Biosystems Engineering Undergraduate Student Handbook

Department of Biosystems Engineering
College of Agriculture
Samuel Ginn College of Engineering
Auburn University
Welcome.

It is my pleasure to welcome you to the Department of Biosystems Engineering at Auburn University. I am glad that you have chosen to be part of the profession that develops solutions to the challenges of providing essentials of life such as safe and plentiful supply of food and fiber, clean water to drink, renewable fuels and alternative energy sources, and safe and healthy environment. Our goal is to prepare students to become successful engineers, and to provide a family environment for all students in the department.

This handbook was developed to guide you in your journey through the undergraduate program in the department. My advice is that you use the handbook as often as possible (preferably once a semester) to check and reflect on your progress towards your professional and personal goals. Even though you will encounter several non-academic distractions around you as a college student, I will encourage you to make the best use of this opportunity you have to obtain a college degree. This will involve you making tough decisions not to be involved in as many extracurricular activities as your non-engineering friends. However, I want to assure you that your success is very important to us. If you have any questions, feel free to stop by my office in Room 209 Corley Building. Also, I will appreciate it if you could send comments/suggestions for improvements to this handbook to Jon Davis at jnd0026@auburn.edu

Finally, I sincerely wish you the best of luck as you progress through college life.

Again, welcome to the Department. War Eagle!

- Dr. Oladiran Fasina
Purpose of the Handbook

The purpose of this handbook is to be a guide for undergraduates during their time in the Biosystems family. Students are encouraged to keep a copy (print, digital, or both) with them. It should serve as a starting point for information on matters of academic policies, student activity, student conduct, contact information, who to see for what, curriculum information, and many other items.

How to Use this Handbook

This document contains links to internet sources; feel free to follow the links where more detailed information can be located. Be sure to check the Frequently Asked Questions and Quick Reference Guide — they will help you locate more information on those topics. This document is searchable! Just hit ctrl+F (command+F for Mac users) and type your search term — i.e. “Advising” or “Grade Adjustment.” There is also an index at the end of the handbook.

Disclaimer

This handbook is not meant to replace the policies, rules, regulations, etc. governing student activity while enrolled at Auburn University. This handbook is formatted with links to these policies, rules, and regulations. For specific questions regarding policy, advising, grades, regulations, rules, etc. please consult with your academic advisor.

Thanks and acknowledgement: Thanks to Amber Denham, Joy Brown, Genta Stanfield, and Dr. Fasina for providing editing, photos, and feedback on the content of the handbook. Thanks also to the Biosystems faculty who gave quality input and feedback on the content, style, and format of the handbook.

If you have questions or comments regarding this handbook, please contact Jon Davis (jnd0026@auburn.edu) 334-844-3509.
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ABOUT BIOSYSTEMS ENGINEERING

Founded in 1919, the Biosystems Engineering (BSEN) department works with both the College of Agriculture (CoAg) and the Samuel Ginn College of Engineering (COE) to deliver quality education in four main areas: bioenergy and bioproducts, ecological engineering, food and biological engineering, and production and process engineering.

Biosystems engineers ensure that we have the necessities of life: safe and plentiful food to eat, pure water to drink, clean fuel and energy sources, and a safe, healthy environment in which to live. Biosystems Engineers at Auburn apply engineering to problems and opportunities presented by living things and the natural environment. For more on the history of BSEN, click here.

Mission

The mission of the Biosystems Engineering Department is to develop and disseminate engineering knowledge to solve problems in biological systems, natural resources, and the environment. This mission supports economic development, sustainability and improved quality of life for the citizens of Alabama.

Vision

Our faculty and staff endeavor to be recognized nationally for excellence and for the impact that the Department makes through its work.

We are committed to:

- Offering an excellent student experience.
- Focusing on stakeholder needs.
- Providing a family environment for students, staff, and faculty.
- Fostering a collegial work experience for faculty and staff.

Quick Facts about Biosystems

- Biosystems Engineers develop solutions to challenges faced society in relation to the environment and natural resources, biological systems, agriculture, food and forestry.
- Biosystems Engineering has three pathways to help you meet your career goals-Biosystems Engineering, Ecological Engineering and Forest Engineering.
- Biosystems Engineering is an increasingly visible discipline that addresses basic global needs.
- Biosystems Engineering is an ABET-accredited engineering degree.
- Biosystems Engineering has a great “family” environment; students and faculty all know each other and work closely and our class sizes are small enough that faculty are always available to mentor students.
- Biosystems Engineering has 38% female students; the highest proportion of any engineering program at Auburn University.
About the College of Agriculture

The College of Agriculture traces its roots back to 1872 with the establishment of the Alabama Agricultural and Mechanical College as a land-grant college. Throughout its history, the college has helped advance Alabama’s agricultural economy while improving the nutrition, health and standard of living for all citizens.

The College of Agriculture has eight departments, 11 undergraduate majors, 23 focus areas and a range of multidisciplinary programs.

About the Samuel Ginn College of Engineering

Auburn University has been offering engineering courses since 1872 and has a long and rich tradition of excellence in engineering education. The Samuel Ginn College of Engineering, the state’s most prestigious engineering program, produces more than one third of Alabama’s engineering graduates and is consistently ranked among the highest public universities offering doctoral programs.

As a major presence in engineering education, you can expect excellent academic, research and outreach programs; computer and laboratory facilities that are second to none; and a world-class faculty. With a dynamic and innovative research program, as well as eight departments offering 12 academic programs, the college is recognized as a major contributor to the region’s economic development and industrial competitiveness.

About Auburn University

Auburn University has developed into one of the largest universities in the South, remaining in the educational forefront with its traditional blend of arts and applied science and changing with the needs of today while living with a respect for the traditions and spirit that are Auburn. Follow the links below to learn more about Auburn University:

Quick Facts  Auburn History  Visitors’ Guide  Traditions  Vision

Algae and aquaponics research  REU poster presentation
OBJECTIVES & OUTCOMES FOR BSEN STUDENTS

Educational Objectives

The educational objectives of the Biosystems Engineering instructional programs are to produce graduates that can:

• Identify and solve engineering problems such as those associated with the environment and natural resources, and the production, processing, storage, manufacture, utilization and recycling of biological products;
• Develop and implement solutions to current and future challenges that combine engineering and biological sciences;
• Develop and implement sustainable, safe and practical design solutions to domestic and international challenges; and
• Use their Biosystems Engineering training to provide leadership in professional, societal and global issues; communicate technical issues effectively; practice in a professional and ethical manner; and transition to other professional careers such as medicine, law, business and management.

Desired Student Outcomes

The Biosystems Engineering degree program promotes the competencies and abilities, within the context defined by the Biosystems Engineering program objectives, which allow students to:

• Apply knowledge of mathematics, science, and engineering;
• Design and conduct experiments, as well as analyze and interpret data;
• Design a system, component, or process to meet desired needs;
• Function on multi-disciplinary teams;
• Identify, formulate, and solve engineering problems;
• Understand professional and ethical responsibility;
• Communicate effectively;
• Gain a broad education necessary to understand the impact of engineering solutions in a global and societal context;
• Recognize the need for, and an ability to engage in life-long learning;
• Gain knowledge of contemporary issues; and
• Use the techniques, skills, and modern engineering tools necessary for engineering practice.
Where do I fit in?

A common question among Biosystems students is “Where do I fit in – Engineering or Agriculture?” The answer is simple – both! As a BSEN major you enjoy access to the resources and communities of both Colleges! This means you can participate in a wider range of activities and have a broader base of support. It allows you to get involved in both colleges, or select the one where you feel most comfortable.

You are eligible for scholarships in both colleges, can participate in student organizations of both colleges, and can be awarded honors and awards from both.

***Remember, however, that all advising is handled within the Samuel Ginn College of Engineering (through your faculty advisor and the Engineering Student Services office)
UNDERGRADUATE PROGRAM & CURRICULUM MODELS

The department is truly an interdisciplinary unit with academic programs housed in the Samuel Ginn College of Engineering, and research and extension programs housed in the College of Agriculture. Three curriculum pathways (biosystems engineering pathway, ecological engineering option, and forest engineering option) are used to prepare graduates for productive professional careers in biosystems industries and related natural resource and environmental systems sectors. More information about each of the three pathways can be found below. Prospective students apply for admission through Samuel Ginn College of Engineering and complete the Pre-Biosystems Engineering, Pre-Ecological Engineering, or Pre-Forest Engineering program.

The Biosystems Engineering degree program is accredited by the Engineering Accreditation Commission of ABET, and is the only accredited Biosystems Engineering in Alabama.

Download the Biosystems Undergraduate Brochure

Biosystems Engineering

The Biosystems Engineering pathway emphasizes application of engineering to biological systems and natural resources, and is built on a strong foundation of biological sciences in addition to traditional chemistry and physics topics. Students in the Biosystems engineering pathway complete the full set of basic engineering courses required of all disciplines in the College of Engineering. Students obtain additional training in process engineering for biological materials; environmental engineering for treatment and processing of biological wastes; environmental control systems for agricultural production facilities; structural analysis and design; soil and water resources engineering; and design of machine systems and mobile equipment.

Download the Biosystems Curriculum Model (pdf)

Download the Biosystems Curriculum Flowchart (pdf)

Download the Biosystems Engineering Career Fact Sheet (pdf)

Download the “Strategies for a Successful Biosystems Engineering Career” (pdf)

E-Day demonstration
**CURRICULUM FOR BIOSYSTEM ENGINEERING (BSEN) PATHWAY**

### FRESHMAN YEAR

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<thead>
<tr>
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<tr>
<td>COMP 1200</td>
<td>Intro to Computing</td>
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</tr>
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<td>MATH 1610</td>
<td>Calculus I</td>
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<tr>
<td>CHEM 1030</td>
<td>Chemistry I</td>
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<td>CHEM 103I Lab</td>
<td>Chemistry I Lab</td>
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<td>ENGR 1110</td>
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<td>ENGL 1120 English Composition I</td>
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### SOPHOMORE YEAR

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<td>BSEN 2210</td>
<td>Engng Methods for Biosystems</td>
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<tr>
<td>ENGR 2010</td>
<td>Thermodynamics</td>
<td>3</td>
</tr>
<tr>
<td>MATH 2630</td>
<td>Calculus III</td>
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<tr>
<td>BIOL 1020</td>
<td>Principles of Biology</td>
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<td>BIOL 3200 Microbiology</td>
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<tr>
<td>CSES 2040 Basic Soil Science</td>
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<tr>
<td>BSEN 3230 Natural Resource Conserv Engng</td>
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<tr>
<td>BSEN 3240 Process Engng in Biosystems</td>
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<tr>
<td>BSEN 3610 Instrumentation &amp; Controls Biosys.</td>
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<tr>
<td>STAT 3010 Statistics for Engineers &amp; Scientists</td>
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<tr>
<td>Social Science Core+</td>
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### JUNIOR YEAR

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<tr>
<td>BSEN 3230 Natural Resource Conserv Engng</td>
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<tr>
<td>BSEN 3240 Process Engng in Biosystems</td>
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<td>BSEN 3610 Instrumentation &amp; Controls Biosys.</td>
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### SENIOR YEAR

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<td>BSEN 3210 Mechanical Power for Biosystems</td>
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<tr>
<td>BSEN 5220 Geospatial Tech for Biosys</td>
<td></td>
<td>3</td>
</tr>
<tr>
<td>BSEN 4210 Irrigation Systems Design</td>
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<tr>
<td>BSEN 4300 Prof. Practice in Biosys Engng.</td>
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<tr>
<td>Biosystems Engineering Elective</td>
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<td>PHIL 1020/1040</td>
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<tr>
<td>BSEN 5230 Waste Management &amp; Utiliz Engng.</td>
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<tr>
<td>BSEN 4310 Engn Design for Biosystems</td>
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<tr>
<td>BSEN 4250 Hydraulic Control Design</td>
<td></td>
<td>3</td>
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<tr>
<td>BSEN 5270 Metabolic Engineering for Bioprocess</td>
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<td>3</td>
</tr>
<tr>
<td>BSEN 5450 Commercial Poultry and Livestock Housing</td>
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<td>3</td>
</tr>
<tr>
<td>FOEN 5230 Engineered Wood Structures</td>
<td></td>
<td>3</td>
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<tr>
<td>BSEN 4250 Hydraulic Control Systems Design</td>
<td></td>
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<tr>
<td>BSEN 5260 Renewable Energy Engineering in Biosys</td>
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<tr>
<td>INSY 3600 Engineering Economy</td>
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<tr>
<td>CIVL 3310 Geotechnical Engineering l</td>
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<tr>
<td>CIVL 3230 Introduction to Environmental Engineering</td>
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<td>3</td>
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<tr>
<td>BSEN 5280 Life Cycle Assessment for Biological Sys</td>
<td></td>
<td>3</td>
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<tr>
<td>BSEN 5250 Deterministic Modeling for Biosystems</td>
<td></td>
<td>3</td>
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<td><strong>Total: 17</strong></td>
<td><strong>Total: 15</strong></td>
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</tbody>
</table>

**Total of 126 SEMESTER HOURS**

*The AU Bulletin lists the University Core Curriculum requirements for students in the College of Engineering. Students must complete a sequence in either Literature or History. Students should complete the **World History or Tech and Civ Course sequence** to ensure that all SLOs are met. + **ECON 2020 preferred.**

Approved course electives

<table>
<thead>
<tr>
<th>Approved Course Electives</th>
<th>Approved Course Electives</th>
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<tr>
<td>FOEN 5230 Engineered Wood Structures</td>
<td>BSEN 4250 Hydraulic Control Systems Design</td>
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<tr>
<td>BSEN 5540 Biomass and Biofuels Engineering</td>
<td>BSEN 5260 Renewable Energy Engineering in Biosys</td>
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<tr>
<td>BSEN 5510 Ecological Engineering</td>
<td>INSY 3600 Engineering Economy</td>
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<tr>
<td>BSEN 5560 Site Design for Biosystems</td>
<td>CIVL 3310 Geotechnical Engineering l</td>
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<td>BSEN 4250 Hydraulic Control Design</td>
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<td>BSEN 5250 Deterministic Modeling for Biosystems</td>
</tr>
</tbody>
</table>

**Only academic advisors in Student Services may mark on this curriculum sheet. Other marks or alterations of this document could result in delayed graduation.**
Ecological Engineering Option

The ecological engineering option was developed to meet a growing demand for engineers with the ability to solve environmental problems using knowledge of natural ecological and biological principles. This option therefore provides more emphasis on the use of engineering to preserve and enhance our environmental and natural resources. Ecological engineering option students complete the full set of basic engineering courses required of all disciplines in the College of Engineering. Students obtain additional training in unique ecological engineering courses such as watershed modeling, site design, ecological engineering, environmental engineering, and GPS/GIS. Students are also required to take an additional ecology elective beyond the basic Biosystems Engineering curriculum. Learning areas include:

- Non-point source pollution
- Watershed modeling
- Stream and river restoration
- Natural resource conservation

Download the Ecological Engineering Option Curriculum Model (pdf)
Download the Ecological Engineering Option Curriculum Flowchart (pdf)
Download the Ecological Engineering Career Fact Sheet (pdf)
Download the “Strategies for a Successful Biosystems Engineering Career” (pdf)

3D printing for algae research with Dr. Blersch
## CURRICULUM FOR ECOLOGICAL ENGINEERING OPTION

### FRESHMAN YEAR

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<td>COMP 1200</td>
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<td>MATH 1610</td>
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<td>CHEM 1030</td>
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<td>CHEM 1031</td>
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<td>ENGL 1100</td>
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<td>ENGR 1100</td>
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**Total**: 16 semester hours

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<td>MATH 2630</td>
<td>Calculus III</td>
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</tr>
<tr>
<td>BIOL 1020</td>
<td>Principles of Biology</td>
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<tbody>
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<td>Natural Resource Conserv Engng</td>
<td>3</td>
</tr>
<tr>
<td>BSEN 3610</td>
<td>Instrumentation &amp; Controls Biosys</td>
<td>3</td>
</tr>
<tr>
<td>CSES 2040</td>
<td>Basic Soil Science</td>
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</tr>
<tr>
<td>BIOL 3200</td>
<td>Microbiology</td>
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<tr>
<td>STAT 3010</td>
<td>Statistics for Engineers &amp; Scientists</td>
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**Total**: 16 semester hours

### SENIOR YEAR

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<tr>
<td>BSEN 5510</td>
<td>Ecological Engineering</td>
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<tr>
<td>BSEN 5560</td>
<td>Site Design for Biosystems</td>
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<tr>
<td>BSEN 5220</td>
<td>Geospatial Tech for Biosys</td>
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<td>BSEN 4300</td>
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<tr>
<td>Ecology Elective</td>
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</table>

**Total**: 17 semester hours

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Total of 127 SEMESTER HOURS

*The AU Bulletin lists the University Core Curriculum requirements for students in the College of Engineering. Students must complete a sequence in either Literature or History. Students should complete the World History or Tech and Civ Course sequence to ensure that all SLOs are met.

+ ECON 2020 preferred.

Approved Electives

<table>
<thead>
<tr>
<th>Ecological Engineering electives (one of the following)</th>
<th>Ecology Electives (one of the following)</th>
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<tbody>
<tr>
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<td>CIVL 4210 Water and Wastewater Treatment and Design</td>
<td>BIOL 5700 Applied and Environmental Biology</td>
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<tr>
<td>INSY 3600 Engineering Economy</td>
<td>CSES 5060 Soil Microbiology</td>
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<tr>
<td>BSEN 4210 Irrigation Systems Design</td>
<td>CSES 5080 Soil Resources and Conservation</td>
</tr>
<tr>
<td>BSEN 5260 Renewable Energy Engineering in Biosystems</td>
<td>CSES 5000 Soils and Environmental Quality</td>
</tr>
<tr>
<td>BSEN 5540 Biomass and Biofuels Engineering</td>
<td>FORY 4230 Forest Ecology</td>
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<tr>
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<td>FISH 5320 Limnology</td>
</tr>
</tbody>
</table>

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Forest Engineering Option

The Forest Engineering option at Auburn, the only one of its kind in the South, has evolved through more than two decades of cooperation between Auburn’s Samuel Ginn College of Engineering and the School of Forestry and Wildlife Sciences. The focus of the Forest Engineering option is to prepare students that can solve engineering problems in forest ecosystems and in the forest products industry. The option is administered by the Department of Biosystems Engineering and students enroll in the College of Engineering. Graduates are eligible for registration as Professional Engineers, and may also become registered foresters upon completion of a minor in forest resources. In addition to completing the full set of engineering fundamentals courses, forest engineering students obtain additional specialization in process engineering for forest products; structural design using engineered wood products; land and water conservation engineering; design of forest roads and transportation systems; and design of forest machine systems and mobile equipment. Students in the program also take courses in ecology, biology, silviculture, mensuration, economics, forest management, and forest operations. Education as both an engineer and a forester gives the forest engineer a broad selection of career opportunities.

Download the Forest Engineering Option Curriculum Model (pdf)
Download the Forest Engineering Option Curriculum Flowchart (pdf)
Download the Forest Engineering Career Fact Sheet (pdf)
Download the “Strategies for a Successful Biosystems Engineering Career” (pdf)

Dr. Adhikari holds a pine seedling
### CURRICULUM FOR FOREST ENGINEERING OPTION

#### FRESHMAN YEAR

<table>
<thead>
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<tbody>
<tr>
<td>COMP 1200</td>
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<tr>
<td>CHEM 1031</td>
<td>Chemistry 1 Lab</td>
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<td>*Tech &amp; Civilization I or World History I</td>
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<td><em>(Note: Choose one from the offered courses)</em></td>
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<td>MATH 1620</td>
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**Total: 16 credits**

#### SOPHOMORE YEAR

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<td>ENGR 2010</td>
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<td>ENGR 2050</td>
<td>Statics</td>
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<td>MATH 2630</td>
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<td>BIOL 1020</td>
<td>Principles of Biology</td>
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<td>ENGR 2350</td>
<td>Dynamics</td>
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<tr>
<td>ENGR 2070</td>
<td>Mechanics of Materials</td>
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<tr>
<td>STAT 3010</td>
<td>Statistics for Engineers &amp; Scientists</td>
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<tr>
<td>MATH 2650</td>
<td>Linear Differential Equations</td>
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<td>FORY 3020</td>
<td>Forest Biology</td>
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<td>FORY 3050</td>
<td>Field Mensuration</td>
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<td>Forest Management</td>
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<td>BSEN 3210</td>
<td>Natural Resource Conserv Engng</td>
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<td>BSEN 3310</td>
<td>Hydraulic Transport in Biosys</td>
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<td>FORY 3100</td>
<td>Dendrology</td>
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<tr>
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**Total: 16 credits**

#### SUMMER PRACTICUM

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<tr>
<td>FORY 3020</td>
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**Total: 16 credits**

#### JUNIOR YEAR

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<td>BSEN 3310</td>
<td>Hydraulic Transport in Biosys</td>
<td>4</td>
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<tr>
<td>FORY 3100</td>
<td>Dendrology</td>
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<tr>
<td>FORY 3180</td>
<td>Measurements I</td>
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<td>Geotechnical Engng 1</td>
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<tr>
<td>BSEN 4300</td>
<td>Professional Pract in Biosys Eng.</td>
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<tr>
<td>FORY 5710</td>
<td>Timber Harvesting Methods#</td>
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<tr>
<td>FORY 5230</td>
<td>Silviculture</td>
<td>4</td>
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<td>BSEN 4310</td>
<td>Engng Design for Biosystems</td>
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<td>PHIL 1020/1040</td>
<td>Ethics</td>
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**Total: 13 credits**

#### SENIOR YEAR

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<tr>
<td>BSEN 5560</td>
<td>Site Design for Biosys</td>
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<td>FORY 5230</td>
<td>Silviculture</td>
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<tr>
<td>BSEN 4310</td>
<td>Engng Design for Biosystems</td>
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<td>PHIL 1020/1040</td>
<td>Ethics</td>
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<td>BSEN 3610</td>
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<td>Professional Pract in Biosys Eng.</td>
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**Total: 12 credits**

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**Total 127 SEMESTER HOURS**

*The AU Bulleting lists the University Core Curriculum requirements for students in the College of Engineering. Students must complete a sequence in either Literature or History. Students should complete the World History or Tech and Civ Course sequence to ensure that all SLOs are met.

+ **ECON 2020 preferred.** ; #Course is only offered every other even years

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**Approved Electives**

- BSEN 3610 Instrumentation and Controls in Biosystems
- BSEN 5230 Engineered Wood Structures
- BSEN 5540 Biomass and Biofuels Engineering
- BSEN 5550 Ecological Engineering
- BSEN 5560 Site Design for Biosystems
- BSEN 3240 Process Engineering in Biosystems
- BSEN 5230 Waste Management Utilization
- BSEN 4250 Hydraulic Control Systems Design
- BSEN 5260 Renewable Energy Engineering in Biosystems
- INSY 3600 Engineering Economy

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Bioprocess Engineering Option (pending)

[pending]
UNDERGRADUATE COURSES AND DESCRIPTIONS

ENGR 1110 INTRODUCTION TO BIOSYSTEMS ENGINEERING (2) LEC. 1. LAB. 3. Introduction to engineering design, engineering teams, graphical presentation, technical writing, oral presentation. May count either ENGR 1110 or ENGR 1113.

BSEN 2210 ENGINEERING METHODS FOR BIOLOGICAL SYSTEMS (2) LEC. 1. LAB. 3. Pr. (ENGR 1110 or ENGR 1113) and (PHYS 1600 or PHYS 1607) or Departmental approval. Introduction to experimental design methodology, basic engineering design and problem solving methodology for Biological Engineering. Visualization skills, computer-aided 3-D solid modeling of parts, 3-D assembly of solid part geometries, computation of mass properties, 2-D engineering drawings, engineering design process, safety, tools and fabrication processes and design, and hands-on shop fabrication of semester project.

BSEN 2240 BIOLOGICAL AND BIOENVIRONMENTAL HEAT AND MASS TRANSFER (3) LEC. 3. Pr. (MATH 2630 or MATH 2637) and (PHYS 1600 or PHYS 1607) and P/C ENGR 2010. Basic principles of heat and mass transfer with special applications to biological and environmental systems. Introduction to steady state and transient heat conduction. Convection, radiation, diffusion, simultaneous heat and mass transfer, and generation and depletion of heat and mass in biological systems.

BSEN 3210 MECHANICAL POWER FOR BIOSYSTEMS (3) LEC. 2. LAB. 3. Pr. ENGR 2010 and MATH 2650 and P/C ENGR 2350. Basic engineering analysis, synthesis, and design concepts applied to power sources, mobile equipment, and machinery applications for agricultural, forestry, and natural resource systems.

BSEN 3230 NATURAL RESOURCE CONSERVATION ENGINEERING (3) LEC. 2. LAB. 3. Pr. BSEN 3310. Departmental approval. Engineering analysis applied to natural resource systems. Design principles and practices in rainfall-runoff relationships, soil erosion and its prediction and control, hydraulic structures, and open channel hydraulics.

BSEN 3240 PROCESS ENGINEERING IN BIOSYSTEMS (3) LEC. 2. LAB. 3. Pr. BSEN 2240. Departmental approval. Theory and application of process operations in biological, food and agricultural systems. Heat transfer, fluid flow, thermal processing, evaporation, psychrometrics, refrigeration, drying freezing.

BSEN 3260 ENGINEERING FOR PRECISION AGRICULTURE AND FORESTRY (3) LEC. 2. LAB. 3. Pr. ELEC 3810 and MATH 2650. Departmental approval. Engineering aspects of spatial technologies applied to agricultural and forest production. Data collection in the field using GPS and use of field data in site specific applications. Fall.

BSEN 3310 HYDRAULIC TRANSPORT IN BIOLOGICAL SYSTEMS (4) LEC. 3. LAB. 3. Pr. (ENGR 2050 or ENGR 2053) and MATH 2650 or Departmental approval. Fluid properties, Non-Newtonian fluids and biological systems, Fluid statics, Energy equation, mass and momentum balance, pipe flow for Newtonian and Non-Newtonian fluids, dimensional analysis, and compressible flows.

BSEN 3500 NATURAL RESOURCE SYSTEMS CONSERVATION (3) LEC. 2. LAB. 3. Pr. MATH 1130 or MATH 1133. Natural resource conservation technologies including rainfall-runoff relationships, sediment transport capacity, runoff control structures, water supply development, surveying techniques including GPS methods.

BSEN 3510 AGRICULTURAL POWER AND MACHINERY FUNDAMENTALS (3) LEC. 2. LAB. 3. Pr. MATH 1130 or MATH 1133. Power unit fundamentals with emphasis on diesel and small gasoline engines; mechanics of operation, safety, use, and adjustment of machines used for horticultural and agronomic crop production; and precision agriculture principles and technology.

BSEN 3530 AGRICULTURAL PRODUCTION AND PROCESSING FACILITY TECHNOLOGY (3) LEC. 3. Pr. MATH 1130 or MATH 1133. Fundamental requirements for the design and operation of agricultural production and processing facilities.
BSEN 3560 TURF SYSTEMS IRRIGATION DESIGN (3) LEC. 3. Pr. MATH 1130 or MATH 1133. Irrigation system design for turf-based systems including residential lawns, commercial properties, athletic fields, and golf courses. Irrigation scheduling and water demand are presented to provide management capabilities.

BSEN 3610 INSTRUMENTATION AND CONTROLS FOR BIOLOGICAL SYSTEMS (3) LEC. 2. LAB. 3. Pr. MATH 2650 and BSEN 2210. Departmental approval. Understanding of fundamentals of electrical circuits, sensing and sensors, simple digital electronics, analog measurement circuits, introductory digital signal processing, computer data acquisition.

BSEN 4210 IRRIGATION SYSTEM DESIGN (3) LEC. 2. LAB. 3. Pr. BSEN 3230. Departmental approval. Theory and design of irrigation systems for the application of water and wastewater including surveying techniques for system design. Systems include solid-set, traveler, center-pivot, and trickle. Fall.

BSEN 4240 BULK BIOLOGICAL SOLIDS BEHAVIOR AND PROCESSING (3) LEC. 2. LAB. 3. Pr. BIOL 1020 and STAT 2510. The course is designed to enable students to develop fundamental understanding of the properties of bulk biological solids and how these properties influence the behavior and processability of bulk solids.

BSEN 4250 HYDRAULIC CONTROL SYSTEMS DESIGN (3) LEC. 2. LAB. 3. Pr. BSEN 3310 or Departmental approval. Principles of energy transfer by means of fluid power. Design of hydraulic control systems using prime movers, valves, actuators, and accessories. Spring.

BSEN 4300 PROFESSIONAL PRACTICE IN BIOSYSTEMS ENGINEERING (2) LEC. 1. LAB. 3. Pr. BSEN 3230 and ENGR 2070 or Departmental approval. This course focuses on issues related to the professional practice of biological engineering including preparing students for transition to careers as professional engineers.

BSEN 4310 ENGINEERING DESIGN FOR BIOSYSTEMS (3) LEC. 1. LAB. 6. Pr. BSEN 4300. Departmental approval. Capstone design course in biosystems engineering emphasizing teamwork, communication, safety engineering, and economic analysis to complete an engineering design project. Spring.

BSEN 4960 SPECIAL PROBLEMS IN BIOSYSTEMS ENGINEERING (1-4) AAB/IND. Departmental approval. Faculty supervision of individual student investigations of specialized problems in biosystems engineering. May be repeated with change in problem. Course may be repeated with change in topics.

BSEN 4967 HONORS SPECIAL PROBLEMS (1-3) IND. Pr. Honors College. Course may be repeated for a maximum of 3 credit hours.

BSEN 4970 SPECIAL TOPICS IN BIOSYSTEMS ENGINEERING (1-4) LEC. Departmental approval. Individual or small group study of a specialized area in biosystems engineering. Course may be repeated for a maximum of 12 credit hours.

BSEN 4980 UNDERGRADUATE RESEARCH (2-4) IND. Departmental approval. Directed research in the area of specialty within the department. Course may be repeated for a maximum of 4 credit hours.

BSEN 4997 HONORS THESIS (1-3) IND. Pr. Honors College. Course may be repeated for a maximum of 3 credit hours.

BSEN 5220 GEOSPATIAL TECHNOLOGIES IN BIOSYSTEMS (3) LEC. 2. LAB. 3. Pr. STAT 2510 or STAT 2513 or STAT 2610 or STAT 3010 or CSES 2040 or CSES 2043 or AGRN 2040 or AGRN 2043 or Departmental approval. Geopatial technologies including GPS, GIS, and remote sensing systems applied to biosystems. Collecting, managing, and analyzing spatial data for agricultural and forest systems. Spring.

BSEN 5230 WASTE MANAGEMENT AND UTILIZATION FOR BIOSYSTEMS (3) LEC. 2. LAB. 3. Pr. CHEM 1040 and BIOL 3200 and P/C BSEN 3230. Introduction to animal waste management problems of confined production
systems, and characterization of animal waste types. Design of biological treatment and processing systems. Departmental approval. May count either BSEN 5230 or BSEN 6230.

**BSEN 5250 DETERMINISTIC MODELING FOR BIOSYSTEMS** (3) LEC. 3. LAB. 2. Pr. MATH 2650 and ELEC 3810 and (ENGR 2350 or MECH 2110) or Departmental approval. Modeling of biosystems, methods to deal with complexity, and validation tools. Spring.

**BSEN 5260 RENEWABLE ENERGY IN BIOSYSTEMS PROCESS OPERATIONS** (3) LEC. 2. LAB. 3. Pr. BSEN 3310. Application and use of renewable energy in biological, food, forest and agricultural systems including bioenergy, solar energy, wind power and geothermal. Departmental approval. May count either BSEN 5260 or BSEN 6260.

**BSEN 5270 METABOLIC ENGINEERING FOR BIOPROCESS** (3) LEC. 3. Pr. BIOL 3200 and CHEM 1040. Or with the consent of the instructor. Introduction of basic principles of bioprocess engineering and metabolic engineering, to prepare engineers and scientists for biotechnology and bioeconomy industries.

**BSEN 5280 LIFE-CYCLE ASSESSMENT FOR BIOLOGICAL SYSTEMS** (3) LEC. 2. LAB. 3. Pr. BSEN 2240. Departmental approval This course introduces the concept of life cycle assessment (LCA) in in the context of biological engineering. Examples will include LCA applications to engineered biological systems and other engineering processes and products.

**BSEN 5450 COMMERCIAL POULTRY & LIVESTOCK HOUSING** (3) LEC. 2. LAB. 3. An introduction to the basic design, operation, and maintenance of modern commercial animal housing systems. Emphasis will be placed on poultry and swine systems with elements of dairy and beef when applicable.

**BSEN 5510 ECOLOGICAL ENGINEERING** (3) LEC. 3. Pr. BSEN 3230. Ecological engineering non-point source transport of nutrients, sediment, pesticides, pathogens, and chemicals from agricultural, forestry, and urban activities. Departmental approval. May count either BSEN 5510 or BSEN 6510.

**BSEN 5520 WATERSHED MODELING** (3) LEC. 3. Pr. BSEN 5510. Modeling of non-point source pollution at watershed scale using Soil and Water Assessment Tool model including underlying processes that control movement of pollutants. Departmental approval. May count either BSEN 5520 or BSEN 6520.

**BSEN 5540 BIOMASS AND BIOFUELS ENGINEERING** (3) LEC. 2. LAB. 3. Pr. CHEM 1040 and MATH 2650 and BSEN 3310. This course introduces the various processes and engineering principles in converting biomass into biofuels and chemicals. The focus will be on thermochemical and biochemical conversion platforms. May count either BSEN 5540 or BSEN 6540.

**BSEN 5550 PRINCIPLES OF FOOD ENGINEERING TECHNOLOGY** (4) LEC. 3. LAB. 3. Pr. (MATH 1130 or MATH 1133 or MATH 1150 or MATH 1153 or MATH 1610 or MATH 1613 or MATH 1617) and (PHYS 1000 or PHYS 1007) or PHYS 1500 or (PHYS 1600 or PHYS 1607). Engineering concepts and unit operations used in processing food products. Fall.

**BSEN 5560 SITE DESIGN FOR BIOSYSTEMS** (3) LEC. 2. LAB. 3. Pr. BSEN 3230. Development of student skills in computer-aided site design and restoration by using rural and urban best management practices to reduce environmental impacts. Departmental approval. May count either BSEN 5560 or BSEN 6560.

**FOEN 3000 INTRODUCTION TO FORESTRY OPERATIONS** (1) LEC. 3, FLD/LEC. 32. Pr. FORY 3050 and FOPR 3390. Introduction to basic field operations in Forestry including site preparation and planting, harvesting and primary manufacturing processes relative to specific geographic locations. Four-day continuous field trip prior to spring or fall semester.

**FOEN 3040 FOREST SURVEYING** (2) PRA. 2. Basic land surveying concepts and procedures as applied to Forestry. Use of basic surveying instruments and calculations for land areas, boundaries, and topographic features. Summer.
FOEN 4730 APPLICATION OF TIMBER HARVESTING TECHNIQUES (2) LEC. 1. LAB. 3. Pr. FOEN 5700. Business considerations including safety, regulations, contracts, deeds and cost accounting and analysis combined with equipment operation and maintenance. Fall.

FOEN 4930 DIRECTED STUDIES (1-3) IND. Departmental approval. Faculty supervision of individual student investigations of specialized problems in forest engineering. Course may be repeated for a maximum of 6 credit hours.

FOEN 4967 HONORS SPECIAL PROBLEMS (1-3) IND. Pr. Honors College. Departmental approval. Topics of an undergraduate nature pertinent to Forest Engineering. Fall, Spring, and Summer. Course may be repeated for a maximum of 3 credit hours.

FOEN 4970 SPECIAL TOPICS (1-4) LEC. Departmental approval. Individual or small group study of a specialized area in forest engineering. Fall, Spring, and Summer. Course may be repeated for a maximum of 8 credit hours.

FOEN 4997 HONORS THESIS (1-6) IND. Pr. Honors College. Departmental approval. Directed research and Honors Thesis. Fall, Spring, and Summer. Course may be repeated for a maximum of 6 credit hours.

FOEN 5230 ENGINEERED WOOD STRUCTURE DESIGN (3) LEC. 2. LAB. 3. Pr. ENGR 2070. Load, deflection criteria; engineering characteristics of wood; designing wood components and mechanical connections; shear walls and diaphragms; trusses; bridges; post-frame construction. Fall.

FOEN 5700 HARVESTING (3) LEC. 2. LAB. 3. Pr. FORY 3180. Analysis of the administration of timber harvest, equipment choice, planning methods, movement of timber products, machine and system costs, balancing of harvesting systems, logging safety, and environmental impact. Spring.

FOEN 5710 TIMBER HARVESTING ANALYSIS METHODS (3) LEC. 2. LAB. 3. Pr. FOEN 3040. Analysis methods for timber harvesting productivity and costs including gathering of time and production data, preparation of data for analysis and statistical modeling. Spring.

Dr. Dougherty and seniors testing the courtyard basins for Lab BSEN 5560
PRE-REQUISITE FLOW CHARTS

Biosystems Engineering Pre-Requisites

Freshman
Fall
ENGL 1100
ENGR 1100
MATH 1610
CHEM 1030
HIST 1210
or
History
World
Sequence
Sophomore
Fall
ENGL 1120
ENGR 1110
COMP 1200
PHYS 1600
MATH 1620
HIST 1220
Sophomore
Spring
ENGR 2050
MATH 2650
ENGR 2010
BSEN 2240
BIOL 1020
BIOL 1030
Junior
Fall
BSEN 2210
ENGR 2070
MATH 2830
BSEN 2240
BIOL 1020
Junior
Spring
STAT 3010
ENGR 2350
CSES 2040
CHEM 1040
BIOL 3200
ECON 2020
Social
Science
Senior
Fall
BSEN 3310
BSEN 3610
BSEN 3230
BSEN 3240
BSEN 4210
BSEN ELECT
Senior
Spring
BSEN 5220
BSEN 3210
BSEN 4300
BSEN 4310
BSEN ELECT
Prerequisites
Prerequisites/
Co-requisites
Fine Arts
Literature
Forest Engineering Option Pre-Requisites

**Freshman Fall**
- ENGL 1100
- ENGR 1100
- MATH 1610
- CHEM 1030
- HIST 1210
- or History World Sequence

**Freshman Spring**
- ENGL 1120
- ENGR 1110
- COMP 1200
- PHYS 1600
- MATH 1620
- HIST 1220

**Sophomore Fall**
- BSEN 2210
- ENGR 2050
- MATH 2630
- ENGR 2010
- BIOL 1020

**Sophomore Spring**
- ENGR 2350
- ENGR 2070
- MATH 2650
- CHEM 1040/1041
- STAT 3010

**Summer Practicum**
- FORY 3020
- FORY 3050
- FORY 3060
- FOEN 3040

**Junior Fall**
- FORY 3100
- FORY 3180
- BSEN 3310
- CIVL 3310

**Junior Spring**
- Fine Art
- ECON 2020 Social Science
- BSEN 3230
- BSEN 3210

**Senior Fall**
- BSEN 5220
- BSEN 5560
- BSEN 4300
- FORY 5230
- FOEN 5710

**Senior Spring**
- PHIL 1020/1040
- Literature
- BSEN 4310
- FOEN ELECT

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Prerequisites

Prerequisites/Co-requisites
Bioprocess Engineering Option Pre-Requisites (pending)
CONTACT INFORMATION

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eplinbl@auburn.edu
BSEN STUDENT ORGANIZATIONS

American Society of Agricultural and Biological Engineers (ASABE)

Faculty Advisor: Timothy McDonald
Meetings: 2nd Tuesday of each month at 6:00 pm in 302 Corley
Annual Activities: Student Picnic (fall and spring), Ag Roundup, E-Day, Lawnmower Clinic

The goal of the ASABE (American Society of Agricultural and Biological Engineers) student branch at Auburn University is to promote the interest and involvement of students (pre-professionals) in ASABE, and to encourage the advancement of agricultural, biological, food, environmental, and ecological engineering. Agricultural, Food, and Biological Engineers develop efficient, effective, and environmentally sensitive techniques and methods of producing food, fiber, timber, and renewable energy sources for a growing world population. Also, the ASABE is designed to allow students to gain friendships, career opportunities, and public relations.

The Auburn ASABE student branch typically meets monthly in the Corley Building to discuss and plan upcoming events while participating in fun team development activities. As a member of ASABE, students have an opportunity to be involved in several engineering competitions. Through these competitions students develop skills such as design, teamwork, and apply knowledge obtained through engineering courses. Joining the ASABE would be beneficial to a student while pursuing an undergraduate degree.

For more information on joining the Auburn student branch of the ASABE call 334-844-3551 or email jnd0026@auburn.edu.

Quarter-Scale Tractor Team Competition

The Auburn student branch of the ASABE competes annually in the ASABE International Quarter Scale Tractor Design competition in Peoria, Illinois. The purpose of this competition is to promote teamwork, communication, technical writing and oral presentation skills. Teams are given a motor and a set of tires, the rest of the design and construction of the tractor is up to the team. Auburn ASABE students have been participating in the Quarter Scale competition since 2002. The value to students in participating in Quarter Scale is the experience of working on a...
team to solve a complex engineering problem, and presenting the solution in a professional environment. The competition consists of a formal presentation, pulling contest, maneuverability course, and a durability course.

The Auburn ASABE supports the quarter scale team by raising funds. To join the Quarter Scale team, one needs only to be a member of the student branch of ASABE. The Biosystems Department supports the Quarter Scale team by providing sponsorship, work spaces, tools, faculty guidance, transportation, and funding. For more information on the Quarter Scale tractor team, see Tim McDonald or Jon Davis.

**Lawnmower Clinic**

The ASABE Student chapter's annual fundraiser is the Lawnmower Clinic. ASABE students repair, clean, and generally prepare Auburn and Opelika residents' lawnmowers for spring and summer. For a small fee, residents can bring their lawnmower to be serviced. Mowers are serviced by replacing oil, checking spark plugs, sharpening blades, and basic tune-up for spring-summer use.

**E-Day**

E-Day is a yearly College of Engineering event providing middle and high school students the opportunity from Alabama and surrounding states to learn about the different engineering programs at Auburn University. The Biosystems engineering ASABE student branch members volunteer at departmental displays, visit with prospective students, and lead tour groups through the department facilities/programs.

**Alpha Epsilon (Delta Beta Chapter)**

Alpha Epsilon the Alabama Delta Beta Chapter at Auburn University is an honor society that promotes high ideals for the engineering profession, gives recognition to biological and agricultural engineers who manifest worthy qualities of character, scholarship and professional attainment, and encourages and supports improvements in the biological and agricultural engineering profession. Another goal of the honor society is to be an instrument of greater service to mankind.

Active members are students enrolled in the Biosystems Engineering Department at Auburn University. Membership in Alpha Epsilon for undergraduate engineering students is limited to (1) juniors who have a minimum cumulative scholastic rank in the upper quarter of the college class and (2) seniors who have a minimum cumulative scholastic rank in the upper third of the college class. Graduate students can also be inducted as members of this honor if they would have met the requirements for membership as undergraduates at the institution they attended, had the organization existed there at that time. Graduate students not eligible for membership as undergraduates will be eligible after the completion of at least seven semester hours (ten quarter hours) of graduate course work with a minimum grade point average equivalent.
to 3.25 on a 4.00-point scale, if they have an undergraduate degree in Biosystems Engineering or closely related field.

**Other Student Organizations**

**Ag Ambassadors**
The Ag Ambassadors are a highly select group of young men and women dedicated to enhancing the image of Alabama agriculture, the College of Agriculture, the Alabama Agricultural Experiment Station, the Alabama Cooperative Extension System and Auburn University. The Ag Ambassadors was created in 1983 to assist with college- or university-sponsored events. The Ambassadors are available to speak on topics related to science, agriculture and natural resources to school assemblies, agriculture-oriented groups, business groups, banquets or similar events. All Ambassadors are majoring in the College of Agriculture, in agriscience education in the College of Education, or in other closely related fields.

**Cupola Engineering Ambassadors**
The mission of the Cupola Engineering Ambassadors is to promote, unify and serve the Samuel Ginn College of Engineering. Cupola Engineering Ambassadors act out this mission by:

- Providing tours of the College of Engineering to prospective students and families
- Hosting alumni events and tailgates
- Assisting with engineering events (BEST Robotics competitions, E-Day, PEAK Camp)
- Facilitating student appreciation days (Welcome Back BBQ and Breakfast)
- Helping with recruiting events (TALONS Days, War Eagle Days)
- Fundraising for Engineers without Borders with the Short Circuit 5K

**Society of American Foresters**
The objectives of this Chapter of the Society is to advance the science, technology, education, and practice of professional forestry in America, especially in the Southeastern region, to use the knowledge and skill of the profession to benefit society, and to maintain a closer fellowship among all students interested in forestry.

**Forest Products Society**
The Forest Products Society is an international not-for-profit technical association founded in 1947 to provide an information network for all segments of the forest products industry.

**Engineering Student Council**
The purpose of the Engineering Student Council is to be the voice of the engineering student body. The council is made up of Executive officers, six SGA senators, and a representative from each engineering student organization. Together, they are able to keep students informed and encourage involvement by publicizing speakers, receptions, meetings, and other events pertaining to Engineering throughout the year.

**Tau Beta Pi**
Tau Beta Pi was founded in 1885 at Lehigh University in Pennsylvania and is the nation’s oldest and most prestigious engineering honor society. Tau Beta Pi recognizes the most outstanding engineering students in the nation and gives them a forum to apply their talents to better the world in which they live. Auburn has the oldest chapter in Alabama, inducting students since 1921. Members strive to maintain the honor and dignity of Tau Beta Pi and use their talents to better the world.
National Society of Black Engineers
The purpose of NSBE is to increase the number of culturally responsible Black Engineers who excel academically, succeed professionally and positively impact the community.

Society of Women Engineers
For more than six decades, SWE has given women engineers a unique place and voice within the engineering industry. The organization is centered on a passion for members’ success and continues to evolve with the challenges and opportunities reflected in today’s exciting engineering and technology specialties.

Minorities in Agriculture, Natural Resources and Related Sciences (MANRRS)
MANRRS promotes academic and professional advancement by empowering minorities in agriculture, natural resources, and related sciences.

To view all College of Agriculture student organizations click HERE.

To view all Samuel Ginn College of Engineering student organizations click HERE.
http://eng.auburn.edu/student-organizations/index

1930's Ag engineering students

ASABE International Quarter Scale competition in Peoria, Illinois
SCHOLARSHIP INFORMATION

Financial assistance based on academic ability and/or financial need is available to Biosystems Engineering students through Auburn University, Samuel Ginn College of Engineering, and College of Agriculture. BSEN students are also eligible for the following departmental scholarships:

<table>
<thead>
<tr>
<th>Scholarship</th>
<th>Criteria</th>
</tr>
</thead>
<tbody>
<tr>
<td>Agriculture Alumni Association Annual Scholarship</td>
<td>Must be a current student enrolled in the College of Agriculture with a declared major in Agribusiness or Biosystems Engineering, with preference given to students who demonstrate financial need</td>
</tr>
<tr>
<td>Alabama Ag Credit, ACA Endowed Scholarship</td>
<td>Must be an incoming freshman awarded a Spirit of Auburn University Scholarship, with preference given to students majoring in agriscience education or biosystems engineering, or pursuing an undergraduate degree from the College of Agriculture or the School of Forestry and Wildlife Sciences; students majoring in a pre-professional curriculum are not eligible for consideration.</td>
</tr>
<tr>
<td>Alabama Section of American Society of Agricultural and Biological Engineers Endowed Scholarship</td>
<td>Must be enrolled in the College of Agriculture with a declared major in biosystems, ecological or forest engineering.</td>
</tr>
<tr>
<td>Dr. William E. Hardy, Jr./First South Farm Credit Endowed Scholarship</td>
<td>Must be an incoming freshman enrolled in the College of Agriculture awarded a Spirit of Auburn Scholarship, with preference given to students majoring in agriscience education or biosystems engineering, or pursuing an undergraduate degree from the College of Agriculture or the School of Forestry and Wildlife Sciences.</td>
</tr>
<tr>
<td>Fred A. Kummer Endowed Scholarship</td>
<td>Must have declared major in Biosystems Engineering</td>
</tr>
<tr>
<td>Hop King Endowed Scholarship</td>
<td>Must have declared major in Biosystems Engineering</td>
</tr>
<tr>
<td>Irene and William Gill Annual Scholarship</td>
<td>Must have a declared major in Biosystems Engineering, with preference to female students who demonstrate financial need although gender of the applicant shall not be the controlling factor in awarding the scholarship.</td>
</tr>
<tr>
<td>Lawrence County Farmers Federation Endowed Scholarship</td>
<td>Must be enrolled in the College of Agriculture with a declared major in agricultural economics, agronomy, animal sciences (excluding pre-vet and equine), biosystems engineering, fisheries, horticulture, or poultry Science, a resident of Lawrence County, Alabama, and a member (or dependent of a member) of the Alabama Farmer’s Federation. To receive consideration, select “Alabama Farmers Federation” when prompted while completing the General Application within AUSOM.</td>
</tr>
<tr>
<td>Lawrence County Friends of Agriculture Endowed Scholarship</td>
<td>Must be enrolled in the College of Agriculture with a declared major in agricultural economics, agronomy, animal sciences (excluding pre-vet and equine), biosystems engineering, fisheries, horticulture, or poultry science and be a resident of Lawrence County, Alabama.</td>
</tr>
<tr>
<td>Lee W. Richards Endowed Scholarship</td>
<td>Must be enrolled in the Samuel Ginn College of Engineering and declared a major in biosystems or environmental science, with preference given to residents of Georgia who demonstrate financial need.</td>
</tr>
</tbody>
</table>
Maxwell E. Jones Memorial Endowed Scholarship  
Must be enrolled in the College of Agriculture with a declared major in biosystems engineering.

Russell and Adelaide Roberson Endowed Scholarship  
Must be enrolled in the College of Agriculture with a declared major in biosystems engineering and demonstrate financial need, with preference to a member of the Farmhouse Fraternity.

William P. Adkins Memorial Endowed Scholarship  
Must be a sophomore enrolled in the College of Agriculture with a declared major in biosystems engineering.

To search all available scholarship opportunities for undergraduates at Auburn University, students can utilize the Auburn University Scholarship Opportunity Manager (AUSOM)

Additional Scholarship Opportunities:

Alabama Chapter of Soil and Water Conservation Society Annual Scholarship  
**Deadline:** April 30

American Council of Engineering Companies Scholarship  
**Deadline:** January 4

SMART Scholarship (Dept of Defense)

NOAA Ernest F. Hollings Scholarship  
**Apply in September**

**CAREER INFORMATION**

**What will I learn in this major?**

Engineering design and problem solving  
- Stream and river restoration  
- Renewable energy engineering in biological systems  
- Biomass conversion techniques, design and implementation for energy, biofuels, and biopower production  
- Sustainability engineering  
- Watershed modeling  
- Water resources engineering  
- Hydraulic control systems design  
- Machine automation design  
- Precision and turf irrigation systems, water and wastewater system design  
- Waste management treatment and system design  
- Project site plan development for production agriculture, forestry, and rural development  
- Soil erosion, hydraulic structures and channel hydraulics system design  
- Biological product preservation and value-added processing and conversion  
- Food engineering  
- Metabolic engineering  
- Geospatial technologies (GPS, GIS) and remote sensing systems  
- Biomass materials characterization, handling, transportation and storage  
- Formation, classification, properties, management, fertility and conservation of soils in relation to the growth of plants  
- Soil-forming processes, physical properties of soils, subsurface investigations, soil classification, permeability, effective stress, time-settlement analysis, and compaction  
- Design of

Undergraduate research in BERL labs
agricultural, forestry and natural resource machines and equipment • Development of skills in technical writing and oral presentations • Global outlook on engineering

**What types of employers will hire me with this degree?**

Food processing industry • Agricultural and construction equipment manufacturers • Electronic instrumentation and control companies • Manufacturing firms • Civil engineering consulting firms • Construction & Geotechnical firms • Land grant universities • Biological production, management, and design companies including: agricultural, forest products, nursery, turf, greenhouses, and mining • Agricultural and environmental design and consulting firms • Bulk product handling, processing, and transport manufacturers • Research and education facilities • USDA Agriculture Research Service • USDA Forest Service • USDA Natural Resource Conservation Service • Alabama Department of Environmental Management • Environmental Protection Agency • Department of Defense • Defense contractors • Architectural and building firms • Forest product and mining companies • State Departments of Transportation • Alternative fuel production companies • Power/utilities companies • Research laboratories and/or firms

**Recent employment examples of Biosystems engineering graduates:**

- **Engineering Consulting Firms:** AMEC, CDG, CH2M, Goodwyn, Mills and Cawood, Hazen and Sawyer, HDR, HMB, Krebs, Michael Baker, Mott MacDonald, SCS Engineering, Thomas and Hutton, TTL
- **Utilities and Energy:** Alabama Power, Halliburton(oil company), Georgia Power, Southern Company
- **Off Highway Vehicle:** Caterpillar, John Deer, Kershaw, Bush Hog
- **Local and State Regulations:** ADECA(Alabama), ADEM(Alabama), Georgia, Florida, Kentucky, North Carolina, South Carolina, Tennessee
- **Municipalities:** Auburn, Charlotte(NC), Montgomery (AL)
- **Federal and State Civil Service:** Department of Transportation(DOT), US Army Corps of Engineers, USDA-NRCS, USDA-ARS, U.S. Forest Service
- **Food Companies:** Frito Lay, Pepsi Co, ADM, Cargill
- **Military:** Air Force, Army, Marines, Navy
- **Manufacturing:** Altec, D&F Equipment, Ecotech, Kyson Warren, Lewis M. Carter, WestRock
- **Forestry and Bioproducts:** Georgia-Pacific, International Paper, Packaging Corporation, Weyerhaeuser
- **Others:** Graduate School, Peace Corps, NGO’s Professional and Medical Schools

**Engineering Career Connection**

The College of Engineering encourages all students to take advantage of our many career-building tools; Co-Op’s, internships, summer jobs or undergraduate research. These opportunities allow a student to gain real world experience in their chosen engineering field. Successful completion within one of these areas will help build a resume; establish a professional network; and help determine the next steps after graduation.

Auburn Engineering is committed to the success and professional development of our students from when they are accepted into the college until graduation. The Engineering Career Connection assists students looking to take the next step in their college career by building and sharing connections with corporate recruiters, Auburn University Career Center, and alumni to provide students with the information, experience and resources they need to pursue their internship and employment goals.
CO-OP, STUDY ABROAD, INTERNSHIP AND UNDERGRAD RESEARCH PROGRAMS

Study Abroad

**Study abroad** experiences allow you to learn about cultures and perspectives in a way that may not be possible on campus. Take classes or gain hands-on experience by completing an internship with an international company, contribute to a service-learning project with an NGO, improve foreign language fluency by immersing yourself in your chosen language, or conduct research with experts in your field.

Regardless of the experience you choose, you will build skills highly sought by employers: adaptability, flexibility, communication skills, intercultural awareness, problem-solving skills, and more. Considering only 10% of U.S. undergraduate students participate in an international experience, those who do so gain an advantage over peers in the competitive job market as well as in graduate and professional school applications.

With a variety of program types, lengths, locations, courses, and costs, you can find a program that fits your interests and will keep you on track for graduation.

Quick Facts about Studying Abroad:

- Programs are possible in any country as long as it does not have a Travel Warning issued by the U.S. Department of State – AU students have studied on every continent, including Antarctica.
- Program lengths range from one week to one academic year.
- Courses for Auburn and non-Auburn programs are pre-approved prior to departure.
- Programs are available for all majors and student levels.
- Credit can count toward majors, minors, core curriculum, and general electives.
- Course load is equal to the same term on campus, ensuring students stay on track for graduation.
- Foreign language ability is not required, as courses are available in English and the host language.
- Costs can be comparable to an equivalent term at AU, and scholarships, financial aid, PACT, VA benefits, and other aid may be applicable.
- Housing options include residence halls, apartments, homestays, and hotels.
- Experiences abroad build skills sought by employers.
- Ready to get started? Attend a Study Abroad 101 session, held every Thursday at 3 p.m. and Friday at 11 a.m. in 242 Foy Hall.

Recent study abroad trips of Biosystems engineering students

- Spain, England, Germany, New Zealand, Australia, China, France, Mexico

Co-Op
Cooperative education can confirm or redirect career decision-making through on-the-job experience in a chosen field... since co-ops "TEST DRIVE" their career! Cooperative Education enhances classroom learning and adds relevance to education by integrating academic theory with real world work experience. Co-Ops have the opportunity to test classroom learning in the laboratory of the real world.

How does Co-Op work?

By alternating terms of school and work, students obtain paid, practical work experience in the career of their choice. Experience that means better qualifications when competing for a job at graduation.

The Co-Op Advantage

- Co-Op experience improves employment prospects at graduation.
- Co-Op graduates are in possession of transferable, relevant work experience.
- Many employers hire only graduates with strong experience in the field.
- Co-Op grads have established relationships with potential employers.
- Co-Op grads often receive higher starting salaries at graduation than regular graduates.
- Professional confidence is increased when students know they can successfully perform in the workplace.

When do I apply?

Students are eligible to begin Co-Op as early as the summer after their freshman year!

Internships

Biosystems students interested in internships can locate opportunities through the Auburn University Career Center. Biosystems engineering students have interned or co-oped at companies such as Briggs and Stratton, International Paper, Georgia Pacific, Alliance Source Testing, Cox Enterprises, D&F Equipment, Weston Solutions, Case New Holland, John Deere, Knox Kershaw, Washington State Department of Natural Resources, and City of Montgomery Water Works Board.

Undergraduate Research

Undergraduate students are encouraged to participate in ongoing research activities in the department. Several BSEN students have also found research opportunities in collaborating departments in the College of Agriculture, Samuel Ginn College of Engineering and School of Forestry and Wildlife Sciences. Participation in research can be for course credit (BSEN 4980) or you can be paid a stipend (by faculty or through other sources such as a fellowship with the Office of Undergraduate Studies) as an undergraduate researcher. Research opportunities are not limited to Auburn University. There are several opportunities to participate in research (mostly during summer) around the country through funded prestigious programs such as NSF-REU, DOE-SULI and NIH-SIP. Research experience as an undergraduate student enables you to experience the culture of research and life as a scientist. It is a risk-free way to investigate (and also in a hands-on environment) whether a research career is a good fit for you. Equally important is that research experience allows you to stand out among your peers. The professor that you worked for as a researcher student will always be glad to write a letter of recommendation for you for after-college employment, professional
schools, and for graduate school. You might wonder why so much importance is placed on research. Several studies have shown that research experience improves students' ability in the following areas: tolerances for obstacles, learning to work independently, time management, problem-solving skills, ability to interpret results and analyze data, self-confidence, presentation skills, etc. Contact or discuss with your faculty advisor if you are interested in undergraduate research.

**Accelerated Bachelor's/Master's Program (ABM)**

The accelerated bachelor's/master's degree program is designed to provide an opportunity for highly motivated students to gain an in-depth understanding of Biosystems Engineering beyond that of typical bachelor's level graduates and make them more competitive for employment positions or for graduate studies. Specifically, the program allows students to take three 6000 level courses (minimum of 9 credit hours) that will count for both the bachelor's and master's degrees. The accelerated degree program will also provide an opportunity for students involved in undergraduate research to build on that research and develop it into a Master's thesis. For more information about the ABM program, see Dr. Sushil Adhikari (sza0016@auburn.edu) – Graduate Admission Committee Chair, or Jon Davis (jnd0026@auburn.edu) – academic advisor.

**ACADEMIC ADVISING & POLICIES**

**Advising**

All Pre-Biosystems and Biosystems engineering majors are assigned a faculty advisor within the department. You can view your advisor assignment on the My Academic's Tab of your AU Access. If you do not have an assigned advisor, please contact Amber Denham (amd0099@auburn.edu) (334) 844-3537. Please bring a tentative planned schedule to your registration advising appointment.

Academic advising is collaboration between student and advisor. In this collaboration, advisors present students with university resources for academic, professional, and social development. Students will have the opportunity to realize academic and personal goals as they share their ambitions and aspirations with their academic advisors.

**Advisor Responsibilities – What You Can Expect**

You can expect your advisor to: Understand and effectively communicate curriculum information, graduation requirements, and university and college policies and procedures,

- Encourage and guide students as they define and develop realistic goals
- Encourage and support students as they gain the skills to develop clear and attainable educational plans
- Provide students with information and strategies for utilizing the available resources and services on campus
- Assist students in understanding the purposes and goals of higher education and its effects on their lives and personal goals
- Monitor and accurately document students' progress toward meeting their goals
- Be accessible for meeting with advisees via regular business hours for advising and e-mail

Click to make an appointment!
• Assist students in gaining decision making skills and skills in assuming responsibility for their educational plans and achievements

• Maintain confidentiality

• Assist students in working closely with their professors

Advisee Responsibilities – What You Are Expected To Do

As an advisee, you have clear responsibilities in the advising partnership in order to be successful:

• Make an appointment to meet with your advisor prior to your registration time ticket each semester

• Come to each advising session prepared with questions and/or a proposed course schedule

• Keep an up-to-date advising file complete with all documents and materials discussed during advising sessions

• See your academic advisor at the first sign of academic difficulty

• Review and be familiar with course requirements and course sequencing in your major

• Agree to attend all class meetings from the first day of instruction

• Register for your classes in a timely manner. (Avoid the need to drop/add after the semester begins if at all possible)

• Confer with your advisor prior to withdrawing from a course

• Read and be responsible for all information/emails sent from the Academic Advisor, ECE Department and Engineering Student Services Office

• Take responsibility for your own actions

Academic Policies

A complete list of undergraduate Academic Policies can be found in the AU Bulletin. This handbook does not list out the full policies; students may access them directly in the bulletin where the most up to date copies are found. For questions regarding specific information and application of academic policies, please consult your assigned Academic Advisor or Engineering Student Services. Note: Wherever departmental and university policy conflict, the AU Bulletin takes precedence.

Policies cover the following topics:

• Academic Advising

• Academic Programs and Curricula
  o Second Baccalaureate/Concurrent Degrees, Double Major, Accelerated Bachelors/Masters, Online Learning, Residence Policy, Change of Major or Curriculum, Internal Transfers, Curriculum Model Change, Academic Program Assessment

• Accommodation Policy for Students with Disabilities

• Appeals of Suspension

• Auburn University’s General Education Goals and Outcomes

• Bachelor’s Degree Requirements
  o Graduation

• Class Attendance and Examinations
  o Excused Absence, Final Exams, Examinations, Academic Grievance Policy

• Core for Students Starting College Before Fall 2011

• Core Curriculum
• Student Learning Outcomes (SLO), English Composition Requirements, Literature Requirements, History Requirements, Oral Communication Requirements

• **Dean’s List and Graduation Honors**

• **Enrollment**
  o Registration and Scheduling, Undergraduate Transient Students, Classification, Course Load

• **Grade Adjustment**

• **Grades**
  o Definitions, Incompletes, Grade Changes, Grade for Withdrawals, Grade Average and Quality point computation, Academic Warning, Academic Suspension

• **Policies and Procedures for Admissions**

• **Policies on Directed Studies**

• **Policy on Withdrawals and Resignation**

• **Repeat Courses**

• **Satisfactory Progress**

• **Special Academic Opportunities**
  o The Honors College, National Honor & Recognition, International Academic Opportunities, Service Learning & Student Engagement, Co-Op Program

• **Student Records**
  o Confidentiality, Access, Release of Educational Records, Right to a Formal Hearing

### CAMPUS INFORMATION & FAQ

Your time at Auburn is valuable. Make the most of it and take advantage of the numerous programs and activities that the University has to offer. Read below for information on all things Auburn. If you can’t find the answer to your question, see your advisor or you can also try the legendary James E. Foy Information Desk (334-844-4244).

#### Frequently Asked Questions

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<td>Where is the library?</td>
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<td>How do I pay my tuition &amp; fees?</td>
<td>Go to EBill in the My Finances tab of AU Access</td>
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How do I get athletic tickets?  
Student Tickets

Can I get a job on campus?  
AU Career Center

How do I get involved?  
AUinvolve for Student Organizations and events

How can I schedule my advising?  
Advise Assist

Can I get a scholarship?  
AUSOM

Can I get financial aid?  
Student Financial Aid Office

How can I join a fraternity or sorority?  
Greek Life

Can I get a tutor?  
Academic Support  Engineering Student Services

Can I change my major?  
Policy  Major Change Form

How do I GAP a class?  
Policy  AU Access

Where are all the Student Policies?  
AU ePolicy Handbook

Where can I buy books?  
AU Bookstore  …you can also buy online or at off-campus stores.

When do classes start?  
Academic Calendar

Where is Corley Building?  
350 Mell Street

Are there intramural sports?  
Campus Recreation

Where is the hospital?  
East Alabama Medical Center

**Things to do around Auburn & Opelika**

**Auburn** is a vibrant, thriving community of 62,000 residents with a neighboring city right next door in **Opelika** (pronounced Oh-pah-like-ah). Below are some of the more popular attractions for students to enjoy and take advantage of while living in Auburn.

**Chewacla State Park** – Constructed in the 1930's, Auburn’s historic Chewacla State Park offers nearly 700 acres of park to relax in, a 26 acre lake for swimming, boating & fishing, camping areas, greenspaces, waterfalls, hiking trails, and nearly 15 miles of 1st class mountain biking trails. There is a small entrance fee.

**City of Auburn Parks** – The City of Auburn features 12 parks, including Kiesel Park and Town Creek Park, which are the most popular with students. Kiesel is a “pet-friendly” park there. City parks are free to the public.

**Downtown Auburn** – Toomer’s Corner, restaurants, shopping, entertainment, and many annual events are found in downtown. Adjacent to campus and within walking distance of many student housing options, downtown offers a great place to get a bite, shop, and hang out.
**Downtown Opelika** – Only a short ride from Auburn, Downtown Opelika offers a wide variety of restaurants, entertainment and shopping options. Situated around the historic district and the railroad, the renovated streets are a friendly and welcoming atmosphere.

**Athletics** – Football, Basketball, Softball, Baseball, Gymnastics, Soccer, Equestrian, and many other teams have games during fall and spring. Some events require tickets, others are free.

**Columbus, Georgia** – only 30 minutes from Auburn, Columbus offers a multitude of shopping and dining venues, in addition to one of the only urban whitewater rafting locations in the southeast.

**Jule Collins Smith Museum of Fine Art** – featuring almost 2000 works of art ranging from traditional to contemporary, JCSM is located next to main campus.

**Golf** – The Auburn-Opelika area is home to 6 golf courses within a 15 minute drive: Grand National, Moore’s Mill, AU Club, Saugahatchee, Indian Pines, and Auburn Links at Mill Creek. Indian Pines, Mill Creek, and Grand National are the most popular with students.

**Louise Kreher Ecology Preserve** – located in north Auburn, this 120 acre preserve has 5 miles of trails. Biking, pets, and vehicles are prohibited, making the preserve a great place to relax and enjoy nature.

These are just a few of the options open to students to explore while in residence at Auburn. For more information on activities in and around Auburn you can visit the [Auburn Opelika Tourism Bureau](#) web page. Also visit the [City of Auburn](#) web page to learn more about parks, cultural arts, volunteer opportunities, and local events happening throughout the year.
QUICK REFERENCE GUIDE

Main Department Info
Department Head: Dr. Oladiran Fasina
209 Corley

Office Administrator: Amber Denham
207 Corley
amd0099@auburn.edu

Office: Corley Building
350 Mell Street
Auburn, AL 36849

Phone: (334) 844-3574

Hours: 7:45 am to 4:45 pm
3rd Floor of Corley labs and classrooms are accessible 24/7 with swipe card access except for University holidays.

Social Media: Follow BSEN on LinkedIn & Facebook

Advising: By appointment – use Advise Assist (click on the owl!) to schedule

Office of Engineering Student Services
1210 Shelby Center
Phone Number: (334) 844-4310

Classification
Freshmen…………..completed 29 hours or less
Sophomore…………..completed 30 hours and is in the 31st to 60th credit hour
Junior .........................completed 60 hours and is in the 61st to 90th credit hour
Senior ........................completed 90 hours and is in the 91st hour or higher

Academic Standing
Academic Warning status is imposed at the end of any term for which the student’s cumulative GPA on Auburn course work is below 2.0.

Academic Suspension Any student who is on Academic Warning status will be placed on Academic Suspension if both of the following conditions apply: (1) the term GPA is below 2.2 and (2) the cumulative GPA on Auburn course work is below that required for the designated number of hours earned as follows:

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<tr>
<th>Hours Earned</th>
<th>Cumulative GPA</th>
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<tr>
<td>0-30.999</td>
<td>1.50</td>
</tr>
<tr>
<td>31-60.999</td>
<td>1.80</td>
</tr>
<tr>
<td>61-90.999</td>
<td>1.90</td>
</tr>
<tr>
<td>91 or more</td>
<td>1.97</td>
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All students, whether beginning freshmen or transfers, are not subject to suspension until they have received one semester warning.
Course Withdrawals
No grade penalty is assigned for dropping a course on or before the 15th class day (5th class day in summer). A student who withdraws from a course prior to the 15th class day during fall or spring semester will have no grade assignment; however, after the first 15 days a W (Withdrawn Passing) grade will be recorded for the course. Students may withdraw from a course via the web up through the last business day prior to the opening of registration for the following term in spring and fall semester and the posted date in the summer.

A course may be dropped with a W deadline only under unusual conditions such as serious illness of the student, serious illness or death of a member of the student’s immediate family or other seriously disruptive circumstances. When approval for dropping the course under such circumstances is granted by the student’s dean, a W may be assigned only when the instructor indicates that the student is clearly passing the course. Otherwise, a grade of WF (Withdrawn Failing) is assigned. A grade of W does not affect GPA, however a WF affects GPA the same as an F.

Also, be aware that dropping a course can result in a $100 drop fee per course dropped. You can check the academic calendar on the Auburn website for more details.

Excused Absences

Students with a valid excuse for non-attendance of class or examination periods per the AU Bulletin Policy of Class Attendance should first take their excuse documentation to the Engineering Student Services office, which will validate the excuse and provide them with paperwork to present to their professor.
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