

BIOSYSTEMS AND AGRICULTURAL ENGINEERING DEPARTMENT

Mission

The Biosystems and Agricultural Engineering Department enhances the production and profitability of agricultural and biological products and the conservation and management of natural resources through teaching, research, and outreach.

Vision

The Biosystems and Agricultural Engineering Department will be recognized nationally and internationally as a program of excellence in the application of engineering and biology to agricultural production and processing, natural resources management, and rural development.

In the tradition of the American land-grant system we will:

- Provide a sound, comprehensive education that prepares students to serve society as professional engineers;
- Conduct fundamental and applied research that makes a positive impact upon Oklahoma, the nation, and the world; and
- Extend the university to all Oklahoma citizens, both urban and rural, to improve the quality of life, increase the profitability and sustainability of agriculture, and protect the environment.

Core Values

Excellence – We seek excellence in all our endeavors, and we are committed to continuous improvement.

Service – We believe that serving others is a noble and worthy endeavor.

Relevance – We are committed to meaningful endeavors that make a difference in people's lives.

Professionalism – We are dedicated to the practice of our profession for the advancement and betterment of human welfare.

Integrity – We are committed to the principles of truth and honesty, and we will be equitable, ethical, and professional.

Stewardship of Resources – We are dedicated to the efficient and effective use of resources. We accept the responsibility of the public's trust and are accountable for our actions.

Teamwork – We appreciate the contributions of colleagues and the synergy that results from working together across disciplines, colleges, and institutions.

Diversity – We respect others and value diversity of opinion, freedom of expression, and other ethnic and cultural backgrounds.

Intellectual Freedom – We believe in ethical and scholarly questioning in an environment that respects the rights of all to freely pursue knowledge.

Goals, Critical Success Factors, Objectives, and Strategies

Goal One: Provide excellent academic and professional continuing education programs that are relevant and state-of-the-art.

Critical Success Factors:

- Undergraduate enrollment of at least 75 students
- Student retention through graduation at a percentage exceeding that for all OSU engineering students
- 60% of B.S. graduates having internship, co-op study, or other engineering work experience
- 60% of B.S. graduates having involvement in professional society activities
- 80% of B.S. graduates taking the Fundamentals of Engineering exam prior to graduation
- 70% pass rate for those students taking the Fundamentals of Engineering exam
- Average of 1 Wentz Research Scholar per year
- Female undergraduate enrollment at a percentage exceeding that for all OSU engineering students
- Undergraduate ethnic diversity comparable to that for all OSU engineering students
- Enrollment of 2.5 graduate students per tenure-track research faculty FTE
- 75% of graduate students presenting a professional paper prior to graduation
- 100% of Ph.D. graduates gaining teaching experience prior to graduation
- 70% of graduate students authoring a refereed publication within 2 years of graduation
- Overall average instructor and course evaluations of 3.0 on a 4.0 scale (based on student surveys of instruction)
- 2 professional continuing education offerings per year

Objectives:

Objective 1.1: Provide an undergraduate engineering program that is accredited by the Accreditation Board for Engineering and Technology, well subscribed, and characterized by an appropriate balance of theory and application.

Strategies:

- Hire additional teaching faculty.
- Maintain program accreditation through the Engineering Accreditation Commission of the Accreditation Board for Engineering and Technology.
- Regularly review undergraduate courses to assure a balance of theory and application in the most appropriate Biosystems Engineering topics.
- Actively recruit students from high schools and junior colleges.
- Ensure that every senior has an industry-relevant, capstone, senior design experience.
- Provide high-quality advising by maintaining low student-to-advisor ratios and ensuring that faculty receive appropriate recognition for advising.
- Provide and promote activities to increase student-faculty interaction.

- Track student retention rates and identify factors involved in student losses.

Objective 1.2: Provide a graduate engineering program that is academically sound and highly synergistic with the department's research program.

Strategies:

- Encourage all eligible faculty to become members of the graduate faculty.
- Secure sufficient research funding so that most graduate students have some form of financial assistance.
- Promote the department on a national level to attract high-quality graduate students.
- Encourage faculty members to develop new courses for Biosystems Engineering graduate students and to offer existing courses on a more regular basis.
- Provide students with support and encouragement to attend and present their research at professional meetings.
- Require Ph.D. students to gain teaching experience as part of their graduate program.
- Inform and encourage Biosystems Engineering undergraduates to consider graduate school.

Objective 1.3: Foster student development through career preparation, enrichment and leadership opportunities, and financial support.

Strategies:

- Increase annual departmental scholarship support for undergraduates.
- Provide international study opportunities for students, and work to develop financial support for such experiences.
- Provide meaningful employment opportunities for undergraduates on research projects in Biosystems Engineering.
- Encourage students to take and pass the Fundamentals of Engineering exam, and develop financial resources to diminish student expenses associated with the exam.
- Support student club events and activities in order to encourage leadership skill development.
- Develop contacts with industries hiring Biosystems Engineering graduates to foster increased job opportunities.
- Improve job placement coordination for co-ops, internships, and full-time jobs.

Objective 1.4: Provide high-quality courses to meet the needs of students in degree programs external to Biosystems and Agricultural Engineering.

Strategies:

- Conduct regular, comprehensive reviews of service course offerings in agriculture and natural resources.
- Determine the needs of other departments and ensure that service courses are up-to-date and relevant.

- Teach service courses which have high demand and in areas which Biosystems and Agricultural Engineering faculty can provide expertise.
- Investigate opportunities for shared teaching of service courses (with faculty from other units) in order to leverage teaching resources.

Objective 1.5: Provide continuing education and life-long learning opportunities for the engineering community.

Strategies:

- Offer specialized short courses for the engineering community.
- Provide continuing education programs through professional societies.
- Develop on-line short courses for the engineering community.

Goal 2: Develop technologies, processes, products, and strategies to support efficiency and sustainability in agricultural, food, biological, and natural resource systems.

Critical Success Factors:

- Average of 2.5 refereed publications per research faculty FTE per year
- Average of 3 professional papers and presentations per research faculty FTE per year
- Average of \$125,000 in annual grant and contract expenditures per research faculty FTE
- 100% of research faculty collaborating on multidisciplinary project teams

Objectives:

Objective 2.1: Enhance the management and sustainable use of natural resources.

Strategies:

- Utilize the Oklahoma Mesonet in the development and dissemination of products to assess and manage Oklahoma's water, air, and land resources.
- Develop computer-based tools to assist governmental agencies in establishing and monitoring water quality standards for nutrients and sediments.
- Develop and evaluate innovative waste management alternatives in animal production agriculture.
- Support state agencies by providing data, analyses, and methods to develop Total Maximum Daily Loads for impaired surface waters.

Objective 2.2: Enhance the economic and environmental sustainability of agricultural production through technology development and application.

Strategies:

- Leverage the expertise of Biosystems and Agricultural Engineering faculty through work with multidisciplinary, collaborative teams.
- Recruit high-quality graduate students to support faculty research programs.
- Seek and secure extramural funds to support relevant research.
- Establish partnerships internally and off-campus to enhance research in these areas.
- Foster dissemination of research in these areas through extension and technology transfer.

Objective 2.3: Develop sensor-based technologies for production, transportation, storage, and processing of agricultural, food, and other biological products.

Strategies:

- Hire new tenure-track faculty with expertise in biosensors and other cutting-edge technologies.
- Recruit high-quality graduate students to work in sensor research.

- Collaborate in the campus-wide focus on sensor technologies.
- Seek and secure extramural funds to support sensor-based research.
- Establish partnerships internally and off-campus to enhance research in these areas.
- Foster dissemination of research in these areas through extension and technology transfer.

Objective 2.4: Develop systems for managing, processing, and reusing wastes from the animal agriculture and food processing industries.

Strategies:

- Hire new tenure and non-tenure track faculty to develop new and explore existing technologies for process waste recovery and reuse.
- Pursue extramural funding from industry, private sources, and state and federal agencies.
- Assist industrial partners in developing and maintaining processes that generate minimal waste.
- Identify existing process waste streams with potential value in reutilization.

Objective 2.5: Maintain quality, ensure safety, and enhance value of food and agricultural products.

Strategies:

- Hire tenure and non-tenure track faculty to develop critical programs in food and agricultural product safety and quality.
- Develop and implement outreach educational programs in food safety, quality, and value-added processing and management activities.
- Maintain state-of-the-art pilot plant and capabilities to perform product/process testing and validation.
- Secure extramural funding for research programs in food safety, and value-added processing and management activities.
- Investigate new uses for underutilized agricultural commodities.

Objective 2.6: Develop bioconversion technologies and processes that utilize biomass to produce liquid fuel and other value-added products.

Strategies:

- Hire tenure and non-tenure track faculty to address critical research needs in feedstock harvesting and processing, gasification, and microbial catalyst conversion processes.
- Expand scope of gasification research as part of the Biobased Products and Energy Center (BioPEC) through the evaluation and conversion of non-traditional feedstocks.
- Establish sustainable, competitive funding from federal agencies.
- Develop partnerships with bio-based companies.

Goal 3: Enhance the economic vitality, natural resource base, and quality of life for Oklahoma's citizens.

Critical Success Factors:

- Average of 8 educational products per extension faculty FTE per year
- Average of \$75,000 in annual grant and contract expenditures per extension faculty FTE
- 100% of extension faculty collaborating on multidisciplinary project teams

Objectives:

Objective 3.1: Provide technical assistance and educational programs to agricultural producers and businesses, and the food and value-added agricultural products industry, in order to improve production efficiency and profitability.

Strategies:

- Contribute to multidisciplinary extension educational meetings.
- Provide an annual continuing educational workshop to health care professionals enabling them to provide better assistance to farmers and ranchers who have a disability.
- Develop continuous improvement workshops for producers of food and agricultural products.
- Publish fact sheets designed to solve specific problems and answer common questions in the food and agricultural products industry.
- Establish an annual award to recognize commercial food and agricultural product processors for efforts in continuous improvement processes and to encourage industry-wide growth.

Objective 3.2: Assist small manufacturers by providing strategic engineering assistance to optimize existing operations and develop and introduce new products.

Strategies:

- Develop outreach educational programs in process optimization, continuous quality improvement, and optimization.
- Meet with processors and manufacturers and provide individual coaching to help with new product concepts and design, improve operations, and increase competitiveness.
- Provide engineering services to small manufacturers through the Applications Engineering program and in cooperation with the Oklahoma Alliance for Manufacturing Excellence.
- Develop prototype products or processes for manufacturing, in cooperation with the New Product Development Center and the Food and Agricultural Products Research and Technology Center.

Objective 3.3: Develop and disseminate quantitative tools to assist decision makers in agricultural production, value-added processing, and natural resources management.

Strategies:

- Utilize the Oklahoma Mesonet to develop and provide weather or soil-based decision-support tools for Oklahoma agricultural production and natural resources management.
- Increase access to and use of Mesonet products on the Oklahoma AgWeather web site through extension, promotion, and collaborative efforts.
- Develop a quantitative Phosphorus Index for pasture systems for nutrient impaired watersheds in eastern Oklahoma.
- Develop decision support systems to address water quality impairment from point and nonpoint sources incorporating environmental, social and economic factors.
- Maintain and expand decision support resources available on the department's web site.

Objective 3.4: Provide education and training to address environmental and natural resource management issues for agricultural producers and business operators.

Strategies:

- Conduct extension seminars on the use of Oklahoma Mesonet products as management tools in agricultural production and natural resources management.
- Support management programs in wildland fire, smoke and odor dispersal, and pesticide application through educational programs highlighting Mesonet products.

Objective 3.5: Provide educational programs to residents, communities, and agencies dealing with infrastructure issues such as private, domestic, water and wastewater systems; solid waste management; farmstead planning; and urban-fringe agriculture.

Strategies:

- Work with municipal officials and various organizations to enhance water conservation and improve water quality.
- Conduct extension educational meetings on private wellhead protection, domestic water and wastewater system maintenance, and farmstead pollution prevention.
- Update the Plans and Building Information web site as new farmstead planning information becomes available and maintain expertise to address specific facility issues.

Objective 3.6: Provide educational programs and professional development opportunities for Cooperative Extension staff, secondary teachers, and other clientele.

Strategies:

- Provide in-service training in engineering-related subjects for Cooperative Extension staff and faculty.
- Provide a workshop suitable for in-service training of public school teachers.
- Provide water-related training (drinking water, waste water treatment, pollution control) annually as a Cooperative Extension in-service.

Goal Four: Recruit, retain, and develop faculty and staff who reflect diversity, possess appropriate expertise, and display outstanding productivity.

Critical Success Factors:

- 20 tenure-track faculty
- Pursue any special opportunities for recruiting women and ethnic minorities for faculty positions
- Average of 0.5 FTE hard-funded support professional per tenure-track faculty FTE
- 80% of eligible faculty registered as Professional Engineers
- 75% of faculty providing service to national organizations (committees, conferences, etc.)
- 50% of faculty having been awarded national or international recognition
- 75% of staff participating in a professional development activity each year

Objectives:

Objective 4.1: Increase the number of tenure-track faculty to meet critical needs in instruction, research, and extension.

Strategies:

- Identify state needs and develop constituent support for meeting those needs.
- Leverage relationships with commodity groups, alumni, etc., and keep them informed of departmental needs.
- Develop active partnerships with on-campus centers and departments to establish mutually beneficial faculty positions.
- Cultivate administrative support in the hiring of new faculty to meet critical needs.
- Maintain a climate that respects and values diversity.

Objective 4.2: Establish at least one endowed faculty chair or professorship.

Strategies:

- Generate support for endowed professorships in focus areas of Biosystems Engineering.
- Access University, state and national resources for diversity-enhancing endowments.
- Provide departmental support to help faculty succeed in receiving enriched professorships; i.e., Sarkeys, Sitlington, etc.

Objective 4.3: Enhance faculty productivity by increasing the number of support professionals.

Strategies:

- Pursue creative avenues for establishing and supporting professional staff positions.

- Enhance the image of the department through proactive advertising of departmental programs, facilities, and faculty.

Objective 4.4: Achieve equitable and competitive compensation packages for faculty and staff.

Strategies:

- Determine competitive faculty and staff compensation for peer groups.
- Promote improvement of fringe benefits for faculty and staff.
- Provide mechanisms for enhancing faculty salaries through royalties, consulting, etc.

Objective 4.5: Encourage and facilitate professional development by faculty and staff.

Strategies:

- Encourage and facilitate faculty sabbaticals or extended study leaves.
- Ensure compensation for participation by staff in professional development activities.
- Maintain a critical mass of support professionals to ensure continuity when staff members participate in professional development.
- Encourage those faculty who are eligible to become a Professional Engineer to take steps toward professional registration.
- Encourage faculty and staff participation in beneficial seminars and workshops.
- Develop departmental policy to encourage faculty to provide seminars based on professional activities.

Goal Five: Provide the physical infrastructure and fiscal resources necessary to support programs of excellence in instruction, research, and extension.

Critical Success Factors:

- Adequate office space to reasonably accommodate all faculty, staff, and graduate students
- Average investment of \$100,000 annually in purchases of computers and other equipment eligible to be inventoried
- Increase endowments and annual giving by 50% over 5 years

Objectives:

Objective 5.1: Provide sufficient, quality space to support the work of faculty, staff, and students.

Strategies:

- Provide individual desk space for all Biosystems and Agricultural Engineering graduate students.
- Provide a larger study room for undergraduate students.
- Improve and expand office space for research engineers and post-docs.
- Develop justification, and work with the administration to obtain more floor space in Ag Hall.
- Engage in dialogue with the Physical Plant regarding exterior appearance upgrades to the BAE Lab in light of recent campus improvements in the area (i.e., Colvin Center, outdoor track renovation).

Objective 5.2: Maintain and upgrade laboratory and classroom facilities.

Strategies:

- Solicit an industrial engineer (e.g., senior design project) to perform a space analysis of the BAE Lab.
- Install multimedia equipment in 122 Ag Hall.
- Upgrade audiovisual/teleconferencing facilities in 225 Ag Hall.
- Develop a new teaching laboratory/classroom facility at the BAE Lab.

Objective 5.3: Provide the equipment resources necessary to conduct cutting-edge instruction, research, and extension.

Strategies:

- Strive to maintain adequate levels of student tech fees to meet needs in engineering.
- Negotiate agreements and licenses for specialty software that students can purchase using their own resources.

- Identify companies, agencies, and individuals interested in supporting departmental research, extension and educational equipment needs.
- Enlist the support of the Biosystems and Agricultural Engineering Advisory Committee in developing strategies for obtaining additional resources.

Objective 5.4: Develop and implement a comprehensive program to encourage private gifts from alumni and friends.

Strategies:

- Form a new Biosystems and Agricultural Engineering departmental committee for fundraising.
- Review fundraising strategies used by departments at OSU and other institutions.
- Identify and cultivate a major benefactor for the department.
- Host alumni events such as an OSU reunion at the annual ASAE International Meeting and a fall tailgate social.
- Target key individuals or groups for support of scholarships, endowed chairs, etc.
- Identify companies that match employer contributions, and publicize accordingly.
- Cultivate relationships with industries that are especially interested in the department's programs.