plans for developing the center.

A partial list of other projects actively pursued during the year gives an indication of the scope and breadth of engineering research at Clemson:

1. Several research projects in the Ceramic Engineering Department were begun or continued. Investigations were made for the Westinghouse Corporation on ceramic seals; work was conducted at the Savannah River project on waste disposal methods; work continued on the Clemson development of new low-temperature, non-silicate glasses; and an industrial associates program was developed with the Norton Company.

2. In Chemical Engineering, the Center for Polymer Processing received national and international recognition through the efforts of Dan D. Edie. The major thrust of Edie's research is toward technical developments in the field of fiber production.
3. Mechanical Engineering research efforts were aimed at studying the nature of the turbulent structure of heated flows using non-intrusive methods. Optical measurement techniques were used in heated jets and purely buoyant flows. Development of holographic interferometry was begun in an effort to determine three-dimensional thermal structure. This was coupled with laser Doppler velocimetry to measure instantaneous velocity profiles. Future efforts will focus on computer-aided data reduction of holographically recorded information.

4. Four research projects of the Clemson Hydraulics Laboratory were started or continued in 1982-83. The National Science Foundation donated $85,000 for a two-year study on unsteady turbulent discharges; $16,500 was given by the S. C. Sea Grant Consortium to continue working on the production of bulkhead designs; an 18-month, $54,000 grant to study and provide more efficient designs of storm-water inlet capacities was funded by the S. C. Department of Highways and Public Transportation; and the Electric Power Research Institute gave $27,000 for a study on the feasibility of using physical hydraulic models to study pollutant transport in ground water.

5. Electrical engineers continued the study of fabrication and properties of very small transistors. The project has more than $250,000 in research support from the Office of Naval Research, the Rome Air Development Command, the Naval Research Labs and the National Bureau of Standards.

6. Researchers in the Department of Civil Engineering continued to evaluate the strength of composite masonry wall under static and earthquake loads. This project is being funded by the National Science Foundation.

7. Solar cell reliability research continued in the Department of Electrical Engineering. Total expenditures since December 1977 for this project have been approximately $690,000. The project is sponsored by the Jet Propulsion Laboratories for the Department of Energy.

8. Environmental systems engineers continued research on the rate of breakdown of manmade organic compounds by bacteria in the natural environment and in wastewater treatment systems. This project is supported by a major grant from the National Science Foundation.

Several members of the college faculty received special recognition for their accomplishments. James G. Goree was selected for the 1983 McQueen Quattlebaum Engineering Faculty Achievement Award. His research in fracture mechanics of composite materials has been continuously funded by NASA since 1979. In agricultural engineering,
John Collier, who was promoted to associate professor during the year, received the American Society of Agricultural Engineers' "Young Designer Award." Buddy Miles was selected by the American Soybean Association and ICI Americas to participate in a program that recognizes outstanding researchers throughout the country.

In October 1982, the Academy of Surgical Research was formed with a starting membership of 40 experimental surgeons from the United States and Europe. Andreas F. von Recum, department head of Interdisciplinary Studies, was elected first president. In July 1982, R. M. Roberds, head of Engineering Technology, was appointed to chair an ad hoc committee to provide recommendations to the Board of Engineering Examiners on the professional registration of technologists in the State. Industry is 85 percent in favor of such registration.

In Environmental Systems Engineering (ESE), Alumni Professor Gene Rich won the Rudolph Hering Medal from the American Society of Civil Engineers for his outstanding paper, "Design Approach to Dual Aerated Lagoons." B. C. Dysart, III, was elected president and Chairman of the Board of the National Wildlife Federation, and C. P. L. Grady was named to a blue-ribbon, five-member, international working party by the president of the International Association of Water Pollution Research and Control. This committee met at Clemson in the fall. Since ESE's Ph.D. program was selected by the Provost's Ad-Hoc Committee as one of the very best on the Clemson campus, the department was awarded a Bowen Professorship. C. P. L. Grady from the ESE faculty was named to fill this position beginning in the 1983-84 academic year.

G. C. Robinson, a ceramic engineer, was elected vice-president of the American Ceramic Society. Frank W. Paul, a mechanical engineer, continued to be a leader in the rapidly growing area of industrial robotics and automated manufacturing. In recognition of Dr. Paul's national and international professional status, he was selected a McQueen Quattlebaum Professor of Mechanical Engineering. A second Quattlebaum chair was filled by Johnson Y. S. Luh, a professor of electrical engineering at Purdue University. Luh came to Clemson University as McQueen Quattlebaum professor of electrical and computer engineering in August 1983.


Public Service

Lifelong learning needs of the engineering community are served by providing a wide spectrum of opportunities for continuing engineering education (CEE). Technology transfer to practicing engineering and, through them, to their business or government employers has an immediate and beneficial impact on the State’s economy. During 1982-1983, engineering faculty served 4,541 people through CEE courses, seminars, workshops and symposia. The Clemson program is the largest in the State and is recognized nationally as a leader in continuing engineering education.

Major conferences last year included two Fiber Producer Conferences, a Robotics Conference, the annual South Carolina Highway Conference, a seminar on Seismic Design of Structures, and two conferences for the brick and ceramics industries.

The annual series of Professional Engineering Reviews was taught in Greenville, Aiken, Columbia, Charleston and Charlotte. A similar series for persons seeking registration in land surveying was initiated by virtue of resumption of the land surveying review course at Greenville. This activity is expected to develop into a multi-level program of continuing education for land surveyors.

Other short courses and workshops representative of the 325 CEE programs conducted are short courses on soil mechanics, computer graphics and design, improving technical presentations, productivity improvement for industry and microprocessor applications.

During this fiscal year, programs were cosponsored with the Asphalt Institute, the American Institute of Industrial Engineers (Chapter 118) and the Piedmont Chapter of the South Carolina Society of Professional Engineers. Cooperation between CEE and professional societies and industry associations is extremely beneficial to all involved and will be encouraged. Another innovation receiving emphasis during the year was the in-plant delivery of specially tailored short courses.
COLLEGE OF FOREST AND RECREATION RESOURCES

The College of Forest and Recreation Resources at Clemson University is truly the forest and recreation resources center for South Carolina. All research and Extension activities in forest management, wood utilization, and recreation resources and services are the responsibility of two departments — the Department of Forestry and the Department of Parks, Recreation and Tourism Management. In addition, the Energy and Resource Development Institute (ERDI) operates under the auspices of the college to investigate the management and development of energy resources in the Southeast.

The college is dedicated to promoting the wise management, use and stewardship of the State's forest resources and to enhancing the quality of life of its people through a rewarding use of leisure.

Department of Forestry

As the only university in South Carolina with a forestry department, Clemson has the unique opportunity to supply the foresters who manage the 12.5 million acres of forest land in this State. In fact, more than 50 percent of the graduates have stayed in South Carolina to meet this objective. Clemson's curricula provide for study in the areas of wood utilization or forest management and emphasize the role of the forester as a steward of our forest resources.

During the year, the department received $30,000 to establish an endowment for undergraduate scholarships. The money was bequeathed in the will of the mother of an alumnus. These scholarships will provide a foundation for attracting more high-quality students into the profession.

This past year has seen two of the department's faculty honored for professional achievements. Dr. D. H. Van Lear was chosen as the recipient of the Robert Adger Bowen Professorship, and Dr. R. M. Allen was elected chairman of the three-state Appalachian Society of American Foresters.

Two personnel changes also occurred. Dr. J. R. Warner retired after 20 years on the faculty, and Dr. A. W. C. Lee joined the faculty as an assistant professor of wood utilization.

In all, the forestry faculty published approximately 50 papers during the year, including eight departmental bulletins and research series.

Teaching

During the academic year, 23 candidates received the Bachelor of Science degree; 20 graduated from the forest management program and three from the wood utilization program. Eleven graduate degrees were awarded; five Master of Science degrees and six Master of Forestry.

A major highlight of the year was the enrollment of the first nine
students in the Ph.D. program. The addition of this program strengthens both teaching and research programs and improves the University's ability to find solutions to the State's forestry problems.

For the third consecutive year, the forestry faculty taught two three-week continuing education sessions in silviculture to U.S. Forest Service Personnel. The choice of this department as the sponsor is a credit to its reputation in silviculture.

Research

Research in the Department of Forestry is undertaken in timber production, forest management, wood utilization and biological productivity, and is supported by State appropriations, federal McIntire-Stennis funds and outside grants.

The timber-production area is made up of a group of scientists in forest soils, silviculture, entomology, genetics, pathology and tree physiology. They are concerned with problems that prevent full timber productivity.

In addition to the approximately 25 State and federally funded projects already going on in this area, new projects were begun to study genetic variation in flowering dogwood, the influence of seed characteristics on the early growth of longleaf pine, and physiological properties of loblolly pine as related to nursery practice and field performance.

Another 10 projects in this area are supported by grants from the Forest Service, other federal agencies, private industry and State agencies. The U.S. Forest Service, through the Southeastern Forest Experiment Station, funded a study on improved coppice regeneration and white pine enrichment plantings for $33,824. Union Carbide funded a project on the importance of acid precipitation on piedmont forest soils for $10,000 and continued funding on ecosystem effects of whole tree harvesting for $56,073.

The European Economic Community funded a 10-year project to study the effect of oak wilt on European oaks. Seeds from these oaks will be outplanted in the Clemson Experimental Forest and will be inoculated with oak wilt fungus to determine their susceptibility. Determination of susceptibility of the native European oaks will affect future decisions on export of oak lumber to Europe.

The United States Department of Agricultural Integrated Pest Management Program provided $60,000 for the development of impact models for the Southern pine beetle pest management program. A highlight of this project was the acquisition of a portable sawmill, which will be used to demonstrate the feasibility of salvaging pine that has been killed by Southern pine beetle. Late in the year ownership of the sawmill was transferred to the South Carolina Forestry Commission to give more landowners exposure to the new technique.

Projects were completed on the effect of climate on red oak mortality in
the North Carolina mountains; the growth, decline and mortality of urban red oaks; and the role of prescribed fire in the Southern Appalachian Mountains and Upper Piedmont.

Research in the forest management area seeks solutions in forest-based, multiple-use problems. New projects begun this year include studies on the potential for forest management of nonindustrial private forests in South Carolina, timber wildlife habitat relationships in loblolly pine stands of the Piedmont, and snag succession in upper piedmont forests.

Studies were completed on firewood consumption and marketing in urban areas of South Carolina, which was funded by the U. S. Forest Service, and the potential biological effects of intensive forest management for energy on-site productivity in the Atlantic coastal plain, funded by the DuPont Corporation. These studies and ongoing State studies in multiple-use management and small private landowner characterization complement each other.

Wood utilization research ranges from the use of cardboard mulch around Christmas trees to weight loss in loblolly pine trees stored with the crowns intact. Two new State-supported projects began this year. The first is a study on the mechanical properties of red oak lumber dried by radio-frequency/vacuum process and dehumidification kiln-drying. The second evaluates the physical and mechanical properties of cement-bonded wood excelsior board.

The U. S. Forest Service funded four projects in this area as follows:

1. Yields of hardwood dimension parts from planed and unplaned lumber dried by two drying methods — $13,000.
2. Weight density of wood fuel — $6,594.
4. The effect of transpirational drying on weight loss and moisture content in sapling-size hardwood trees — $15,000.

The area of wood utilization was enhanced by a $100,000 appropriation by the State Legislature to begin a multidisciplinary research trust in forestry, textiles and chemistry. The seed money will be used to hire a wood chemist to organize a multidisciplinary research program with industry and other departments on campus. The goal is to determine if greater potential exists for using raw wood products and materials in the textile and chemistry industries — the State's two top industries. With the abundance of forest products in South Carolina, greater utilization by these two industries would benefit the State's economy and the productivity of all three industries.

Faculty who research biological productivity are all in the South Carolina Coastal Plain either at the Belle W. Baruch Forest Science Institute near Georgetown or the Forest Sciences Laboratory in
Charleston. This arrangement with the Charleston laboratory began two years ago in cooperation with Clemson and the U.S. Forest Service scientists.

Some of the more than 15 ongoing State-supported projects this year include the examination of several properties of turkey oak and its potential for culture on dry sites, a problem analysis of the physiology and ecology of wetland sites, and a monitoring of groundwater on the Hobcaw Barony.

Two new State projects were started during the year. The first is a study of the woodcock population and habitat characteristics in South Carolina. The second will study the movements and habitat utilization by Southern fox squirrel in coastal South Carolina.

A project investigating the silvical characteristics of loblolly bay as a source of pulpwood and other uses was completed this year. Also, a project that investigated the spatial distribution of loblolly and longleaf pine stems and the relationship of spacing to seed dispersal was completed.

**Extension**

In October 1982 a regional meeting identified opportunities in computer-assisted resource management. In cooperation with professionals from across the South, a private institute to promote the availability and application of micro- and macrocomputer hardware and software in natural resources has been organized. The institute will benefit private consultants, agencies, universities and contractors.

In cooperation with the South Carolina Forestry Commission, the Extension Service surveyed Christmas tree retail operations throughout the State to evaluate marketing systems, sources of trees and the opportunity to market State-grown trees.

The landowner contactor program continues to grow in Orangeburg and Hampton counties. Plans call for expanding the program to three additional counties in 1983-84. In 1982, 600 acres of forest land were reforested because of this program.

During the year, workshops and training sessions have been conducted on Christmas tree pest management, integrating forest and wildlife management, pulpwood production and forestry as an investment. More than 300 people attended these sessions.

**Department of Parks, Recreation and Tourism Management**

**Teaching**

A new emphasis area in travel and tourism at the undergraduate level and a Master of Science degree were approved by the Commission on Higher Education during the year. The faculty reviewed and revised the undergraduate curriculum, adjusting for new general education requirements and amending the required courses in each of the four emphasis
areas: therapeutic recreation, community leisure service, recreation resource management, and travel and tourism.

With the selection of a departmental faculty member as the new director of the University Honors Program, new honors courses were developed and a departmental honors program initiated. Furthermore, faculty-student advising was adjusted and strengthened to reflect faculty specialties within the four emphasis areas.

Public Service/Extension

Extension personnel in PRTM responded to a greatly increased number of requests this year for information and technical assistance from as far away as Canada and California and as near as other departments on campus. The majority of time and effort was directed toward agencies, businesses and communities within the State. These included: Abbeville County, Bankers Trust Travel (Anderson), Belton, Central Wesleyan College, Charleston AFB and Naval Weapons Station, Cheraw, College of Charleston, Duke Power, Foothills Garden Club, Florence, Greenwood, Greer, Greenville-Reedy River Industrial District, Harbor Island Resort, Hartsville Chamber of Commerce, Hemingway, Heritage World Expo Authority, Horry County, I. E. DuPont (North Augusta), Lake Arrowhead Campground, Liberty Hall (Pendleton), McCormick County, Mullins Chamber of Commerce, Ocean Lakes Campground, Oconee County, Pendleton, Pickens Outdoor Drama, Inc., Roxie Anna Collins Children’s Home, Salvation Army (Gaffney), Seneca, Six Mile, Sumter, S. C. Department of Parks, Recreation and Tourism, S. C. Sea Grant Consortium, University Relations (Clemson), Walhalla Chamber of Commerce, Walterboro, Westminster, Wildwater Ltd., and York Recreation Commission.

Types of assistance included: grant applications, site design, computer applications, architectural review, organizational development, brochure design, festival development, recreational needs assessment, tourism potential assessment, feasibility studies, interpretive plans, visitor center design and needs study, marketing research, research agenda development, survey development and financial planning.

Professional Development Programs

1. A four-day professional development program for therapeutic recreation specialists attracted 175 participants from the Southeastern states. Program income was $7,000.

2. The Outdoor Recreation Management Short Course provided an opportunity for 29 federal agency outdoor recreation planners and managers to undergo three weeks of training at Clemson University. Participants came from across the nation and consisted primarily of U. S. Forest Service employees. Program income was $81,200.
3. The department cosponsored a 36-hour training institute with the American Health Care Association for 40 nursing home activity directors from South Carolina.

4. The Executive Development for Resource Management program involved 33 Army Corps of Engineers employees in two weeks of resource management training as it relates to outdoor recreation. The group represented Corps facilities and sites nationwide. Program income was $23,217.

5. The Training Institute for Resource Management was held during the spring for 35 National Park Service employees. It consisted of five days of training in various aspects of resource management. The participants were primarily from the Southeastern states, and the program income was $13,667.

6. A series of four one-day swimming pool workshops was held in four different locations throughout the State in cooperation with the Department of Health and Environmental Control. The workshops provided an update to 327 participants in various areas of pool management, including regulations, legal liability and maintenance. Income from the program totaled $14,800.

Public Service/Research

Research activity by faculty and students of this department reflects a commitment to increasing the understanding of leisure and recreation at both the basic and applied levels. The transfer of research information to our many publics is the end goal of our efforts.

The department has been involved with the dissemination of research knowledge at all levels. For example, nine national and seven regional and local research presentations were made, five articles were published in research journals, and 19 professional and technical bulletins were distributed. Assistance has been given to local recreation agencies as they undertake research efforts. Faculty are involved with research journals in both the associate editorial capacity and as reviewers.

Much research is still underway. Work continues on the relationship of National Park establishment to Third-World development and the influence of parks on scientific research. These interests led to a sponsored seven-week trip by one faculty member to Cameroon. Such honor attests to the growing research reputation of this department. Another project explored the conflict created by bus travel in historic districts. Another resulted in a tourism development handbook for local communities. A study on reducing the dependence of the aged confined to institutions is progressing, as is a philanthropy study. Some of these projects are funded through outside sources.

Faculty continue to submit proposals for funds from non-appropriated sources to supplement the department’s research efforts. While not all
proposals are successful initially, contacts which lead to future funding are often established. The diversity of agencies contacted reflects the broad range of faculty research interests. Examples of these agencies include Clemson University Faculty Research Committee, the National Park Service, U. S. Forest Service, Pickens Outdoor Drama, National Institute on Aging, Atari Research Foundation, South Carolina Department of Parks, Recreation and Tourism, and Resources for the Future. The funded projects allow further research diversity and generate information directly applicable to South Carolina.

A Cooperative Park Service Research Unit located in the department continues to work closely with faculty. Preliminary exploration has begun to determine if the arrangement can be expanded to include other Park Service personnel with further research interests allied to those of the Department of Parks, Recreation and Tourism. The cooperative tourism project supported one graduate and one undergraduate student this year and provided support for faculty and staff. The staff of the research unit serves on graduate research committees and has provided partial funding for three graduate students.

The department’s increasing emphasis on the research mission of its faculty facilitates the growth of new knowledge in the profession and supplements the data base from which parks, recreation and tourism personnel operate.

Outdoor Laboratory

Increased use of the Clemson University Outdoor Laboratory continued during the 1982-83 fiscal year. All available weeks during the summer months were scheduled for residential camping programs. The number of groups and the total number of people using Laboratory facilities during non-summer months remained stable.

Jaycee Camp Hope served 256 South Carolina mentally retarded children and adults during a six-week program involving five different sessions. The South Carolina Jaycees and Jaycee-ettes continued their strong financial support by providing $19,500 in operation support. Support for scholarships also was given by the South Carolina Knights of Columbus ($6,000). Campers and staff for this program were recruited by the Outdoor Laboratory professional staff. Total budget was about $51,500.

Camp Sertoma served 136 children. Two one-week sessions were for underprivileged children, and three one-week sessions were for children with speech and hearing problems. The Sertoma Clubs of South Carolina provided total financial support for this operation. The new Sertoma cabins were used for the first full season. Campers were selected by Sertomans, and the staff was recruited by the Laboratory professional staff. Total approximate budget was $16,000.
Camp Running Brave, a residential camp for hemophiliacs, served 43 campers from several states under the sponsorship of the South Carolina Chapter of the National Hemophilia Foundation. The Outdoor Laboratory seasonal staff provided support, and the campers were selected by a camp committee. Total approximate budget was $6,500.

Camp Lions Den, again sponsored by the Mid-Day Lions Club of Anderson, hosted 19 visually handicapped campers for one week. The Camp Sertoma staff conducted the program, and the campers were recruited by the Outdoor Laboratory professional staff. Total budget was about $4,200.

South Carolina Diabetic Children’s Camp was held for two weeks in August for 58 diabetic children. The Outdoor Laboratory staff provided the program while specialists were utilized in medicine and food service. The campers were selected by a camp committee. Total approximate budget was $14,200.

The South Carolina Department of Mental Health continued to fund Camp Logan, a single six-week residential camp for 53 emotionally disturbed clients. Camper and staff recruitment was a function of the mental health professional staff. The laboratory provided food service, maintenance support and program support. Total approximate budget for use of the Laboratory was $22,000.

Three one-week sessions for senior citizens were conducted for the 12th consecutive year for 101 campers whose ages ranged up to 103. Support staff was provided to the Outdoor Laboratory by PRTM students and faculty. Total approximate budget was $8,000. Also, College Week for Senior Citizens was conducted on campus last May by the Outdoor Laboratory. The 12th consecutive College Week attracted 357 people for the two one-week sessions. Financial support was received from several businesses and organizations, with the most significant coming from the Elliott White Springs Foundation for 25 scholarships. Total budget was about $34,000.

Camp Placement Day experienced a record registration from camp directors and visitations by Clemson University students. Thirty-five camp directors were present, and more than 250 students applied for positions. The Outdoor Laboratory staff plans and conducts this event annually.

From mid-August the Laboratory is available to any group or organization on a space-available, rental basis. This use continues until the following summer programs begin in early June. The Laboratory has facilities for housing, food service and recreation programming. Typical uses include conferences, workshops, socials, retreats and in-service training sessions.

During the 1982-83 season, 130 groups involving more than 7,500 people used Laboratory facilities. The busiest rental months were October
and May (22 groups each month) followed by April (21) and September (16). The following list indicates the types of groups using the Outdoor Laboratory: various University disciplines and student organizations, U.S. Forest Service, National Park Service, City of Greenville, various civic organizations, Anderson Memorial Hospital, Tri-County Technical College, Central Wesleyan College, Clemson Chamber of Commerce, South Carolina Chamber of Commerce and State Forestry Commission.

Energy and Resource Development Institute

Fiscal 1982-83 was a productive year for the Energy and Resource Development Institute (ERDI). New research initiatives for the year included:

1. An assessment of wood residue for energy, U.S. Forest Service ($135,000). This project involves scientists from Clemson University, University of Georgia, Western Carolina University, V.P.I. and the U.S. Forest Service.
2. Assessment of vegetation management activities on the Blue Ridge Parkway; National Park Service and the University of Tennessee ($15,000).
3. Development of a regional research agenda in the areas of forest economics and energy, and changing resource use patterns and lifestyles; U.S. Forest Service ($10,000).

In addition to the above specific projects, the U.S. Forest Service continued its support of ERDI operations with an additional cooperative agreement ($45,000).

ERDI's ongoing research programs included the Housing Research Program by the U.S. Department of Agriculture and the Agricultural Research Service. The house is the result of a 1981 arrangement between the Clemson University Foundation Inc., ERDI and the USDA-Rural Housing Research program. The project involves construction of a series of homes to assess energy conservation techniques, materials and site preparations. At the conclusion of the research, the homes will be sold and proceeds will go to the Clemson University Foundation Inc. to underwrite future ERDI programs and housing research.

Construction on the first house began in summer 1982. Project delays have moved the completion date to October 1983.

Private contributions and sponsorship for the house have been received from the following: The Carolina Concrete Masonry Association, Upper South Carolina Masonry Contractors Association, The American Enka Company, Santee Cement Company, Wilson Brothers Sand Company, Phillips Petroleum Geotextiles Group, Boren Brick, Dow Chemical, Thuro-Seal Corp., Kohler Company, U.S. Gypsum, Owens-Corning,
Metro Mont Materials and North Carolina Masonry Contractors Association.

Additional contributions are anticipated for 1983-84 with the initial planning for the second house. A slide-tape show, "Cooperative Housing Research," was produced by ERDI and has been shown to a number of groups.

While many of ERDI's current projects extend past 1983-84, a number of possible projects are being negotiated for initiation during the coming year. These include: development of a national workshop on home heating with wood, U. S. Forest Service and industry groups; development of microcomputer applications for monitoring selected residential energy variables, U. S. Forest Service; and assessment of regional biomass by type and operability, DOE/TVA.

ERDI also will continue to seek support from private and industrial groups to develop regional cooperative programs.

Because of its strong regional emphasis and because of the name similarity between ERDI and the South Carolina Energy Research Development Center (ERDC), we have suggested, and President Atchley has approved, a name change from the Energy and Resource Development Institute to the Regional Resources Development Institute. This change is expected to occur sometime during the coming year.

Publications for 1983 include two scholarly journal articles, two popular periodical publications, one textbook chapter and two papers in published proceedings. In addition, numerous lectures and slide-tape presentations were given to University classes, national and regional associations, and community groups.
COLLEGE OF LIBERAL ARTS

It has been said that no university can ever become a great institution of higher learning without a strong program in the humanities and social sciences. The College of Liberal Arts recognizes that dictum; it is founded upon the idea that a self-governing society requires of its citizens a basic general education which will enable them, regardless of their occupational or professional interests, to lead fuller, more useful lives and to contribute to the general welfare of society.

Even with these lofty ideals, the College of Liberal Arts, like all undergraduate colleges at Clemson, is steeped in a tradition of practical endeavor. Though only about 9 percent of the student body major in liberal arts fields, the faculty of the college teach almost a third of the credit hours taken by the student body. This underscores the importance of the college's courses to all curricula in the University.

The college is composed of the departments of English, History, Languages, Music, Political Science, Psychology and Sociology. All departments except Music offer the Bachelor of Arts degree. English and History offer the master's degree as well.

Seventy-five percent of the Liberal Arts faculty hold the doctoral degree or other terminal degree in their field of specialization. Graduates of the college enter some of the outstanding graduate and professional schools in the country as well as work in the business community and public service fields.

Public Service

The college's public service role throughout the State and region continues to grow. Frequently the departments of Political Science and Sociology are called upon by units of local and State government or business and industry for advice on such problems as poll-taking, tax matters, governmental organization, the impact of industrial development on society, mental health and alcoholism, and management of job-related stress. Psychologists provide clinical service to Clemson's Redfern Health Center; management training for area industry and hospitals; consultation on jury selection, eyewitness validation and expert witness on criminal sanity; and a weekly newspaper column on labor-management relations. Members of the English faculty work with industry by conducting seminars and workshops in technical report writing.

The Department of Languages continues to stress a practical, business orientation by encouraging Clemson students to major or minor in a modern language while also preparing themselves in business administration, engineering, computer science or textile science. Given the large foreign investment in South Carolina industry and the need for development of overseas trade markets, this is an important career option for the
State’s students. The Languages Department sponsors an annual Language Declamation Contest, which draws hundreds of participants from South Carolina and nearby states. The department also conducted a summer foreign-study program in Strasbourg, France.

Among the recipients of the college’s public service activities are the State’s school teachers. Improved civic education in South Carolina’s public schools is the goal of the Thurmond Seminar conducted by the Department of Political Science with funds from The Strom Thurmond Institute for Government and Public Affairs. Thirty-one social science teachers from South Carolina’s secondary schools participated in this summer’s institute.

Seventeen Piedmont-area teachers interested in teaching writing attended the first six-week summer institute of the Clemson Writing Project sponsored by the English Department and the College of Education.

Each fall the English Department presents a well known and widely attended Children’s Literature Symposium for the State’s librarians and teachers.

Members of the college serve regularly as program leaders for the South Carolina Committee for the Humanities. Last spring they helped organize, conduct and contribute to the Piedmont Humanities Scholars Forum. Faculty of the Music Department regularly act as resource people, performers and judges in the State and region.

The College of Liberal Arts serves the student body in a variety of ways. The Model United Nations Program, sponsored by the Department of Political Science with student participation from throughout the University, annually competes with outstanding success in the Harvard University United Nations Program. The Department of English conducts an innovative course designed for freshmen with poor verbal skills. In addition, a writing laboratory is open to all students with a writing deficiency. Language students present a full-length play in French, German and Spanish each year.

The college also contributes to University life through sponsorship of a large number of student organizations and extracurricular activities. The English Department sponsors the Clemson Players, the student drama group which presents four plays during the academic year and two during summer school. The department also sponsors the debating team and helps manage student publications, including the “The Tiger,” “The Chronicle” and “The Calhoun Literary Review.” The Department of Music sponsors and manages the University Concert Series, the Liberal Arts Chamber Music Series and student musical organizations, including the “Tiger” band, the symphonic band, the university chorus, the Forty-Three Thursday Singers and the jazz ensemble.

Another constituency served by the college’s public service activities are the State’s elementary and secondary school students. In cooperation
with a national program, the Department of History sponsors a History Day for promising students. The Department of Psychology, in cooperation with the College of Sciences, supports a series of summer science camps to acquaint students with the sciences, including computer science. The Languages Department offers instruction in French, Spanish and German to area elementary school students.

Three publications of national interest emanate from the College of Liberal Arts. "The South Carolina Review" is edited and published by faculty members in the Department of English. This distinguished journal provides a forum for literary scholarship, original poetry and outstanding fiction.

"The Journal of Political Science," with an international editorial board under the editorship of a faculty member in the Department of Political Science, boasts a list of authors from leading universities and colleges throughout the United States and overseas. This journal pays special attention to the scholarly contributions of younger researchers.

Within the past year, the Department of Languages has assumed the editorship of "The Comparatist," a journal devoted to the literary and language interests of scholars in the Southeast.

In addition to editing these scholarly journals, the Liberal Arts faculty members contribute articles to a variety of professional journals and books published through numerous university and commercial presses. Several successful textbooks, especially in Political Science, have been published in recent years, and more are in the final stages of development.

The Department of History continues to spread the name of the University through a free, syndicated book review column published in newspapers throughout the country. This history book review service is the only such regular newspaper feature by an institution of higher education. The Department of English provides a similar service for children's books.

As a part of its public service activities, the Department of History also sponsors a popular radio program, "The Latin Beat," covering a wide range of Latin American music. "The Latin Beat" is broadcast over the South Carolina Educational Radio network as a part of the department's public service effort. Another media effort is the weekly radio program, Newswatch, an award-winning show coordinated by a member of the Political Science faculty.

The social sciences are also very active. Members of the Psychology Department faculty are conducting research on a variety of topics such as aging, laterality of brain function, stress management and computer-assisted instruction. The Department of Sociology has revamped its curricular options to acquaint students not only with principles and theories but also their practical application in society. Faculty members conduct workshops and research in several areas, including crime, paren-
tal grief, children's responses to crisis, parental abuse and alcohol consumption, drinking and driving, and abortion.

Scholarly gatherings are regular features of the activities of the College of Liberal Arts. The highly successful conference "Sport and Society," cosponsored with the Athletic Department, is the only interdisciplinary conference of its kind in the nation. The college also conducts programs in cooperation with the Strom Thurmond Institute of Government and Public Affairs.
COLLEGE OF NURSING

The College of Nursing provides a vital link between the University and its constituencies by offering programs of instruction, research and service directed toward the enhancement of health. Guided by the University’s mission, the College of Nursing faculty and students work with local communities to enable individuals and groups to become more knowledgeable about health and motivated to achieve it.

College activities reflecting concern for the health and welfare of those served are as follows:

1. Preparation of nurses competent to provide care, at the level of excellence, for the ill, injured and infirm. Additionally, students are prepared to design and lead community-based programs aimed toward maintenance and promotion of health.
2. Clinical research to increase the knowledge base for the practice of nursing.
3. Community services directed toward providing information related to health and development of appropriate health-related behaviors.

Undergraduate Program

The four-year program leading to the Bachelor of Science in Nursing is designed to prepare students for beginning practice of professional nursing in a variety of settings, such as hospitals, industries, clinics and public health agencies. This curriculum provides opportunities for men and women to attain sound preparation for nursing and a foundation for graduate study in nursing. During the first two years of the program, students are enrolled in liberal arts and basic science courses arranged sequentially to provide a foundation for the nursing major. During the junior and senior years, emphasis is placed specifically on the study of nursing.

Multiple community resources enable nursing students to learn and practice within a wide range of patient-care settings. Clinical nursing experiences under the guidance of the College of Nursing faculty take place with patients in local hospitals, clinics and other health agencies.

In response to a steady stream of serious inquiries from registered nurses seeking access to baccalaureate education with a major in nursing, the college has submitted a proposal to the South Carolina Commission of Higher Education. This proposal is a request for Commission approval to offer the Clemson University Baccalaureate Nursing Program on a part-time basis in the evening at Greenville Technical College. Through the development of this additional instructional site, it is anticipated that the college could meet more adequately the needs of employed registered nurses who wish to go to school part time and thereby benefit from educational opportunities aimed toward enabling them to improve their
clinical practice. This proposal is scheduled for review by the Commission in October 1983.

**Master's Program**

The master's program in nursing is a two-year curriculum leading to a Master of Science in Family Health Nursing. This program prepares family health nurse specialists and emphasizes nursing of families in rural and near rural areas. Within family and household settings, students learn to assess health care needs and to respond therapeutically. Emphasis is placed on care of the ill, health teaching, counseling, making referrals to other professionals and enabling students to become articulate advocates for family groups as well as for individuals.

**Continuing Education**

The continuing education program provides short-term, intensive learning experiences for registered professional nurses. This program is aimed toward helping nurses in active practice keep on the "cutting edge" of new knowledge and assisting nurses who have temporarily left the profession to prepare for reentry into the field.

This year continuing education offerings have drawn nurses from a 16-state area. The primary site for meetings has been moved from the Clemson campus to Greenville to provide ready access for nurses who live and work in the Greenville metropolitan area. The Greenville site also accommodates nurses who travel by air to and from continuing education offerings.

**Additional Activities**

In Fall 1982 Mrs. Ellen Wu, a professional nurse and teacher, Taipei Municipal Teachers College, Taiwan, Republic of China, began a two-year period of study as a Clemson College of Nursing student. One of Mrs. Wu's major educational goals is to learn more about teaching methods and techniques used by American nurses. An additional goal is to interest nursing faculty in providing consultation to the faculty she represents in Taipei.

In November 1982 a College of Nursing faculty team visited clinical centers on the China mainland to study contemporary Chinese nursing and medical practices. It is anticipated that Mrs. Wu's visit and the *in situ* contact with nurses and physicians in mainland China will strengthen the emphasis upon cultural differences in nursing care within College of Nursing curricula.

Margaret M. McCracken, R.N., district director of Public Health Nursing, Appalachia Public Health District I, received an honorary Doctor of Humane Letters from Clemson University at the December 1982 graduation.
The number of students majoring in scientific disciplines, with one exception, has remained fairly constant, probably due to continuing interest in health, environmental and energy-related problems. The number of majors in computer science continues to expand each year beyond expectation. The demand for classes in all the sciences continues to expand each year due to an increasing number of freshmen who want to major in technical curricula. Consequently, the College of Sciences is responsible for 30 percent of the total University teaching load while comprising only 23 percent of the faculty.

The College of Sciences faculty has attracted more than $5 million in contract research funds from both federal agencies and industry. This figure is up by $1.4 million from 1980-81. Last January the college added an associate dean, Dr. John D. Petersen, whose major duties will be to increase external funding for research and instruction by improving relations with industry, government agencies and private foundations. During his first six months in office, he organized the College of Sciences Advisory Council, a group of nationally known leaders in business and industry, which had its first meeting June 1983. Another change in the college was the reorganization of the departments of Biochemistry, Botany and Zoology into the Department of Biological Sciences with Dr. Carl W. Helms as head.

Most faculty members are active in national scientific societies with some serving as officers. In addition to their continuing involvement in national meetings of the various societies, an increasing number of faculty members are being invited to present lectures at international conferences.

Department of Biochemistry

This was a very active year for the Department of Biochemistry. Clemson University was represented by the department at six international meetings. The department also represented Clemson well at national and local meetings.

Six outside grants were in force this year, ranging from the South Carolina Sea Grant Consortium to the American Heart Association. One faculty member received a Fulbright grant to spend a year in Germany, and two of our students spent two weeks in a laboratory in Scotland.

This year five doctorate degrees and six Master of Science degrees were awarded, the largest number in the brief history of the department.

Department of Botany

Research in the Botany Department continues to provide insight into plant growth and metabolism, the effect of elevated carbon dioxide on the
world environment, fungi as control vectors for mosquitoes and the floristic composition of the southeastern United States. This past year the department held grants totaling more than $125,000 from NSF, the Corps of Engineers and the University. Four papers were published and two others accepted for publication. Two master's degrees and three doctoral degrees were awarded in the Plant Physiology program. The Botany Department merged with the departments of Zoology and Biochemistry to form the Department of Biological Sciences.

Department of Chemistry and Geology

Teaching and research activity in the department continued at a high level. Plans were completed for the implementation of a new freshman chemistry program in the fall of 1983. The program will include the establishment of a chemistry helproom staffed by faculty and graduate students, coordinated coverage of subject material in all lecture sections and a common examination system. This program is expected to increase the number of students successfully completing beginning chemistry. As financial resources permit, we are also striving to upgrade all teaching laboratories.

In 1981-83, the department awarded 51 degrees in chemistry (31 B.A. and B.S., nine M.S. and 11 Ph.D. degrees) and 21 B.A. and B.S. degrees in geology. Graduate enrollment in chemistry in 1983 will number 44 students.

Research publications reached an all-time high for the period January '81 to December '83, with faculty members having 104 publications in national and international scientific journals (96 in chemistry and 8 in geology). Chemistry and geology faculty members also were very active in presenting lectures to universities and colleges, industry, government and at scientific meetings, with more than 100 presentations in 1982-83. Research funding continued to be strong, with nine new grants in chemistry and two in geology. A survey by the Office of University Research showed that the department of Chemistry and Geology was No. 1 in the College of Sciences in total research dollars for the period 1974-83.

Two faculty members received prestigious awards in 1983. Dr. Rudolph Abramovitch was awarded a Senior Fulbright Grant for a year's study in Europe, where he will lecture and conduct research, including three months with chemistry Nobel Laureate, Sir Derek Barton. Dr. Darryl D. DesMarteau was awarded the 1983 ACS Award for creative work in fluorine chemistry sponsored by PCR, Inc. He is the youngest person to receive the award, which was first given in 1971.

Plans for the new chemistry building are proceeding on schedule, with completion by the architects scheduled for late 1983. The architecturally novel building will be triangular in shape, and will have about 100,000 gross square feet. Every effort is being made to achieve maximum
efficiency with state-of-the art facilities for teaching and research.

A negative note for 1983 involved the loss of two junior chemistry faculty and one senior chemistry faculty member to other institutions. Lack of some major research equipment and low salaries figured heavily in these departures. An intense effort will be made in 1983 to bring three new outstanding young faculty members to the department.

Department of Computer Science

During its fifth year of operation and its third year offering degree programs, the Department of Computer Science continued its rapid growth. The number of majors increased to approximately 450 B.S. and 40 M.S. students, an increase of 29 and 100 percent, respectively. There were 32 B.S. graduates and three M.S. graduates. Although the economic situation caused a decline in the previously very high level of demand for our graduates, the job opportunities for computer science graduates remained excellent.

Response continues to be good to night courses offered in Greenville through the Clemson at Greenville TEC program. The department is now offering two courses per semester through this program.

A proposal for a Ph.D. program in computer science was approved by the University and will be submitted to the Commission on Higher Education for implementation during 1984-85. A proposal for a new B.S. degree in Computer Information Systems was approved by the Commission on Higher Education and will begin in 1983-84.

Excellent progress was made in the development of research programs in the department. Externally funded research has increased from a level of zero in 1980-81 to more than $1 million during 1982-83. Some of this research involves joint efforts with faculty in the Department of Mathematical Sciences and the Department of Electrical and Computer Engineering.

After only one year in our new facilities in the College of Nursing Building, space continues to be a very serious problem. Although space was adequate during 1982-83, a severe shortage exists for the coming year due to growth in faculty, graduate students and research activities.

Faculty recruiting continues to be a problem, and once again the department was unable to fill all available faculty positions for the coming year.

Department of Mathematical Sciences

During 1982-83, the undergraduate credit hour production of the Mathematical Sciences Department was more than one-eighth that of the entire University, and the doctoral level credit hour production of the department was more than one-seventh of the University's total doctoral level credit hour production. Last year 55 students majoring in depart-
mental programs received baccalaureate degrees and 22 received master's degrees. In addition, three students whose dissertations were directed by faculty of the department received doctoral degrees.

The graduate programs of the department continue to attract graduate students of high quality. Few other graduate mathematics programs in the United States and Canada have enjoyed such success in graduate student recruitment. This year, five of the 16 University fellowships available to graduate students were awarded to students recruited by our faculty. In noting the strong interest of industry in hiring mathematicians, "Business Week" magazine recently cited our department as a pioneer in the development of degree programs integrating all of the mathematical sciences.

University contracts and grants in force involving investigators in the Mathematical Sciences Department during 1982-83 amounted to more than $550,000. Included in this amount is a thirteenth year of funding of the department's Office of Naval Research contract and a five-year, 10-participant National Science Foundation EPSCoR grant in discrete mathematics.

Accomplishments of our faculty during 1982-83 include a Fulbright Visiting Scholarship to visit Trinity College in Dublin, Ireland; naming a chairman-elect of College Board's Mathematical Sciences Advisory Council; a position in the U.S.A.F. Summer Faculty Research Program; a Visiting Lecturer for the Society of Industrial and Applied Mathematics.

Department of Microbiology

The first doctorate degree in microbiology (program initiated August 1981) was awarded in December 1982, and the recipient continued with post-doctoral work at Vanderbilt University. Twenty-four B.S. and 11 M.S. degrees were also awarded throughout the year. One B.S. graduate, Rodney Rene Reid of Columbia, received the Norris Medal for being the best-all-around graduate. The award was based on citizenship and scholastic achievement. As in the past, a number of our majors entered medical and dental schools, while others obtained employment in a variety of industries and research laboratories.

A new service course, Introductory Microbiology, was introduced for the benefit of students majoring in nursing and other programs not requiring advanced study of microbiology. A short course in immunology and serology was developed and offered to high school teachers. The department also offered a full semester of instruction in general microbiology to employees of Daniel International Corporation in Greenville.

The faculty pursued a variety of research projects, with external funds coming from Diamond Shamrock Corp., NIH, USDA, Army Research Office and Sea Grant. An equipment grant was received from the Department of Defense for the purchase of a high performance liquid
chromatograph system. This equipment will enhance several of the projects underway in the department. Some of the research areas have been: improvement of cellulose digesting ability of a microbe for industrial uses; basic studies on the interactions of carcinogens with DNA: genetic engineering of microbes to produce chemicals for agricultural uses, including animal health; some microbial diseases of fish; herbicide degradation by flooded (anaerobic) soils; biogenesis of methane; molecular studies of certain organisms responsible for communicable diseases; the microbial ecology of sea grasses; and immunological aspects of dental caries.

This year the faculty's research efforts have resulted in the publication of 13 articles in refereed international journals and 23 papers presented at professional meetings.

Dr. E. L. Kline was appointed to the Science Advisory Board of North American Biologicals, Inc. The South Carolina Branch of the American Society for Microbiology presented Dr. Ann W. Baxter with its Outstanding Microbiologist Award for her contributions to education in the field of microbiology.

**Department of Physics and Astronomy**

The department's graduate program and associated research programs continued to receive outstanding external recognition this year. New funding came from federal sources such as the National Science Foundation (NSF) and the National Aeronautics and Space Administration (NASA) as well as a major regional industry. Other continuing programs were supported by NASA, NSF, the textile industry, the National Institute of Health and the U. S. Department of Agriculture.

In a study released this year by the National Academy of Science, the department's graduate program was ranked second in the State in faculty quality and productivity among physics, chemistry and mathematics departments. On a national level, we surpassed older programs (such as the University of Georgia's) and established a firm position among teaching-research universities.

Further recognition came in the form of invitations to lecture at international conferences or participate in other international programs. Nine trips to foreign countries including Canada, France, Italy, the United Kingdom and West Germany were made. Two were sponsored by the North Atlantic Treaty Organization (NATO), and two others were supported by Provost Research Grants.

A program is also distinguished by the visitors it receives. This year the eminent theoretical physicist Edward Teller lectured at a special colloquium. Other well-known scientists from Belgium, Canada, France, Portugal, the United Kingdom and West Germany lectured and participated in research collaborations with our faculty.
A major instructional innovation implemented computer interfacing in one of our introductory laboratories. Students obtain firsthand experience in use of microcomputers in the compilation and analysis of data. Thus, they are prepared very early in their university career to become adept at interfacing and use of microcomputers. This program will be extended to other laboratories and courses to provide students with a full range of interfacing experiences with both microcomputers and the mainframe facilities.

The physics portion of the two-week summer science camp for high school students was again very well attended. Two faculty members instructed high school students in a variety of computer-interfaced experiments, providing the students with the opportunity to encounter basic physical ideas in a new and stimulating context.

Faculty members were also involved in service activities. Several participated in the South Carolina Academy of Sciences and one addressed a national meeting of the American Association of Physics Teachers.

Several changes have been made to strengthen our teaching programs at both the undergraduate and graduate levels. A new undergraduate course in electricity and magnetism, which will be offered jointly with the Department of Electrical and Computer Engineering, will provide students with a sound foundation for pursuit of applied studies as well as deeper, theoretical investigations of the subject. A second course, to be offered jointly with Mechanical Engineering at the graduate level, is kinetic theory. This will fill a gap in the graduate student’s education and lead into important studies in statistical physics.

Department of Zoology

In the fall of 1982, the Department of Zoology had 75 students pursuing B.S. degrees and one the B.A. Fifteen students were enrolled in the M.S. program. With 32 students in its Ph.D. program, the Department of Zoology has the largest doctoral program at Clemson. During the 1981-82 academic year, the department awarded 18 B.S., five M.S. and three Ph.D. degrees.

Research and training activities were supported by 13 outside grants or contracts: three from the National Science Foundation, four from the U. S. Army, two from South Carolina Sea Grant, and one each from the National Institute of Health, the U. S. Department of Agriculture and the Electric Power Research Institute. One faculty member received a contract for research from Calgon Corporation. Since 1974, the department has attracted outside funds approaching $1.9 million to support its research and graduate training activities.

Small grants received during the year included three Provost’s Research Awards and three Faculty Research Grants, two awards from the
Scholarly activities by faculty and students during the year included papers presented at three international meetings and at least 47 papers presented at national and regional meetings, including participation in one Gordon Conference session. Sixteen scientific papers, seven book chapters or review articles and 27 abstracts, reviews or notes were published. At least 11 manuscripts are in press. A doctoral candidate in our department received the Best Paper Award by the Ohio Electron Microscopical Society and another was awarded honorable mention for the best student paper by the American Society of Zoologists. S. A. Gauthreaux, Jr. was selected by Sigma Xi and the Clemson Alumni Foundation for the 1983 Outstanding Researcher Award. Our faculty included one Rhodes and one Danforth Scholar.

Professional and service contributions by members of the faculty included the following activities: chairman, Heritage Trust Advisory Board of South Carolina; secretary, Animal Behavior Society; chairman of committees of the American Ornithologist’s Union, Wilson Ornithological Society and Southeastern Society of Parasitologists; Board of Reviewers for “Transactions of the American Microscopical Society”; member, Rhodes Scholarship Selection Committee of South Carolina; associate editor, “Journal of Experimental Biology” and “Journal of Environmental Biology of Fishes”; technical editor, “Journal of the American Killifish Association”; campus representative for the American Society of Zoologists; and chairman of the Board of Scientific Advisors and trustee, Highlands Biological Station.

Faculty members gave six seminars at other institutions, and seven outside speakers visited our campus and presented seminars. Three seminars were given to the department by Clemson faculty, and two were presented by graduate students.

Our vertebrate museum continues to expand and is a valuable resource in our teaching, research and public service roles.

We have, during the year, further developed our research, training and service functions using microcomputers and have updated equipment and laboratory procedures with these tools.

**Biology Program**

During the 1982-83 academic year about 4,900 students were enrolled in courses offered in the Biology Program. Six lecture sections and 58 laboratory sections per week accommodated these students. Laboratories were taught by graduate students from the departments of Biochemistry, Botany, Microbiology and Zoology and three Biology Program instructors. A teaching assistant training program was initiated to improve laboratory instruction.
The development of a science resources center was initiated in the spring of 1982-83 and is to house audio-visual materials and microcomputers to aid in instruction. The Teacher Information Processing System, a computer-based program for computer-managed instruction, was revised and adopted to direct students to the science resources center. The Teacher Information Processing System makes it possible to pair individual students with materials appropriate for their level and interests, and to send students to the science resources center to use these materials.

The fourth Clemson University Biology Merit Exam was conducted this year, with more than 1,000 high school and junior high school students in attendance. Top winners were awarded scholarships to the Summer Science Camp through a grant from the Alumni Foundation Fund. The Biology Program hosted the national laboratory workshop conference of the Association for Biology Laboratory Education. The 118 participants were from the United States and Canada.

More than 50 high school teachers attended the summer short course program in biology. This year the program was extended to surrounding states, with participants coming from North Carolina, Georgia, Florida and Texas. Two short courses were taught off campus in an effort to extend contract course offerings to school districts.

The faculty developed a series of 25 short laboratory exercises and presented these as hands-on workshops at the South Carolina Science Council. The laboratory exercises are distributed to South Carolina teachers through the South Carolina Association of Biology Teachers.

The director of the Biology Program received the South Carolina Science Council's first award for outstanding achievement in science education. This faculty member was also elected to the council of the South Carolina Academy of Science and as first vice president of the National Association for Biology Laboratory Education. A second faculty member was appointed director of the South Carolina Junior Academy of Science and was also elected treasurer of the National Association for Biology Laboratory Education. Other faculty members were appointed to the positions of South Carolina state representative to the American Association of Biology Teachers and pre-medical adviser for the University.

Additional activities of the faculty included a two-week workshop in advanced placement biology for the College Board; a one-week workshop in advanced placement biology for Greenville County; three papers presented at annual meetings of the National Science Teachers Association and the National Association of Biology Teachers; presentation of two workshops at the national meeting of the Association for Biology Laboratory Education; participation in the Notre Dame workshop on instructional uses of microcomputers; attending the Chataqua Short Course on Science, the Media and the Public; organizing and directing the South
Carolina Junior Academy of Science Olympics; judging the South Carolina Junior Academy paper presentations; and judging regional science fairs.

Six grant proposals were submitted, and $45,000 in outside funds were obtained. Three papers and one coauthored book were published by faculty members. Four laboratory manuals were revised and published.

**Medical Technology Program**

The Medical Technology Program continues to supply the needs for supervisory-level personnel in clinical labs of hospitals throughout South Carolina. Eight students received degrees in medical technology in 1982-83. There are currently nine students enrolled in four different clinical facilities. The projected freshmen enrollment for 1983-84 is considerably larger than last year.

The senior students at Anderson Memorial Hospital won the state Student Bowl this year and the University contributed toward their expenses to participate in the Southeastern Regional Student Bowl. Five pre-clinical students attended the S. C. Society of Medical Technology Convention in Greenville.
GRADUATE SCHOOL

The 1982-83 academic year was one of significant strides in the operation of the Graduate School. To those close to the scene, the accomplishments were quite evident, while the reaction of an outsider might be one of surprise to learn that these operational techniques were not already in place. One of the accomplishments is full inclusion of the Graduate School records into the Student Data Base (SDB). Another is the maintenance of cumulative grade summaries for graduate students.

In keeping with the trend that began in the previous academic year, the support for graduate fellowships increased. Fourteen students were awarded R. C. Edwards Research Fellowships and five were awarded Graduate Alumni Fellowships, for a total increase of 600 percent over the level of funding just three years ago. The number of South Carolina Graduate Incentive Fellowships for black applicants who are citizens of the State rose from five to 10.

Enrollment in the fall semester was 1,907, approximately 4 percent above that in the 1981-82 academic year, with the increases occurring in doctoral, Master of Science and Master of Arts degree programs. A decrease was observed only in the professional master’s programs, a trend that began in 1980.

Advanced degrees awarded in the year totaled 505, including 54 Ph.D. degrees.

The Graduate Student Association’s orientation for new students has now become a permanent and successful event. During the academic year, this organization also played a vital role in establishing grievance procedures for graduate students.

UNDERGRADUATE STUDIES

The Undergraduate Studies Office, in addition to its work with undergraduate curricula, the honors program, academic standards, scholarships and awards, University-wide lectures, and new faculty-staff orientation, coordinates and administers the Clemson Career Workshops.

These workshops bring academically outstanding minority students to the campus before their junior and senior years in high school. In 1982 and 1981, 140 rising juniors visited Clemson. In that same program, 90 rising seniors visited in 1982, compared with 34 in 1981. The 1983 program grew to include 198 rising juniors and 140 rising seniors.

In 1982, 48 minority students recruited through the previous workshops enrolled at Clemson. Eighty-six students enrolled in the fall, and the first minority students recruited through the program will graduate in spring '84.

Plans call for the program to be expanded again in 1984 if revenues can be found.
OFFICE OF UNIVERSITY RESEARCH

The Office of University Research provides information and assistance concerning all aspects of the University research effort to faculty members, departments, colleges and other administrative units. The office helps prepare and submit applications for sponsored research, instruction and public service programs. During 1982-83 the office processed 603 faculty proposals.

The office also provides University liaison between the institution and all public and private, national and local organizations and/or entities concerned with any aspect of research support, regulation or administration.

Guidance and executive support were provided to the University Committee for the Protection of Human Subjects (48 active projects); the Biomedical Research Support Grant Committee (9 active awards); the University Research Grant Committee (48 faculty grants, 25 Provost Research Awards); the Committee for Laboratory Animal Welfare; the Institutional Biosafety Committee (2 active projects) and the Clemson University Patent Committee (25 patent disclosures processed).
While 1981-82 consisted of a number of small changes for the Clemson University libraries, 1982-83 was a year of major changes and new initiatives. During 1982-83, significant administrative and physical organizational changes were implemented in the libraries.

Reorganizations

Administratively, the Social Sciences and Humanities Reference Unit and the Science and Technology Reference Unit were merged to form a unified reference unit. A new unit was established, Public Documents, to provide control and service to government documents and other materials not currently reflected in the libraries' card catalog. The Circulation Unit had new responsibilities assigned, and the Monograph Acquisitions Unit assumed responsibility for monographic standing orders, which had been handled by the Serials Acquisitions Unit.

To facilitate the administrative changes and to make the Cooper Library more accessible to its users, a number of significant physical modifications took place. The two reference collections were carefully reviewed, weeded, merged and located on the east side of the fourth (main) level. The current periodicals were likewise merged and located on the west side of the fourth level. The microforms from the Microform Reading Room were relocated. Microfilm copies of periodical volumes were placed with the current periodical issues on the fourth level. Microfiche holdings became a part of the Public Documents Unit's responsibility and are located on the third level.

Offices and a service desk were provided for the Public Documents Unit on the third level. All government documents, federal and State (including agricultural Extension and Experimental Station documents), were merged and relocated on the third level along with maps and technical reports.

With completion of the renovation of the second level providing space for the Thurmond Collection and the Special Collections Unit, rare books, archives and manuscripts were united in one area.

The elimination of the divisional library organization permitted the reorganization of the stacks in Cooper Library to provide a natural A to Z flow from the lowest level to the top level. The collection is now organized starting with the A's on the first level and concluding with the Z's on the 6th level. Levels 3 and 4 are used as primary service levels.

At the very beginning of 1982-83 the libraries welcomed its newest branch, Sirrine Library. Sirrine officially became a part of the libraries July 1, 1983. Since then an advisory committee has been constituted and a mission statement adopted. A collection development policy for Sirrine Library has been written and is currently under review.
Two physical changes were made, which altered the appearance and improved service in the main area of the Cooper Library. The circulation desk was relocated to the east side of the main level lobby near the exit doors. The reference desk was moved so its orientation is toward, rather than away from, the reference collection and card catalog.

**Special Projects**

In addition to the reorganization work, there have been a number of other highlights during 1982-83. The NOTIS (Northwestern Online Total Integrated System) software was acquired, installed and is being tested. Personnel from the libraries and DAPS are to be commended for the work they have done to install this major computer software system. Prior to the arrival of the NOTIS software, the libraries revised a staff position into a Programmer Analyst position, and it was filled by Ms. Beth Reuland, previously the serials cataloger in the Cataloging Unit. Ms. Reuland will play a major role in implementing NOTIS and training staff in its use.

A major part of implementing NOTIS is having the libraries’ bibliographic records in machine-readable form for use by NOTIS. Early in the year a reconversion project was begun. This project, designed to convert more than 170,000 records into machine-readable form began with a $20,000 grant from the South Carolina State Library. These funds were used to cover the OCLC costs and to pay part of the salaries for the staff working on the project. Mrs. Marsha McCurley has been brought to the libraries as coordinator of the reconversion project. This is at least a three-year project. Tentative approval has been made for an $11,600 extension of the State Library Grant for 1983-84.

During 1982-83, the South Carolina State Legislature enacted a bill to establish 10 State document depositories throughout the State. Clemson University libraries applied for and received depository status. Having depository status provides the libraries with many state documents without the expense of ferreting them out and writing for copies. As a part of this program, the new Public Documents Unit had to establish and implement procedures for this new activity.

Another activity of our Public Documents Unit has been participating in the statewide effort to secure a U. S. Government Documents Regional Depository for South Carolina. A plan sent to Washington, D. C., in the spring has received tentative approval.

In an effort to save equipment funds, the libraries introduced a program to splice microfilm reels of periodicals and newspapers to utilize the full capacity of each reel, thus reducing the number of reels to be stored. As a result of the splicing, nearly two microfilm cabinets have been cleared and made available for future acquisitions.

Two major studies were accomplished during 1982-83. The first was the evaluation of the libraries’ holdings in the areas where Clemson has
master's degree programs but not doctoral programs. This study was conducted to help evaluate those master's degree programs by the University. The second study was done as a basis for a proposal to improve the libraries' resources in the primary mission areas of Clemson. This proposal seeks $3 million over a period of three years to enhance the academic programs.

A number of new services were instituted during 1982-83. These include: 1) the provision of seven group study rooms, 2) an improved method of validating student identification cards at registration, thus reducing frustration on the student's part, and 3) a reference consultation service for in-depth reference needs.

This was a good year for acquiring outside support for the libraries. During 1982-83 more than $76,000 of non-state funds were secured for the libraries. The major contributors were Mr. and Mrs. Joe Shirley who gave approximately $26,000 to go with the $96,000 which they gave in 1981-82, and Tigerama which gave $25,000. The Interfraternity Council and the Pan Hellenic together gave $2,100. A State grant of $20,000 was received for retrospective conversion.

The libraries' Patrons of Excellence Program was instituted, and a plaque, on which are noted the first three Founding Patrons, is located in the lobby of the Cooper Library. The first three Founding Patrons are Mr. William J. Latimer, Mr. and Mrs. Joseph Shirley and the Tigerama Fund.

The libraries Special Collections Unit made good progress on the processing of the Thurmond Papers, as well as completing the processing of those of Thomas Green Clemson and the Holmes Collection. A project proposed in 1982-83 and continuing to develop in 1983-84 will merge, for microfilming purposes, the Thurmond Gubernatorial Papers now housed in three separate institutions within the State. These collections are located at the South Carolina Library at USC, the South Carolina Department of Archives and History, and Clemson University. As a result of the temporary merger, each institution would have a microfilm copy of the complete papers of Governor Thurmond, including the remaining States' Rights Party and campaign papers. Once the microfilming is complete, the original documents will be returned to their respective repository. Private funds will be sought to finance this project.

The major University archives collection added during 1982-83 was a collection of early financial records found in the Dairy Barn. This acquisition points out a clear need for a new position of University archivist. A person in this position would administer the acceptance and implementation of a University Records Retention Schedule and process records scheduled to be deposited in the University archives.

Budget Restrictions

During the later part of 1982-83, the libraries experienced their first
budget cut in several years, although other parts of the University have had a series of cuts during the past two years. The libraries' supply and travel funds were cut approximately $15,000 in anticipation of a State-mandated 3 percent cut. When this budget reduction did not materialize, the funds cut from the various University departments were redistributed, and the libraries received an additional $100,000 to cover the costs for the second payment for NOTIS ($25,000) and the increased costs of periodical subscriptions ($75,000). In this cut/redistribution function, the libraries had a net gain of approximately $85,000.

Excluding this one-time reallocation, the libraries' budget has basically remained the same for the past three years, thus resulting in considerably less buying power for library materials due to inflation. In fact during 1982-83, the libraries were forced to cut more than 500 periodical and serial subscriptions to provide a minimum amount of funds for the purchase of monographs. The reallocation of the $100,000 prevented a more severe cut in subscriptions for 1983-84.

With the receipt of the 1983-84 material budget, the pattern of level budgets was broken. This budget was increased by $200,000 or 23 percent. This is a significant move forward, but more remains to be done. The University must commit itself to increasing this budget annually by the amount needed to cover the increased periodical and serial subscriptions costs as well as added programs.

**Statistics**

1. Collections

**Books and Journals**

<table>
<thead>
<tr>
<th>Gross Added</th>
<th>Withdrawn</th>
<th>Net Added</th>
<th>Total Holdings</th>
</tr>
</thead>
<tbody>
<tr>
<td>Catl'd: All libraries</td>
<td>15,390</td>
<td>2,484</td>
<td>12,906</td>
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<tr>
<td>Uncatl'd: Gunnin</td>
<td>4,289</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sirrine</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>TOTAL</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Documents and Reports**

| Cooper | 519,594 |
| Gunnin | 2,231 |
| Sirrine | 2,234 |
| TOTAL | 524,059 |

63
## Microforms

<table>
<thead>
<tr>
<th>Public Documents</th>
<th>Microfilm Reels</th>
<th>Microfiche</th>
<th>Microcards</th>
<th>Total Bound Vol. Equivalent</th>
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</thead>
<tbody>
<tr>
<td>2,228</td>
<td>556,146</td>
<td>—</td>
<td>31,508</td>
<td>148,288</td>
</tr>
<tr>
<td>Other</td>
<td>17,859</td>
<td>53,352</td>
<td>31,508</td>
<td>148,288</td>
</tr>
<tr>
<td>TOTAL</td>
<td>20,087</td>
<td>609,498</td>
<td>31,508</td>
<td>148,288</td>
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<tr>
<td>GRAND TOTAL PRINTED HOLDINGS</td>
<td>1,259,026</td>
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</table>

<table>
<thead>
<tr>
<th>Slides (Gunnin)</th>
<th>55,880</th>
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<table>
<thead>
<tr>
<th>Maps (Public Documents)</th>
<th>27,916</th>
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### Current Serial Subscriptions

<table>
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<tr>
<th>Periodicals</th>
<th>5,201</th>
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<tr>
<td>Other Serials</td>
<td>1,138</td>
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<td>TOTAL</td>
<td>6,339</td>
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### 2. Circulation

#### Door Count of Visitors

<table>
<thead>
<tr>
<th>Cooper</th>
<th>628,357</th>
</tr>
</thead>
<tbody>
<tr>
<td>Architecture</td>
<td>36,929</td>
</tr>
<tr>
<td>Sirrine N/A</td>
<td>—</td>
</tr>
<tr>
<td>TOTAL</td>
<td>665,286</td>
</tr>
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</table>

#### Books Circulated

<table>
<thead>
<tr>
<th>Cooper</th>
<th>180,759</th>
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<tbody>
<tr>
<td>Gunnin</td>
<td>14,225</td>
</tr>
<tr>
<td>Sirrine</td>
<td>8,706</td>
</tr>
<tr>
<td>TOTAL</td>
<td>203,690</td>
</tr>
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</table>

### 3. Reference Services (Cooper):

<table>
<thead>
<tr>
<th>Reference questions</th>
<th>23,773</th>
</tr>
</thead>
<tbody>
<tr>
<td>Directional questions</td>
<td>12,178</td>
</tr>
<tr>
<td>Research requests</td>
<td>262</td>
</tr>
<tr>
<td>TOTAL</td>
<td>36,213</td>
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</table>

#### Computer Searches

<table>
<thead>
<tr>
<th>Reference</th>
<th>7</th>
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</thead>
<tbody>
<tr>
<td>Quick</td>
<td>61</td>
</tr>
<tr>
<td>Research</td>
<td>270</td>
</tr>
<tr>
<td>TOTAL</td>
<td>338</td>
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</table>

#### Interlibrary Loans

<table>
<thead>
<tr>
<th>Loaned</th>
<th>5,194</th>
</tr>
</thead>
<tbody>
<tr>
<td>Borrowed</td>
<td>2,604</td>
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* Estimate Based on Linear Measure
COMPUTING SERVICES

Computer Center

The demand for computer resources is growing rapidly. Total on-campus use increased by 27 percent, while outside usage increased by only 8 percent. The shift in use from off-campus to on-campus continued. Revenue projection, however, was realized.

In November the overloaded IBM 3033 was replaced with IBM's largest single system, the IBM 3081-K. The new system provides computer system users with almost three times the computing power of the previous system, while using 60 percent less air conditioning and 20 percent less floor space than the 3033. The 3081 has somewhat relieved the environmental problems in the machine room and has greatly improved the Computer Center's ability to provide computer services to users.

Processing loads on the new system are growing. Central processing unit (CPU) use almost doubled between November 1982 and July 1983, and the Computer Center staff is moving to handle a 50 percent increase in the teleprocessing network. Response times have stabilized at an acceptable level.

Advanced communication function (ACF) teleprocessing software was installed for networking to other large data centers. A new security package called RACF was implemented this year providing an increased level of data security on the computer system, while lowering the overhead cost associated of administering security for several thousand users.

Preliminary work was done to implement MVS Extended Architecture, a new operating system to complement the 3081, and to compensate for the growth in computer service demands projected for January 1984. Preparation was also completed to upgrade the magnetic disk subsystem. The Computer Center will begin the disk upgrades in January 1984 to provide 40 percent more disk storage space. This upgrade will also double the data transfer rate on the disk subsystem.

The Computer Center staff completed a software development project for Storage Technology Corporation in return for $600,000 worth of computer hardware.

The remote site in the basement of Riggs Hall was completed in August 1983. This facility now houses the two Digital Equipment Corporation VAX 11/780 computer systems acquired last year. These systems are used to: run jobs which, by virtue of their size or run-time, cannot be run on the IBM system without severely disrupting other users of the system; access graphic terminals and other devices not accessible from the IBM system; communicate with mini- and microcomputer systems (including data collection devices) not readily accessible from the IBM system.

The Computer Center has been working to provide by January 1984
videotex services to Clemson University students, faculty and staff. The videotex system will facilitate the distribution of information about University events through the use of low-cost computer terminals. The University’s Department of Information and Public Services is working with Computer Center staff to develop graphics and information displays.

The major problem at the Computer Center is lack of space. Office space is still very limited, and tape storage space is quickly becoming a problem as the tape system continues to grow. (There are currently more than 24,000 tapes in the system.) The environmental situation in the machine room is still marginal, even though some relief was brought by the installation of the 3081.

The Computer Center staff remains relatively stable. However, training for new staff members and re-training for existing staff is becoming increasingly expensive, and it is not possible to provide the staff the professional exposure they have received in the past.

Division of Administrative Programming Services

The Division of Administrative Programming Services (DAPS) develops and maintains computerized information systems for the University administration. The division consults with the University departments and helps design systems to support routine operational needs as well as management decisions. A key ingredient in DAPS’ mission is to design coordinated information systems that operate around an integrated University data base. During the 1982-83 fiscal year, in conjunction with major users, DAPS accomplished the following tasks:

1. Continued the implementation of a Student Data Base with the installation of a grades processing system, a course enrollment system, a course data base and an optical mark reader system for collection of student grades.
2. Began the conceptual design of a student degree progress reporting system.
3. Assisted in the implementation of the NOTIS library system for the R. M. Cooper Library.
4. Implemented an automated billing/indirect cost charging system for the Grants and Contracts Office.
5. Fostered the use by administrative staff of data retrieval languages such as CULPRIT and SAS.
6. Implemented a data security system for administrative information.
7. Developed software to report Clemson financial information to the newly developed State Accounting and Reporting System.
8. Expanded the network of terminals in administrative offices to allow on-line access to certain personnel and accounting records.
9. Began a limited test implementation of an on-line departmental encumbrance system. This facility will be used along with the departmental on-line systems currently used that retrieve accounting, budget and personnel information.

10. Assisted in implementing fiscal year-end pay adjustment and fiscal year-end budget/accounting processing.

11. Maintained the effectiveness and on-going operation of 50 administrative systems and responded to requests for enhancements as prioritized by major users.

12. Implemented a system in the Development Office to process contributions from corporate, industrial and professional/trade organizations.

13. Assisted several departments in the selection and installation of microcomputers for administrative use.

14. Improved the instruction and faculty workload analysis system.

15. Installed in the financial systems the requirements of the State usage tax and enhanced A-21 employee activity reporting.

16. Continued software support for the spring and fall budget processes.

17. Implemented a new IPTAY donation processing and information retrieval system.

Division of Information Systems Development

The Division of Information Systems Development (DISD) had a successful year from the point of view of revenues, although no major new contract was signed. However, efforts continue to find work to supplement revenues derived from the Department of Social Services, which extended its contract for an additional year. Several staff members left during the year, and plans are to hire new staff members to support the current work and the expected new contract.

DISD and the Computer Center continued to work on joint projects, with fruits of this effort soon to be seen in the videotex pilot project.

DISD designed and implemented an online registration system which Professional Development started using July 1, 1983. No other new projects were started; however, a substantial amount of work was done on existing systems.

Contract work is expected to pick up as the economy improves.
OFFICE OF HUMAN RESOURCES

The Office of Human Resources continues to carry out its charge to oversee and enhance the affirmative action/equal employment opportunity efforts of the University.

As part of this duty, the office directs the University’s efforts to meet the objectives outlined in the South Carolina Plan for Equity and Equal Opportunity in the Public Colleges and Universities. As a result of the significant progress made in these areas, Clemson was cited by the Commission on Higher Education as one of the few institutions meeting its goals for 1982-83.

The Administrative Management Trainee Program, through which selected blacks are trained in professional-level positions within the University, and the Clemson Career Workshops, which broaden the horizons of black high school students by exposing them to college, were developed and first implemented at Clemson. They are representative of the innovative programs responsible for the University’s effectiveness in meeting these objectives.

One particular area of achievement during the past year has been the increase of black representation in Clemson University’s student body, faculty and staff.

In the undergraduate area, black enrollment increased 43.6 percent from fall 1981 (243) to fall 1982 (349). Full-time graduate enrollment increased 36.4 percent from fall 1981 (33) to fall 1982 (45).

The Administrative Management Trainee Program placed six black professionals on the University staff during the past year.

Extensive efforts were made during the year to identify and recruit blacks for faculty positions. Of four candidates selected for positions, two accepted appointments and began their careers at Clemson this fall.

The black scholar-in-residence program, which brings a distinguished black scholar from industry or another institution for one or two semesters of teaching and research, was implemented in the fall.
ACADEMIC FUND RAISING

Development

Private support from business, industry, foundations, and professional and trade organizations reached another all-time high of $2,983,530. Business and industry contributed $1,936,997 and foundations $937,585. Most of these gifts were designated for projects and activities in various academic areas.

Gifts to assist students with the cost of their education and to recognize academic excellence exceeded $350,000. Gifts of new and modern laboratory equipment to replace outmoded and aging equipment exceeded $1 million. Equipment gifts, including several computer systems, have helped many academic departments achieve a high level of quality and academic excellence.

Private gifts provide the means of enhancing the educational activities supported by State appropriations. While State appropriations are the primary support of State institutions, the State cannot be expected to make all institutions centers of academic excellence. Therefore, the ultimate quality of the University rests with private support. By supplementing State and federal appropriations with private funds, credit is brought to both the State and the University.

Clemson University Foundation

The Clemson University Foundation is the organization designated by the Board of Trustees to accept and administer all endowments for Clemson University. It is a non-profit organization with 25 directors who oversee its activities. During the year the Foundation’s assets increased by more than $1 million to a total of $10.2 million. The Foundation has six standing committees: Executive, Investment, Planned Gifts, Real Estate, Policy and By-Laws, and Special Projects and Assets. In addition, six college committees of the Foundation are charged with increasing the non-alumni private support for the individual colleges. These six committees are: Agricultural Sciences, Commerce and Industry, Education, Engineering, Forest and Recreation Resources, and Liberal Arts.

Alumni Relations and Resources Development

Throughout its history, Clemson University has commanded healthy respect from its contemporaries for the loyalty of its alumni and the dedication of parents, faculty, staff and friends. Harnessing this enthusiasm and guiding it through transition to resources that benefit Clemson’s educational program at every level has led to new interest, involvement and support from private sources.

Enrichment of the academic environment is the primary mission of the Division of Alumni Relations and Resources Development.

One of the annual fund’s first commitments is to those classroom
professors whose work at the undergraduate level provides the solid foundation on which serious students can build an education that will prepare them to face the challenge of the '80s. Unrestricted gifts help attract and keep high-quality faculty through Alumni professorships and recognition of master teachers; awards also recognize individuals for achievement in research and public service.

The number of alumni professorships has, within the last year, grown to 15. Selected by the provost and academic deans, these outstanding classroom teachers receive an annual stipend of $3,000.

Equally important is student scholastic achievement. The prestigious Robert Franklin Poole Alumni Scholarships and the Frank Johnstone Jervey Scholarships recognize top high school achievers from across the nation. These renewable scholarships each have a value of $12,000. University alumni scholarships help Clemson compete favorably with other great universities for the nation’s best high school talent. And the alumni presidential scholarships attract hundreds of freshmen to Clemson. This year, for the first time, the Alumni Loyalty Fund will underwrite Clemson’s participation in the National Merit Scholarship program. Annual fund gifts by campus participants also recognize scholars and help with other academic support programs. The Parents Fund and gifts from the University’s friends add strength to the recognition of distinguished students and outstanding teachers. These grants totaled $3.2 million in the last two years alone.

All annual giving — the Alumni Loyalty Fund, the Faculty-Staff Loyalty Fund, the Parents Fund, giving by friends, and the corporate and business matching grants program — is consolidated in a single department, which also has responsibility for long-range accumulation of assets through deferred giving and estate planning.

In the past fiscal year, major efforts have been devoted to:

- Refining a centralized gifts recording system.
- Upgrading levels of giving to the annual fund.
- Continuing a “town and gown” program with the Chamber of Commerce.
- Contributing to the function of the President’s Advisory Group.
- Reorganizing Clemson Clubs throughout the country.
- Coordinating the Clemson Medallion Ceremony during Founder’s Week.
- Continuing the Senior Challenge program, which seeks new graduate support of the Alumni Fund.
- Improving the “Clemson World” magazine, which now ranks as one of the 10 best alumni publications in the country.

In addition, members of the staff have served on the President’s Cabinet, Planning Committee, the University Self-Study Committee and the Computer Advisory Committee.
STUDENTS

The 1982-83 academic year marked Clemson's highest on-campus enrollment with 11,618 students registered for classes (10,554 full time and 1,064 part time). An additional 516 were in various off-campus programs, bringing the total enrollment to 12,134 — a record high for the University. Of the total enrollment, 1,983 were graduate students.

The College of Engineering was again No. 1 in on-campus enrollment in 1982-83 with 3,292 students enrolled. The College of Commerce and Industry, a close second with 2,676 students enrolled, was followed in order by Sciences, Education, Agricultural Sciences, Liberal Arts, Architecture, Forest and Recreation Resources, and Nursing. Engineering, Commerce and Industry, and Sciences had enrollment increases. Enrollment in Liberal Arts and Nursing remained almost constant, while all other colleges experienced some decrease.

Opportunities for higher education continued to become increasingly accessible as evidenced by the increased number of freshmen entering college with advanced standing. In the 1982-83 fall semester, many new high school graduates entered Clemson with advanced standing by means of College Board Advanced Placement courses (318 students, 2,752 credit hours), concurrent enrollment in high school and college (108 students, 812 credit hours), enrollment in summer school (186 students, 611 credit hours) and departmental examinations (25 students, 75 credit hours).

Performance in high school has proven to be the best single predictor of success in the freshmen year. The class ranks of entering freshmen has improved to the point that 43 percent of the freshmen class entering the fall of 1982 ranked in the top 10 percent of their class; 69 percent in the top 20 percent; and 95 percent in the top 50 percent.

Much publicity has been given to the decline in the past decade of SAT scores. In contrast, the average SAT score of freshmen at Clemson has increased during the period of decline. In 1982 the freshman class average of 1,017 compared with an average of 893 reported by College Board for all high school seniors. It is also the highest average among State-supported institutions in South Carolina.

Of the 8,573 new applications for admissions processed for 1982-83, 4,432 were accepted and 2,673 actually enrolled (including freshmen and transfer students). South Carolina residents accounted for 79 percent of the 12,134 students, including those enrolled in off-campus programs. Clemson students come from all 46 South Carolina counties, 48 states, Puerto Rico, the District of Columbia, Guam and 63 foreign countries (292 students).

Greenville County continued to be the top county with 1,234 students enrolled on campus. Pickens County was second with 966 students enrolled, followed in order by Anderson, Charleston, Spartanburg and
Most out-of-state students came from the contiguous states of Georgia (559), North Carolina (550) and Florida (382).

Computerized pre-registration helped the record number of students get off to a smooth start for fall classes. More than 90 percent were pre-registered and had their course schedules completed before they arrived on campus to begin classes.

Fall Semester Enrollment Comparisons for Recent Years

<table>
<thead>
<tr>
<th>Year</th>
<th>Undergraduate</th>
<th>Graduate and Others</th>
<th>Total</th>
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<tr>
<td>1972-73</td>
<td>7,686</td>
<td>2,071</td>
<td>9,757</td>
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<td>1973-74</td>
<td>7,910</td>
<td>2,202</td>
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<td>1974-75</td>
<td>8,171</td>
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<td>1975-76</td>
<td>8,576</td>
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<td>1976-77</td>
<td>8,620</td>
<td>2,763</td>
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<td>1977-78</td>
<td>8,708</td>
<td>2,566</td>
<td>11,274</td>
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<td>1978-79</td>
<td>8,925</td>
<td>2,553</td>
<td>11,478</td>
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<td>1979-80</td>
<td>9,291</td>
<td>2,457</td>
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<td>1980-81</td>
<td>9,427</td>
<td>2,152</td>
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<td>1981-82</td>
<td>9,918</td>
<td>2,008</td>
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<td>1982-83</td>
<td>10,151</td>
<td>1,983</td>
<td>12,134</td>
</tr>
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</table>

The 1982-83 figures include 343 students attending off-campus institutes and 173 in the Clemson-Furman University Master of Business Administration degree program.

The on-campus enrollment of women at Clemson reached an all-time high during the 1982 fall semester. There were 4,709, of which 4,169 were undergraduates. Enrollment of undergraduate coeds increased 5.6 percent over last year. Women now constitute more than 40.5 percent of the on-campus enrollment and 41.2 percent of the total enrollment.

The Clemson student body continues to be a working group receiving a significant amount of financial assistance in the form of loans, grants, scholarships and work assistance. In 1982-83 approximately 2,507 students earned more than $5.15 million working for the University. This figure does not include earnings from off-campus employment. Clemson awarded 371 long-term loans totaling $411,215. The University also approved and certified 2,000 guaranteed student loans from a variety of lending institutions. Excluding donor-selected scholarships, 528 scholarships and grants valued at $488,077 were awarded. The number of students receiving Pell Grants was 1,477, with awards totaling $1,504,574. In all, an estimated 65 percent of the student body received an estimated total of $12.5 million in financial assistance administered by Clemson.

Students at Clemson University enjoyed educational experiences outside the classroom through participation in student organizations. This
year the number of recognized organizations rose to an all-time high of 235. Half of these groups directly complement the academic experience by providing career-oriented fellowship, programs and trips to professional conferences. Our students enjoy competition through 37 sports clubs, socialization through 32 social clubs and fellowship through 21 religious organizations. In addition, more than 30 student groups have formed to provide associations with other students interested in fine arts, media, military, government and community service. In 1982-83 these organizations sponsored 155 projects to raise funds for charity and to meet organizational expenses.

Student Government has grown to meet the needs of the student body. Approximately 300 people were involved this year to represent the students through the senate, assure justice through the court system and the Student Traffic Review Board, and provide services through various committees in the Executive Branch. This year’s services included copy machines, typewriters, refrigerator rentals, security shuttles and free legal aid. For additional campus security in the evening, a walking escort system was provided by Student Government volunteers.

Student media organizations experienced changes this year, including the final issue and derecognition of “The Chronicle” variety magazine this spring. The “TAPS” staff again produced an award-winning yearbook, and “The Tiger” newspaper was honored as a five-star collegiate publication. WSBF radio was granted a power increase to 1,000 watts, allowing listenership within at least a 30-mile radius.

Clemson’s 10 sororities and 18 fraternities claimed total membership of 1,066 and 900, respectively. Sorority women emphasized academic excellence and maintained an average grade point ratio of 2.83, which was higher than the total University’s female student average of 2.70. Approximately 28 percent of the undergraduate women at Clemson were members of sororities and 16 percent of the undergraduate men were members of fraternities in 1982-83.

Parking and traffic records are maintained to coincide with the academic calendar from August 15 to August 15 each year. During the period August 15, 1982, through May 6, 1983, 11,256 student parking decals were issued, and $27,246 was deposited to the Miscellaneous Income Account (MIA). The Department of Public Safety officers wrote 21,716 parking tickets plus 17,174 warning tickets during the same period. The total amount of parking fines collected at the Traffic Office and deposited to the MIA was $31,696, while $193,578 was turned over to the Accounting Office for collections. The Student Traffic Review Board heard appeals for 1,475 students involving 1,719 parking tickets, or about 7.9 percent of the tickets written.

Career Services, which is composed of Placement and Cooperative Education, continued to feel the effects of the recession. Unfortunately,
the end of the long period of economic uncertainty came too late to appreciably improve the employment situation for the class of 1983.

Because of the dwindling numbers of employers recruiting on college campuses, seniors at major universities throughout the country started spending nights in line waiting to sign up for interviews. A new preference card system implemented at Clemson this year not only eliminated the waiting lines but forced students to research companies so they were better prepared for interviews.

The number of employers recruiting on campus fell to 184 in the fall and 170 in the spring, reducing the number of interviews to 6,200 from the 8,000 granted for the past several years. On the positive side, the Placement Office statistics showed a 15 percent increase in the number of offers and a 39 percent increase in the number of acceptances from last year.

A record number of students applied for Cooperative Education during the year. During the spring semester alone, nearly 200 students expressed a desire to begin working in the summer of 1983. Unfortunately, the economy had not improved enough for industry to increase the number of authorized co-op positions. The total number of students in the program decreased by less than 10 percent from 396 to 367. As a group, cooperative education students earned more than $1.8 million during the academic year. There are strong indications that the economy will continue to improve, and more companies will revitalize their programs with new hiring of cooperative education students.

The Clemson University Union, through its 11 student committees and 250 volunteers, provided 1,200 different social, cultural and recreational programs, with an aggregate attendance of 180,000 during the 1982-83 school year.

In 1982-83 eight Clemson athletic teams finished in the top 10 in the nation, and the overall sports program finished fourth in the nation. This marks the sixth time in the last seven years the Clemson program has finished in the top 10 in overall sports programs. Clemson also claimed five Atlantic Coast Conference championships. The football record of 21-1-1 for the past two years is the best in the nation.

Clemson had 37 All-Conference athletes representing 15 different sports and 12 All-American athletes representing 11 different sports.
**1982-83 Clemson Athletics Review**

<table>
<thead>
<tr>
<th>Sport</th>
<th>Home</th>
<th>Away</th>
<th>Neut</th>
<th>ACC</th>
<th>Overall Record</th>
<th>PCT</th>
<th>ACC Reg Finish</th>
<th>ACC Trn Finish</th>
<th>National Ranking</th>
<th>All-ACC Players</th>
<th>All-Americans</th>
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<td>Soccer</td>
<td>12-0</td>
<td>5-2-1</td>
<td>1-0</td>
<td>5-1</td>
<td>18-2-1</td>
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<td>First-T</td>
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<td>6-0</td>
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<th>34-20</th>
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</tbody>
</table>

* Denotes advancement to postseason play as a team or individual.

Officially, Clemson claimed five ACC championships: Football, Men’s Cross Country, women’s tennis, soccer (tie) and men’s tennis.
### Fall Semester 1982 Enrollment by Colleges, and Degrees Awarded
#### December 1981-August 1982

<table>
<thead>
<tr>
<th>Main Campus</th>
<th>Enrollment</th>
<th>Associate</th>
<th>Bachelor's</th>
<th>Master's</th>
<th>Specialist</th>
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<td>66</td>
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<td>101</td>
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<td>0</td>
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<td>Commerce &amp; Industry</td>
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<td>8</td>
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<td>Education</td>
<td>1,184</td>
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<tr>
<td>Engineering</td>
<td>3,292</td>
<td>0</td>
<td>430</td>
<td>64</td>
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<td>Forest &amp; Rec. Resources</td>
<td>405</td>
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<td>98</td>
<td>19</td>
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<td>0</td>
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<tr>
<td>Liberal Arts</td>
<td>794</td>
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<td>169</td>
<td>11</td>
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<td>Nursing</td>
<td>295</td>
<td>9</td>
<td>64</td>
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<tr>
<td>Sciences</td>
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<td>0</td>
<td>155</td>
<td>60</td>
<td>0</td>
<td>15</td>
<td>230</td>
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<tr>
<td>Non-Degree</td>
<td>86</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>TOTALS</strong></td>
<td><strong>11,618</strong></td>
<td><strong>9</strong></td>
<td><strong>1,905</strong></td>
<td><strong>471</strong></td>
<td><strong>10</strong></td>
<td><strong>45</strong></td>
<td><strong>2,440</strong></td>
</tr>
</tbody>
</table>

Degrees awarded since 1896 (through August 1982) total 49,506 of which 425 have been associate degrees; 40,103 bachelor’s degrees; 8,231 master’s degrees; 103 education specialist degrees; and 644 doctorates. Includes 307 Clemson-Furman MBA degrees awarded May 1972-August 1982.
### Number and Percent of Black Students

<table>
<thead>
<tr>
<th>Year</th>
<th>Number</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>1972</td>
<td>179</td>
<td>2</td>
</tr>
<tr>
<td>1973</td>
<td>211</td>
<td>2</td>
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<tr>
<td>1974</td>
<td>216</td>
<td>2</td>
</tr>
<tr>
<td>1975</td>
<td>338</td>
<td>3</td>
</tr>
<tr>
<td>1976</td>
<td>307</td>
<td>3</td>
</tr>
<tr>
<td>1977</td>
<td>336</td>
<td>3</td>
</tr>
<tr>
<td>1978</td>
<td>290</td>
<td>3</td>
</tr>
<tr>
<td>1979</td>
<td>341</td>
<td>3</td>
</tr>
<tr>
<td>1980</td>
<td>305</td>
<td>3</td>
</tr>
<tr>
<td>1981</td>
<td>325</td>
<td>3</td>
</tr>
<tr>
<td>1982</td>
<td>429</td>
<td>4</td>
</tr>
</tbody>
</table>

### Student-Faculty Ratio  
(Full-Time Equivalent)

<table>
<thead>
<tr>
<th>Year</th>
<th>Ratio</th>
</tr>
</thead>
<tbody>
<tr>
<td>1972</td>
<td>14.6 :1</td>
</tr>
<tr>
<td>1973</td>
<td>16.8 :1</td>
</tr>
<tr>
<td>1974</td>
<td>17.9 :1</td>
</tr>
<tr>
<td>1975</td>
<td>18.3 :1</td>
</tr>
<tr>
<td>1976</td>
<td>17.6 :1</td>
</tr>
<tr>
<td>1977</td>
<td>16.3 :1</td>
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<tr>
<td>1978</td>
<td>15.9 :1</td>
</tr>
<tr>
<td>1979</td>
<td>16.0 :1</td>
</tr>
<tr>
<td>1980</td>
<td>15.6 :1</td>
</tr>
<tr>
<td>1981</td>
<td>16.4 :1</td>
</tr>
<tr>
<td>1982</td>
<td>16.6 :1</td>
</tr>
</tbody>
</table>
Average College Board Score of Freshmen

<table>
<thead>
<tr>
<th>Year</th>
<th>Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>1972</td>
<td>995</td>
</tr>
<tr>
<td>1973</td>
<td>982</td>
</tr>
<tr>
<td>1974</td>
<td>984</td>
</tr>
<tr>
<td>1975</td>
<td>983</td>
</tr>
<tr>
<td>1976</td>
<td>996</td>
</tr>
<tr>
<td>1977</td>
<td>985</td>
</tr>
<tr>
<td>1978</td>
<td>1000</td>
</tr>
<tr>
<td>1979</td>
<td>1002</td>
</tr>
<tr>
<td>1980</td>
<td>1005</td>
</tr>
<tr>
<td>1981</td>
<td>1007</td>
</tr>
<tr>
<td>1982</td>
<td>1017</td>
</tr>
</tbody>
</table>

Number of Teachers (Full-Time Equivalent Teaching Faculty)

<table>
<thead>
<tr>
<th>Year</th>
<th>Teachers</th>
</tr>
</thead>
<tbody>
<tr>
<td>1972</td>
<td>614.8</td>
</tr>
<tr>
<td>1973</td>
<td>578.4</td>
</tr>
<tr>
<td>1974</td>
<td>591.8</td>
</tr>
<tr>
<td>1975</td>
<td>602.5</td>
</tr>
<tr>
<td>1976</td>
<td>611.3</td>
</tr>
<tr>
<td>1977</td>
<td>654.4</td>
</tr>
<tr>
<td>1978</td>
<td>675.6</td>
</tr>
<tr>
<td>1979</td>
<td>691.8</td>
</tr>
<tr>
<td>1980</td>
<td>718.2</td>
</tr>
<tr>
<td>1981</td>
<td>709.7</td>
</tr>
<tr>
<td>1982</td>
<td>720.9</td>
</tr>
</tbody>
</table>
### Number in Freshman Class
*(New Students)*

<table>
<thead>
<tr>
<th>Year</th>
<th>Number</th>
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<tbody>
<tr>
<td>1972</td>
<td>1,919</td>
</tr>
<tr>
<td>1973</td>
<td>2,034</td>
</tr>
<tr>
<td>1974</td>
<td>1,949</td>
</tr>
<tr>
<td>1975</td>
<td>1,901</td>
</tr>
<tr>
<td>1976</td>
<td>1,861</td>
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<tr>
<td>1977</td>
<td>1,838</td>
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<tr>
<td>1978</td>
<td>2,020</td>
</tr>
<tr>
<td>1979</td>
<td>1,998</td>
</tr>
<tr>
<td>1980</td>
<td>2,008</td>
</tr>
<tr>
<td>1981</td>
<td>2,284</td>
</tr>
<tr>
<td>1982</td>
<td>2,321</td>
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</table>

### Acceptance Rate of Applicants

<table>
<thead>
<tr>
<th>Year</th>
<th>Rate</th>
</tr>
</thead>
<tbody>
<tr>
<td>1972</td>
<td>83%</td>
</tr>
<tr>
<td>1973</td>
<td>83%</td>
</tr>
<tr>
<td>1974</td>
<td>84%</td>
</tr>
<tr>
<td>1975</td>
<td>77%</td>
</tr>
<tr>
<td>1976</td>
<td>69%</td>
</tr>
<tr>
<td>1977</td>
<td>69%</td>
</tr>
<tr>
<td>1978</td>
<td>69%</td>
</tr>
<tr>
<td>1979</td>
<td>60%</td>
</tr>
<tr>
<td>1980</td>
<td>59%</td>
</tr>
<tr>
<td>1981</td>
<td>59%</td>
</tr>
<tr>
<td>1982</td>
<td>60%</td>
</tr>
</tbody>
</table>
### Retention Rate of Students
(Freshman Class)

<table>
<thead>
<tr>
<th>Year</th>
<th>Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>1971</td>
<td>84%</td>
</tr>
<tr>
<td>1972</td>
<td>82%</td>
</tr>
<tr>
<td>1973</td>
<td>83%</td>
</tr>
<tr>
<td>1974</td>
<td>83%</td>
</tr>
<tr>
<td>1975</td>
<td>82%</td>
</tr>
<tr>
<td>1976</td>
<td>84%</td>
</tr>
<tr>
<td>1977</td>
<td>84%</td>
</tr>
<tr>
<td>1978</td>
<td>87%</td>
</tr>
<tr>
<td>1979</td>
<td>87%</td>
</tr>
<tr>
<td>1980</td>
<td>87%</td>
</tr>
<tr>
<td>1981</td>
<td>89%</td>
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</table>

### Number of On-Campus Students in Summer School

<table>
<thead>
<tr>
<th>Year</th>
<th>Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>1972</td>
<td>5,232</td>
</tr>
<tr>
<td>1973</td>
<td>6,267</td>
</tr>
<tr>
<td>1974</td>
<td>5,997</td>
</tr>
<tr>
<td>1975</td>
<td>6,275</td>
</tr>
<tr>
<td>1976</td>
<td>6,100</td>
</tr>
<tr>
<td>1977</td>
<td>6,301</td>
</tr>
<tr>
<td>1978</td>
<td>6,393</td>
</tr>
<tr>
<td>1979</td>
<td>6,708</td>
</tr>
<tr>
<td>1980</td>
<td>6,858</td>
</tr>
<tr>
<td>1981</td>
<td>6,897</td>
</tr>
<tr>
<td>1982</td>
<td>7,149</td>
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</table>
Number of Dorm Beds and Percent Being Utilized

<table>
<thead>
<tr>
<th>Year</th>
<th>Beds</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>1972</td>
<td>5,174</td>
<td>100</td>
</tr>
<tr>
<td>1973</td>
<td>5,330</td>
<td>102</td>
</tr>
<tr>
<td>1974</td>
<td>5,592*</td>
<td>101</td>
</tr>
<tr>
<td>1975</td>
<td>5,616*</td>
<td>103</td>
</tr>
<tr>
<td>1976</td>
<td>5,625*</td>
<td>103</td>
</tr>
<tr>
<td>1977</td>
<td>5,662*</td>
<td>103</td>
</tr>
<tr>
<td>1978</td>
<td>5,683*</td>
<td>104</td>
</tr>
<tr>
<td>1979</td>
<td>5,726*</td>
<td>106</td>
</tr>
<tr>
<td>1980</td>
<td>6,317*</td>
<td>112</td>
</tr>
<tr>
<td>1981</td>
<td>6,864*</td>
<td>100</td>
</tr>
<tr>
<td>1982</td>
<td>6,862*</td>
<td>104</td>
</tr>
</tbody>
</table>

* Includes beds in the Clemson House:
  1974 — 252
  1975 — 262
  1976 — 271
  1977 — 308
  1978 — 317
  1979 — 324
  1980 — 329
  1981 — 330
  1982 — 328
OPERATING FUNDS
FOR THE YEAR ENDED JUNE 30, 1983

Revenues

<table>
<thead>
<tr>
<th>Description</th>
<th>Unrestricted</th>
<th>Restricted</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Student Fees</td>
<td>$19,577,382</td>
<td>$19,577,382</td>
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<tr>
<td>Federal Appropriations</td>
<td>9,927,547</td>
<td>9,927,547</td>
<td></td>
</tr>
<tr>
<td>State Appropriations</td>
<td>65,681,456</td>
<td>65,681,456</td>
<td></td>
</tr>
<tr>
<td>Local Appropriations</td>
<td>2,927</td>
<td>2,927</td>
<td></td>
</tr>
<tr>
<td>Federal Grants and Contracts</td>
<td>968,058</td>
<td>$6,014,146</td>
<td>6,982,204</td>
</tr>
<tr>
<td>State Grants and Contracts</td>
<td>9,116</td>
<td>490,537</td>
<td>499,653</td>
</tr>
<tr>
<td>Local Grants and Contracts</td>
<td>1,852</td>
<td>30,117</td>
<td>31,969</td>
</tr>
<tr>
<td>Private Gifts, Grants and Contracts</td>
<td>726,450</td>
<td>5,930,608</td>
<td>6,657,058</td>
</tr>
<tr>
<td>Endowment Income</td>
<td>9,266</td>
<td>285,969</td>
<td>294,965</td>
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<tr>
<td>Sales and Services of Educational Department</td>
<td>1,641,077</td>
<td>1,641,077</td>
<td></td>
</tr>
<tr>
<td>Sales and Services of Auxiliary Enterprises</td>
<td>26,640,895</td>
<td>26,640,895</td>
<td></td>
</tr>
<tr>
<td>Other Sources</td>
<td>4,166,957</td>
<td>490,015</td>
<td>4,656,972</td>
</tr>
<tr>
<td><strong>TOTAL REVENUES</strong></td>
<td><strong>$129,352,983</strong></td>
<td><strong>$13,181,122</strong></td>
<td><strong>$142,534,105</strong></td>
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</table>

Expenditures And Mandatory Transfers

<table>
<thead>
<tr>
<th>Description</th>
<th>Unrestricted</th>
<th>Restricted</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Educational and General</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Instruction</td>
<td>$36,926,238</td>
<td>$955,059</td>
<td>$37,881,297</td>
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<td>Research</td>
<td>3,450,259</td>
<td>3,998,403</td>
<td>7,448,662</td>
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<tr>
<td>Research-Agricultural Experiment Stations</td>
<td>12,204,142</td>
<td>1,725,927</td>
<td>13,930,069</td>
</tr>
<tr>
<td>Extension and Public Service</td>
<td>789,730</td>
<td>982,884</td>
<td>1,772,614</td>
</tr>
<tr>
<td>Extension and Public Service-Cooperative</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Agricultural Extension Service</td>
<td>18,358,039</td>
<td>566,191</td>
<td>18,924,230</td>
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<tr>
<td>Extension and Public Service-Regulatory Service</td>
<td>3,105,974</td>
<td>716,147</td>
<td>3,822,121</td>
</tr>
<tr>
<td>Academic Support</td>
<td>6,868,217</td>
<td>242,999</td>
<td>7,111,216</td>
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<tr>
<td>Student Services</td>
<td>3,607,484</td>
<td>38,289</td>
<td>3,645,773</td>
</tr>
<tr>
<td>Institutional Support</td>
<td>8,495,153</td>
<td>104,889</td>
<td>8,600,042</td>
</tr>
<tr>
<td>Operation and Maintenance of Plant</td>
<td>8,381,882</td>
<td></td>
<td>8,381,882</td>
</tr>
<tr>
<td>Scholarships and Fellowships</td>
<td>30,416</td>
<td>3,821,099</td>
<td>3,851,505</td>
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<tr>
<td><strong>Total Educational and General</strong></td>
<td><strong>$102,217,534</strong></td>
<td><strong>$13,151,877</strong></td>
<td><strong>$115,369,411</strong></td>
</tr>
<tr>
<td>Mandatory Transfers</td>
<td>205,269</td>
<td></td>
<td>205,269</td>
</tr>
<tr>
<td><strong>Total Educational and General</strong></td>
<td><strong>$102,422,803</strong></td>
<td><strong>$13,151,877</strong></td>
<td><strong>$115,574,680</strong></td>
</tr>
<tr>
<td>Auxiliary Enterprises</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Auxiliary Enterprises Expenditures</td>
<td>$23,147,543</td>
<td>$29,245</td>
<td>$23,176,788</td>
</tr>
<tr>
<td>Mandatory Transfers</td>
<td>1,470,000</td>
<td></td>
<td>1,470,000</td>
</tr>
<tr>
<td><strong>Total Auxiliary Enterprises</strong></td>
<td><strong>$24,617,543</strong></td>
<td><strong>$29,245</strong></td>
<td><strong>$24,646,788</strong></td>
</tr>
<tr>
<td><strong>TOTAL EXPENDITURES AND MANDATORY TRANSFERS</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>$127,040,346</strong></td>
<td><strong>$13,181,122</strong></td>
<td><strong>$140,221,468</strong></td>
<td></td>
</tr>
<tr>
<td>OTHER TRANSFERS AND DEDUCTIONS</td>
<td>$(49,731)</td>
<td>(5,361,114)</td>
<td>(5,410,845)</td>
</tr>
<tr>
<td><strong>NET INCREASE/(DECREASE) IN FUND BALANCES</strong></td>
<td><strong>$2,262,906</strong></td>
<td><strong>(5,361,114)</strong></td>
<td><strong>(3,098,208)</strong></td>
</tr>
</tbody>
</table>

82
The College of Agricultural Sciences administers statewide public service programs in addition to its programs for resident instruction. Among its public service functions are administration and coordination of the varied activities and services of the South Carolina Agricultural Experiment Station, the Cooperative Extension Service, the Division of Regulatory and Public Service Programs, and the Livestock-Poultry Health Department. Reports of these divisions follow.

SOUTH CAROLINA AGRICULTURAL EXPERIMENT STATION

W. Cecil Godley, Director

Clemson’s S. C. Agricultural Experiment Station conducts South Carolina’s only state-funded agricultural research program.

Scientists in the College of Agricultural Sciences’ 10 departments provide expertise for this program, with home economics research conducted at Winthrop College. Facilities at Clemson and four branch stations located across the State provide indoor and outdoor laboratories for scientists in agricultural economics, agricultural engineering, agronomy, animal science, dairy science, entomology, fisheries and wildlife, food science, horticulture, plant pathology and poultry science.

The Experiment Station’s four branches enable researchers to conduct studies that relate to growers in their areas under the constraints of soils and climates.

The Experiment Station was established in 1886 under federal law and is state controlled, with annual appropriations from the South Carolina Legislature and supplemental funding from the United States Congress.

Experiment Stations operate in all 50 states and conduct both cooperative and complementary research, avoiding duplication of effort and trying to increase the wealth of information responsible for the advances of the past 50 years.

To meet future challenges, the S. C. Agricultural Experiment Station will continue to add research findings to those of researchers in other states with one common goal in mind — creating better standards of living for people through the best possible use of natural resources.

Highlights and Accomplishments

The following summary is a capsule review of the extensive research program at the Experiment Station. Many important studies have been
omitted, and the ones that follow are intended only to illustrate the scope of the Station’s total program.

**Agricultural Economics and Rural Sociology**

Agricultural economists and rural sociologists are investigating alternatives to the development of human and natural resources in South Carolina.

Marketing and production economists analyzed the State’s dairy industry and found that economic conditions for most South Carolina dairy producers improved in 1981 but remained unfavorable in 1982. The analysis was based on the computer-processed farm business records service offered to the dairy industry. The estimated cost of production of farms participating in the service was $19.34 per hundredweight, while the average blend price of producers was $15.68 per hundredweight. Returns to management increased nearly 40 percent from 1981 to 1982, but remained negative in both years. Researchers developed and tested a formula for pricing milk that was adopted by the S. C. Dairy Commission.

Economists conducted research to estimate economic impact of the area-wide cost sharing program to eliminate the cotton boll weevil in South Carolina. Projected investment payback periods and estimated rates of return on investment were derived. On average, the boll weevil eradication program should produce benefits greater than costs by the fifth year. The average rate of return on investment in the program will be about 40 percent. Annual grower savings from reduced pest control expenses will vary from $9 to $53 per acre.

Economists estimated that foreign persons reported purchases of about 469,819 acres of South Carolina agricultural land as of February 1982. Most of this land, 93 percent, was in forest, with only 2.8 percent in cropland. McCormick County had the highest concentration of foreign ownership, with foreigners having an interest in 12.82 percent of the county’s acreage. Individuals or legal entities from the United Kingdom accounted for 57 percent of the foreign-held land.

Sociologists conducted a survey of South Carolina farm operators to provide information on the structure of agriculture. Results showed that compared to large operators, small South Carolina operators are more likely to hold off-farm jobs, have a higher family income, engage in animal enterprises, have more land in pasture and timber, and view farming as less of a business than a lifestyle. Other research highlighted State tobacco producers. Compared to nontobacco producers, tobacco farmers reported higher farm sales and higher family incomes. They also operated larger farms.

Resource economists conducted a study to evaluate the willingness of the public to pay for environmental-open space amenities provided by agricultural land in Greenville. A procedure called contingent valuation
was used in a mail questionnaire. The results indicated that county environmental amenities varied from about $1 million if one-fourth (18,000) were preserved, to about $1.37 million if all (72,000 acres) were preserved.

An interdisciplinary research team evaluated potential alternative feedstocks for ethanol production at the Savannah River Plant. Results indicate that, at least in the short run, corn is the most economically feasible feedstock. However, new technological developments for growing and harvesting sweet sorghum and sweet potatoes will likely make these crops more attractive in the future.

Regional economists analyzed the impact of the scheduled deregulation of natural gas prices on profits of several food processing sectors. The impact of natural gas price deregulation under NGPA over the range of prices assumed in the study is likely to result in small, but not insignificant, reductions in profit margins for low-cushion relative to deep-cushion food processors.

Production economists developed equations to determine the value of tobacco allotments using income tax rates, planning horizons expected before-tax return to allotment, expected lease payments, available financing and other critical decision factors.

**Agricultural Engineering**

Agricultural engineers have been involved in a wide range of research efforts aimed at increasing food and fiber production, while using less fossil energy and maintaining a quality environment.

A computer model of a subsurface water management system was tested using field data from Orangeburg County. The model predicted field water table levels with acceptable accuracy and showed the potential for use as a tool in system management.

Trickle irrigation research on peaches included a study of irrigation versus no irrigation, fertilizer application at two rates with irrigation, and part-season partial irrigation.

Runoff and erosion studies are underway on soybean plots using conventional tillage, no-till and an intermediate tillage. Water and soil losses and bean yields will be compared for the various treatments.

Swine lagoon effluent was utilized on mature pine and hardwood forests over the past five years. There was significant growth in three diameters on hardwoods but not on pines.

Interests has been generated through on-farm testing of the pasture renovator/clover seeder developed in the department. Growers in Abbeville, McCormick and Saluda counties have responded enthusiastically to the demonstrations.

Development of the green onion harvester was completed with the testing of a successful prototype machine that can harvest 1,000 dozen
bunches of onions per hour.

Mechanization of fresh peach production is being continued in cooperation with horticulturists. Mechanization of tree pruning, fruit thinning and fruit harvesting are being investigated with two non-conventional peach cultural systems.

Basic information and instrumentation were developed, leading to more effective mechanical sorting of peaches and other fruit. Studies were conducted jointly with the Horticulture Department to quantify minimum ground color indicative of peach maturity. Nondestructive firmness sorting techniques are being developed by analysis of fruit impact forces.

A mechanical oyster harvester was used to transplant oysters from polluted water to clean water, and for an environmental impact study with S. C. Wildlife and Marine Resources. The harvester is currently being converted to a diesel drive, and work is continuing on a shrimp deheader.

Ethanol production and energy efficiency tests continued, using a farm-scale plant to produce 180-proof fuel ethanol from corn, grain sorghum, sweet sorghum and sweet potato feedstocks.

Development of an automatically controlled, wood-fueled combustion system for agricultural applications progressed. Several types of wood chippers were tested, a 300,000 BTU/hour wood chip gasifier-combustor was successfully demonstrated, and progress was made on developing computer control of the gasifier-combustor.

A hybrid solar brooding facility was tested in cooperation with the Poultry Science Department. While energy savings were realized, the birds did not perform as well under the conditions of high density and low ventilation rates as did conventionally reared birds.

A microprocessor-based computer monitors ambient air conditions and automatically controls a deep-bed grain drier to bring the grain to a specified moisture content with a minimum of fossil fuel. The unit has been successfully used to control drying corn, wheat and soybeans.

Tillage energy requirements and tractor-implement performance factors were measured with a computer-based instrumentation system. The yield response of soybeans to tillage energy input was measured for five different soil conditions.

Agronomy and Soils

Soybean breeding research continues, with major emphasis on developing germplasm with improved nematode and insect resistance. In 1983 the S. C. Agricultural Experiment Station participated in the joint release of "Kirby" soybeans. Kirby is superior to all other currently available Maturity Group VIII cultivars in resistance to Race 3 cyst nematodes and to the root-knot nematodes *M. incognita* and *M. arenaria*, and has
produced higher average seed yield.

Forage breeding and management research continue to receive departmental emphasis. Studies are underway to identify management practices that would improve persistence of legumes grown with tall fescue. The compatibility of various perennial and annual species with tall fescue is being investigated in clipping trials. Numerous species of legumes are being screened for potential production in the Piedmont.

Work continues to produce varieties of cool-season perennial forage grasses with high quality, good persistence and/or adaptation to the Coastal Plain.

Agronomy and animal science faculty are continuing cooperative research to find forage systems to carry beef cattle from weaning to slaughter with a minimum of grain feeding. This research should eventually give cattlemen more flexibility in beef production and provide more opportunity for profitable beef production.

A new wheat, tentatively named “Williams,” has just been developed for release. Williams is a medium maturity variety with an excellent yield record at locations in South Carolina and the Southeastern United States. It has typical soft wheat quality. Williams exhibits a powdery mildew reaction more in keeping with the concept of field or horizontal resistance in that disease levels have been at a low level during the testing period.

Research trials have demonstrated that new herbicides Poast® and Fusilade® have given consistent and highly selective control of both annual and perennial grasses in cotton and soybeans under a wide range of weed growth stages and environmental conditions.

Trifluralin, a soil-incorporated herbicide, has given consistent and long-lasting control of goosegrass (Eleusine indica) and other weeds in cotton, soybeans and a large number of vegetable crops. Recently a trifluralin-resistant goosegrass biotype was identified in South Carolina and is believed to be distributed throughout several counties. Our research will determine the distribution of this biotype in South Carolina, the biotype response to all commercially available dinitroaniline herbicides, and to certain other soil- and foliar-applied herbicides that have alternate modes of action and are commonly used throughout the South.

Other important research activities relate to more effective nitrogen fixation by plants, management of soils for more efficient use of water, effects of acid precipitation on crops and soils, and cultural practices that increase crop yields.

Animal Science

Varying chemical treatments have been investigated to preserve forage and improve the use of low-quality forages by beef cattle. Treatment of forages with anhydrous ammonia increases the digestibility of dry matter and nitrogen content. Anhydrous ammonia has fungicidal properties
which prevent development of molds in high-moisture hay. This preservative effect may be useful in reducing the risk of rain damage during the curing of hay by allowing it to be baled at higher moisture levels. Crude protein content of coastal bermudagrass was increased by adding anhydrous ammonia and storing bales in plastic hay bags.

Postpartum nutrition appears to have little or no effect on the interval to first postpartum heat, or the percent of cows showing heat after 2, 40 or 60 days of breeding, provided the cows calved in moderate to good body condition. The postpartum period has little effect on pregnancy rate provided the cows are gaining weight just prior to and during the breeding season. Cows calving in good body condition can be allowed to lose weight until just prior to breeding, but they must be fed above normal during the breeding season.

Alpha-prostol, a prostaglandin derivative, was shown to be an effective agent to induce farrowing in sows and gilts. Injection of the compound two days prior to the expected farrowing date caused birth to occur earlier than females injected with a control substance. Results of this research may permit producers to control the farrowing period, improve the efficiency of labor utilization and rear more pigs per litter.

At the Edisto Station, allowing weaned calves to consume a highly nutritious diet resulted in less post-weaning stress and an increased daily gain in body weight. Control animals were allowed to graze millet pastures. Feeding of the highly nutritious diet would have advantages only when it is economically advantageous for animals to meet a predetermined weight by a specified date.

Dried whole whey, a cheese manufacturing by-product high in milk sugar (lactose), has potential as a feed ingredient for early weaned pigs. Addition of energy in the form of whey improved gains and gain per unit of feed consumed. Results of the experiments demonstrate that a manufacturing by-product has potential for swine diets provided the whey can be purchased economically.

South Carolina’s beef industry consists mainly of cow-calf operations. Long-term drylot grain feeding to finish cattle is not feasible. However, year-round forage production and management offers the possibility of stockering the calves and finishing them to market weight with forages. In a forage evaluation study, steers allowed to graze a fescue-red, clover-Tillman pasture gained more rapidly than steers grazing a fescue-Tillman clover combination. Results of the experiments demonstrated the potential for excellent gain and beef production from grazing forages. However, consumer acceptance of the product will depend on the quality of forage-fed beef. Carcass evaluation studies demonstrated that high-quality beef can be produced with pasture grazing and with a corn silage drylot finishing period of 80 to 90 days. If the cattle finish the grazing period at heavier weights, less time is required for corn-silage finishing of the cattle.
Dairy Science

Dairy scientists are conducting research in a broad range of areas that involve milk production and processing.

In the forage area, ruminal digestion of protein of alfalfa, oat, fescue and coastal bermuda hays is being compared by tagging the protein with chemical agents that produce color that can be measured. Hay with diazonium-marked protein was placed in dacron bags and immersed in the liquid phase of rumen contents of steers being fed the same hay as that from which the diazotized protein was derived. Bags were removed in duplicate at timed intervals and the color compared to a previously prepared standard curve. Using this technique, solubilization and hydrolysis of proteins are being determined more accurately than with methods that use microbial markers.

Forage systems studies have involved wheat planted in fall and harvested in spring, followed by corn planted in spring and harvested in late summer, and sorghum planted in late spring and harvested in fall. These forages were stored as silage and evaluated for milk production by cows and for digestibility by steers.

The American Medical Association, National Association of Science and the National Research Council all agree iodine content of milk should not be greater than 500 parts per billion. Yet, they also agree that concentrations up to 1,000 parts per billion are safe. The dairy cow is exposed to iodine in feed, in sanitizing solutions used as teat dips, and in other ways. Therefore, milk should not be produced with extremely high levels of iodine. Both raw and pasteurized milk samples were collected from commercial South Carolina supplies, and the mean iodine values were 440 and 443 parts per billion, respectively. Mean iodine value for raw milk samples from the Clemson University herd was 333 parts per billion.

Studies on reproductive physiology of bovine females revealed that the microscopic appearance of the lining of the reproductive tract of cows was altered when they were maintained on a low plane of nutrition during pregnancy and later calving. The altered lining of the tract may account for some of the lowered fertility that occurs in high-producing dairy cattle. Although the research was conducted with Polled Hereford cattle, similar processes may occur in high-producing dairy cows known to be losing weight during the peak of lactation. The tract may not be receptive to another pregnancy as long as the cow is losing weight.

Entomology, Fisheries and Wildlife

The feral swine is an important wildlife species in South Carolina, yet little is known about its habits. Clemson wildlife researchers recently completed radio-telemetry study of adult feral hogs inhabiting the river swamp of the U. S. Department of Energy’s Savannah River Plant. The
research sheds light on the movements of this animal. During the study, individual hogs used areas, or home ranges, much larger than reported in other studies. These larger home ranges were probably the result of poorer habitat conditions, which required the animals to cover larger areas to meet their needs. Typical of feral swine, the study animals exhibited nomadic movement. At any one time, only a portion of the home range was actively used, with unpredictable shifts throughout the year to other portions. Data revealed that boars moved greater distances than sows on a daily basis. Bottomland hardwood habitats received the greatest use by feral swine during all seasons. This apparently was due to that area's more dependable supply of food, cover and wallowing sites.

Tobacco is a major agronomic crop in South Carolina and other Southeastern states, and insect damage and control cost farmers a great deal of money each year. The use of insecticides gives temporary control but often leads to environmental contamination and health hazards. The use of host-plant resistance would be an excellent method of control. It is specific, safe, long-lasting, decreases toxic residues and is an easy, economical method of controlling insect pests.

To date, 3,000 tobacco entries (cultivars, tobacco introductions and crosses) have been screened for insect resistance at the Pee Dee Research and Education Center in Florence, S. C. Resistance to tobacco budworms, hornworms and aphids has been found in some tobacco. Experiments are underway to determine possible mechanisms for that resistance. These studies will evaluate tobacco leaf chemistry and determine possible relationships between insect activity and leaf chemistry profiles or compounds. Results of these studies will enhance efforts to incorporate insect resistance into acceptable cultivars for tobacco farmers.

The tobacco budworm is a serious pest of tobacco and cotton in South Carolina and has been difficult to control with insecticides. The Insecticide Toxicology Laboratory under the direction of Thomas M. Brown completed a comprehensive survey of insecticide resistance in this pest. Resistance to methyl parathion was common in collections of the budworm from cotton. Substitutes and synergists for methyl parathion were tested and the biochemical mechanisms of resistance determined.

The tobacco budworm was susceptible to synthetic pyrethroid insecticides, which have been used in cotton insect control since 1978. Monitoring revealed no evidence of resistance to these insecticides to date. In a new project, surveillance of this pest and several others in field crops will continue. In addition, a survey for insecticide resistance in beneficial insects has begun with the goal of providing genetically improved strains of these useful allies for biological control.

Food Science

Increased use of South Carolina foodstuffs is an objective of research
conducted in the Food Science Department. To accomplish this, a process by which sweet potatoes are precooked and formulated into sweet potato patties has been developed. The patty is the result of an exacting formulation procedure using starch and selected ingredients in conjunction with a very unique system of processing. Sensory evaluation studies indicate the patty is a highly acceptable product. Other studies with sweet potatoes have involved alginates in conjunction with Ca$^{+++}$ donors over a wide pH range to alter the shape and texture of precooked sweet potatoes.

The functionality of food proteins is often a key to their successful use. In this regard, studies have been conducted with various protein sources including egg white protein, to determine inherent functionality as well as functionality as a consequence of various processing procedures. Studies suggest protein solubility may be a method by which protein functionality can be predicted. A recently developed foaming procedure related to functionality in which freeze-dried egg white protein is used is showing progress. Maximum functionality appears to be obtained at a pH of about 7.5, but maximum foam stability of the various proteins examined, particularly egg white proteins, was produced at a pH between 6 and 9. Studies of protein functionality of other food proteins and the application of these food proteins in food products continue.

Studies relating to the effect of processing on nutritional properties of foodstuffs have indicated that when cereal grains such as wheat and oats are processed into breakfast cereal products, significant changes occur in nutritional content. When different processing methods were used to prepare the breakfast cereals, it was noted that protein quality, as measured by lysine availability, was adversely affected and varied with the processing method. Cereal grains prepared by a shredding process suffered a 20 percent decrease in available lysine. Products processed by flaking suffered decreases in available lysine from 30 to 37 percent. Of particular interest was the fact that breakfast cereals prepared by the puffing process showed the greatest amount of damage as measured by total and available lysine. Protein quality damage as a consequence of processing for cereal products prepared from oats was not as great as for products made from wheat. The destruction of the amino acid lysine was greater for the wheat products compared to oat products. The reason for this difference is not understood.

Other studies on the prolaminos of cereal grains dealt with amino acid profiles, biological values, amino acid scores and in vitro digestibility. The amino acid profiles were similar among the prolaminos, gliadin, hordein and zein, with lysine and tryptophan being the limiting amino acids. These studies suggest the proteins that comprise the prolaminos of cereals are glycoproteins in nature and are in part responsible for the relationships of nutritional value (low essential amino acid contents) typical of cereal proteins.
Also of concern is the impact nutrients may have on health and well-being of people. A study was made of several hundred individuals ranging in age from 18 to 29 years to determine if there is a relationship between blood pressure and either dietary intake or anthropometric characteristics. Of the individuals studied, approximately 10 percent were identified as hypertensive with blood pressure over 159 systolic and over 89 diastolic. Diastolic blood pressure was positively correlated with coffee consumption, and systolic was positively correlated with the amount of time spent in sports activities. Individuals with a stated preference for salty foods also had higher blood pressures. Increased lead concentration in their hair was closely associated with high blood pressure. These studies continue in hope of delineating the association between dietary practices and incidence of hypertension.

Home Economics

The School of Consumer Science and Allied Professions at Winthrop College conducted research in family and child development, nutrition, textiles and interior design.

Winthrop faculty participated in a three-year, Southern regional research project on the nutritional status of adolescent girls, 12, 14 and 16 years of age. Anthropometric, socio-economic and dietary data were collected from approximately 80 black and white females. Biochemical analyses were performed on fasting blood samples from the girls and determinations were made for triglycerides, cholesterol and iron. Data were combined with those from eight other states. Preliminary results from first-year data included: mean hemoglobin concentrations were significantly higher for white females than for the black females studied; and 16-year-olds had slightly higher intakes of calories, total fat, vitamin A, ascorbic acid and vitamin B₆ at school, while 12- and 14-year olds had somewhat higher intakes of these nutrients at home.

Demographic, dietary, socio-economic, biochemical and anthropometric data were also collected on 111 elderly males and females from three South Carolina counties. Relationships between frequency of participation in the congregate meal program for the elderly and the intake of selected nutrients and various blood nutrient levels were explored. Preliminary results indicated no significant relationship between frequency of participation and biochemical measures used in the study. Dietary data are currently being examined for possible relationships.

One project, "Identification and Application of Considerations Involved in Interior Space Planning of a Solar Greenhouse Residence," was supported by the Rural Housing Research Unit at Clemson. Efforts of Winthrop faculty assigned to the project focused on interior space planning and furnishings for the multi-therm residence, as well as on acquiring industry support for materials used in the interior.
Horticulture

The Department of Horticulture conducts research throughout South Carolina on fruits, vegetables, flowers, ornamental perennials and turfgrass. There are 29 separate research projects, as well as many collaborative projects with other departments.

In ornamental horticulture the department has developed an interactive microcomputer program to be used for landscape designs. This new process will reduce the time required for designs by using computer graphics to produce design layouts. Garden centers, landscape nurserymen and private individuals can be trained to use this program, making aesthetically pleasing, environmentally planned landscapes more available to South Carolina businesses and homeowners.

In vegetable crops research the Coastal Experiment Station in Charleston has been successful with okra breeding. For the second consecutive year a Clemson horticulturist had a new breeding line chosen as an All American Selection in prestigious trials conducted all over the United States. In addition to the two okras, the Coastal Station also released a new pole bean and a pickling cucumber.

Keeping quality high on fruit that must be picked before full maturity requires very specific knowledge of the chemistry of ripening. Horticulturists working with agricultural engineers have developed a system that uses a computer to examine the fruit, which are then correlated to taste panel evaluations. Plastic color chips are used to help the orchardist decide when to pick fruit that will ripen and have the full flavor of a tree-ripened fruit.

Plant Pathology and Physiology

Field crop diseases are still some of the harder to control plant pests. To aid forage crop breeding, work on identifying the principal viruses of clovers revealed a new serotype of the peanut stunt virus that goes to resistant white clover. This knowledge will help plant breeders sort resistant and susceptible clover lines. Occasionally, metalaxyl was demonstrated to be toxic to tobacco plants when applied in transplant water. It was again demonstrated that it is not economical to apply nematicides under soybeans when the soil counts are at or below the economical threshold, even though plant-parasitic nematodes were virtually eliminated. Control of anthracnose-causing fungi in soybeans did not significantly increase yields, even though the disease was controlled. It was again demonstrated that in most cases it does not pay to try to control powdery mildew of wheat.

The most effective fungicide treatment for the control of gummy stem blight of cucumbers was maneb and benomyl on a 14-day schedule, which is about one-half the amount of fungicide currently recommended. Ridomil (metalaxyl) effectively controlled soil-borne, fruit-rotting orga-
isms and fruit rot of cucumbers. Of 250 okra lines tested, three were resistant to both root and fusarium wilt. Five different viruses were found causing problems of summer squash in South Carolina. This information for okra and squash will help develop resistant varieties.

Race 2 of the root-knot nematode *M. arenaria* caused losses to tobacco and soybeans. There is no resistance to *M. arenaria* race 2 in either crop. Diseases of several major weeds were identified, and one tested against sickle-pod proved reasonably successful when field tested. Several hosts were tested as nonhost for the ring nematodes that contribute to peach tree short life. Some of the plants did not support populations of ring nematodes and might be used in orchard floor management to control the pests.

Sediment of ponds, lakes and rivers may be the ultimate repository of agricultural and other man-made chemicals. It was found that anaerobic entities found in pond sediment caused the breakdown of certain herbicides.

**Poultry Science**

Poultry science research aims to answer basic questions regarding avian species of commercial interest and supply useful knowledge to producers and processors. This new information will help the industry supply ample quantities of wholesome, economical and appetizing eggs, poultry meat and further processed products to consumers.

Extreme summer heat is often a serious disadvantage to state broiler producers. High temperatures interfere with normal growth, and very high temperatures kill many birds.

Experimental use of a synthetic prostaglandin synthetase inhibitor reduced mortality from heat stress. Whether this information can be used by commercial producers depends on proving its safety, and on finding a good method of administering the drug to large flocks.

The reproduction rate of turkeys is vastly inferior to that of chickens, and the high cost of young turkey poults is a significant part of the cost of producing turkey meat. Research on a number of aspects of turkey reproduction has been conducted at Clemson. This has included light quantity and quality for both hens and toms, weight control of breeders, vaccination procedures and semen preservation and quality. Recent work on semen quality has focused on an abnormal semen condition known as yellow semen. This trait has been found in more than 10 percent of the toms in commercial flocks. A rapid screening test for detecting males with the trait has been developed and presented to commercial breeders. The useful life of turkey semen has been extended to about nine hours from the previous half-hour. This is far from ideal, but is sufficient to allow distribution of sperm from a stud farm to a number of hen farms. Previously, each hen farm had to maintain its own group of toms. This was
more costly, and it required a higher level of management skill to manage both toms and hens.

Bobwhite quail producers have been formulating feed with fragmentary information on protein and amino acid requirements. Clemson’s work has shown that National Research Council (NRC) recommendations are adequate for quail to three weeks of age, but that beyond that age requirements change. Lysine and methionine, the two most critical amino acids in quail diets, are costly, and this work indicates the levels required between three and eight weeks are considerably less than those currently recommended. Since feed is the most costly part of quail production, these results can lower production costs for this increasingly competitive business.

Branch Stations

The S. C. Agricultural Experiment Station’s four branch stations continue to emphasize the specialties of the areas where they are located.

The Sandhill Station at Pontiac focuses on fruit and nut tree research, along with vegetable investigations. The S. C. Swine Evaluation Center and Livestock-Poultry Health Division are both located at Sandhill.

Florence’s Pee Dee Station continues to expand crop research on tobacco, soybeans and corn on the site of the new Pee Dee Research and Education Center for Agriculture, a complex under construction that will replace the present station.

The Coastal Station at Charleston furnishes data to the Extension Service for work with vegetable growers in the Coastal Plains. Ornamental research is conducted at the facility, and a large urban research and demonstration area on Highway 76 South provides information to school classes, garden clubs and homeowners concerning flowers, herbs, shade trees, lawn grasses, vegetables and other plants.

The Edisto Station at Blackville designs its research for growers and cattle producers in the Upper Coastal Plains. Field crops such as corn, soybeans, small grains, melons and sweet potatoes are studied, along with cattle.

Active Research Projects, 1982-83

Agricultural Economics and Rural Sociology


Economic Evaluation of Alternate Investment in Financing Plans.

Impact of Selected Institutional Factors on S. C. Agriculture.

Price Discovery and Information Flows for Major Agricultural Commodities in the Southern Region.

Social and Economic Impact of Adopting Mechanical Tobacco Harvester in S. C.
Local Factors Affecting Industrial Plant Locations In S. C. Communities.
Optimum Number, Size and Location of Commercial Grain Storage in S. C.
Economics of Row Crop Irrigation in S. C.
Changing Structure of Agriculture: Causes, Consequences and Policy Implications.
Market for Stillage, Wet Distillers Grains and Dried Distillers Grains in S. C.
Relative Regional Shifts in Labor Productivity in S. C.
Economic Analysis of Farm Land Market in S. C.
Economic Analysis of Alternative Marketing Strategies for Cotton Producers.
Supply, Pricing and Marketing Alternatives for Cattle, Beef Systems in the South.
Acquisition and Analysis of Census and Other Demographic Data for S. C. and the U. S.
Economic Analysis of the Potential for Increased Swine Production in S. C.
Economic Analysis of the Use of Resources on Small Farms in S. C.
Market Information and the Nature of Price Dispersion in Retail Food Outlets.
Agricultural Regulation vs. Incentive Programs for Improving Water Quality.
Economies of Size in Hog Slaughtering Plants in S. C.
Economic Issues in the Conversion and Protection of Agricultural Land in S. C.
Economic Impact of Rising Energy Prices on Land and Water Resource Use in S. C.
Economies of Horticultural Crop Production in S. C.
Impact of Changing Costs, Institutions and Technology on the Southern Dairy Industries.
Improving Community Services in Non-Metropolitan Counties in the South.
U. S. Food Demand and Consumption Behavior.
Local Impacts of Economic Demographic Change in S. C.
Structural and Operational Efficiency of the Fruit and Vegetable Production-Marketing System.
An Economic Analysis of Risk Management Strategies for Agricultural Production Firms.

Agricultural Engineering
Soybean Production and Management Simulation Models.
Non-Point Source Pollution from Grassed and Forested Land in the Piedmont of S. C.
Utilizing Anaerobic Livestock and Poultry Lagoon Sludge.
Potential for Ambient Air Grain Drying in S. C.
Utilizing Swine Lagoon Effluent on Forest Land.
Flue-Cured Tobacco Bulk Curing Technology.
Trickle Irrigation in Humid Regions.
Animal Waste Utilization and Treatment Systems.
Viability of Soybean in Storage.
Energy Reduction for On-Farm Processing of Agriculture Products.
Optimize Efficiency of Energy Utilization in Agricultural Housing Systems.
Ethanol Production and Energy Efficiencies for On-Farm Fuel Production.
Equipment for Mechanization of Production of Oysters and Other Shellfish.
Cord Wood Gasification Combustion Demonstrations for Curing Flue-Cured Tobacco.
Irrigation Scheduling Models for Efficient Use of Water and Energy.
Control Systems for Optimizing Tractor Energy and Fuel Consumption.
Physical Properties and Mechanized Sorting of Peaches.
Energy Reduction for Crop Production Systems.
Effects, Mechanisms and Control of Erosion and Sediment from Agricultural and Forested Lands.
Agricultural Meteorology and Climatology for Production in the Southern Region.
Control Algorithm for Two-Stage Combustors.
Water Table Management for Crop Production in the Coastal Plain of S. C.
Development of Vegetable Harvesting Systems.
Cultural Systems and Equipment for Mechanization of Peach Production.

Agronomy and Soils
Adaptation and Breeding of a Cool-Season Forage Grass Species.
Production Practices of Flue-Cured Tobacco.
Selection of Tall Fescue and Hardinggrass for Persistence in Coastal Bermudagrass in the Piedmont.
Movement and Retention of Water and Solutes in Selected Southern Regional Field Soils.
Rhizosphere Ecology as Related to Plant Health and Vigor.
Rate of Soybean Root Growth and Nutrient Uptake as a Function of Varieties.
Soil Properties and Nutrient Levels in Relation to Nutrient Uptake by Corn and Soybeans.
Sunflower Improvement.
Significance and Distribution of Mineral Components in Southern Soils.
Small Grain Breeding and Genetics.
Grain Yields and Field Performance of Barley, Oats, Rye and Wheat.
Cultivar Performance Evaluation of Cotton, Soybeans and Peanuts.
Cultivar Performance Evaluation of Corn and Grain Sorghum Hybrids.
Effect of Minimum Tillage and Rotation on Soybean Production in S. C.
Sulfur and Nitrogen Components of Precipitation and Effects on Soil Fertility and Plant Nutrition.
Soil Fertility Management for Irrigated Corn and Soybeans.
Evaluation, Establishment and Management of Forage Legumes and Legume Grass Combinations.
Cytological and Developmental Studies of Soybean and Clover Hybrids.
Boron Retention and Availability in Soils of S. C.
Nitrogen Source for Production of Forages.
Development of Improved Soybean Varieties.
Breeding Cotton for Improved Yield, Fiber Quality and Resistance to Insects.
Weed Control in Corn, Cotton and Soybeans.
Soybean Seed Germination Under Heat Stress.
Overcoming Factors Limiting Biological Dinitrogen Fixation by Leguminous Plants.
Cellular and Molecular Genetics for Crop Improvement.
Chemistry of Atmospheric Deposition-Effects on Agriculture, Forestry, Surface Waters and Materials.

Animal Science
Breeding Methods for Beef Cattle in the Southern Region.
Forage Systems for Production of Beef from Conception to Slaughter.
Reproductive Physiology of Farm Animals.
Management Practices for the Early Weaned Pig.
Dietary Nitrogen Sources for the Young Equine.
Nutritional Systems for Swine to Increase Reproductive Efficiency.
Endocrine and Immunosuppressive Mechanisms and Material Recognition and Pregnancy in the Beef Cow.
Biochemical Characteristics of the Porcine Stress Syndrome.
Muscle Yield and Processing and Packaging Techniques for Pork.
Wintering Horses on Bermudagrass Pastures Overseeded with Oats, Rye, or Rye and Ryegrass.
Physiological Role of Relaxin During Reproductive States in the Gilt.
Factors Affecting the Immune Process in Cattle and Poultry.
Simulation of Forage-Beef Production in the Southern Region.
Utilization of Forages for Production of Slaughter Cattle Throughout the Year.

Dairy Science
Factors Affecting Nitrogen Economy of the Bovine.
Optimizing Nutritional Management of Dairy Calves.
Forage Feeding Systems for Growing and/or Lactating Dairy Cattle.
Influence of Ration Composition on Plasma Hormones and Lipid Metabolism in Dairy Cows.
Effect of Chemical Change in Light-Induced Off-Flavored Milk on its Consumer Acceptance.
Physico-Chemical Properties and Usefulness of Hydrolyzed-Lactose Dairy Products.
Effects of Environmental and Management Stressors on Production and Reproduction in Dairy Cattle.
Iodine Concentrations in Milk and Milk Products.
Metabolism, Toxicokinetics and Physiological Effects of Aflatoxin in B1 in the Bovine.
Effect of Media, Culture and Storage on Survival of Cattle and Sheep Embryos.
Protein Nutrients for Ruminants.

Entomology, Fisheries and Wildlife
Ectoparasites of Poultry and Synanthropic Flies Associated with Poultry and Livestock, Their Biology and Control.
Biology and Control of Arthropods Affecting Man and Animals.
Bionomics and Control of Billbugs Injurious to Corn.
Biological Control of Insect Pests of Soybeans.
Insecticide Resistance in Beneficial and Destructive Insects in Field Crops.
Development of Microbial Agents for Use in Integrated Pest Management Systems.
Physiopathological Relationships Between Insects and Pathogens.
Control of Tobacco Insects.
Feral Swine Movement, Habitat Utilization and Pig Survival.
Identification and Distribution of S. C. Insects of Economic Importance.
Control of Vegetable Insects in the Piedmont Area of S. C.
Biology and Control of Arthropods on Apples.
Management and Culture of Molluscan Species.
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As the educational outreach arm of the Clemson University College of Agricultural Sciences, the Cooperative Extension Service provides information and statewide continuing education programs that can make life easier and more enjoyable for every South Carolinian. The programs cover 16 disciplines relating to agriculture, home economics, youth and community development, programs for the economically disadvantaged in addition to general education information. They are made possible through an agreement between Clemson University and the United States Department of Agriculture.

Funded by federal, state and county governments, the Extension Service was created in 1914 as a nationwide system designed to carry education from land-grant universities to these people. For 68 years Extension has worked closely with South Carolinians helping them build a better life through dissemination of practical, useful information within its assigned areas of responsibility.

Originally conceived to help rural people, as the needs of those it served changed, Extension responded by broadening its scope of activities to include urban and suburban problems.

Clemson University, through Extension, maintains an office manned by county agent personnel in each county. A professional staff of Extension subject matter specialists at the University and four Experiment Stations around the State compiles information from research and translates it into data the people of South Carolina can use day-to-day.

From basic cooking demonstrations to irrigation field tours, Extension staff members are teachers carrying Clemson University educational programs to all areas of the State.

The Extension program is organized around six broad categories: agricultural programs, 4-H and youth development, home economics, community and resource development, special programs for low income farmers and 1890 programs conducted by South Carolina State College in cooperation with the Clemson University Extension Service.

Agriculture and Natural Resources

Whether the classroom is a tobacco field, a wood lot or a farm shop, Extension activities are directed toward solving problems. Extension education tends to be informal, tailored to individual needs and budget requirements.

The delivery system is designed to deal with continuing problems as well as the unexpected and the uncommon. Consequently, the system requires substantial planning. Extension agricultural programs are relying more heavily on videotape, computers and other forms of mass
Diesel pumping plant efficiency was addressed during the irrigation society’s tour. A regional no-till demonstration highlighted new planting and spraying equipment. A corn planting demonstration emphasized how to obtain a uniform stand. A grain harvesting and drying demonstration was conducted at the Soybean Field Day.

Every county was supplied with a sprayer calibration kit containing a stop watch, tape measure, measuring tube, hand tools and calibration instructions. Two regional field days were held to address proper incorporation of chemicals into the soil.

The publication “Aeration After Drying” was completed and was awarded a blue ribbon in the American Society of Agricultural Engineers’ education aids awards. The publication will be the major reference for our stored grain educational programs over the next three years.

In the electrical power area, we have completed the stray voltage survey and have completed two demonstration farms. These farms will serve as models for dairy farmers who need to correct inadequate grounding and wiring in their parlors.

South Carolina animal and poultry producers recognize more fully each year the significance of the stresses on production and reproduction caused by hot and cold weather. Controlled environment, whether based on natural or mechanical systems, is a subject of continuing concern and development. A recent two-year study of poultry loading in Newberry County has identified the factor most responsible for successful operation — a loading rate about 50 percent less than specified in existing design standards. Successful operation is judged on the basis of low odor production and longevity of service without maintenance.

The Agricultural Weather Office has responded to requests for weather information by developing computer-based communication capabilities. This makes possible preparation and dissemination of daily agricultural weather advisories. In addition, weekly and monthly climatological summaries are prepared to assess progress of the season. Emphasis was placed on peach rest during the winter by calculating chill units. A technique for assessment of the spring freezes using satellite data was demonstrated during April’s disastrous freeze.

The results of a farm accident survey conducted in the State were incorporated into Circular #636, “South Carolina Farm Accident Report.” Demonstrations were conducted on how farm accidents occur and the proper procedure for rescuing a person.

Emphasis was given to the development of information on the economics of cotton production and ginning safety, providing the basis for a new program. Continued emphasis has been given to fire safety in home heating with wood and training emergency medical personnel in farm safety.

Even with relatively small reductions in interest rates, residential
housing activity has accelerated markedly. Remodeling, reconditioning and improving existing housing continues to be an area of high consumer education interest and information requests. The pervasive problems associated with the control of moisture in the residential environment are the most demanding and least understood of the residential housing problems in the State. In response to public demand, special emphasis was given these two areas.

The South Carolina 4-H computer project was initiated in 1982. One publication was written, "Proceeding into Programming." Two training sessions were held to acquaint approximately 50 agents and volunteers with the microcomputer. Several local clubs used eight computers for computer projects. Three hundred 4-H’ers received computer instruction at 4-H Amp Camp.

Agronomy

South Carolina farmers are faced with perhaps the most severe crisis in their history. High costs and low commodity prices have forced many out of business. To alleviate this situation, there are two alternatives — produce more and/or reduce costs.

Extension agronomists, working with county Extension staffs, agribusiness, other government agencies and farmers, provide the latest crop production technology for adoption on the farm. Educational programs feature publications, mass media, newsletters, farm visits, tours and meetings. The following are some examples of educational emphasis areas during the year.

1. Wheat, a major crop of almost one-half million acres, was severely damaged by a late-spring freeze. Early-maturing varieties were particularly hurt. To inform farmers of the extent of damage, specialists helped county Extension agents with surveys and provided guidelines for making a field-by-field assessment. As a result, some damaged fields were used for forage, thereby easing somewhat the financial impact of the loss of the wheat for grain.

2. Tobacco farmers are traditionalists. They tend to use practices their fathers and grandfathers used. Educational efforts have been made using on-farm test demonstrations, TV, radio, newsletters and meetings to get growers to adopt new practices and reduce the costs of production. Encouraging the use of high analysis fertilizers according to soil test results is an example. Another example is in the area of sucker control, where particular attention is given to residues in tobacco from the excessive use of sucker control chemicals.

3. After stem canker disease struck the South Carolina soybean crop in late 1982, surveys were taken across the State to determine the overall impact. Extension specialists from agronomy and plant pathology discussed the situation with other states and together
formulated an educational program for control. More than 1,000 soybean growers attended meetings and were presented information on control of this destructive disease, which could again threaten the crop.

4. South Carolina is a feed-grain-deficit state in that much corn and other feed grain is imported for livestock and poultry feeds. An intensive effort has been made to increase grain sorghum production in the Newberry, Saluda and Edgefield areas. Several local poultry processors contracted with farmers for grain sorghum, resulting in a 100 percent increase in acreage in one year. Extension agronomists assisted county Extension agents with publications, meetings and tours to inform farmers of the latest grain sorghum production technology.

5. Incorporating legumes into forage systems for livestock has been a challenge for several years. In recent years, alfalfa has made a comeback as a hay crop. With the assistance of Extension agronomists, alfalfa and other systems such as fescue-clover pastures have increased in importance. Various production practices for efficient production of quality forages have been demonstrated.

6. Weeds are the number one pest of South Carolina field and forage crops. The weed control specialist in Extension agronomy conducted special field training programs in weed identification and in diagnosing crop injury problems from herbicides. More than 150 people participated.

Animal Science

The South Carolina beef industry is making slow progress, and positive changes are being made. The State now has a purebred breeder’s council and its second bull testing facility, which has responded with an average daily gain of 2.60 pounds per day on its first group of bulls tested.

Rules governing the two bull test stations are the most demanding of any such facility in the country. The facilities are open to breeders both in and outside the State. The requirements are such that out-of-state participants must send their top bulls here rather than to their own state. They are willing to do this because our requirements attract the higher quality bulls, thus more buyers and higher prices than other stations. The 1982-83 sale averaged $2,178, some $600 higher than the next highest sale.

Purebred breeders, forced to be more competitive than ever, are using more artificial insemination sires, and we are receiving 10-12 embryo bull calves per test group.

Genetic improvement through bulls is definitely being made. On the female side, South Carolina now has a commercial replacement heifer sale. For many years we could not advise commercial producers on when to find replacement heifers. Today, we have the sale that can meet the
heifer demand. For the first time, South Carolina has a quality beef cattle program. Its performance program has the best records in the country.

**Dairy Science**

Extension dairy science personnel continue to work with dairy producers, dairy organizations and related businesses to provide information essential to the well-being of the dairy producer and the consumer.

Since feeding dairy cattle is 50 to 60 percent of the cost of producing milk in South Carolina, this continues to be a demanding area for educational programs and individual assistance. More than 65 percent of the dairy producers in the State are reached annually by Extension dairy personnel during the year to develop low-cost, high-profit feeding programs. More than 600 feed and forage samples were analyzed through the Agricultural Service Laboratory and were used by dairy producers to evaluate programs.

In addition, in cooperation with the Farmers Education Association, a sorghum silage survey was presented in two locations to more than 200 producers, Extension workers and industry personnel. This is part of our continued educational effort to help dairy producers shift from heavy dependence on corn silage to more sorghum and small grain silage. In another project with FEA 100 sorghum silage samples were tested for nutrition to determine the progress made in sorghum silage production in South Carolina.

The dairy science department head and Extension dairy project leader participated in more than 40 meetings of the South Carolina Farm Bureau-Dairy Division, the American Dairy Association of South Carolina, the South Carolina Dairy Association, the Oconee Dairy Association and the Anderson Dairy Association in their milk marketing, promotional and educational programs.

The Dairy Herd Improvement Program continues to have a large impact on cow performance and profitability in South Carolina herds as shown in the following table:

<table>
<thead>
<tr>
<th></th>
<th>Number Cows</th>
<th>1982</th>
</tr>
</thead>
<tbody>
<tr>
<td>All Cows</td>
<td>48,000</td>
<td>11,833</td>
</tr>
<tr>
<td>DHI Cows</td>
<td>30,712</td>
<td>13,700</td>
</tr>
<tr>
<td>Non-DHI Cows</td>
<td>17,288</td>
<td>8,516</td>
</tr>
</tbody>
</table>

Cows on these programs produce 62 percent more milk than cows not on a testing program. South Carolina dairy producers rank among the highest in the nation with cows on DHI. Sixty-four percent of the dairy
cows in South Carolina are on a DHI program, ranking South Carolina in the top five states in the nation.

Dairy Extension personnel work with 11 local DHIA Associations, the S.C. DHIA, 21 DHIA supervisors and other educational phases of this program. More than 30,000 samples are taken monthly from South Carolina dairy cattle, with milk weights recorded, milk fat, somatic cells and protein samples evaluated. Information is fed through the regional computer, and producers get the most comprehensive data set available for herd management decisions.

A seminar on reproductive management, presented at seven South Carolina locations, attracted about 160 dairy producers and workers. An extensive field study was conducted comparing results for butterfat, protein and somatic cell counts between four states or regional DHI labs. Results from the study were presented to producers by a variety of Extension methods and were presented at a scientific meeting. Extension dairy scientists worked with several producers to improve milking management procedures.

A proposal was submitted and a grant received for a residue avoidance program (RAP) for swine and dairy producers in South Carolina. During the year, the RAP team assimilated data on violative products and withdrawal times for these products and prepared support material for educational programs. Educational programs conducted included: "Residues and Means of Control" for South Carolina Association of Veterinarians; "Residue Avoidance" was a part of the program for 11 county livestock demonstrations; and three regional meetings were planned for dairy producers to stress antibiotic residues and testing procedures to assure that market milk and all dairy cow meat are free of antibiotics.

**Entomology**

Extension entomology was again involved in the boll weevil eradication program, which was approved by a majority of cotton producers early this year. The program officially began during the fall with critically important diapause treatments to reduce overwintering weevils. Removal of the boll weevil as an economic pest of cotton could lead to a resurgence of cotton production in South Carolina.

A new pest management service was initiated by Extension entomology during 1983. Using a computer link, data on economic pests (bollworm in particular) from field observations (scouting) and traps were sent directly to "The State" newspaper. The paper published this information twice weekly, thus providing growers with timely printed information at low cost.

Problems with fish kills from pesticide run-off has been of concern to Extension entomology. Problems were averted in 1983 when Extension entomologists working with vegetable growers developed insect manage-
ment practices that minimized run-off of pesticides from cropland near tidal creeks and estuaries. No fish kills were reported in 1983.

Extension entomology enjoyed great success during 1983 with urban pest problems and the pest control industry. In cooperation with the Plant Pest Regulatory Service of Clemson University and the South Carolina Pest Control Association, Extension entomology conducted a successful three day training program for the pest control industry. The 24th annual PCO School was attended by more than 300 people. The Clemson PCO School is now recognized as one of the best in the country.

Extension wildlife and fisheries programs are used heavily by the public. A highlight of 1983 was the signing of a cooperative agreement with S. C. Wildlife and Marine Resources to support an expanded Extension effort in wildlife, freshwater fisheries and marine aquacultural projects.

**Food Science**

More than 3,800 notices of proposals, changes and new federal/state regulations were distributed to 1,050 South Carolina food industry companies by the Extension Food Science's Food Regulation Information Filter Center. This enabled processors to participate in the promulgation of regulations and avoid possible citations, fines or adverse publicity by having lead time to implement necessary regulatory compliance changes. Another 186 educational advisories were developed in response to request from food processors (in addition to 78 on-site plant visits), citizens and other agencies both in and outside the State dealing with food safety, preservation and processing. Educational public service information on food additives, irradiation, non-nutrient sweeteners and caffeine was developed for news media reporters and incorporated into nine press, two radio and three television features reaching an estimated 750,000 South Carolinians.

Several food science project demonstrations were initiated to assist small food processing ventures. This work enabled one family-operated business to enter the dehydrated conch meat export market and another to process sweet potatoes into ready-to-serve frozen patties. Both instances are examples of "valid added" processes using South Carolina raw resources. Other Extension food science technology transfer activities included assistance in the development of quality assurance programs for three pickled sauce/egg operations, start-up of a grape juice pressing and canning venture, and improvement of a canned fermented okra process. Processing equipment adequacy checks (heat distribution) and installation advisories were provided to five companies processing seafoods, meats and/or vegetable products and to another 15 community canneries sponsored by high school and low-income agencies.

Fiscal year 1982-83 budget reductions have sustained a 50 percent
manpower cut, leaving one Extension food scientist to develop and deliver the Extension food science project programs.

Forestry
A slide-tape program featuring three South Carolina landowners has been developed in cooperation with the South Carolina Tree Farm Committee. The presentation centers on the future of forestry and why these landowners are practicing forestry. Fifteen copies have been purchased and are in use by Extension agents and forestry professionals.

The topic of forestry as an investment continues to be one of our most active program areas. Six training sessions were held for Extension and other agency professionals this year. In addition, a large number of programs have been conducted on a county and multi-county basis. We are continuing to expand our capabilities in this area and foresee additional activities for the next several years.

Extension implemented the first phase of a long-term plan to increase forestry education in South Carolina when an area agent was employed for Lexington, Newberry, Fairfield and Richland counties. This program, funded by earmarked federal money, will be expanded when additional funds become available. Area agents in forestry provide greater attention to our underdeveloped forest resource by concentrating educational activities and providing a cooperative atmosphere where landowners and professionals can work together.

During this past year, county Extension offices have organized county landowner forestry associations in Laurens and Abbeville. Seventeen counties are exploring the possibility of forming a landowner association. These associations provide an excellent mechanism for keeping landowners informed of current practices and issues in forestry.

Horticulture
When the economy turns down, the number of home food gardens goes up as does interest in small acreage fruit and vegetable plantings to supplement cash income. Large-scale cash-crop farmers were especially hard hit in 1982 and 1983 from poor grain prices coupled with high interest costs. These economic factors caused many farmers to look toward horticultural crops as an alternative. In turn, this increased the need for horticultural training programs for county Extension agents, farm managers and others needing specialized sources of horticultural information.

Classroom and field short courses have been used to train county agents. Master Gardener volunteer helpers were trained by urban and suburban agents in the three major metropolitan areas, creating an invaluable volunteer force of more than 300. Continued emphasis will be placed on volunteerism as a means of meeting the ever increasing
demands for horticultural assistance in the urban counties.

The peach orchard management system (POMS), Clemson’s nationally recognized Extension innovation, is cutting costs for many peach growers. This year POMS continued two very effective segments. One deals with reduced pesticide use and the other with improved fruit quality. The POMS program continues to be refined with some services now being provided by private agricultural consultants, but with Extension’s cooperation and guidance.

Contact with clientele through radio, television and volunteers helps get information to the tremendous number of people interested in city beautification and home vegetable gardening, ornamentals and turf. Fruit and nut producers, vegetable farmers, flower growers, turf producers and nurserymen are still being served primarily through demonstration trials, newsletters and published bulletins. However, microcomputers, slide-tapes and word processors are new ways we are trying to be more efficient teachers.

Personnel shortages in Extension have continued to hamper educational programs. However, every effort has been made to limit the impact of these reduced resources on the horticulture industry of South Carolina.

Marine Advisory Services

Although the Marine Advisory Service (MAS) has only four specialists, they cover a broad range of activities from commercial fishing to coastal awareness programs along the entire South Carolina coast.

In response to the National Marine Fisheries Service’s need to contact fishermen, the MAS has put 22 trawl efficiency devices (TED’S) on South Carolina boats. These devices keep turtles from becoming entangled in shrimp fishermen’s nets. They also help improve fuel efficiency by keeping unwanted sea life from being caught in the nets and weighing down the load.

The fishing fleets as well as recreational boaters have long needed accurate weather reports. Using the system employed for airplanes as a model, the National Weather Service asked MAS to help set up the Marine Weather Reporting System. MAS found a trailer, radio and operators, and now Charleston has one of the first such systems on the East Coast.

With aquaculture developing as an industry in South Carolina, MAS is developing programs for local growers. MAS has helped form an aquaculture technicians training program for the Georgetown aquaculture technicians training manual. MAS estimates that it has helped 250 landowners and doubled the acreage of crawfish ponds from 100 to 200 acres.

Marine recreation has become a major industry in South Carolina, with recreational fishing far surpassing commercial fishing in economic impact on the State. MAS has begun a boater survey to define the people using the resources in Beaufort County. From this will come better
resource management and regulatory procedures.

A fishing and tourist guide for Beaufort County waters was completed this fall. It brings together information into one easily carried map. An earlier effort resulted in visitor information being developed for the Edisto Beach area and the Low Country Council of Governments.

Marinas on the coast of South Carolina have operated in very independent ways until high operating costs and mutual problems made an association inevitable. MAS has recently helped form the S. C. Marina Association. This group will make group rate insurance possible, as well as cooperative buying and credit checks for transients who consistently mistreat marinas in the area.

MAS plans to expand on-going programs and begin work in hotel management training for coastal awareness, coastal erosion workshops for administrators and citizens alike, and sail training in the future.

Plant Pathology

Extension plant pathologists are continuing with programs to encourage growers to recognize disease problems early, to identify the causes and to take timely actions for controls.

Greater use is being made of the Plant Problem Diagnostic Clinic and the Agricultural Services Nematode Laboratory by growers and county agents. Nematodes continue as a major cause of reduced yields and the quality of field, vegetable and fruit crops, and much attention is being given these tiny pests.

Progress has been made in developing control procedures for nematodes in several crops. Among these are soybean cyst, ring nematodes of peach, lance nematodes of field crops and root knot of tobacco, peanuts, fruit and many other crops. New tobacco disease problems, such as blue mold and new strains of root knot, have been solved or are under intense survey and study.

Peanut leaf spot monitoring progressed to the point that many growers are expressing a desire to become involved. Tomato fruit decay problems were given priority survey and study with some progress made. The peach brown rot organism had developed resistance to a much-used fungicide. Through the use of intense monitoring programs, changes in control strategies and increased educational efforts, the disease has been brought under control. The serious gummosis disease of peach occurred in limited areas, which was isolated and controls applied before it spread.

Diseases of small fruits are demanding and receive more attention as more growers enter this market. Ornamentals make up more of the grower market than many realize. Programs to help nurserymen treat several troublesome diseases have been successful to date.

Soybeans, which comprise the major agricultural acreage for row crops, were attacked by stem canker disease with devastating results in 1982.
Several demonstrations and surveys are in progress. Growers treated more seed with fungicides than normal and heeded several other practices to thwart this disease.

Finally, a computerized communication system has been designed and will soon be operational. The capabilities of the Extension plant pathology unit will be increased and improved when the program becomes fully established.

**Poultry Science**

Poultry health problems received continuing emphasis during the year. Fowl pox in commercial and hobby flocks was more serious than in any year since fowl pox vaccine was widely adapted. Apparently, a more virulent strain of virus has emerged. Also, the mosquito, which spreads the disease, was abundant. Assistance was provided in fowl cholera immunization and in a variety of other disease and management areas.

4-H poultry teams and individuals represented the state well in regional and national competition. This is especially noteworthy because of poultry personnel losses, which have impacted on the 4-H program. The strong continued 4-H poultry effort is credited to enthusiastic county workers.

Poultry specialists worked with industry to try to forge a federation of trade associations within the State. This effort failed, and the hatchery, feed, broiler, layer, turkey and servicemen organizations still have no united voice in dealing with State and federal agencies or poultry trade associations.

The struggling South Carolina rabbit industry turned another corner during the year, with the opening of a processing plant in Pageland. Rabbit producers are one of the most enthusiastic, receptive and numerous groups of departmental clientele, as evidenced by a meeting attended by 300 persons.

During a year of doubtful economic returns to egg producers, there was less demand for advice on entering or expanding the layer production business. In January the final South Carolina chicken hatchery came into voluntary compliance with the National Poultry Improvement Plan, which is supervised by the poultry specialists. This culminated an effort that began in the mid-thirties.

Feed manufacturers exhibited concern this year about quality control of feed ingredients. Specialists helped obtain samples and interpret analysis results.

**Production-Marketing Economics**

The basic function of the Extension production-marketing economics group is to provide educational programs and training to farmers, agribusinesses, Extension agents and the public about agricultural marketing,
farm management, agribusiness management, estate planning, income tax management, agriculture-policy and trade, computer applications, 4-H and consumer economics.

The major thrust in 1982-83 was to provide farmers and other managers with the economic training and tools of analysis to do a more effective job of management and marketing.

The following programs were conducted to help managers improve their information base and their ability to make decisions and manage risks:

1. 20 marketing workshops and seminars;
2. 17 farm and financial management workshops and seminars;
3. 25 outlook presentations, including a statewide outlook conference;
4. 26 county meetings on agricultural policy, income taxes, estate planning, farm management and marketing.
5. 5 schools for tax practitioners (800 participants);
6. 12 training and workshop sessions on microcomputers;
7. National agricultural and food policy symposium;
8. International trade seminar on forest products.

Literature development was a major educational emphasis. Economic issues influencing agriculture were discussed in "Outlook Updates" and "Management Marketing Memos." Publications included "Extension Economics Reports," leaflets and circulars. These materials covered a broad range of information on outlook, financing, planting decision, crop and livestock marketing, costs of production, agricultural policy, tobacco, irrigation, leasing, income and estate taxes.

Budgets for the major crops and livestock enterprises were prepared and used extensively in production, policy, financial lending and marketing decisions. Additionally, specific marketing reports for peaches, cotton and commodity futures were prepared.

With the increased emphasis on forward contracting, hedging, cashflow analysis and budgeting, producers must look logically at alternatives before making commitments. Computer programs for vegetables, fruits, cotton, corn, soybeans, wheat, livestock, cashflow analysis and enterprise budgeting have been written and are currently available to producers.

More than 50 programs have been developed for microcomputers. A farm records program and an accounting program for tomato packing sheds have been completed. Extension’s work with microcomputers is increasing and has gained national recognition. Through a Kellogg Grant of $360,000, a three-year program was begun to place microcomputers in county Extension offices. Eighteen microcomputers have been placed in county Extension offices through the second year of the program. The computers will be used to deliver Extension educational programs.

Due to increased demand for assistance, special emphasis was given to
marketing and farm management programs in grain marketing, dairying and farm credit. A grant from SEA/Extension was obtained to study the alternative sources of farm credit. A publication of sources of farm credit has been prepared. A financial handbook has been completed and is being used by farmers and lenders.

Community Development

Through the Extension Community Development (CD) program, communities are provided educational and technical assistance in efforts to improve the quality of life in rural areas. CD emphasis is placed on helping community leaders, local governments, organizations and professionals in other agencies understand and solve community problems and obtain maximum benefits from community resources.

In 1982-83 leadership surveys were conducted in four communities. Meetings to present survey results drew excellent participation from local community leaders, elected representatives and resource agency representatives. Identifiable results include the establishment of several community projects and increased interaction between elected officials and community leaders.

Extension continues to help the Governor’s Office conduct a cooperative annual program, Emphasis/South Carolina, at which outstanding community efforts in beautification and community improvement are recognized through award presentations at an annual luncheon. This year’s program attracted 275 people from 35 counties. Extension provides organizational support for participating local and county beautification and community improvement committees.

Extension and the Soil Conservation Service continued to conduct educational programs in resource and conservation development. Three television programs were presented, and 17 county meetings were conducted with local government and community leaders on the impact of economic development and planning on land use in urban and rural areas. Specialists helped the Governor’s Council on Rural Development identify the needs of the rural areas.

A fiscal impact model and users manual have been developed to help communities analyze the financial impact of providing necessary community services for proposed industrial development. Personnel classification and compensation studies were placed on microcomputers and prepared for seven rural communities. Several computer programs have been developed for use by local governments, one of which has been used by three towns in evaluating the cost effectiveness of emergency medical service.

Other work with local governments included helping several rural towns analyze land regulation ordinances. In cooperation with the Clemson University College of Architecture, a downtown revitalization plan
was prepared for Bishopville.

Circulation of the Extension “CD Newsletter” has increased to 1,500. Video-tapes were produced on leadership surveys, community industrial development and land-use planning. A slide-tape set describing CD programs was completed and has been used extensively.

**Extension Home Economics**

**Scope of Activity**

Home economics deals with man’s physical environment and his nature as a social being. The interrelatedness of these components and the significance of their relationships require an interdisciplinary approach to problem solving.

Extension home economics is organized around six subject matter areas: child development and family relations, clothing and textiles, family resource management, food and nutrition, interior design, and residential housing. Extension home economists aim to help individuals and families in South Carolina develop the knowledge and skills essential to a satisfying, quality life in an increasingly complex world. Information is delivered through county agents in each of the 46 counties in the State. Their primary responsibility is home economics education for youth and adult audiences.

Extension home economics is proactive as well as reactive, for prevention is more desirable and less costly than correction. As a result of Extension home economics education, families and individuals are more able to identify their needs and opportunities, make informed decisions, utilize resources and acquire needed competencies to live more effectively. Improving the quality of life, relating positively to others, and feeling competent and in control of one’s own destiny are resulting individual and societal benefits.

Extension home economics programs center around four major identified program thrusts: family economic stability and security; energy and environment; food, nutrition and health; and family strengths and social environment.

A brief overview of each subject matter area for 1982-83 follows:

**Child Development and Family Relations**

Special interest groups, Extension Homemaker Clubs and 4-H programs were conducted in areas of child development and family relations. Also, articles for daily newspapers and Extension newsletters reached thousands of families. Newspaper and radio topics included parenting, latch-key children, marriage enrichment, relationship with the elderly and dealing with stress during unemployment.

The home study courses “Baby Talk,” “Pointers for Parents of Preschool Children” and “I Am A Person” were sent to approximately 3,000
South Carolina families.

The parent/child interaction program has provided in-depth study of parenting skills to about 400 parents. The major concept is to teach parents that they are their children’s first and most important teacher.

Two mini-lessons were written for the computer, “Coping with Stress” and “Characteristics of Strong Families.” More than 1,000 people interacted with these in the Dutch Square Shopping Mall.

Helping families know how to handle relationships and to become stronger have been our two main goals.

**Clothing and Textiles**

In an effort to help families manage resources, four new programs in clothing have been developed.

Secondhand clothing stores are becoming very common across the State. Using these stores is an effective way for families to stretch their clothing dollars. Shopping used clothing stores takes specific skills not needed at other clothing sources. A videotape, slide set and publication were developed to help families learn how to make wise clothing purchases at secondhand stores.

Many of the clothes that families have on hand or can buy at used clothing stores are in good condition, but the styles are outdated. Quick and simple techniques were developed on how to turn last year’s clothes into today’s fashions. To assist with the teaching, four publications and two clothing sample kits were developed to show how attractive these garments could be.

In South Carolina, clothing outlets are very numerous and are an excellent source of good quality clothing. A videotape, slide set and publication were developed to help clientele learn how to shop outlets wisely.

The fourth portion of the project was selecting quality clothing. Knowing what constitutes a good quality garment and when it is important to buy good quality clothes can help make the most of your resources. A slide program, leaflet and kit of materials were developed for this program.

The youth of today are very interested in learning to use their resources wisely. The past two 4-H fashion clinics have emphasized wise shopping. Topics included shopping outlets, shopping secondhand stores, restyling clothes, making fashion accessories, making inexpensive cosmetics and good grooming techniques.

**Family Resource Management**

Unemployment, underemployment, lost work hours due to cutbacks and a variety of day-to-day problems, coupled with price increases, plague most South Carolinians.

Extension agents used a variety of techniques this year to reach 78,000
households via a special news column, 720 officers and crew aboard the USS Sierra, a coupon exchange, FHA loan applicants, kindergarten teachers, parents receiving aid from the Department of Social Services, homemaker clubs and the general public.

At Charleston Air Force Base, 40 percent of the clients used Extension's money management computer program to determine financial ability to invest in new housing or a car. Requests from clientele have increased 40 percent in Anderson County due, in part, to increased exposure to Extension via a special news column. Coupon exchange participants reported monthly savings ranging from $10 to $400 or more. In one South Carolina county, 38 percent of those participating in a money management home study course indicated they made adjustments in family spending, while 80 percent said they became more aware of what was important to them and their families.

In addition to traditional Extension audiences, four South Carolina counties have extended their programming to such groups as graduated EFNEP homemakers, church groups, young homemakers and inmates in a transition program offered in the prison.

The week of June 13-17, 1983, was a record-setting week for 4-H Amp Camp at Camp Long near Aiken. Youth participation was 335, a 50 percent increase over 1982.

Foods and Nutrition
The Extension home economics food and nutrition program has concentrated educational programs in two areas — nutritional status as it relates to good health and wise use of food resources.

More than 500 individuals participating in Eating Slim, a behavior modification-based weight control program, lost more than 17 pounds each. More than 100 young families participated in Fun Food Facts, a nutrition education program that stresses interaction between parents and children in learning good food and nutrition habits. Ten thousand individuals participated in a variety of programs that stressed food budgeting, meal planning and food safety. More than 25,000 individuals took part in food preservation programs, and 6,000 youth were involved in 4-H food/nutrition programs. In each case, the educational messages were presented in person as well as in newspaper, newsletter, radio and television media.

The Extension food and nutrition program has also extended its outreach by training volunteers to deliver programs to 4-H and Extension homemaker audiences. Cooperation between Extension and other State agencies, including the South Carolina Department of Social Services, the South Carolina Department of Health and Environmental Control, the South Carolina Commission on Aging, Sea Grant, Head Start, the South Carolina Department of Agriculture and local school boards, has also
enhanced the food and nutrition programs. As an example, interagency efforts between the Department of Health and Environmental Control and the Clemson Extension Service resulted in the development of a tool used by Extension agents and public health employees to answer questions about low sodium diets.

**Expanded Food and Nutrition Education Program**

In 1969, the Expanded Food and Nutrition Education Program (EFNEP) was launched to attack the widespread problem of poor diets in America.

EFNEP focuses on families with young children and helps them acquire the knowledge, skills, attitudes and changed behavior necessary to improve their diets in normal nutrition. Since the inception of the program, carefully selected educational methods have resulted in EFNEP emerging as a successful program in changing dietary patterns and effecting better management of total resources.

4-H EFNEP concentrates on youth from limited resource families between the ages of 9 and 19. Since 1969, EFNEP has reached 34 South Carolina counties. For the first six months of the 1982-83 fiscal year, 4,745 different families were involved in the adult phase, and 2,933 youth were reached through 4-H EFNEP. Efforts have continued to enhance the coordination of the adult and youth phases of EFNEP. Volunteer leaders continue to be recruited and trained to provide outreach efforts.

**Interior Design**

Although we have a vacancy at the State level for a specialist in this area, the needs of the people are still there and being handled at the local level by county home economists using materials and information currently available.

A learning packet, "Space Planning for Residential Interiors — Creative Furnishings and Interior Design Techniques," was prepared and made available to at least one agent in each of the 46 counties last year. The information and materials included in this packet have been put to extensive use in most of the counties this year.

Interior planning information was made available to South Carolinians through a newly developed interior design correspondence course. Most counties have offered the five-lesson course, which provides information on design principles, as well as selection and purchasing of furniture, with good participation and results.

Programs were also given in counties on the construction of home furnishing items and refurbishing used items.

**Residential Housing**

Energy conservation, home repairs, and kitchen and home remodeling
are major areas in which South Carolina citizens received assistance from the Clemson University Extension Service in 1982-83.

In one county, 108 homeowners saved from 10 to 20 percent on home utility bills — a total of $7,776 — as a result of demonstration lessons in one special interest program and through 14 Extension Homemaker Clubs. Statewide, 42 such programs were held, for an estimated $326,592 in utility costs saved.

In another county, lessons on home storage and kitchen improvement resulted in six homeowners remodeling kitchens. The economic value of Extension assistance for those six kitchens alone is $2,400.

One of the most popular Extension housing programs is home repairs. A very conservative estimate of citizen savings as a result of learning to do their own simple home repairs, such as replacing broken windows and torn screens or repairing a leaky faucet, is more than $20,000 annually (based on 12 repairs per county at a savings of $35 per repair).

Problems of excessive moisture in homes are common in South Carolina. Help with this problem is a major activity of Extension personnel. In one day in upper South Carolina, agents visited four homes with moisture problems. Citing the benefit of Extension information in just one of those cases, the homeowner was able to correct the problem himself and avoid $2,800 worth of work prescribed by a commercial firm.

Other areas in which Extension housing information benefits State citizens are home heating alternatives, home security, paint problems, affordable housing alternatives, home safety and homelighting. In a June 1983 ETV program, a South Carolina resident, who was named National Handicapped American of the Year, cited training she received in an Extension vocational rehabilitation training kitchen as one of the outstanding training opportunities available to handicapped citizens in our state.

**Volunteerism**

Volunteerism is becoming increasingly important in Extension home economics due to reduced staff and greater demand for information. Extension homemaker groups throughout the State assist in the dissemination of information by attending leader training meetings and then teaching others. This is a growing, dynamic group of volunteer leaders as evidence by its membership increase from 5,426 in 1982 to 6,067 in 1983.

**4-H and Youth Development**

The mission of the 4-H and Youth Development Program is to help youth in South Carolina become self-directed, productive individuals who make a positive contribution to our State and nation.

The learn-by-doing approach to the 62 4-H educational projects and activities enables youth to participate in programs of interest, acquire
relevant experiences and evaluate these experiences in terms of potential careers.

**Participation**

The most successful 4-H programs are accomplished through organized community 4-H groups with an adult volunteer and/or teen leader to provide guidance. In South Carolina, 3,107 adult volunteer and teen leaders gave leadership to 4-H programs in 1982. There were 37,096 youth ages 9-19 enrolled in 1,534 4-H clubs, and 16,785 youth enrolled in special interest programs.

In 1982, 2,956 youth participated in the 4-H camping programs conducted at Camp Bob Cooper and Camp Long, and 3,977 youth were enrolled in the expanded Food and Nutrition Education Program. The most popular 4-H projects in 1982 were food and nutrition, exploring 4-H, bicycle, electric energy and personal development.

More than 8,050 4-H youth lived on farms; 36,902 lived in towns with populations under 10,000 and rural non-farm; 10,118 lived in towns and cities with populations of 10,000-50,000; 5,559 lived in suburbs or cities with populations greater than 50,000; and 5,055 lived in cities with populations exceeding 50,000.

**Program Emphasis**

The primary emphasis of the South Carolina 4-H and youth development program is for county Extension professionals to recruit, train and support adult and teen leaders. This emphasis is essential to expand and enhance educational learning experiences for more youth and to make the best use of tax dollars allocated to the 4-H program.

Curriculum areas in 4-H include producing, processing and distribution of food and fiber; human and animal nutrition; conservation of natural resources; citizenship/community service; leadership development; health; and family living.

Two years ago, the South Carolina 4-H Foundation was formed as a component of the Clemson University Foundation system. One of the goals of the Foundation continues to be to increase support of 4-H from the private sector. Plans are being completed to identify 4-H alumni throughout the State. A by-product of this effort will be additional adults to provide leadership in the county and State.

County Extension professionals who recruited, trained and supported adult and teen leaders enabled more youth to receive positive learning experiences through 4-H. The leadership skills developed by adult and teen leaders also helped them prepare for other positions of leadership in their county and our State.
Special Programs

The Special Programs area is designed to give special assistance to a segment of the populace that has low incomes and limited resources. Definite programs and projects are developed and implemented to help families improve their living standards in both farm and non-farm areas. Extension professionals and para-professionals help identify problems and establish objectives in crop and livestock production, marketing, food production, nutrition, consumer education, housing, youth development and family life.

Small Farms Program

There are many definitions and concepts of what constitutes a small farm. Extension's special programs uses the USDA criteria as those farms operated by families who provide most of the labor and management, depend on farming for a significant portion of their income, and have a total income below the median non-metropolitan family income for their state.

Despite the trend toward large mechanized farm operations, increased production cost and decreasing returns for products sold, small family farms with limited incomes still make up a substantial portion of the total agricultural operations in the State. Both primary and secondary sources of data reveal that many areas of the State have concentrations of poverty due to low incomes received by small family farms. Particular emphasis is being placed on such farm operations in an effort to create a more stable family enterprise by providing technological assistance needed to improve efficiency and increasing incomes through efficient production and marketing systems.

Due to the constant influx of technological information directed toward large farm operators, most small farm operators have not kept abreast with the radical changes in agriculture. Efforts in the special programs area are bridging the gap between the small farmer with limited resources and the new technology. Significant progress is being made in basic management techniques, including farm planning, soil preparation and fertilization, proper pest management, harvesting and marketing farm products.

The small family farms need help with many problems, but becoming efficient with their present enterprises is the first order of business. To meet this demand, method and results demonstrations are used to write lessons on the farm. These demonstrations give more one-on-one contact with professionals and have the advantage of using the small farm problems and conditions and the resources on the farm, including labor, equipment and investment potential. In addition to demonstrations with crops and livestock, emphasis was put on reaching small farmers and other limited resources clientele with educational information through the mass media, meetings and workshops.
Marketing

Marketing farm products is a challenge for all farm operators regardless of size or product to be marketed. Progress is being made in the State with small farm operators in direct marketing. Horticultural crops can be produced almost year-round in the State, and they can be marketed when properly harvested, prepared and displayed to the consumer. The establishment of direct-to-consumer farm markets is benefitting more than 1,000 small farm operators and some home gardeners who market surplus vegetables.

Small Farm Project Management Team

Extension special programs cooperated with the Governor’s Council on Rural Development and other State and federal agencies in developing horticultural crop demonstrations in Anderson, Beaufort, Florence, Marion and Orangeburg counties. These demonstrations were set up on small farms using recommended production practices with special emphasis on trickle irrigation. To maximize observation, each site was well publicized, and some counties held small farmer field days and tours.
DIVISION OF REGULATORY AND PUBLIC SERVICE PROGRAMS

L. H. Senn, Director

This division of Clemson University operates several consumer protection-type programs closely related to the agricultural sector. The philosophy for having regulatory programs at Clemson is that certain regulations can be enforced more effectively when strong educational approaches are used. Regulatory and Public Service Division personnel use this technique as a normal procedure.

The division maintains close coordination with the Cooperative Extension Service and the S. C. Agricultural Experiment Station and solicits their aid when additional education and research efforts are needed. Strict enforcement is used only against recalcitrant offenders.

The major objective of this division is to ensure that consumers buying lime, fertilizers, pesticides and seed get the qualities indicated on tags or labels. It also enforces regulations of the Crop Pest, Bee Disease and Abandoned Orchards Acts and imposes quarantines when needed.

The division also was given the responsibility for enforcing the South Carolina Pesticide Control Act. During 1976 the South Carolina Agricultural Liming Materials Act was passed, and enforcement responsibilities were given to the division.

The following report highlights the activities of the division during 1982-83.

Department of Agricultural Chemical Services

This department performs the chemical analyses reported by the Department of Fertilizer Inspection and Analysis and the Plant Pest Regulatory Service. Most samples analyzed were multi-components, with more than 25,000 individual analyses made. The laboratory has concentrated on improved methodology, instrumentation and organization to analyze all samples quickly and accurately.

In addition, the Agricultural Service Laboratory processed more than 84,600 samples, 4,200 plant and feed samples and 1,500 samples for nematodes. The department did more than 40,000 analyses for the S. C. Agricultural Experiment Station.

Department of Seed Certification

Seed certification is a program of standards imposed on seed and plant production that ensures varietal purity, good germination and freedom from noxious weed seeds. Participation in the program is voluntary.

Clemson University was designated by law in 1945 as the agency for inaugurating and carrying out a program of certification of pure seed and plants in South Carolina. The Seed Certification Department of Clemson
University and other seed certification agencies in the United States must comply with standards for certification of seed in Federal Seed Act Regulations.

Departmental field work in 1982-83 involved inspections of 73,981 acres of crops for certified seed production. Inspections included 70 varieties of 12 crops for 348 farmer/growers and 28 seed-producing firms. Each field was inspected to determine that the crop was true to variety and free of noxious weeds.

Major acreages of crops inspected in the program were soybeans, 51,367; small grains, 19,203; and cotton, 2,428. Cotton acreage has continued to decline and was the smallest acreage certified in the 37-year history of the program. Under the peach nursery stock certification program, a program initiated at the request of South Carolina peach growers to provide true to variety, insect- and disease-free nursery stock, 72,450 trees were certified. Other field work involved grow-out plantings of 211 samples of South Carolina certified soybeans for comparison to producer or processors' samples of the same seed lots. This work, in effect the past two years, clearly indicates the excellent job certified seed producers and processors are doing in obtaining representative samples of their seed.

During 1982-83, some 1,361,793 certified seed tags were issued to growers whose seed met field standards and seed purity and germination standards when analyzed in the laboratory. Thirty-nine facilities were inspected and approved during the year for custom processing of South Carolina certified seed.

Though plagued by low prices for their seed and adverse weather in some areas, certified seed growers did another outstanding job of providing an adequate supply of good quality seed to the State's farmers for planting crops in 1982-83.

**Plant Pest Regulatory Service**

**The Crop Pest Act**

*Nursery Inspections:* A total of 615 nurseries, greenhouses and vegetable transplant growers and 902 nursery dealers were licensed to sell plant material, including 22 out-of-state dealers. Three hundred and three additional establishments were visited on routine inspections to determine compliance with quarantines and regulations and to provide assistance with pest problems. Two other nurseries were not certified on the initial inspection because of pests or weed problems.

*Sweet Potato Inspections:* Seventy-nine inspections, including storage, plant bed and field inspections, were conducted for about 25 growers in the Pee Dee, Sandhills and Coastal Plains areas of the State. Regular and certified seed stock was involved.

*Phony Peach:* More than 1.3 million peach trees were inspected in
commercial orchards for the presence of phony peach disease. In 1982, 427 diseased trees were destroyed as compared to 1,241 in 1981. This decrease is attributed to several growers who destroyed their own diseased trees prior to survey by Plant Pest Regulatory Service personnel. The disease incidence in their area had been extremely high in previous years.

**Japanese Beetle:** Trapping in selective counties during 1982 resulted in a portion of Kershaw County and all of Horry County being included in the Japanese beetle quarantine.

**Sweet Potato Weevil:** Ten dead sweet potato weevils were found in stored material taken from the internal cork virus field test plots at the USDA/SEA Vegetable Breeding Laboratory in Charleston. All storage areas at the lab were treated with an appropriate insecticide. No weevils were found in any of the other storage areas.

**Miscellaneous Inspections:** One hundred and forty-eight phytosanitary export certificates, 67 State and 81 federal, were issued for various agricultural planting seed, flue-cured tobacco and plant material, primarily orchids and chrysanthemum and rhododendron cuttings, destined to other states, Canada and other foreign countries. Twenty-three foreign countries were involved. Fourteen regular certificates of plant inspection were issued for tobacco seedlings, pine tree seedlings and assorted houseplants being moved or shipped within the United States. Five states were involved.

**Bee Disease Act**

Of the 2,286 bee colonies inspected, 20 were infected with disease. One colony had symptoms of chalkbrood disease, nine had symptoms of American foulbrood and 10 had European foulbrood. A total of 346 other beekeeper contacts were made regarding various bee related problems. Certification was issued to move 899 colonies to North Carolina, Georgia, Virginia, Ohio, New Jersey and New York.

**Cooperative State-Federal Programs**

**Witchweed:** Statistics compiled by USDA, APHIS indicate that 1,353 farms comprising 34,891 acres have been released from quarantine since the program began in 1957. Twenty-five new farms encompassing 830 acres were found infested with witchweed during the 1982 survey season. A total of 3,336 acres received one or more herbicide applications for control purposes for an aggregate 7,497 acres treated. This is slightly more than a 50 percent decrease in both categories from last year.

**Boll Weevil:** Another cotton grower referendum was held in January to determine if a boll weevil eradication program would be implemented in South Carolina. The referendum passed with 72 percent of the farmers voting in favor. A similar referendum in North Carolina passed with 79 percent of the cotton farmers voting for the program.
The S. C. Boll Weevil Eradication Act of 1976, as amended in 1982, was amended again in 1983 to provide for the establishment of a cotton growers' organization in addition to other minor changes. As a result, the Boll Weevil Eradication Foundation of South Carolina, Inc., composed of five South Carolina cotton producers and the director of Clemson's Division of Regulatory and Public Service Programs, was formed to help guide the program with farmers paying for 70 percent of the program costs. A tremendous amount of work and effort by many different State and federal agencies and individuals has gone into implementation of the program. Six farmers from Clarendon, Sumter and Williamsburg counties have since filed a suit against the program.

_Gypsy Moth_: In 1982, 312 adult male moths were trapped, compared to 327 the year before. Horry County continued to be number one in total moths trapped. Five new county records were established with adult moths caught for the first time in Allendale, Berkeley, Calhoun, Dillon and Dorchester counties.

Six egg masses and evidence of other gypsy moth stages were found during a winter survey at a campground in Jasper County. Placement of numerous larval traps in the campground was successful as six gypsy moth larvae were found in April 1983. Again, the discovery of egg masses and larvae represented a new county record for Jasper County. Larvae were also found in a campground in Horry County. Three regulatory treatments using Sevin in ground application equipment were applied at weekly intervals at both locations. No larvae were found after treatments. Adult trapping will be continued to provide additional information at infested sites and other locations in the State.

_Imported Fire Ant_: This pest continues to be a nuisance throughout most of the State, but the efforts of Plant Pest Regulatory Service have been limited to regulatory and plant quarantine activities. Regulatory treatments were applied to several small, isolated infestations outside the present quarantine boundaries in an effort to eliminate them.

Large-scale control programs have been halted because eradication is not feasible and new products are very costly. Several new products effective against fire ants are on the market, and control is the responsibility of the individual landowner.

_Pest Detection_: A special survey in conjunction with the National Plant Pest Survey and Detection program (USDA, APHIS) was initiated for the cereal leaf beetle in Cherokee, Spartanburg, York, Chesterfield and Lancaster counties. This pest feeds on small grains and is spreading south from North Carolina. Specimens were caught and verified in York, Lancaster and Chesterfield counties for a new State record.

South Carolina Pesticide Control Act

In an effort to compensate for a continuing decrease in State appropri-
ated monies, this agency has pursued external sources of funds where possible without hindering our State pesticide program. These efforts have resulted in two grants from EPA totaling $121,611. The department has also made a concerted effort to increase efficiency.

Registration: In 1983, a total of 838 companies registered 5,945 pesticide products for sale in South Carolina. The number of pesticide samples collected and analyzed was 2,095 with 27 or 1.3 percent found deficient in the guaranteed percentage of one or more ingredients. Compared to 1982, the number of deficiencies decreased by 1 percent. Stop sale notices were issued on all deficient products. Registration fees totaling $113,950 were deposited.

Utilizing provisions of the Federal Pesticide Control Act, the department issued 14 Section 24(c), special local need registrations. One Section 18, emergency exemption, was issued for the use of Larvadex to control fly larvae in and around poultry houses.

Certification: Pesticide dealers and applicators must be certified and licensed in order to sell, purchase and/or apply pesticide classified for restricted use by the Environmental Protection Agency. In 1983, the following licenses were issued: 12,718 private applicators, 1,417 commercial applicators, 719 noncommercial applicators and 439 pesticide dealers. Certification fees totaling $45,200 were deposited.

Certification examinations were given each quarter throughout the State with at least three locations per session. Department personnel participated in numerous other training sessions for applicators and administered certification examinations at the end of each session.

Education and Enforcement: Pesticide personnel made the following personal contacts during 1983: 626 pesticide dealers, 105 county agents, 100 commercial applicators, 75 aerial applicators, 100 commercial applicators, 15 private applicators, 81 manufacturers, 400 pest control operators and 1,263 miscellaneous contacts.

A total of 400 structural pest inspections were conducted. The promulgation of comprehensive structural pest control regulations in August 1980 has significantly increased the workload in this area but is providing a valuable service to both the industry and the consumer. Although strong enforcement measures have been required in a few instances, most pest control companies are voluntarily correcting violations and refunding charges for unnecessary pest control activities.

However, 10 civil penalties ranging from $50 to $1,000 and totaling $2,150 were assessed, and four criminal prosecutions resulted in convictions. Thirty investigations of potential pesticide misuse were conducted in 1983. Numerous stop sale notices were issued for unregistered products, sale of restricted use products by unlicensed dealers and other violations of the Act.

Comprehensive investigations of flim-flam pest control activities re-
sulted in the arrest and incarceration of several people who for years have consistently caused problems. An excellent working relationship has been established between the agency and the Consumer Fraud and the Consumer Affairs sections of the Attorney General's Office. Overall, compliance with the Act by members of the agribusiness industry has been excellent.

**Department of Fertilizer Inspection and Analysis**


Some of the major activities of the department for the July 1, 1982-June 30, 1983 period follow:

<table>
<thead>
<tr>
<th>Activity</th>
<th>Quantity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fertilizer usage data — tons</td>
<td>621,737</td>
</tr>
<tr>
<td>No. of fertilizer samples procured and analyzed</td>
<td>5,459</td>
</tr>
<tr>
<td>No. of fertilizer samples not meeting guarantee</td>
<td>1,181</td>
</tr>
<tr>
<td>Percent of fertilizer samples not meeting guarantee</td>
<td>21.6</td>
</tr>
<tr>
<td>No. of liming material samples procured and analyzed</td>
<td></td>
</tr>
<tr>
<td>Total number of liming material samples not meeting guarantee</td>
<td>6</td>
</tr>
<tr>
<td>Percent of liming material samples deficient</td>
<td>3.0</td>
</tr>
<tr>
<td>Total number individual deficiencies in liming material samples</td>
<td>6</td>
</tr>
<tr>
<td>Number of irregularities other than underweight</td>
<td>2</td>
</tr>
<tr>
<td>Weight irregularities</td>
<td>9</td>
</tr>
<tr>
<td>Fines collected, payable to state treasurer</td>
<td>$ 795.00</td>
</tr>
<tr>
<td>Penalties collected, payable to state treasurer</td>
<td>31,622.31</td>
</tr>
<tr>
<td>(Deficiencies where consumers not identifiable)</td>
<td></td>
</tr>
<tr>
<td>Fertilizer registration fees collected, payable to state treasurer</td>
<td>7,528.00</td>
</tr>
<tr>
<td>Lime registration fees collected, payable to state treasurer</td>
<td>850.00</td>
</tr>
<tr>
<td>Lime permit fees collected, payable to state treasurer</td>
<td>2,390.00</td>
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<tr>
<td>Fertilizer taxes turned over to state treasurer</td>
<td>143,199.29</td>
</tr>
<tr>
<td>Total monies sent to state treasurer</td>
<td>$186,384.60</td>
</tr>
</tbody>
</table>

* This is a first report. Final report may vary slightly.

**Fertilizer Movement in 1982-83**

Further decreases in farm commodity prices and acreage reduction due to the government Payment in Kind (PIK) program in conjunction with a very wet late spring resulted in the lowest fertilizer tonnage since
1936. Limited credit and demand for cash sales by many fertilizer companies also contributed to the low demand for fertilizer and agricultural liming materials. The July-April fertilizer tonnage was down 23.5 percent below the tonnage for the same period in 1981-82. However, a sharp increase in movement in May and June resulted in a yearly total (July 1-June 30) only 10.9 percent below the previous annual figure.

Changes in the Fertilizer Industry
The 10.9 percent 1982-83 reduction in total fertilizer tonnage from the previous year and the 19.8 percent reduction in 1981-82 from the 1980-81 year resulted in a total reduction of 28.5 percent in the two-year period. The reduction in sales and profits has caused changes in the fertilizer industry. Some plants have closed, others have changed ownership and work forces have been reduced.

Fertilizer and Agricultural Liming Material Quality Control
The department procured 5,459 official fertilizer samples of which 21.6 percent were found to be deficient beyond allowed investigational allowances. This value is very close to the 21.3 percent deficiency found in 1981-82. Even though the percentage is higher than is desired, it demonstrates a very definite improvement over the deficiency figures of 28.2 percent 1978-79, 26.7 percent 1977-78 and 22.3 percent 1976-77. Some companies have continued to have good records while others need to improve. Meetings were held with fertilizer dealers and manufacturers where suggestions were made for methods which would improve quality control.

Only 3.0 percent of 200 agricultural liming material samples were found to be deficient beyond allowed tolerances. The enforcement of the Agricultural Liming Materials Act has continued to improve the quality of lime offered to South Carolina farmers.

Soil Amendments
Soil amendments are products advertised to increase yields or quality of crops or plants but do not contain recognized plant nutrients. A regulation passed by the General Assembly in 1979 requires such products to be registered. To date, no products have been registered. This regulation has prevented consumers from buying some products of very questionable value.
The Livestock-Poultry Health Division conducts a number of regulatory programs in the fields of consumer protection and animal health and the diagnosis of various disease problems in South Carolina livestock.

The division's three main areas of responsibility are the administration of the South Carolina Meat and Poultry Inspection Program, the Livestock Regulatory Programs and the Diagnostic Laboratory.

The Animal and Plant Health Inspection Service, USDA, cooperates with the Livestock-Poultry Health Division in carrying out certain animal disease eradication programs conducted on a national basis. It also provides 50 percent of the funds for administering the South Carolina Meat and Poultry Inspection Program.

The following highlights the activities of this division during 1982-83.

**Meat and Poultry Inspection**

This department's responsibilities cover the wholesomeness of meat and poultry slaughtered and the food products processed at all processing plants in the State except for a small number of plants that operate under federal jurisdiction.

A total of 114 meat and poultry plants in 39 counties are under State inspection. The full-time staff consists of six veterinarians, 55 inspectors, a compliance-evaluation officer and two administrative personnel. More than 100 million pounds of red meat and poultry are inspected annually in State plants.

South Carolina's programs continue to meet the standards to be classified as equal to the Federal Meat and Poultry Inspection Programs.

**Cooperative Disease Eradication Programs**

National disease eradication programs have been established in this country to eradicate certain livestock diseases that cause great economic losses to the livestock industry.

Our current major eradication programs are for brucellosis in cattle and pseudorabies in swine. South Carolina cooperates with the other states and the federal government in following uniform programs in eradicating these diseases. The federal government cooperates by furnishing approximately one-half the personnel, equipment and indemnity funds to help carry out those programs.

During the year, USDA approved the shipment of one Hannoverian mare into South Carolina under quarantine for intensive testing. This horse came from a foreign country where contagious equine metritis was known to exist. The mare was found to be free of the disease and released from quarantine.
In January 1983, South Carolina was declared a Class A state for brucellosis by the federal government, which means the herd infection rate for this disease does not exceed .25 percent.

**Animal Diagnostic Laboratory**

The laboratory is staffed by six veterinarians and 11 technicians. It provides diagnostic services in animal pathology, bacteriology, virology and serology for the regulatory programs as well as diagnostic help to practicing veterinarians and livestock and poultry owners in the State.

The laboratory is in a position to isolate and identify many animal diseases impossible to differentiate clinically. During the year, the laboratory handled more than 3,000 cases and conducted more than 200,000 laboratory tests and examinations.

**Livestock Auction Market Inspection**

All livestock going through auction markets are inspected for contagious and infectious diseases.

From 94 to 108 livestock auction sales are held at the 18 livestock markets in the State each month. This division furnishes a veterinarian and a livestock inspector at each sale to ensure compliance with all animal health requirements. In addition, a veterinarian is present at all dispersal and consignment sales for cattle and swine.