

# College of Agriculture

**Charles B. Browning, Ph.D., Dean**  
**Paul D. Hummer, Ph.D., Associate Dean**  
*for Resident Instruction*  
**Clement R. Henderson, M.A., Director of**  
**Student Academic Services**

**M**odern agriculture is the nation's largest industry employing approximately one-fourth of the nation's total work force. *The Dictionary of Occupational Titles* lists more than 500 different types of positions in the profession of agriculture. These positions include work in research, education, business, industry, government and international development as well as farming and ranching.

The curricula in the College of Agriculture are designed to meet the needs of students in a wide range of subject matter related to food and fiber production and associated agribusinesses and organizations. Courses of study are concerned with personal development as well as professional competence of students in their chosen fields.

Both general education and professional courses are available in 13 major fields of study. Plans of study that emphasize production, science, business or other specific areas of specialization are provided in the various departments.

## Accreditation

Agriculture is a broad and diverse profession and does not have a single accrediting society as do some other professions. Programs in forestry and landscape architecture are accredited by their profession. In addition, each department's program is reviewed at least once every five years by a panel of scientists and other professionals with national or international reputation for excellence in that respective discipline.

## Academic Programs

**Undergraduate Programs.** The *Bachelor of Science in Agriculture* degree is offered in the following major fields of study: agricultural communications, agricultural economics, agricultural education, agronomy, animal science, biochemistry, entomology, forestry, general agriculture, horticulture, mechanized agriculture and pre-veterinary science. The *Bachelor of Landscape Architecture* is also offered in the College of Agriculture.

**Graduate Programs.** Graduate study is available in all departments in the College. In addition to the *Master of Agriculture* and *Master of Science* degrees which may be obtained through several departments, the *Doctor of Philosophy* degree (Ph.D.) may be earned in the following areas: agricultural economics, agricultural education (Ed.D.), agricultural engineering, animal breeding, animal nutrition, biochemistry, entomology, crop science, food science, plant pathology, and soil science.

## High School Preparation and Admission Requirements

The high school preparation and admission requirements for the College of Agriculture are the same as the general University requirements. A solid background in English, natural science, and algebra is important preparation for the many academic programs in the various agricultural disciplines.

## Transfer Students

Students who transfer from an accredited college or junior college must meet the general University admission requirements. All transferred courses are recorded on the OSU transcript; however, transfer students from a junior college must complete at least one-half of the total credit hours required for graduation in a given curriculum at this institution. Specific departmental requirements needed for graduation are determined by the department in which the student plans to earn his or her degree.

## Scholarships

Students enrolled and entering the College of Agriculture are annually awarded more than \$140,000 in scholarships from the College and its departments. The following areas will be considered in the awarding of scholarships: financial need; scholastic standing in high school or college; leadership qualities which have been shown in school, church, community or youth groups; sincere interest in agriculture.

Applications and additional information may be obtained from the Dean's Office, College of Agriculture, Oklahoma State University, 136 Agriculture Hall, Stillwater, OK 74078. Applications are available beginning December 15,

## Academic Advising

All students in the College of Agriculture have the advantage of being advised by a faculty member working in the individual student's academic discipline. Such advisers are readily available to students and work closely with the students throughout their academic careers.

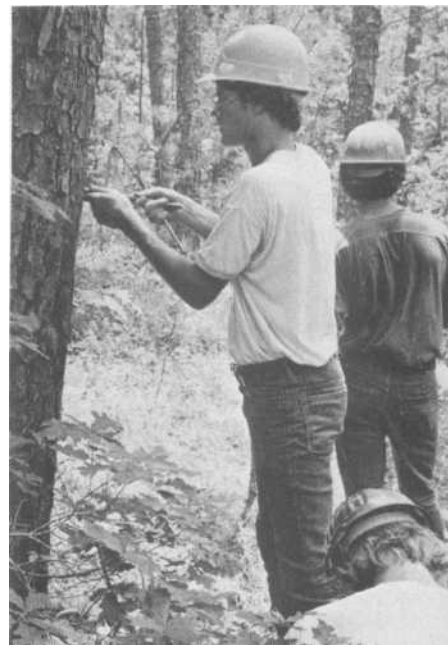
## Special Academic Programs

**Honors Program.** The Honors Program in the College of Agriculture is designed to provide outstanding students with opportunities to pursue new challenges and academic excellence. Honors courses, seminars, and special honors contracts provide for discussions and independent thought by students who have the desire and ability to explore academic subjects beyond the normal class work material.

Honors awards available in the College of Agriculture are:

1. General Education Honors
2. Departmental Honors
3. The bachelor's degree, with honors

Awards (1) and (2) may each be earned independently of the others. Award (3) is earned by satis-



ying the requirements of both (1) and (2). The completion of each award is noted on the student's transcript. Students who complete all three receive the bachelor's degree with honors diploma.

All entering freshmen who have ACT composite scores of 27 or above are eligible to become a part of the Honors Program. All other students who have an overall college-level grade-point average of 3.50 or above may enroll in the Honors Program.

Additional information may be obtained from the director of the Agriculture Honors Program, 136 Agricultural Hall.

**Pre-veterinary Medicine Curriculum.** The program in pre-veterinary medicine as offered in the College of Agriculture includes all courses required before application can be made for admission to the College of Veterinary Medicine.

A minimum grade-point average of 2.80 with no grade below "C" is required in the courses listed below:

English composition and technical writing (8 hours minimum): ENGL 1113 and 1323; ENGL 2333 (or 3323).

- Chemistry (17 hours minimum.)
1. General chemistry (8 hours minimum): CHEM 1314 and 1415 (or 1215 and 1225).
  2. Organic chemistry (5 hours minimum): CHEM 3015 (or 3053 and 3112).
  3. Biochemistry (4 hours minimum): BIOCH 3653 and 3721.
- Physics (8 hours minimum): PHYS 1114 and 1214.

Mathematics (3 hours minimum): MATH 1513 (or 1613 or 1715 or other advanced mathematics).

Biological science (15 hours minimum. Courses must cover botany, genetics, microbiology and zoology. Each course, except genetics, must include laboratory work).

1. Principles of biology: BISC 1304, 1403 and 1603.
2. Microbiology: MICRO 2124.
3. Genetics: (ANSI 3423 or AGRON 3553 or BISC 3024.)

Although these course requirements may be completed within two years, most pre-veterinary medicine students complete at least three years of preparatory course work or a bachelor's degree. For information as to required tests and application procedures, refer to the "College of Veterinary Medicine" section in this *Catalog* and the current *Veterinary Medicine at Oklahoma State University* brochure. Students are also encouraged to contact the assistant dean for resident instruction in the College of Agriculture.

**Pre-veterinary Science Degree.** A Bachelor of Science degree in Agriculture with a major in pre-veterinary science may be obtained after the completion of one year in the College of Veterinary Medicine. General education and other requirements for graduation in the College of Agriculture must be met. Specific plans of study may be obtained from the Office of the Assistant Dean of Instruction, 136 Agriculture Hall.

### General Education Requirements

The College of Agriculture is committed to providing graduates both a depth of knowledge in their chosen field of study as well as breadth of knowledge outside their major. General education requirements are the same as those of the general University. Specific course offerings are given in the respective plans of study.

### Graduation Requirements

General University requirements for graduation are stated elsewhere in this *Catalog*. In addition, specific requirements must be met for the Bachelor of Science and Bachelor of Landscape

Architecture degrees in Agriculture. For the Bachelor of Science degree, a total of 130 semester credit hours must be completed satisfactorily in all departments except agricultural education, biochemistry and forestry. Agricultural education (teaching option) requires 133 credit hours; biochemistry requires 124 credit hours; and forestry requires 140 credit hours. The Bachelor of Landscape Architecture is a five-year program requiring 160 credit hours. No credit will be allowed for MATH 1113 toward meeting the requirements for graduation. A minimum of 40 semester credit hours and 100 grade-points must be earned in courses numbered 3000 or above.

### Departmental Clubs and Honor Societies

Ag Communicators of Tomorrow  
 Aggie-X Club (agricultural economics)  
 Agriculture Ambassadors  
 Agriculture Student Council  
 Agronomy Club  
 Alpha Tau Alpha (agricultural education)  
 Alpha Zeta (College of Agriculture honor society)  
 American Chemical Society  
 American Society of Landscape Architects  
 Associated Landscape Contractors of America  
 Block and Bridle Club (animal science)  
 Collegiate 4-H  
 Collegiate FFA  
 Dairy Science Club  
 Food Industry Club  
 Forestry Club  
 Horticulture Club  
 Mechanized Agriculture Club  
 National Agri-marketing Association  
 Pre-veterinary Medicine Club  
 Rodeo Association  
 Sanborn Entomology Club  
 Society for Range Management  
 Soil Conservation Society  
 Xi Sigma Pi (forestry honor society)

## Agricultural Communications

**Associate Professor and Head Kevin G. Hayes, M.A.**

The modern agricultural complex of production and industry is so diverse and specialized that communication between the segments, as well as with the general public, is vital to the function of the whole. Education in agriculture and journalism to effectively provide such communication is the curriculum objective of the agricultural communications and journalism program.

Students may develop strong emphasis in special-interest areas such as advertising, radio and television work, feature or newswriting and reporting, or research report writing, as well as develop a double-major program of study with specific departments of the College of Agriculture.

Career opportunities are excellent in all areas of modern agriculture for the graduate with a Bachelor of Science degree in Agriculture with a major in agricultural communications.

## Agricultural Economics

**Professor and Head J. E. Osborn, Ph.D.**

Agricultural economics provides professional opportunities for students interested in solving problems in agricultural production and agribusiness, as well as solving problems in the broader areas of resource development, environmental planning, recreation, public policy and agricultural law.

Agricultural economics combines instruction in the agricultural sciences with education in the application of business and economic principles and tools to the science and art of private and public decision-making. Emphasis is placed on the management of agricultural production and marketing firms and upon decision-making and problem-solving guides relevant to public policy decisions.

Careers of agricultural economists reflect the broad base of the educational program, particularly as related to management. Careers in production and marketing include self-employment as farmers or ranchers, and managers of agribusiness marketing firms such as processors, manufacturers and distributors of food products, chemicals and machinery. Other careers include employment by consulting firms, educational institutions and financial agencies in private and governmental research and service activities.

Major areas of course work in agricultural economics include farm management, agricultural marketing, agricultural financial management, resource conservation and development, agricultural prices, agricultural policy and land appraisal. Courses in economic theory, statistics, computer sciences, mathematics and technical agriculture provide additional depth and breadth to the curriculum. An intensive advisement program and a broad range of elective courses permit the student to structure a program consistent with his personal interests, objectives and needs.

Ten degree options or specialties are available to students majoring in agricultural economics: farm and ranch management, marketing and business, general, science, pre-law, pre-veterinary business management, international agricultural marketing, and rural development and natural resources with two additional options offering double majors in agricultural economics and accounting and in agricultural economics and computer science.

### Graduate Programs

The Department offers graduate work leading to the Master of Science, the Master of Agriculture and the Doctor of Philosophy degrees. Both thesis and non-thesis options are available at the M.S. level. Ph.D. students complete a teaching practicum in addition to the research thesis as a part of the degree requirements.

The graduate program stresses development of superior professional competence suited to the demands of the modern business, academic, government and research environments. Advanced courses concentrate on economic anal-



ysis applied to problems of production, distribution and consumption of agricultural products. Courses in economic theory, econometrics, mathematical economics, statistics, and computer science are an integral part of the program. Problems of agricultural policy, natural resource use and rural area development and planning are also important topics. The faculty gives direction and individual guidance to student research in marketing, production, management of agricultural enterprises, price analysis, land and water use and development, rural development and planning, agricultural finance, international trade, farm appraisal and agricultural policy. Specialization is achieved through course electives and research topics. Each student is guided in the preparation of the program of study by an advisory committee to assure that background or prerequisite work and the graduate plan will lead to the desired depth and breadth of proficiency.

**Admission Requirements.** Prerequisites to advanced training in agricultural economics are (1) the desire to understand and solve the complex and changing economic problems faced by agriculture and rural society, and (2) the desire and ability to learn methods of rigorous logical analysis. In addition, differential calculus, three semester hours of statistical methods and 15 semester hours of agricultural economics and economics, including intermediate micro- and macroeconomic theory, constitute a minimum background for advanced study in agricultural economics. In certain cases, a part of this work can be taken after admission, but will not count toward a graduate degree.

Acceptance by an adviser in the Department is not required prior to official admittance to the departmental graduate program.

## Agricultural Education

Professor and Head H. Robert Terry, Ph.D.

The program of studies offered by the Department of Agricultural Education is designed to provide both comprehensive and specialized training in preparation for a career as an educator in the various fields of agriculture. In addition to the objective of preparation for licensure as teachers, graduates are professionally well-prepared for work in cooperative extension and other federal and state educational programs and services, as well as international education endeavors. Graduates also may find employment as educational directors and consultants with agribusiness industrial firms and organizations. Study programs are designed for persons desiring to serve at secondary, post-secondary and adult levels. Studies may culminate in the B.S., M.Ag., M.S. or Ed.D. degrees.

The undergraduate teaching option is designed primarily to qualify the bachelor's degree recipient for the Oklahoma Vocational Agriculture Teaching License. This license is recognized as meeting requirements for certification in most other states. The professional service option is designed to focus on careers relating to education in agriculture, but outside of the public school setting. The primary emphasis is upon employment in cooperative extension or closely allied areas. Some students find it advantageous to elect a dual major, thus meeting requirements in both agricultural edu-

cation and another major within the College of Agriculture. The undergraduate programs in agricultural education are structured to provide ample educational experience in general education, specialized or technical agriculture and professional education.

### Graduate Programs

Programs of graduate study in the Department of Agricultural Education are designed to (1) prepare students for entry into or advancement in teaching careers and (2) provide for further development of professional leadership in other educational careers in agriculture, agribusiness industries, extension, adult education, and vocational-technical programs. An attempt is made to develop individual study programs to meet needs of both international and domestic students.

Advanced graduate studies are more specifically directed toward preparing graduates for careers in teacher education, administration, supervision, curriculum development and other areas of professional leadership in agriculture, agricultural extension or vocational education.

Candidates for the degree of Master of Science in agricultural education must complete a minimum of 21 semester credit hours of 5000-level courses or above. A total of 16 hours must be in education; 12 hours of this work must be in agricultural education completed at this institution. At least ten hours must be completed in a minor area of specialization such as technical agriculture, educational sciences, or youth development. Other courses completed within the total 30 credit hours required may be chosen as free electives. Students working on the Master of Science degree are required to complete a course in research design, and to do a thesis as a part of the requirements for the degree.

An alternative is the Master of Agriculture in the emphasis area of agricultural education. The credit hours required of 5000-level courses, education courses, and specialization courses are the same as for the Master of Science degree. Three options are available: (1) a 32-credit hour option which includes a two-hour formal research report; (2) a 36-credit hour option which includes a two-hour creative component; and (3) a 36-credit hour option which includes a six-hour professional internship.

The Doctor of Education degree with a major in agricultural education is offered by the Depart-

ment of Agricultural Education as a member of the Teacher Education Group V of the Graduate Faculty. A minimum of 20 hours must be completed in agricultural education, education, and psychology. In addition, at least 20 semester hours must be completed in an area of specialization such as agricultural extension, technical agriculture, educational administration, curriculum development, adult education, or behavioral sciences. Ten hours of credit will be given for the completion of a thesis. The remaining ten hours of course work within the 60-hour total requirement may be chosen as free electives. Applicants for admission to the doctoral program must have had at least three years of successful vocational agriculture teaching or similar professional experience.

In addition to the above programs, the Department also cooperates with the School of Occupational and Adult Education area at the specialist and doctoral levels.

## Agricultural Engineering

Professor and Head David R. Thompson, Ph.D.

The Department of Agricultural Engineering is administered jointly by the College of Agriculture and the College of Engineering, Architecture and Technology.

## Mechanized Agriculture Curriculum

Mechanized agriculture graduates are concerned with the practical application of engineering achievements in agriculture or biology with emphasis on the end product. Engineering graduates focus on the development of new methods or technologies, while mechanized agriculture graduates are more concerned with the effective use of established methods.

The agricultural mechanization curriculum is a four-year program leading to the Bachelor of Science degree in Agriculture. This curriculum is designed to provide the student with a broad general education in the social, biological and physical sciences, and mathematics. Degree candidates will receive technical training in specialized fields of greatest interest to them.

Course work emphasized at Oklahoma State University includes principles of modern mechanized agriculture, automation of farm operations, buildings for production and storage, management and utilization of water including irrigation and utilization of electrical energy. Related course work in fields such as economics, marketing, animal science, and agronomy give mechanized agriculture students the background for competitive positions in related industries. Computer programming and use is required.

Specific types of work in business and industry include product development, product education, firm or association field representatives, farm service advisers, service, sales and editorial work.

Graduates in agricultural mechanization are employed by farm machinery companies, building material suppliers, irrigation equipment companies, manufacturers of materials-handling equipment, manufacturers of processing equipment, pump companies, electric power compa-



nies or cooperatives, and government agencies such as the Farmers' Home Administration and the Federal Land Bank.

A degree with a major in agricultural mechanization requires 130 credit hours. Course work is distributed approximately as follows: basic science and mathematics-20%; applied science and engineering-35%; business-20%, social science and communications-25%.

## Agricultural Engineering Degree

Agricultural engineers are professional people who generate and adapt engineering knowledge and technologies for the efficient and effective production, processing, storage, handling and distribution of agricultural, food and other biological products, and the management of natural resources.

Students interested in a degree in agricultural engineering may initially enroll in the College of Agriculture or College of Engineering, Architecture and Technology. If they elect to enroll in the College of Agriculture, they should request an agricultural engineering adviser, and transfer to the College of Engineering, Architecture and Technology by the end of their first semester. Agricultural engineering students receive basic engineering and basic courses in the biological and agricultural sciences. Agricultural engineering courses apply mathematics, basic engineering and science to create and design new systems and equipment for agricultural and biological production and processing. Social studies and humanities prepare students to work with people; these studies are important because the agricultural engineer early in his or her career assumes supervisory and management responsibilities. Computer use is emphasized for simulation, control, analysis and design.

Agricultural engineering courses for juniors and seniors integrate the engineering sciences with agricultural and biological sciences and teach students to design solutions to real problems of society. Students work both as individuals and in teams to solve design problems provided by industrial firms who also hire agricultural engineering graduates. Students receive specialized design experiences in one or more of the following areas: hydrology and water resources, including flood control, irrigation, and water supply; machinery, instruments and controls for farming and ranching, food processing and packaging, and production of biotechnology products; and systems for efficient production, processing, handling and storage of agricultural and biological products.

A wide variety of employment opportunities are available for agricultural engineers in industry and public service. Some of these opportunities include governmental agencies; irrigation and drainage companies; tractor and machinery manufacturers; manufacturers of agricultural chemicals, producers of steel, building and construction supplies; electric power companies; food processing and canning; and feed processing companies.

Other opportunities include university teaching, research and extension; positions as engineering editors, industrial consultants and positions in foreign service. The United States and most large companies have agricultural engineers in foreign countries.

In addition to the 76 semester credit hours of common requirements for engineers, agricultural engineers take courses in electronic application,

instrumentation, watershed hydrology, flood control, drainage and irrigation, environmental engineering, farm power and machinery, design structures and process engineering. The agricultural engineering program is accredited at the basic level by the Engineering Accreditation Commission of the Accreditation Board for Engineering and Technology.

### Graduate Programs

The School of Agricultural Engineering offers three programs leading to post-baccalaureate degrees: Master of Agricultural Engineering, Master of Science and Doctor of Philosophy. The Master of Agricultural Engineering program places emphasis on design and internship in engineering experience to prepare the graduate for practice in the engineering profession.

Facilities for design and research are available in processing of agricultural products, plant and animal environment, energy in agriculture, microelectronics, light structures, agricultural power and machinery, pesticide application, soil and water resources development, irrigation, hydraulics, and hydrology.

Research projects are supported by the Agricultural Experiment Station. A well-trained faculty, many of them registered professional engineers with research, consulting and design experience, guide the graduate students' activities and help plan programs to meet the students' needs. Graduate students prepare designs and specifications for special equipment and facilities needed to carry out their work. They are expected to demonstrate by thesis and supporting research or by designs the ability to organize a design problem or an experimental investigation, carry it to completion and report the results.

**Admission Requirements.** Admission to either the Master of Science or Doctor of Philosophy degree program requires graduation from an engineering curriculum accredited by the Accreditation Board for Engineering and Technology.

Admission to the Master of Agricultural Engineering degree program is permitted for students who meet the prerequisites as stated in the "Master of Engineering" section of the College of Engineering, Architecture and Technology. The departmental graduate committee will evaluate the applicant's credentials to determine equivalency and specify requirements to overcome deficiencies. A student must be accepted by an adviser in the Department prior to official admission to the graduate program.

**Degree Requirements.** A candidate for any of the degrees listed above follows an approved plan of study which must satisfy at least the minimum University requirements for that particular degree.

## Agriculture (General)

Professor and Associate Dean Paul D. Hummer, Ph.D.

The general agriculture program of study is designed to provide students the opportunity of obtaining a broad education in agriculture rather than the more specialized study typical of departmental programs.



Students select general agriculture as their major for one of two reasons:

1. Students undecided on a major may elect to take the general agriculture program as it provides the opportunity to investigate various majors and options. Courses taken in the general agriculture option apply to the B.S. degree programs in Agriculture, as well as degree programs in some other colleges. Transfers from one major to another may be made at any time. Career information and guidance is available from faculty advisers as well as the Agricultural Career Development Center, 136 Agricultural Hall.
2. Students wanting a broad-based degree program may do so through the general agriculture program. This option allows students to prepare for careers that require a broad background of understanding of the modern agricultural complex.

The general agriculture curriculum may be pursued in any department in the college and allows students to select courses of special interest to them in relation to the work they plan to do. Basic courses in general education, the sciences and business are required along with over 40 credit hours of electives, in order to complete requirements for a Bachelor of Science degree in Agriculture.

### Graduate Programs

The Master of Agriculture degree is designed for students interested in graduate professional training with a strongly applied research orientation. The degree is offered in the following areas of emphasis: agricultural economics, agricultural education, agronomy, animal science, entomology, forestry, horticulture and landscape architecture, and plant pathology.

**Purpose.** The purpose of this degree is to provide a program which will give additional specialization in technical fields as well as increased breadth of training. Students who are interested

in working toward the Ph.D. degree should follow the regular Master of Science degree program.

**Character of Program.** This program will provide a greater breadth of study than the Master of Science program. Emphasis will be given to practical application of the technical aspects of the discipline as well as discipline interrelationships. The principal focus, however, is on an applied research concept and a broader program than is normally available with the specialized research degree.

**Admission Requirements.** A baccalaureate degree in agriculture or a related field is required for admission. The candidate must meet requirements for acceptance into the Graduate College and be recommended by the departmental graduate committee responsible for the program.

**Degree Requirements.** The requirements for this degree are the same as those listed in the "Graduate College" section under "The Master's Degree."

In addition, each candidate approved for study under this program will be assigned an adviser or advisory committee with whom he or she will develop a plan of study in accordance with guidelines established in the Department. An approved preliminary plan of study must be approved by the associate dean of resident instruction and must be filed in the Graduate College Office prior to enrollment for the 17th credit hour. Departmental comprehensive final examinations will be required of all candidates.

**Degree Options. Option "A" Requirements.** A total of 32 approved semester credit hours of work, including an approved report having a credit hour value of not more than two semester hours, is required.

**Option "B" Requirements.** A total of 36 approved semester credit hours of work without a report is required and must contain a creative component.

**Option "C" Requirements.** A total of 36 approved semester credit hours of work which includes six hours of credit for a professional internship is required. The internship includes professional practice and a report.

## Agronomy

Professor and Head Charles J. Scifres,  
Ph.D.

Agronomy is the science of soil management and production of field crops, forages and rangeland. Undergraduate options include crops and soils, business, science, range management and plant protection. Each of these options provides a thorough preparation in the sciences relating to its specialization.

Modern agricultural production requires a highly technical approach to problems such as soil and water conservation, crop and range improvement and management, prevention and abatement of agricultural sources of environmental pollution, and judicious use of agricultural chemicals. In the vast field of agribusiness, technical preparation in agronomy is essential in supplying agricultural producers with up-to-date information, as well as improved seed, fertilizers, management systems and pesticides. Processing, distribution and marketing of food, fiber and feed crops require an integration of production technology with economics at all levels. Agronomists are in



demand for research and marketing positions in universities, industry and government. Concern for future food supplies creates an urgency for technological advancement in food production which cannot be ignored.

Each of the areas of study is designed to permit students of varying backgrounds and experiences to attain a level of preparation commensurate with their capabilities and motivation. There are no specific prerequisites.

Careers in agronomy include farm or ranch operation or management; land appraisal for banks or loan companies and crop consulting; technical sales and service for seed, fertilizer or agricultural chemical supply companies; federal employment in soil and range conservation; research positions as plant breeders, fertilizer chemists and weed control specialists with federal or state experiment stations or private industries; teaching and extension positions with colleges and universities; and a broad range of employment or ownership in retail businesses supplying feed, seed, grain, fertilizers, agricultural chemicals and other agricultural supplies and services.

Study for the B.S. degree, in addition to a standard agronomic academic program, provides a thorough grounding in the biological and physical sciences, and communications, with sufficient elective hours to permit flexibility.

### Graduate Programs

The Department of Agronomy offers programs of course work and research leading to the Master of Agriculture in the emphasis area of agronomy, and Master of Science degrees in agronomy, and the Doctor of Philosophy degree with majors in crop science or in soil science. Programs are available in the areas of plant breeding and molecular genetics, cytogenetics, range management, forage management, weed science, crop physiology, soil morphology and genesis, soil microbiology, soil fertility and management, soil physics, soil-water management, and soil chemistry. Applicants should indicate their specific area of interest upon application.

The graduate programs of the Department of Agronomy prepare individuals for successful careers in a variety of areas including farming and

ranching, extension education, agricultural business, and plant or soil science research and teaching.

**Prerequisites.** Admission to the graduate program requires a B.S. degree in agronomy or in a closely related field. Applicants should have completed basic courses in agronomy, biology, chemistry and mathematics, required of undergraduate majors. Deficiencies in fundamental course requirements will be met by the student with the direction of the student's advisory committee. Applicants must be accepted by an adviser in the Department prior to official admission.

**Degree Requirements.** Students must follow approved plans of study which meet the minimum University requirements for the respective degrees they are pursuing.

The Master of Science degree in agronomy may be earned by utilizing one of two plans:

Plan I-Thesis, minimum of 30 credit hours of course work, including six credit hours of AGRON 5000, master's thesis.

Plan II-Formal report (non-thesis), minimum of 32 credit hours of course work, including two credit hours of AGRON 5000, master's thesis.

The Master of Agriculture degree may be earned by utilizing one of three options:

Option A-Formal report (non-thesis), minimum of 32 credit hours of course work, including two credit hours of AGRON 5000, master's thesis.

Option B-Minimum of 36 credit hours of course work and a creative component.

Option C-Minimum of 36 credit hours of course work which includes six hours of credit (AGRON 5230, Research) for a professional internship. The internship will consist of professional practice and an informal report. Internships for students with previously established vocations and career experience must be in areas other than the specific vocational field of the students.

The degree plans of study for the Doctor of Philosophy degree in crop science or soil science are developed individually for each candidate. In general they must include 10 credit hours of agronomy courses at the 5000 level or above (excluding thesis), and meet certain requirements

in basic disciplines such as statistics, mathematics, botany, and chemistry. Study of a foreign language is not required but can be incorporated if the student and advisory committee feel that it is desirable.

## Animal Science

Professor and Head Robert Totusek, Ph.D.

The Department of Animal Science offers professional training at two levels: *undergraduate*, leading to the Bachelor of Science degree in Agriculture; and *graduate*, leading to the Master of Science degree or the Doctor of Philosophy degree in nutrition, animal breeding, animal reproduction and food science. The Master of Agriculture degree in the emphasis area of animal science is also offered.

Animal science is concerned with the science, art and business of the production of beef cattle, dairy cattle, horses, poultry, sheep and swine. An animal scientist is concerned with the application of the principles of the biological, physical and social sciences to the problems associated with livestock and poultry production.

Animal science is also concerned with providing specialized training in the food industry, which is the largest and one of the most important industries in the United States. The food industry and food science options provide expertise in the processing, quality control and marketing of meat, dairy and poultry products.

The ranch operations option provides another area of study available for students in the Department of Animal Science. Ranching represents the second largest source of income and the most important renewable resource in Oklahoma. Study in this option will provide training in areas important in the successful operation of a ranching program.

Students completing a degree with a major in animal science have a wide choice of challenging careers, a brief listing of which includes: ownership and/or management of farms, ranches, feedlots or other production units; livestock marketing; employment with state and federal agencies concerned with inspection, grading or regulation; sales and service positions with feed, chemical or pharmaceutical companies, positions in agricultural extension or teaching; and work in the processing, distributing and merchandising of dairy, poultry and meat products. Students who earn the master's or doctor's degree can look forward to careers in teaching, research or extension with universities, the U.S. Department of Agriculture or private industry.

Undergraduate students may elect an option in the area of pre-veterinary animal science, production, business, food industry, food science, livestock merchandising, ranch operations, biotechnology or a double major with agricultural education to qualify to teach vocational agriculture. In addition, students have the opportunity to concentrate their studies on one of the animal groups (meat animals, dairy, horses or poultry). Internship programs providing six months of work experience are available in all options. Students may complete the pre-veterinary medicine requirements at the same time they are working toward a B.S. degree in animal science. Regardless of their option, all students follow a similar curriculum for the first two years which includes basic courses in the physical, biological and social

sciences, and a series of basic courses in the agricultural sciences and business areas.

Upper-class students complete a basic core of advanced science courses including genetics, physiology, and nutrition. In addition, students complete a number of advanced animal science courses which are designed to apply business concepts and the basic sciences to livestock production or food processing. Every opportunity is taken in teaching to utilize the excellent herds, flocks and processing facilities owned or operated by the Department.

### Graduate Programs

The Department of Animal Science offers work leading to the Master of Science degree in animal science, dairy science, poultry science, and food science. Thesis work at the M.S. level is available in the areas of animal breeding, animal nutrition, animal physiology or food science (meat or milk products). A Master of Agriculture degree in the emphasis area of animal science is also available. The Department offers programs leading to the Doctor of Philosophy degree in animal breeding, animal nutrition and food science.

**Prerequisites.** Admission to the graduate program requires an undergraduate major in animal science, dairy science or poultry science, or in closely related biological sciences or biochemistry. In addition, students with a major in dairy manufacturing, microbiology, human nutrition, food science, or food technology can qualify for the program in food science. A student enrolling in a degree program must have been accepted by an adviser prior to official admission. In all cases, the student's graduate adviser or committee may recognize specific undergraduate deficiencies and require their removal.

## Biochemistry

Professor and Head Roger E. Koeppe, Ph.D.

Biochemistry, the central scientific discipline linking the chemical, physical and biological sciences, exerts a profound influence on the progress of medicine and agriculture. By applying concepts and methods of chemistry and physics to the fundamental problems of biology, biochemists have made great progress in their effort to understand the chemistry of living organisms.



Biochemists are concerned with living things. They must acquire some knowledge of the biological sciences. Since a biochemist's tools are the physical sciences, he or she must receive sound training in mathematics, physics and chemistry.

Challenging positions for well-trained biochemists are available in colleges and universities, state and federal laboratories, research institutes, medical centers and in an increasing number of industrial organizations, particularly the pharmaceutical and food industries. Biochemists are involved with research on the chemistry of processes occurring in plants, animals, and various microorganisms, and with the discovery and development of antibiotics, vitamins, hormones, enzymes, insecticides and molecular genetic techniques.

At the undergraduate level a major in biochemistry administered by the Department of Biochemistry is available through either the College of Agriculture or the College of Arts and Sciences. An honors program is available. The curriculum provides a broad background in chemistry and biological science and permits flexibility in meeting particular interests of the student. Courses in biochemistry are based on general, organic and analytical chemistry. The biochemistry curriculum provides students with sufficient training in the basic sciences of mathematics, physics, chemistry and biology to meet the needs for graduate study in most fields of modern science related to agriculture or medicine. The curriculum is excellent for preprofessional students of medicine, dentistry and veterinary medicine.

### Graduate Programs

Because many of the opportunities in biochemistry require advanced training, a major part of the program in the Department of Biochemistry is concerned with its graduate program leading to the M.S. or Ph.D. degree. This graduate program is an integral part of extensive basic research activities in the Oklahoma Agricultural Experiment Station. These research activities provide opportunities for part-time employment of undergraduate majors to improve their professional competence.

**Prerequisites.** Although the B.S. in chemistry or biochemistry is preferred, students with strong backgrounds in other biological or physical science disciplines are eligible. Individuals not having at least eight semester credit hours in each of organic and physical chemistry and calculus must take appropriate undergraduate courses to make up deficiencies. Entering graduate students are given placement examinations to assess their chemistry background; if performance is unsatisfactory they are asked to repeat an appropriate undergraduate course without graduate credit.

**Degree Requirements.** A more detailed description of the graduate study program in biochemistry is available from the Department upon request. The requirements listed below complement the general graduate requirements described in the "Graduate College" section of this *Catalog*. After the first semester continuous attendance and participation in the departmental seminar is expected.

**The Master of Science Degree.** Twenty-four credit hours of formal graduate courses are required, to include BIOCH 5753 (or 4113), 5853, and 5930. In addition, a student must present an acceptable research thesis (six hours) and pass a final oral examination covering it and related material. Research advisers are selected at the end of the first semester.

**The Doctor of Philosophy Degree.** The course requirements are determined with the aid of the student's graduate advisory committee. Usually they follow these guidelines: total of 30-40 credit hours of formal graduate course work which includes all the courses listed for the M.S. degree, at least four of the advanced graduate courses in biochemistry (6000 level) and two offerings of Special Topics (6820). Additional course requirements, appropriate to the student's interests, are determined by the advisory committee. The advisory committee is selected at the end of the second semester. Each student will take a series of cumulative examinations beginning in January of his or her first year. A more comprehensive qualifying examination is given, usually at the end of the fourth semester of graduate study.

One year of a foreign language at the college level is required. The student must present, and defend in a final oral examination, an acceptable research thesis which contains a substantial original contribution to the field of biochemistry. The Department offers research experience in a variety of areas of biochemistry.

## Entomology

**Professor and Head Larry A. Crowder, Ph.D.**

Entomology is the science and study of insects and related organisms regarding their biology, structure, identification, physiology, economic significance and population manipulation.

Education in entomology prepares the student for a career in industry, public service with state or federal agencies, or self-employment. A background in the basic physical and biological sciences is required before specialization in entomology can be initiated. The entomologist is qualified for a wide range of activities including research, teaching, quarantine and enforcement, insect control with insecticides or biological control agents, agriculture, pest control, insecticide sales or distribution, military entomology and pest management consulting.

### Graduate Programs

The Department offers programs of study and research leading to the degrees of Master of Science and Doctor of Philosophy.

**Prerequisites.** Students making applications must be accepted by an adviser and approved by the departmental graduate committee prior to being admitted to the Graduate College.

Each program of study will be under the direction of a graduate committee. The program will be adapted to the individual's needs but will comply with all departmental and Graduate College requirements. The thesis option for the M.S. requires a minimum of 30 credit hours while the report option has a minimum of 36 credit hours. An oral examination is required of all candidates. Graduate student candidates are required to meet with their advisory committee every six months for program reports and/or examinations. Doctoral candidates are required to present a public defense of their dissertations. Doctoral students must assist in teaching one or more laboratories, including "Introduction to Entomology", for at least one semester. Students supported as half-time research assistants are required to work a minimum of twenty hours per week on projects of their major professors.

## Forestry

**Professor and Head Stanley B. Carpenter, Ph.D.**

America's forests are an important natural renewable resource. With proper decisions concerning management, forests can provide a bounty of uses and values for generations to come. Professional foresters play a vital role in developing and utilizing the forest and its diverse resources: timber, water, wildlife, range forage, recreation and wilderness.

Professional foresters manage the planting, growth and harvest of trees, while at the same time protecting forests from the harmful effects of fire, disease and insects. Foresters today are problem solvers using a blend of science, technology, economics and sociology to produce the products of the forest desired by society. Foresters work with private landowners and city planners, they teach and conduct research at universities, they administer parks and recreation areas, they manage the business of forest industry, and they manage the public forest land.

Graduates with a Bachelor of Science degree may be employed by federal agencies, including the U.S. Forest Service, Bureau of Land Management, the Soil Conservation Service, the Fish and Wildlife Service, and the Bureau of Indian Affairs. In addition, state, county and municipal governments employ foresters in a variety of positions. Wood-using industries retain foresters for land management, land and timber acquisition and harvesting positions as well as in mill production and administrative work. Foresters work for associations promoting the use of forest products and in many other public relations jobs. Some foresters are self-employed as consultants, specializing in timber and land appraisals, management planning and a variety of special services. Recipients of advanced degrees, especially the doctorate, may conduct research for the federal or state governments, universities or industrial organizations, or may enter the teaching profession.

The Department of Forestry offers a major in forestry leading to a Bachelor of Science degree

in Agriculture. Course work in forest management is offered for the individual with career aspirations in the U.S. Forest Service and other federal agencies, state and local forestry organizations, forest industry and consulting. Courses in forest products are designed for those interested in the business, manufacturing and sales aspects of forestry. For the student with a research career in mind, course work in forest science is available. Requirements for a B.S. degree include the successful completion of a nine-week summer camp and a total of 140 credit hours of course work. The summer camp is scheduled to follow the sophomore year and is held annually in different forest settings. Past summer camps have been held across the U.S. from Maine to Oregon, from Montana to Florida, and even in Brazil. Students learn field forestry skills and observe state-of-the-art operations.

The Department of Forestry maintains two research stations in southeastern Oklahoma in the midst of the Ouachita National Forest and industrial timber holdings. Oklahoma has an active and progressive forest industry with one of the most modern highly mechanized timber harvesting systems in the world. One of the largest paper mills in the southern United States is located in the pine-oak forests of southeastern Oklahoma. Field trips to this area comprise part of the instruction in many forestry courses.

### Graduate Programs

The Department of Forestry offers instruction leading to Master of Science degrees in forest resources and environmental science for students interested in graduate training with a research orientation. The Master of Agriculture degree in the emphasis area of forestry is offered for students interested in non-research graduate training in forestry. Programs of instruction and research leading to a Doctor of Philosophy degree are available through cooperating departments with an adviser from the Department of Forestry.

Instructional programs are designed to serve the needs of individual students and allow concentration in the areas of: biometry, ecology, physiology, economics, genetics and tree improvement, silviculture, management, and watershed management. The prerequisite for



graduate study in the Department of Forestry is a bachelor's degree in forestry or a related field with an overall undergraduate grade-point average of 3.00 ("B" average). Applicants for financial aid are required to submit scores from the Graduate Record Examination for full consideration. Students without a bachelor's degree in forestry must take an approved core of undergraduate forestry courses for the Master of Science in forest resources and the Master of Agriculture degree.

Students preparing for the Master of Science in forest resources are required to complete 30 credit hours of course work including six hours of "Research and Thesis" (FOR 5000) (Plan I). Students preparing for the Master of Agriculture degree may elect to meet the requirements of either Plan I or Plan II (see "Credit Requirements" section of the "Graduate College.")

A student must be accepted by an adviser on the Graduate Faculty in the department prior to official admission to the program.

## Horticulture and Landscape Architecture

**Professor and Head** David W. Buchanan, Ph.D.

**Horticulture** is the science and art associated with the culture and production of flowers, trees, shrubs, turfgrass, vegetables, fruits and nuts. It also includes the proper use and maintenance of plants in the landscape. Thus, horticulture is involved with the production of a significant part of the food supply and provides a major source of the beauty in and around homes, cities, parks, highways, golf courses and other public areas.

Today, horticulture requires highly trained and capable people to help meet the food demands of society and to be involved in activities that lead to a better quality of life.

Studies in horticulture cover a wide variety of plants and subjects. Factors such as nutrition, irrigation, genetics, propagation, control of flowering and fruit and seed production are considered in their relationship to culture, production, harvesting and storage. Students can prepare themselves for careers in public grounds administration, horticulture business, production, teaching, extension and research.

The training that the student obtains is related to the specific area of emphasis that is chosen. Regardless of one's interest, objectives, or area of emphasis, a good knowledge and understanding of horticulture is a necessity. A student can receive a Bachelor of Science (B.S.) degree and choose from the two following options:

*Horticulture* provides the training and expertise for production of fruits, nuts, vegetables, nursery crops, flower crops, etc. Training can be general, have a business or science orientation, or be chosen to emphasize a particular commodity area of horticulture;

*Turf management* provides the training for turfgrass production and for management of turfgrass in golf courses, in parks, home landscapes, along highways, etc. After the B.S. degree is completed, a qualified student may choose to pursue a graduate degree, specializing in any option.

**Landscape architecture** is the art of design, planning or management of the land and arrangement of natural and man-made elements thereon through application of cultural and scientific knowledge. It is also concerned with resource conservation and stewardship to the end that the resultant environment serves a useful and enjoyable purpose.

There are two options in the landscape area:

*Landscape architecture* is the study of art, business, construction, design, ecology, engineering and horticulture in a five-year professional program leading to the Bachelor of Landscape Architecture (B.L.A.) degree. Typical employers include landscape architecture firms, architectural-engineering firms and governmental agencies dealing with land planning, urban planning and design, or parks and recreation.

In an effort to maintain an effective balance between students, faculty, and facilities, enrollment in the fourth and fifth years of the program is limited to 25 students each. Students will be evaluated during their third year by the faculty to select the most qualified candidates based upon academic achievement and professional potential. Minimum requirements may vary each year; however, a student must have completed a minimum of 60 credit hours with "C" average or above in all courses required as prerequisites to the last two years of the B.L.A. program.

*Landscape contracting* is a four-year study leading to the Bachelor of Science in Agriculture degree. It emphasizes the implementation and management phases of landscape development. Course work includes basic landscape architectural design, construction technology, business and horticulture. Graduates are employed by landscape nurseries, contracting companies, design/building firms and landscape maintenance companies.

### Graduate Programs

The Department offers work leading to a Master of Science degree in horticulture through the study of flower crops, fruit and nut crops, vegetable crops, ornamental nursery crops, and turf. The Department also participates in an interdepartmental program leading to the Ph.D. in crop science.

**Prerequisites.** The Department may require credit hours in horticulture and related technical subjects.

Prior to admission to the program, all applicants for advanced degrees must be approved by the head of the Department and a faculty member who will serve as the adviser. The program of study and research will be directed by the student's graduate adviser and advisory committee. The master's degree may be earned through Plan I, Plan II or Plan III.

## Plant Pathology

**Professor and Head** Larry J. Littlefield, Ph.D.

Plant pathology is a broad discipline that ranges from basic studies of physiological and genetic aspects of plant diseases to the development of practical plant disease controls. It encompasses the science required to understand the causes of plant diseases as well as the art of preventing or controlling these diseases. Thus, the plant pathologist must have knowledge of plant biology as well as practical plant culture. Plant

pathology, as a discipline, is actively involved in the newly emerging field of biotechnology.

Graduates in plant pathology (Ph.D.-level individuals) commonly find employment as research scientists in universities, the government (U.S. Department of Agriculture), industry or with various international development agencies. Graduates with the M.S. degree often work as research technicians in industries, universities or government laboratories or as sales or technical representatives in the agrichemical or plant breeding industries.

To qualify for graduate study in plant pathology an undergraduate student should obtain a solid background in the basic sciences, especially biology and chemistry, math, English and communication skills.

In order to become a fully trained plant pathologist, one or more graduate degrees in plant pathology are required. The Department offers both M.S. and Ph.D. programs with opportunities to specialize in a wide range of basic or applied research fields.

### Graduate Programs

The Department offers programs of study and research leading to the Master of Science, Master of Agriculture in the emphasis area of plant pathology, and Doctor of Philosophy degrees. Programs are concerned with the cause, development, and control of plant diseases. Research problems are involved with on-going projects in the Oklahoma Agricultural Experiment Station, which include investigations on disease control (chemical, cultural, biological, and genetic) soil-borne diseases, virology, phyto bacteriology, nematology, genetics, and host-parasite physiology. Individual programs can be developed toward basic research or can be developed to provide a broad practical background in plant health and pest management.

**Admission Requirements.** It is desirable that applicants have a strong background in biological or agricultural sciences. All requirements of the Graduate College must be satisfied by each applicant. In addition, applicants for graduate programs in plant pathology are required to take the Graduate Record Examination and to submit their scores with their applications and transcripts. Approval for admittance will be determined by the departmental screening committee and the department head. During the first semester of enrollment, each student, after council with the department head, will select a faculty adviser. Each graduate program is under the direction of the major adviser and a selected faculty committee and is adapted to the needs of the graduate student. There is no graduate credit for courses below the 4000 level. Each student will follow a program of study and research approved by his or her committee and, except for the Master of Agriculture degree, must submit an approved thesis.