College Administration
Robert Whitson, PhD, Dean and Vice President of Agricultural Programs
David R. Porter, PhD, Interim Associate Dean for Academic Programs
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Edwin L. Miller, PhD, Director for International Agricultural Programs
Shida R. Henneperry, PhD, Director for Masters of Agriculture in International Agriculture
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The College of Agricultural Sciences and Natural Resources is the academic arm of the Division of Agricultural Sciences and Natural Resources, and offers outstanding undergraduate and graduate programs that are recognized at the state, regional, national and international levels. In collaboration with the Oklahoma Cooperative Extension Service (OCES) and the Oklahoma Agricultural Experiment Station (OAES), the College of Agricultural Sciences and Natural Resources (CASNR) provides great breadth and exceptional quality in teaching, advising, outreach, research and service. Undergraduate and Graduate students have come to expect and receive academic programs of excellence in CASNR.

Career opportunities in Agriculture and Natural Resources are highly diverse. Majors are supported in the very traditional agricultural and natural resource areas such as animal science, crop science, and agricultural education, emerging areas such as plant and animal biotechnology, food science, and communications, and many fields not commonly associated with agriculture such as turf management, biochemistry, environmental science, leadership and pre-medical sciences. As a result of this wide variety of majors, CASNR students come from both traditional agricultural roots and urban settings. This diversity adds strength to the college experience for all CASNR students. Active international programs are available to students in every CASNR major and add a unique dimension to the college experience.

In 2006, a new department was created to serve students interested in natural resources. The Department of Natural Resource Ecology and Management (NREM) brings together programs in forestry, wildlife, fisheries and rangeland ecology, and fire ecology. Students studying in these areas have many common interests and career goals. Graduate programs are available in these areas and departmental faculty have research interests to complement their teaching responsibilities.

The College of Agricultural Sciences and Natural Resources prepares students to analyze information, communicate effectively, think critically, problem solve, and assume leadership roles in their respective fields of study. Students also receive a solid general education in communications, humanities and social sciences. In agriculture or natural resources, the graduate will have an opportunity for a rewarding career that will last as long as food is consumed, fiber is grown and soil, water and wildlife resources are valued.

Accreditation
Agricultural Sciences and Natural Resources include broad and diverse professions and do not have a single accrediting society as do some other professions. Programs in agricultural education, agricultural engineering, forestry, landscape contracting and landscape architecture are accredited by their professional organizations.

Academic Programs
Undergraduate Programs. The Bachelor of Science in Agricultural Sciences and Natural Resources degree is offered in the following major fields of study: agribusiness, agricultural communications, agricultural economics, agricultural education, agricultural leadership, animal science, biochemistry and molecular biology, entomology, environmental science, food science, horticulture, landscape contracting, natural resource ecology and management, and plant and soil sciences. The Bachelor of Landscape Architecture is also offered in the College of Agricultural Sciences and Natural Resources.

Graduate Programs. Graduate study is available in all academic departments in the College. In addition to the Master of Agriculture and Master of Science degrees that may be obtained through several departments, the Doctor of Philosophy degree (PhD) may be earned in the following areas: agricultural economics, agricultural education, biosystems engineering, animal breeding, animal nutrition, biochemistry and molecular biology, crop science, entomology, food science, plant pathology, soil science, natural resource ecology and management and in horticulture through interdisciplinary programs in crop science, environmental science, and plant science.

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

Transfer Students
Students who transfer from an accredited college or two-year college must meet the general University admission requirements. All transferred courses are recorded on the OSU transcript; however, no more than 60 hours from a two-year college will be used to meet the College's degree requirements. 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 Agricultural Sciences and Natural Resources were awarded over one million dollars in scholarships by the College and its departments for the 2010-2011 academic year. The following areas are considered in the awarding of scholarships: scholastic standing in high school or college; leadership qualities which have been shown in school, church, community or youth groups; financial need; sincere interest in the various agricultural disciplines.

Additional information may be obtained from the Office of the Associate Dean, College of Agricultural Sciences and Natural Resources, Oklahoma State University, 136 Agricultural Hall, Stillwater, OK 74078. Applications are available at www.casnr.com.

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

Special Academic Programs
Honors Program. The Honors College through the College of Agricultural Sciences and Natural Resources 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 study by students who have the desire and ability to explore academic subjects beyond the normal class work material. Honors awards available in the College 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 one another. Award (3) is earned by satisfying 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 and a high school GPA of 3.75 or better, are eligible to become a part of The Honors College. Sophomores, juniors, and seniors, with minimum cumulative grade-point averages of 3.30, 3.40, and 3.50, respectively, may enroll in The Honors College. Additional information may be obtained from the director of The Honors College, 101 Old Central.
Pre-Veterinary Medicine Curriculum. Specific pre-veterinary science majors in Agribusiness, Animal Science, Biochemistry and Molecular Biology, and Entomology, as offered in the College of Agricultural Sciences and Natural Resources, includes all courses required for admission to the Center for Veterinary Health Sciences.

Applicants must have completed at least 60 semester hours and have a minimum grade-point average of 2.80 in the required courses listed below (applicants must have satisfied all academic requirements by the last day of the spring term of the year in which admission is desired):

- English composition (6 hours minimum): ENGL 1113 and 1213; or 1313 and 1413.
- Technical report writing or English elective (3 hours minimum).
- Inorganic chemistry and lab (8 hours minimum): CHEM 1314 and 1315.
- Organic chemistry and lab (5 hours minimum): CHEM 3015 (or 3053, 3153, and 3112).
- Biochemistry (3 hours minimum): BIOC 3653.
- Mathematics (3 hours minimum): MATH 1513 (or any higher level mathematics).
- Physics (4-8 hours minimum): PHYS 1114 and 1214.
- Animal nutrition (3 hours minimum): ANSI 3543.
- Biological science (8 hours minimum): BIOL 1114 and ZOO L 1604.
- Microbiology and Lab (5 hours minimum): MICR 2123 and 2132.
- Genetics (minimum 3 hours): ANSI 3423 or PLNT 3554 or BIOL 3023.
- Humanities/Social Sciences (6 hours minimum).

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 more information on application requirements, refer to the “Center for Veterinary Health Sciences” section in the Catalog and the current brochure, OSU Veterinary Medicine Admission Requirements. Students are also encouraged to contact the Office of the Assistant Dean for Academic Programs in the College of Agricultural Sciences and Natural Resources.

General Education Requirements
The College of Agricultural Sciences and Natural Resources 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
Generally, University requirements for graduation are stated elsewhere in the Catalog. In addition, specific requirements must be met for the Bachelor of Science in Agricultural Sciences and Natural Resources and Bachelor of Landscape Architecture degrees. For the BS degree, the required total semester credit hours vary by department, major and option. A minimum of 40 semester credit hours and 100 grade-points must be earned in courses numbered 3000 or above. The Bachelor of Landscape Architecture is a five-year program requiring 160 credit hours.

College and Departmental Clubs, Organizations and Honor Societies
Agricultural Communicators of Tomorrow
Agricultural Education Graduate Student Association
Aggie-X Club (agricultural economics)
Agricultural ambassadors
Agronomy Club
Alpha Epsilon
Alpha Tau Alpha (agricultural education honor society)
Alpha Zeta (college honor society)
American Fisheries Society
American Society of Agricultural & Biological Engineers
Biochemistry Club
Biochemistry & Molecular Biology Graduate Student Association
Block and Bridle Club (animal science)
CASNR Student Council
Collegiate Farm Bureau
Collegiate 4-H
Collegiate FFA (agricultural education)
Cowboy Motorsports
Cowboys for Christ
Dairy Science Club
Environmental Science Club
Food Industry Club
Freshmen in Transition
Golf Course Superintendent’s Assoc. of America
Horseman’s Association
Horticulture Club
Leadership League
Meat Science Association
Oklahoma Collegiate Cattlemen
Oklahoma Collegiate Cattlemens
Pi Alpha Xi
Plant and Soil Sciences Graduate Student Organization
Pre-veterinary Science Club
Professional Landcare Network
Rodeo Association
Sanborn Entomology Club
Sigma Alpha
Sigma Lambda Alpha (horticulture and landscape architecture)
Society of American Foresters/Forestry Club
Society of Landscape Architects
Society for Range Management
Soil and Water Conservation Society
Turf Club
Wildlife Society
Xi Sigma Pi (Forestry Honor Society)

Agricultural Communications
Robert Terry, Jr., PhD, Professor and Head
Modern agriculture, with its diversity and specialization, requires accurate communication between industry leaders and the public. Education in agricultural communications prepares students to provide the necessary communications link.

By majoring in agricultural communications, students gain renaissance communications education with classes in advertising and public relations, web design, magazine writing and production, radio and television broadcasting, photography, reporting and newswriting, or research report writing. Opportunities also are available for the student to develop a double-major program with other departments in the College of Agricultural Sciences and Natural Resources.

For the graduate with a bachelor's degree in agricultural communications, career opportunities are abundant in the agricultural production industry and in service organizations as well as with publishing firms, broadcast stations, trade publications or related media.

Graduate Programs
The Master of Science degree in agricultural communications is designed to build mastery of knowledge in key areas such as communication theory, history, philosophy, computer technology, advanced communication skills and research and data analysis. The Master of Science degree in agricultural communications reflects the distinctive body of knowledge, research base, professional delivery and program focus of the discipline. In addition, the program introduces and requires students to apply research tools and methods.

The Master of Science program serves two primary purposes: (1) encouraging mastery of discipline-specific knowledge with an introduction to research and data analysis and (2) offering discipline-specific knowledge with professional application to the work setting.

The Master of Science program offers students two options for completion of the degree: thesis option and formal report option. The thesis option requires 30 approved credit hours of course work, which includes a six credit hour formal thesis following the graduate college format. The formal report option requires 32 approved semester credit hours of course work, which includes a two credit hour formal report.

Students applying for the Master of Science program without a background in the appropriate option will be expected to complete course work to bring their preparation to the appropriate level.

Admission Requirements. All students accepted into the agricultural communications Master of Science degree program will be expected to meet all University and Graduate College requirements and to have earned a degree in agricultural communications or related field from an accredited university. Applicants from outside agricultural communications will be required to complete prerequisite courses equivalent to the knowledge and competencies expected in the agricultural communications undergraduate program.
An undergraduate grade-point average of 2.80 overall on a 4.00 scale or 3.00 in the last 30 hours is required. The applicant must complete the Graduate Record Examination, submit a statement of goals for pursuing the master's degree and submit letters of reference from at least three people knowledgeable of the applicant's professional qualifications. These references should include statements relating to (a) the applicant's success in professional settings or commitment to professional goals allied with the disciplines in the College of Agricultural Sciences and Natural Resources, (b) the applicant's prior academic record as a reflection of ability to succeed in a Master of Science program, and (c) the applicant's potential for success in research, writing and course work at the Master of Science level. If such references are not available, the applicant should submit references from one or more faculty members familiar with the applicant's academic career. Other references should be from individuals capable of addressing the applicant's ability to successfully complete a Master of Science program.

Review Process for Admission. The Office of the Associate Dean of Graduate Studies manages all procedures and records pertinent to admission. The admission process is ongoing with admission recommendations rendered by the graduate faculty in agricultural communications and agricultural education. To be eligible for committee review, each applicant must submit an application for admission to the Graduate College, transcripts of all academic records, reference letters, goal statement and GRE scores.

Agricultural Economics
Michael D. Woods, PhD, Professor and Head
The Department of Agricultural Economics at Oklahoma State University offers programs of study leading to the BS, MS, MAg and PhD degrees in agricultural economics and the BS degree in agribusiness. Agricultural economics and agribusiness curricula study the economic relationships among individuals, firms and service agencies in agriculture and between the agricultural sector and other sectors of the economy. The department's courses emphasize the economic issues and concepts associated with producing, processing, marketing, and consuming agricultural goods and services and those used in the industry. Undergraduate programs in agricultural economics and agribusiness combine instruction in technical agricultural sciences with education in the application of economic and business management principles and tools. The agricultural economist or agribusiness person draws upon the physical and social sciences to outline, understand, and solve economic problems created by agriculture's dynamic operating environment. Curricula in the Department of Agricultural Economics emphasize the decision-making and problem-solving skills used in the management of agricultural production and marketing firms.

Study in agricultural economics or agribusiness prepares students to excel in many challenging careers. Many graduates work to improve food production and processing throughout the world. Other graduates work with government policies that affect the food and fiber sector. Others assist rural communities to adjust and thrive in the rapidly changing world. Graduates also help protect and maintain natural resources and the environment for the greatest benefit of society. Many graduates choose career paths that lead them far from the farm.

Agricultural Economics
The agricultural economics BS degree trains students to analyze problems and make decisions using a solid framework of economic and business principles. Study plans may be tailored to a wide variety of career interests. In addition to a base agricultural economics BS degree plan, the agricultural economics student can choose from two degree options: international agricultural marketing and double major with accounting. In addition, the base agricultural economics degree plan offers specializations in quantitative studies, environmental and natural resources, and community and regional analysis. Each of the study plans in agricultural economics equips students for a variety of employment opportunities at competitive salaries in private industry and government agencies.

Agribusiness
Like the agricultural economics degree the agribusiness BS degree trains students to analyze problems and make decisions using a solid framework of economic and business principles. In addition, the agribusiness degree targets the skills needed for careers in agribusiness firms, including all areas of food and fiber production, processing, and marketing. In addition to the base agribusiness degree plan, students may choose from seven degree options: farm and ranch management, agribusiness management, agribusiness marketing, agribusiness finance, plant and soil science, pre-law, or pre-veterinary business management. Agribusiness students also may develop a minor area of study or a double major by selecting various course electives. Employment opportunities for agribusiness graduates are widely diverse, including jobs with farms, agricultural advisers, processing firms, wholesalers and retailers, food and fiber input supply firms, banks and other financial services firms, utilities and educational institutions.

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 MS level. PhD 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 analysis applied to problems of production, distribution and consumption of agricultural products. Courses in economic theory, econometrics, mathematical economics and statistics are an integral part of the program. Primary data analysis, natural resource use, international trade, planning, policy, and development are also important topics.

The faculty give direction and individual guidance to student research in marketing, production, management of agricultural enterprises, demand and price analysis, land and water use and development, non-market valuation, rural development and planning, agricultural finance, international trade, farm appraisal, agricultural policy, econometrics, and experimental economics. Students specialize through course electives and research topics. In addition, an advisory committee guides each student in preparing the program of study to ensure that the student's background, graduate course work, and research program together lead to the desired depth and breadth of proficiency.

Admission Requirements. Prerequisites to advanced training in agricultural economics include: (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, statistics, and intermediate macro- and microeconomic 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 towards a graduate degree.

Acceptance by an adviser in the department is not required prior to admission to the departmental graduate program. GRE test scores are required for admission to the program. GRE test scores are required for admission to the program.

Agricultural Education
Robert Terry, PhD, Professor and Head
The programs of study offered in agricultural education are designed to provide both comprehensive and specialized training to prepare graduates for careers in a wide range of fields of agriculture. In addition to being prepared for licensure as teachers, graduates are professionally prepared for work in cooperative extension and other federal and state programs and services, as well as international education endeavors. Graduates also may find employment as educational directors and consultants with agribusiness firms and organizations. Studies may culminate in the BS, MAg, MS or PhD degrees.

The undergraduate teaching option is designed to qualify the bachelor's degree recipient for the Oklahoma Agricultural Education Teaching License. This license is recognized as meeting requirements for initial employment as a teacher in most states. Graduates look forward to careers ranging from agricultural education teacher and cooperative extension educator to agricultural sales, marketing and production positions. Some students find it advantageous to elect a dual major, thus meeting requirements in both agricultural education and another major within the College of Agricultural Sciences and Natural Resources. The undergraduate agricultural education major is structured to provide educational experiences in general education, agriculture and professional education.

Graduate Programs
Graduate programs in 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 skills for other educational careers in agriculture, agribusiness, government service, extension, or adult education. To meet the needs of both international and domestic students, plans of study are developed for academic excellence specific to students' career goals. The selection and organization of courses are made in consultation with the adviser and the student's advisory committee.

The Master of Agriculture is offered to further knowledge and skills of agriculture and education in preparation for and advancement in teaching, extension administration and other professional areas. The Master of Agriculture program requires 32 approved semester credit hours of course work, including a two-credit-hour creative component, which may involve curriculum, teaching methods, research literature review or some similar area.
The Master of Science develops the theoretical and research foundation for further graduate studies in addition to further knowledge and skills in agriculture and education. It is designed primarily for those students interested in research. Two options are offered in the Master of Science program. The thesis option requires 30 approved credit hours of course work, which includes a six-credit-hour formal thesis following the graduate college format. The formal report option requires 32 approved semester hours of course work, which includes a two-credit-hour formal report.

The Doctor of Philosophy program is designed to prepare graduates for careers in professional education, supervision, administration, curriculum development and other areas of professional leadership in agriculture, agricultural extension, career and technology, and agricultural communications. Within the minimum 60 credit hour requirement, 15 credit hours must be completed in agricultural education. In addition, 15 credit hours must be completed in an area of specialization such as agricultural extension, technical agriculture, educational administration, or other similar areas. The additional hours include 15 hours of research design and statistics and 15 hours for the dissertation.

Admission Requirements. Students seeking admission to the master's degree program must have earned a bachelor's degree in agriculture education, agriculture or education. A student with background deficiencies must compensate for such deficiencies before completing the masters degree. Evidence of academic ability (2.80 GPA or above) in undergraduate course work is required. Three letters of reference and a statement of purpose are also required. Graduate Record Exam (GRE) scores are required for students seeking admission to the Master of Science degree program.

Admission to the doctoral degree program is based upon evidence that the applicant meets the general requirements of the Graduate College, has demonstrated superior achievement, and can successfully complete a doctoral program as evidenced by three letters of recommendation, GRE scores, a minimum of 2.80 undergraduate grade-point average and 3.00 graduate grade-point average, three years of successful professional experience, and a philosophy statement and goals. Alternative criteria may be considered by the graduate committee for those who submit ample supportive evidence of other exemplary qualifications.

Agricultural Leadership
Robert Terry, PhD, Professor and Head
With its far-reaching impacts, the agricultural industry needs strong leaders. The ever-increasing intricacies of the agricultural industry make it all the more important to have employees in the industry who understand the technical aspects of agriculture as well as the human aspects. The Agricultural Leadership major provides an opportunity for students to prepare as generalists in agricultural sciences and natural resources while developing a strong understanding of leadership theory and its application. Agricultural Leadership graduates seek careers in extension, politics, governmental agencies, non-profits, corporate agriculture, higher education and small business.

The Agricultural Leadership curriculum at Oklahoma State University is guided by five core values: commitment to agriculture, authentic leadership, diversity, critical thinking and professionalism. Agricultural leadership faculty align course objectives, learning opportunities and student experiences with the five core values. Beginning students study historical and theoretical foundations in leadership, authentic leadership and transformational leadership before exploring contemporary leadership issues, leadership program facilitation and current scholarship in the discipline. Specific topics within course work include leadership styles, power, decision-making, ethical leadership, motivational theories and team processes.

In addition to leadership course work, the curriculum provides a broad introduction to the agricultural sciences and natural resources and allows students to develop an area of emphasis or pursue a minor in areas such as animal science, soil science or agricultural economics.

Minor in Leadership Education. The minor is designed to prepare students to serve as leadership educators within the context of their chosen major. Students explore career options in leadership education, develop an understanding of their own leadership style and philosophy, acquire knowledge about leadership theories, explore contemporary issues in leadership, evaluate current leadership research and learn to design and facilitate leadership training. Requirements of the minor include 17 hours of leadership course work, including six hours of controlled electives.

Graduate Programs
Students may pursue graduate studies in agricultural leadership through the Master of Agriculture in Agricultural Leadership or the department's Doctor of Philosophy or Master of Science in agricultural education. The Master of Agriculture degree in Agricultural Leadership is an advanced studies program for practitioners seeking to develop their knowledge related to leadership and its application to the agricultural industry. Graduates pursue careers in extension, government, corporate agriculture, and human resources and training. The Master of Agriculture program requires 32 approved semester hours of course work including a 17 hour area of emphasis. Graduate course work in agricultural leadership includes leadership theory and practice, developments in agricultural and extension education and a creative component. More information on graduate studies in agricultural leadership is available under Agricultural Education graduate programs.

Agriculture
David R. Porter, PhD, Professor and Interim Associate Dean
Graduate Programs
The Master of Agriculture degree is designed for students interested in graduate professional training. The degree is offered in the following specialization areas: agribusiness, agricultural economics, agricultural education, agricultural leadership, animal science, entomology, horticulture, natural resource ecology and management, plant pathology, plant science, and soil science. New to CASNR is the interdisciplinary option, international agriculture.

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 PhD degree will generally 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. In some areas of specialization the focus is on an applied research concept and a broader program of study 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 Catalog, "Graduate College" section, under "The Master's Degree." In addition, each candidate approved for study under this program will be assigned an adviser and advisory committee with whom he or she will develop a plan of study in accordance with guidelines established in the department. A preliminary plan of study must be approved by the Office of the Associate Dean for Academic Programs 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 Master of Agriculture 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 credit hours, is required.

Option B Requirements. A total of 36 approved semester credit hours of work is required and must contain a creative component. No report is required.

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

Animal Science
Ronald Kensinger, PhD, Professor and Head
Animal science is concerned with the science, art and business of the production of beef cattle, dairy cattle, horses, poultry, sheep, goats, swine and pet/companion animals. An animal scientist is concerned with the application of the principles of the biological, physical and social sciences to the problems associated with domestic animal production and management.

Animal science is also concerned with food production. The food industry is one of the largest and most important industries in the United States. Food scientists are concerned with the processing, safety, quality control and marketing of food. Undergraduate students may elect to pursue a Bachelor of Science degree in the department by majoring in either animal science or food science. Internship programs providing three to six months of off-campus work experience are available in all animal science options and are part of the curriculum for food science. Participation in undergraduate organizations (Animal Science Leadership Alliance, Block and Bridle, Dairy Science, Horsemens Association, Food Industry, Meat Science Association, Oklahoma Collegiate Cattlemen, Pre-Club) judging teams (livestock, meats, horses, or dairy cattle) and academic programs (hons, undergraduate research
Biochemistry and Molecular Biology
Dale M. Maronek, PhD, Professor and Interim Head

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. Major discoveries concerning the biochemistry of genetic material provide the tools of molecular biology that are essential to contemporary life sciences research.

Biochemists and molecular biologists are concerned with living things and thus, must be fluent in the concepts of biological sciences. Since a biochemist's tools are the physical sciences, he or she must receive sound education in mathematics, physics and chemistry. Our academic programs are designed to integrate these disciplines, preparing students for a wide range of professional careers.

Challenging positions for well-trained biochemists and molecular biologists 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 production and development of antibiotics, vitamins, hormones, enzymes, insecticides and molecular genetics techniques.

At the undergraduate level a major in biochemistry and molecular biology administered by the Department of Biochemistry and Molecular Biology is available through the college of Agricultural Sciences and Natural Resources. The department also offers a BS degree in biochemistry through 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 and molecular biology curriculum provides students with sufficient background 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 either agriculture or medicine and other related health programs. The curriculum is excellent for pre-professional students. The department's research activities provide opportunities for part-time employment of undergraduate majors to improve their professional competence.

Graduate Programs
Because many of the opportunities in biochemistry require advanced course work, a major part of the program in the Department of Biochemistry and Molecular Biology is concerned with its graduate program leading to the MS or PhD degree. This graduate program is an integral part of extensive basic research activities in the Oklahoma Agricultural Experiment Station.

Prerequisites. Although the BS 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 each of organic chemistry and calculus plus four credit hours each of analytical and physical chemistry must take appropriate undergraduate courses to make up deficiencies. The results of the three general GRE exams (verbal, quantitative, analytical) are required for entrance. An advanced GRE subject matter exam (biochemistry, chemistry or biology) is also recommended. A GRE score of 500 verbal, 650 quantitative and 4.0 analytical is normally required.

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 the 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, including BIOC 5002, 5753, 5824, 5835, and 5930. In addition, students 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.

A non-thesis Master of Science degree is also available. It does not require a research thesis, but requires a report and extensive technical training in the laboratory. The non-thesis MS is not recommended for students wishing to pursue a PhD later.

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 hours credit hours of course work in the emphasis area of biochemistry and molecular biology which includes all the courses listed for the MS degree, at least four of the advanced graduate courses in biochemistry (6000 level). 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 preliminary examinations in January of his or her third semester.

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.

Biosystems and Agricultural Engineering

Daniel L. Thomas, PhD, PE, Professor and Head

The Department of Biosystems and Agricultural Engineering is administered jointly by the College of Agricultural Sciences and Natural Resources and the College of Engineering, Architecture and Technology. Biosystems engineers are professionals who create and adapt engineering knowledge and technologies for the efficient and effective production, processing, storage, handling and distribution of food, feed, fiber and other biological products, while at the same time providing for a quality environment and preserving and protecting natural resources. Biosystems engineers directly address problems and opportunities related to food, water, energy, and the environment - all of which are critical to the quality of life in our society. Subject-matter specialization is provided through the following four undergraduate option areas: biomechanical, bioprocessing and biotechnology, environment and natural resources, and food processing.

Biosystems engineering courses integrate engineering sciences, physical sciences, and biological sciences, and teach students to address real-world challenges. With the guidance of experienced faculty, students work both as individuals and in teams to design creative solutions to complex problems.

The undergraduate biosystems engineering degree program provides the comprehensive education necessary to prepare students for successful, productive and rewarding careers in engineering for agricultural, food and biological systems. Graduates of the program will be:

- able to apply mathematical, physical, engineering, and biological principles needed to understand, analyze and solve problems in food, agricultural, environmental and/or biological systems.
- effective in oral, written and visual communication.
- effective in accomplishing tasks, both as an individual, and as a contributor to multi-disciplinary teams.
- able to understand the social, environmental, safety and economic impacts of their work in local and global contexts, and to perform in a professional and ethical manner.
- committed to enhancing knowledge and skills through continuing education.

Undergraduate educational programs are divided into two components—pre-professional and professional. In the pre-professional portion of the biosystems engineering program (usually equivalent to two years of study) the focus is on understanding biological, physical, chemical and mathematical principles of engineering, supplemented by appropriate general education courses in English, social sciences and humanities. Students who demonstrate proficiency in this portion of the program are eligible for admission to the professional school in biosystems engineering.

The professional school of biosystems engineering curriculum (typically two years) builds systematically upon the scientific knowledge acquired in the pre-professional curriculum. In professional school, students have the opportunity to focus on the option areas given above. The degree is accredited by the Engineering Accreditation Commission of the Accreditation Board for Engineering and Technology under agricultural engineering and similarly named programs.

Each professional school course builds upon preceding engineering courses to develop in the student the ability to identify and solve meaningful engineering problems. The course work is specifically sequenced and interrelated to provide design experience at each level, leading to progressively more complex, open-ended problems. The course work incorporates the social and economic aspects of technical problems, and stresses the responsibilities as engineering professionals to behave ethically and promote occupational and public safety. The program culminates in senior year design courses in which students integrate the analysis, synthesis and other abilities they have developed throughout the earlier portions of their study into a capstone experience. At this point, they are able to design components, systems and processes that meet specific requirements, including such pertinent societal considerations as ethics, safety, environmental impact and aesthetics. The students have also developed and displayed the ability to conduct experiments essential to specific studies and to analyze the experimental results and draw meaningful conclusions.

An integral part of this education continuum from basic science through comprehensive engineering design is learning experiences that facilitate the students' abilities to function effectively in both individual and team environments. Moreover, the program provides every graduate with adequate learning experiences to develop effective written and oral communication skills. State-of-the-art computational tools are introduced and used as a part of their problem-solving experiences. Finally, the students' experiences in solving ever-more-challenging problems enable them to continue to learn independently throughout their professional careers.

A wide variety of employment opportunities are available for biosystems engineers in industry, public service and education. Some of these opportunities include positions in governmental agencies, consulting engineering firms, and agricultural and food equipment industries. Biosystems engineers are employed throughout the U.S. as well as internationally.

Students interested in a degree in biosystems engineering may initially enroll in the College of Agricultural Sciences and Natural Resources or the College of Engineering, Architecture and Technology. Students who enroll in the College of Agricultural Sciences and Natural Resources should request a biosystems engineering adviser and transfer to the College of Engineering, Architecture and Technology by the end of their first semester.

Graduate Programs

The Department of Biosystems and Agricultural Engineering offers programs leading to the Master of Science and Doctor of Philosophy degrees in Biosystems Engineering. These degrees emphasize research and development.

Excellent laboratory and computer facilities are available for students to explore research and design in such areas as bioprocessing and food engineering, machine vision, sensor and control technology, waste management and utilization, hydrology, water quality, porous media flow, and intelligent systems for agricultural production.

Research projects are supported by the Agricultural Experiment Station and by state, federal and private grants and contracts. A well-trained faculty, many of them registered professional engineers with research, consulting and design experience, guide the graduate students' activities and plan programs to meet students' needs. Graduate students design experiments and special equipment to conduct their work. They are expected to demonstrate, by supporting research or by designs, the ability to identify a problem, define alternatives, propose a solution, organize a design 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. Students without accredited degrees may be admitted provisionally and may be required to take additional courses. A student must be accepted by an adviser in the department prior to official admission to the graduate program.

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

Entomology and Plant Pathology

Phillip G. Mulder, Jr., PhD, Professor and Head
Carmen Greenwood, PhD, Undergraduate Coordinator
Brad Kard, PhD, Graduate Coordinator

The mission for the Department of Entomology and Plant Pathology is to discover, develop and disseminate science based knowledge concerning arthropods and plant pathogens. Entomology is the science and study of insects and related arthropods. Plant Pathology is the science and study of bacteria, viruses, fungi and nematodes that cause diseases in plants. A strong academic background in the physical and biological sciences is essential for success in both disciplines. Research and education programs range from basic studies of cellular, physiological and genetic aspects to broad ecological and population studies and focus on the development of practical pest management strategies.

The undergraduate program in entomology leads to the BS in Entomology and offers students opportunities to explore the diversity of nature through the study of arthropods and their interactions with plants, animals and human culture. Specialized course work in entomology includes insect identification, biology, ecology, physiology, biochemistry, population dynamics, medical and veterinary entomology and insect pest management.

Plant pathology as a discipline encompasses the science required to understand the causes of plant diseases as well as prevention and controlling diseases. Undergraduate level courses are available in Plant Pathology and are valuable additions to programs in entomology, horticulture, agronomy, ecology and botany. Specialized course work in plant pathology includes pathogen identification, genetics, host-parasite physiology, biotechnology, molecular genetics and disease management.
There are many, and diverse, career opportunities for graduates of these programs, including positions involved with pest management in crops and livestock production, stored products such as grains and processed foods and protecting structural systems such as houses from termites and agricultural biotechnology. Undergraduate options in entomology include insect biology and ecology, and bioforensics, pre-medical, and pre-veterinary sciences. Undergraduates of this department may also choose to pursue a formal academic minor in horticulture. Students learn plant care techniques and the role plants and landscape applications play in sustaining the environment.

Graduate Programs
The Department of Entomology and Plant Pathology offers programs of study that lead to the MS of Entomology and Plant Pathology, the PhD in Entomology or the PhD in Plant Pathology. These programs offer students opportunities to specialize in a wide range of basic or applied research fields. To qualify for graduate study in entomology and/or plant pathology an applicant should obtain a solid background in the basic sciences, especially biology, chemistry, mathematics, English and communications skills. All requirements of the Graduate College must be satisfied for entry to the graduate programs. In addition, applicants for graduate programs should take the Graduate Record Examination and submit their scores. Students applying to the graduate program must be accepted into a research program by a major professor. The applicant must secure appropriate financial support in the form of a scholarship, fellowship or graduate assistantship to be negotiated with the major professor and department and be approved by the department screening committee and the Graduate College prior to being admitted to the Graduate College. Each graduate student is under the direction of the major professor as adviser and a selected faculty advisory committee. The program of study will be adapted to the individual's needs within the departmental and Graduate College guidelines.

Environmental Sciences
Brian J. Carter, PhD, Professor and Director
The College of Agricultural Sciences and Natural Resources offers an undergraduate major in environmental sciences. This interdisciplinary program is designed to improve the current and future welfare of the human race through understanding environmental policies based on scientific principles in accordance with the true benefits and costs as evaluated by an informed society.

Graduates complete a well-rounded selection of horticulture courses and courses in art, construction, ecology, horticulture, environmental sciences and subjects and range from the cellular to the whole plant level. Factors such as nutrition, irrigation, genetics, propagation, control of flowering, and fruit and seed production are considered in their relationship to culture, production, conservation of resources, harvesting, processing and storage. Students can prepare themselves for careers in public grounds administration (arboretums, parks and zoos), golf course management, horticulture business, environment and sustainability areas, sales and marketing, 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 BS degree and choose from the following four options:

Horticulture Science emphasis is on preparing students for science-based careers, including laboratory science or graduate study. This option provides the training and expertise for production maintenance and preservation of fruits, nuts, vegetables, nursery crops, flower crops, etc. Training can be general or be chosen to emphasize a particular commodity area of horticulture. Students learn plant care techniques and the role plants and landscape applications play in sustaining the environment.

Horticulture Business option features opportunity to combine horticulture with principles of running a business. A built-in requirement for a formal academic minor in a business area is a feature of this option.

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dealing with land planning, environmental and conservation applications, urban planning, parks and recreation.

Landscape contracting is a program that emphasizes the construction and management phases of landscape development, including plants, environmental applications, and structures. It is a four-year program leading to an accredited BS degree. The degree is accredited by the Professional Landscape Network. Course work includes basic landscape architectural design, construction technology, business and horticulture. Students may emphasize either landscape construction or landscape management. Graduates are employed by landscape contracting companies, design-build firms, landscape maintenance companies, landscape nurseries, and governmental agencies.

Graduate Programs
The department offers programs of study leading to the degrees of Master of Science in horticulture (with areas of specialization in horticultural science, landscape architecture, phytochemistry and turfgrass science), Master of Agriculture with specialization in horticulture, and participates in multidisciplinary PhD programs in crop science, environmental science, food science, and plant science. Areas of study include foli-culture crops, fruit and nut crops, vegetables, ornamental nursery crops, and turf. In addition to commodity-oriented specialties, students may emphasize food processing, environmental applications, plant extraction applications, postharvest physiology, or stress physiology disciplines. Applicants should indicate their interest area(s). Research opportunities range from whole plant production to management studies to fundamental cellular studies. Additional information on programs, application procedures, and financial assistance is available at:

www.hortla.okstate.edu/graduate/.

Prerequisites. Admission requires a bachelor’s degree in horticulture, landscape architecture, or a related field with at least a 3.00 (“B”) grade-point average. Students with course work deficiencies in fundamental areas may be required to take remedial courses to attain proficiency in accordance with the advisory committee’s guidelines. In addition to Graduate College requirements, applicants must submit official GRE scores, a statement of research and career interests, and three letters of reference.

Admission to the program requires approval by the graduate committee, a departmental advisor on the Graduate Faculty, the department head, and the Graduate College. The program of study and research will be directed by the student’s graduate adviser and advisory committee.

Natural Resource Ecology and Management
M. Keith Owens, PhD, Professor and Head
Faculty in the Department of Natural Resource Ecology and Management (NREM) have expertise in conducting interdisciplinary instruction, research, and extension education which focus on the natural resources of fisheries, forests, rangeland, and wildlife within and beyond the boundaries of Oklahoma. Increased public understanding of the ecology and management of these natural resources which are important in agriculture, hunting and fishing, ecotourism, forest production and use, as well as the conservation of wildlife habitat is an important goal of the faculty in NREM.

The NREM faculty support undergraduate and graduate programs in fire ecology, fisheries, forestry, rangeland, and wildlife. The NREM curriculum prepares students to plan, implement, and research the management, protection, and sustainable use of natural resources within Oklahoma and throughout the world. The department provides an integrated education in renewable natural resource management, conservation, and utilization, as well as a valuable perspective for understanding and solving critical contemporary environmental problems at local, regional, and global scales.

NREM Degree Options.
Fire Ecology and Management option was developed in response to the need for understanding the ecological role and management of wildland fire in natural ecosystems, and the importance and implementation of prescribed fire in land management. This option offers students the opportunity to accomplish specific land management objectives through the proper use of prescribed fire. The curriculum combines experience with prescribed fire plans, policy and law, weather, equipment, conducting prescribed burns, and post-burn management. In addition, students will be assisted in completing federal fire training requirements.

Fisheries and Aquatic Ecology is an option designed for students with interest in the management of fish populations and habitats. Courses offer research techniques and methodology in fisheries science, including sampling design, habitat measurements, sampling techniques and abundance estimation, age and growth analysis, recreational surveys, data analysis and report writing.

Forest Ecology and Management emphasizes the science-based conservation and management of forest lands, ecosystems and related natural resources.
Department is a bachelor's degree in an area aligned with the student's research interests with a minimum overall GPA of 3.00. Please refer to the website nrem.okstate.edu for a full description of the application process. A student must be accepted by a member of the Department's faculty prior to official admission to the program.

Plant and Soil Sciences

David R. Porter, PhD, Professor and Head

The mission of the Department of Plant and Soil Sciences is to discover, develop, and disseminate knowledge that advances the management, sustainability, and restoration of plant and soil ecosystems. The goal of the department is to meet societal needs for food, fiber, energy, and intrinsic value related to the conservation and management of plant and soil resources. Teaching, research and extension efforts are designed to assist decision makers in matters regarding land management.

Undergraduate students select an option of study from: agribusiness, bioenergy production, forage and livestock production, plant biotechnology, plant science, soil geotechnology or soil and water resources. Targeted topics a student may choose to pursue include: crop production, precision agriculture, plant genetics, soil conservation, soil chemistry, soil fertility, weed science, crop protection, soil management. Options of study provide flexibility for students to work with their academic advisers to develop a plan of study to suit their interests. Upon completion of their education, students are encouraged to pursue professional certification available in their respective areas of expertise.

The knowledge base regarding land management continues to grow as the department's internationally recognized research faculty discovers new information. Faculty contributions in plant breeding and genetics, biotechnology, environmental remediation, plant physiology, crop production, applied landscape ecology, weed science, weed ecology, soil nutrient management, soil chemistry, soil physics, invasive species management, water quality, and land restoration assist decision makers in finding solutions that sustain natural resources and are economically viable. Many undergraduate students work with the research faculty on projects providing the student an opportunity to assist in gathering new information.

Upon completion of a Bachelor of Science program, students are employed by private firms, public institutions, state and federal agencies, or non-profit organizations that require personnel with expertise in plant and soil systems. Typical careers include: federal employment in soil and rangeland conservation; crop consulting; technical sales and service for seed, fertilizer or agricultural chemical supply companies; farm or ranch operation; research positions as plant and soil scientists with federal agencies, state agricultural 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, equipment, agricultural chemicals and other agricultural supplies and services. Demand for individuals with experience in plant and soil sciences will continue as long as society demands a safe, secure food supply balanced with a desire to conserve natural resources.

Graduate Programs

Programs of course work and research are offered leading to the Master of Science degree in plant and soil sciences and the Master of Science degree in crop and soil sciences. The Master of Science degree in plant and soil sciences may be earned by using one of three options: Option A—Formal report (non-thesis), minimum of 32 credit hours of course work, including two credit hours of PLNT or SOIL 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 including six hours of credit (PLNT or SOIL 5230, Research) for a professional internship. 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 and soil science are developed individually for each candidate. Doctoral programs in crop science and soil science require 60 credit hours beyond the MS degree, including a minimum of 15 credit hours of PLNT or SOIL 6000 (Dissertation). All students must 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.

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

The Master of Science degree in plant and soil sciences may be earned by using the thesis option. This plan requires a minimum of 30 credit hours of course work, including six credit hours of PLNT, or SOIL 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 PLNT or SOIL 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 including six hours of credit (PLNT or SOIL 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 and soil science are developed individually for each candidate. Doctoral programs in crop science and soil science require 60 credit hours beyond the MS degree, including a minimum of 15 credit hours of PLNT or SOIL 6000 (Dissertation). All students must 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.