

# Department of Agricultural and Biological Engineering

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## Agricultural Engineering Technology and Business (AETB)

**Department Head: Dr. J. Alex Thomasson**

Office: 150 J. Charles Lee Agricultural and Biological Engineering Building

The Agricultural Engineering Technology and Business (AETB) curriculum is designed to provide students the academic and technical background necessary to understand the operation and management of current and emerging agricultural production systems, technologies, and businesses. Students gain real-world experience by participating in immersive learning projects and field studies. AETB graduates can find rewarding careers in a variety of agricultural, environmental, and industrial businesses. Technologists focus on managing, operating, and troubleshooting technology systems by applying their knowledge of technology and business applications. This hands-on curriculum teaches students to manage equipment and machinery, biological processes, computers, computer simulations, and other technologies to create and maintain current and new production systems. The AETB Bachelor of Science degree is offered by the Department of Agricultural and Biological Engineering, which is housed in the College of Agriculture and Life Sciences.

Students may pursue one of four concentrations within AETB:

1. Precision Agriculture (PRAG)
2. Natural Resources and Environmental Management (NREM)
3. Enterprise Management (EMGT)
4. Surveying and Geomatics (SGEO)

Concentration descriptions and employment opportunities are discussed below. These concentrations are achieved by completing 36 to 38 hours of restricted and free electives relevant to the focus area. The PRAG, NREM, and SGEO concentrations provide students a pathway to complete the requirements of the Geospatial and Remote Sensing Minor.

Students are required to earn a grade of C or better in all AETB major core courses. Students interested in AETB who are attending a community college before transferring to Mississippi State University are strongly encouraged to contact the AETB Undergraduate Coordinator regarding their community college course schedule and transfer requirements. A maximum of 12 transfer hours of technical credit from a community college can be applied toward degree requirements.

Internship and co-op experiences are highly encouraged and help students translate their classroom and laboratory experiences into the reality of the business setting.

The **Precision Agriculture** (PRAG) concentration provides students the background and technical skills in current and emerging technologies necessary for decision-making in agricultural production based on geospatial data. Technologies of interest include the global positioning system (GPS), geographic information systems (GIS), unmanned aircraft systems (UAS), artificial intelligence (AI), broadband wireless communication networks, sensors, robotics, the Internet of Things (IoT), and advanced machinery systems.

The **Natural Resource & Environmental Management** (NREM) concentration provides students the background and technical skills in current and emerging technologies necessary for conserving resources and minimizing the environmental risks associated with agricultural production. Technologies of interest consider the environmental impacts of human activities on rural/agricultural and urban landscapes and include BMPs (best management practices) for water-resource management, remote sensing, alternative energy, geographic information systems (GIS), artificial intelligence (AI), and sensors for environmental monitoring.

The **Enterprise Management** (EMGT) concentration provides students the background and technical/business skills for current and emerging markets that are necessary to apply engineering technology in agricultural enterprises like agricultural supplies, agricultural machinery, and commodity logistics. Technologies and business skills of interest include data science, geographic information systems (GIS), artificial intelligence (AI), the Internet of Things (IoT), life-cycle analysis, and agricultural business management.

The **Surveying & Geomatics** (SGEO) concentration provides students the background and technical skills in current and emerging technologies necessary to conduct property/boundary surveys, topographic and construction surveys, and control surveys. Technologies of interest include various types of surveying equipment, the global positioning system (GPS), and geographic information systems (GIS). This concentration is designed to provide the first stage of the three-step process (academic training, supervised surveying experience, and the Principles and Practice of Surveying Exam) to become a registered land surveyor.

General Education Requirements

**English Composition**

|            |                                |   |
|------------|--------------------------------|---|
| EN 1103    | English Composition I          | 3 |
| or EN 1104 | Expanded English Composition I |   |
| EN 1113    | English Composition II         | 3 |
| or EN 1173 | Accelerated Composition II     |   |

**Creative Discovery**

|                                       |  |   |
|---------------------------------------|--|---|
| Select from General Education courses |  | 3 |
|---------------------------------------|--|---|

**Humanities**

|                                       |  |   |
|---------------------------------------|--|---|
| Select from General Education courses |  | 6 |
|---------------------------------------|--|---|

**Social/Behavioral Sciences**

|                                       |                                             |   |
|---------------------------------------|---------------------------------------------|---|
| AEC 2713                              | Introduction to Food and Resource Economics | 3 |
| Select from General Education courses |                                             | 3 |

**Quantitative Reasoning**

|            |                                           |   |
|------------|-------------------------------------------|---|
| MA 1323    | Trigonometry                              | 3 |
| MA 1613    | Calculus for Business and Life Sciences I | 3 |
| or MA 1713 | Calculus I                                |   |

**Natural Sciences**

|            |                        |   |
|------------|------------------------|---|
| PH 1113    | General Physics I      | 6 |
| & PH 1123  | and General Physics II |   |
| or PH 2213 | Physics I              |   |
| & PH 2223  | and Physics II         |   |

## Degree Requirements

**AETB Major Core**

|          |                                                                                                             |   |
|----------|-------------------------------------------------------------------------------------------------------------|---|
| ABE 1073 | Technology Design I. <sup>1</sup>                                                                           | 3 |
| ABE 1863 | Engineering Technology in Agriculture                                                                       | 3 |
| ABE 2873 | Land Surveying <sup>1</sup>                                                                                 | 3 |
| ABE 3513 | The Global Positional System and Geographic Information Systems in Agriculture and Engineering <sup>1</sup> | 3 |
| ABE 4263 | Soil and Water Management                                                                                   | 3 |
| ABE 4383 | Building Construction                                                                                       | 3 |
| ABE 4473 | Electrical Applications for Agriculture                                                                     | 3 |
| ABE 4961 | Seminar                                                                                                     | 1 |

**AETB Science Courses**

|            |                                    |     |
|------------|------------------------------------|-----|
| CH 1043    | Survey of Chemistry I              | 7-8 |
| & CH 1053  | and Survey of Chemistry II         |     |
| & CH 1051  | and Experimental Chemistry         |     |
| or CH 1213 | Chemistry I                        |     |
| & CH 1211  | and Investigations in Chemistry I  |     |
| & CH 1223  | and Chemistry II                   |     |
| & CH 1221  | and Investigations in Chemistry II |     |

**AETB Statistics Requirement <sup>2</sup>** 6

|            |                                |   |
|------------|--------------------------------|---|
| BQA 2113   | Business Statistical Methods I | 3 |
| or MA 2113 | Introduction to Statistics     |   |
| or ST 2113 | Introduction to Statistics     |   |

**AETB Business Courses**

|          |                                                  |   |
|----------|--------------------------------------------------|---|
| ACC 2013 | Principles of Financial Accounting <sup>1</sup>  | 3 |
| ACC 2023 | Principles of Managerial Accounting <sup>1</sup> | 3 |
| AEC 3133 | Introductory Agribusiness Management             | 3 |
| BL 2413  | The Legal Environment of Business <sup>1</sup>   | 3 |
| MGT 3513 | Introduction to Human Resource Management        | 3 |

**AETB Oral Communication Requirement**

|         |                                 |   |
|---------|---------------------------------|---|
| CO 1003 | Fundamentals of Public Speaking | 3 |
|---------|---------------------------------|---|

|                                                         |                                                                            |                |
|---------------------------------------------------------|----------------------------------------------------------------------------|----------------|
| or CO 1013                                              | Introduction to Communication                                              |                |
| <b>AETB Writing Requirement</b>                         |                                                                            |                |
| AELC 3203                                               | Professional Writing in Agriculture, Natural Resources, and Human Sciences | 3              |
| Concentration Courses -- see specific lists for courses |                                                                            | 30-32          |
| <b>Total hours</b>                                      |                                                                            | <b>122-124</b> |

## Natural Resource & Environmental Management (NREM) Concentration

### Required Concentration Courses

|                                       |                                                              |   |
|---------------------------------------|--------------------------------------------------------------|---|
| ADS 1113<br>& ADS 1121<br>or BIO 1134 | Animal Science<br>and Animal Science Laboratory<br>Biology I | 4 |
| PSS 1313<br>or BIO 1023               | Plant Science<br>Plants and Humans                           | 3 |
| GR 4303                               | Principles of GIS                                            | 3 |
| PSS 3303                              | Soils                                                        | 3 |
| PSS 3301                              | Soils Laboratory                                             | 1 |

### NREM Restricted Electives - choose 9 hours from the following:

|                 |                                                                                              |          |
|-----------------|----------------------------------------------------------------------------------------------|----------|
| <b>ABE 1083</b> | <b>Technology Design II (NREM Restricted Electives - choose 9 hours from the following:)</b> | <b>3</b> |
| ABE 4313        | Biological Treatment of Nonpoint Source Pollutants                                           | 3        |
| ABE 4803        | Simulation in Biological Systems                                                             | 3        |
| GG 3613         | Water Resources                                                                              | 3        |
| GR 3113         | Conservation of Natural Resources                                                            | 3        |
| PSS 4333        | Soil Conservation and Land Use                                                               | 3        |
| PSS 4373        | Geospatial Agronomic Management                                                              | 3        |

### NREM Electives - choose 15 hours from the following:

|           |                                                         |    |
|-----------|---------------------------------------------------------|----|
| ABE 4483  | Introduction to Remote Sensing Technologies             | 3  |
| ABE 4800  | Undergraduate Research in Ag & Bio Engineering          | 13 |
| AEC 3233  | Introduction to Environmental Economics and Policy      | 3  |
| AEC 4223  | Applied Quantitative Analysis in Agricultural Economics | 3  |
| AEC 4233  | Environmental Economics                                 | 3  |
| AEC 4243  | Natural Resource Economics                              | 3  |
| BIO 2503  | Environmental Quality                                   | 3  |
| BL 4263   | Environmental Law                                       | 3  |
| FO 4483   | Forest Soils                                            | 3  |
| GG 3133   | Introduction to Environmental Geology                   | 3  |
| GG 4613   | Physical Hydrogeology                                   | 3  |
| GR 2313   | Maps and Remote Sensing                                 | 3  |
| GR 4313   | Advanced GIS                                            | 3  |
| GR 4333   | Remote Sensing of the Physical Environment              | 3  |
| NREC 3213 | Environmental Measurements                              | 3  |
| NREC 4313 | Spatial Technologies in Natural Resources Management    | 3  |
| NREC 4353 | Natural Resource Law                                    | 3  |
| NREC 4463 | Forest Hydrology and Watershed Management               | 3  |
| PSS 4383  | Agriculture Remote Sensing I                            | 3  |
| PSS 4393  | Agriculture Remote Sensing II                           | 3  |
| PSS 4483  | Introduction to Remote Sensing Technologies             | 3  |
| PSS 4733  | Ag. Flight Technologies I                               | 3  |
| PSS 4743  | Ag. Flight Technologies II                              | 3  |

## Precision Agriculture (PRAG) Concentration

### Required Concentration Courses

|                                       |                                                              |   |
|---------------------------------------|--------------------------------------------------------------|---|
| ADS 1113<br>& ADS 1121<br>or BIO 1134 | Animal Science<br>and Animal Science Laboratory<br>Biology I | 4 |
| PSS 1313<br>or BIO 1023               | Plant Science<br>Plants and Humans                           | 3 |
| GR 4303                               | Principles of GIS                                            | 3 |
| PSS 3303                              | Soils                                                        | 3 |
| PSS 3301                              | Soils Laboratory                                             | 1 |

### PRAG Restricted Electives - choose 9 hours from the following:

|                         |                                                                                              |          |
|-------------------------|----------------------------------------------------------------------------------------------|----------|
| <b>ABE 1083</b>         | <b>Technology Design II (PRAG Restricted Electives - choose 9 hours from the following:)</b> | <b>3</b> |
| ABE 2173                | Principles of Agricultural and Off-Road Machines                                             | 3        |
| ABE 2543<br>or PSS 2543 | Precision Agriculture I<br>Precision Agriculture I                                           | 3        |
| ABE 4163<br>or PSS 4373 | Agricultural and Off-Road Machinery Management<br>Geospatial Agronomic Management            | 3        |

### PRAG Electives - choose 15 hours from the following:

|                         |                                                      |    |
|-------------------------|------------------------------------------------------|----|
| ABE 4483                | Introduction to Remote Sensing Technologies          | 3  |
| ABE 4543<br>or PSS 4543 | Precision Agriculture II<br>Precision Agriculture II | 3  |
| ABE 4800                | Undergraduate Research in Ag & Bio Engineering       | 13 |
| AEC 4413                | Public Problems of Agriculture                       | 3  |
| FO 4453                 | Remote Sensing Applications                          | 3  |
| GR 2313                 | Maps and Remote Sensing                              | 3  |
| GR 3303                 | Survey of Geospatial Technologies                    | 3  |
| GR 4313                 | Advanced GIS                                         | 3  |
| GR 4323                 | Cartographic Sciences                                | 3  |
| GR 4333                 | Remote Sensing of the Physical Environment           | 3  |
| GR 4343                 | Advanced Remote Sensing in Geosciences               | 3  |
| NREC 4313               | Spatial Technologies in Natural Resources Management | 3  |
| PSS 3133                | Introduction to Weed Science                         | 3  |
| PSS 4103                | Forage and Pasture Crops                             | 3  |
| PSS 4123                | Grain Crops                                          | 3  |
| PSS 4133                | Fiber and Oilseed Crops                              | 3  |
| PSS 4383                | Agriculture Remote Sensing I                         | 3  |
| PSS 4393                | Agriculture Remote Sensing II                        | 3  |
| PSS 4483                | Introduction to Remote Sensing Technologies          | 3  |
| PSS 4733                | Ag. Flight Technologies I                            | 3  |
| PSS 4743                | Ag. Flight Technologies II                           | 3  |
| PSS 4813                | Herbicide Technology                                 | 3  |

## Enterprise Management (EMGT) Concentration

### Required Concentration Courses

|                                       |                                                              |   |
|---------------------------------------|--------------------------------------------------------------|---|
| ADS 1113<br>& ADS 1121<br>or BIO 1134 | Animal Science<br>and Animal Science Laboratory<br>Biology I | 4 |
| PSS 1313<br>or BIO 1023               | Plant Science<br>Plants and Humans                           | 3 |
| GR 4303                               | Principles of GIS                                            | 3 |
| PSS 3303                              | Soils                                                        | 3 |

|                                                                                  |                                                                                            |          |
|----------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------|----------|
| PSS 3301                                                                         | Soils Laboratory                                                                           | 1        |
| <b>EMGT Restricted Courses - choose 9 hours from the following: <sup>2</sup></b> |                                                                                            |          |
| <b>ABE 1083</b>                                                                  | <b>Technology Design II (EMGT Restricted Courses - choose 9 hours from the following:)</b> | <b>3</b> |
| ABE 2173                                                                         | Principles of Agricultural and Off-Road Machines                                           | 3        |
| ABE 4163                                                                         | Agricultural and Off-Road Machinery Management                                             | 3        |
| AEC 3113                                                                         | Introduction to Quantitative Economics                                                     | 3        |
| EC 2113                                                                          | Principles of Macroeconomics                                                               | 3        |
| MGT 3323                                                                         | Entrepreneurship                                                                           | 3        |
| <b>EMGT Electives - Choose 15 hours from the following;</b>                      |                                                                                            |          |
| ABE 4483                                                                         | Introduction to Remote Sensing Technologies                                                | 3        |
| ABE 4800                                                                         | Undergraduate Research in Ag & Bio Engineering                                             | 13       |
| ADS 4323                                                                         | Beef Cattle Science                                                                        | 3        |
| AEC 2223                                                                         | Introduction to Sustainability Economics                                                   | 3        |
| AEC 3233                                                                         | Introduction to Environmental Economics and Policy                                         | 3        |
| AEC 4113                                                                         | Agribusiness Firm Management                                                               | 3        |
| AEC 4213                                                                         | Ag Finance I                                                                               | 3        |
| AEC 4343                                                                         | Advanced Farm Management                                                                   | 3        |
| AEC 4413                                                                         | Public Problems of Agriculture                                                             | 3        |
| AEC 4623                                                                         | Global Marketing of Agricultural Product                                                   | 3        |
| BL 4243                                                                          | Legal Aspects of Entrepreneurship                                                          | 3        |
| MGT 3113                                                                         | Principles of Management                                                                   | 3        |
| MGT 3823                                                                         | Socially Responsible Leadership                                                            | 3        |
| PO 4334                                                                          | Broiler Production                                                                         | 4        |
| PSS 4103                                                                         | Forage and Pasture Crops                                                                   | 3        |
| PSS 4123                                                                         | Grain Crops                                                                                | 3        |
| PSS 4133                                                                         | Fiber and Oilseed Crops                                                                    | 3        |

## Surveying & Geomatics (SGEO) Concentration

### Required Concentration Courses

|         |                           |   |
|---------|---------------------------|---|
| MA 1313 | College Algebra           | 3 |
| CE 2213 | Surveying <sup>1</sup>    | 3 |
| CE 4233 | Control Surveys           | 3 |
| CE 4243 | Land Surveys <sup>1</sup> | 3 |
| GR 4303 | Principles of GIS         | 3 |

### SGEO Restricted Elective

|            |                       |   |
|------------|-----------------------|---|
| ABE 1083   | Technology Design II  | 3 |
| or EG 1143 | Graphic Communication |   |

### SGEO Electives - choose 18 hours from the following: <sup>2</sup>

|                 |                                                                                                           |          |
|-----------------|-----------------------------------------------------------------------------------------------------------|----------|
| <b>ABE 4483</b> | <b>Introduction to Remote Sensing Technologies (SGEO Electives - choose 18 hours from the following:)</b> | <b>3</b> |
| ABE 4800        | Undergraduate Research in Ag & Bio Engineering                                                            | 13       |
| BL 4243         | Legal Aspects of Entrepreneurship                                                                         | 3        |
| BL 4333         | Real Estate Law <sup>1</sup>                                                                              | 3        |
| FO 4453         | Remote Sensing Applications                                                                               | 3        |
| GR 2313         | Maps and Remote Sensing                                                                                   | 3        |
| GR 3303         | Survey of Geospatial Technologies                                                                         | 3        |
| GR 4313         | Advanced GIS                                                                                              | 3        |
| GR 4323         | Cartographic Sciences                                                                                     | 3        |
| GR 4333         | Remote Sensing of the Physical Environment                                                                | 3        |
| GR 4363         | Geographic Information Systems Programming                                                                | 3        |
| MGT 3323        | Entrepreneurship                                                                                          | 3        |

|           |                                             |   |
|-----------|---------------------------------------------|---|
| NREC 4463 | Forest Hydrology and Watershed Management   | 3 |
| PSS 4383  | Agriculture Remote Sensing I                | 3 |
| PSS 4393  | Agriculture Remote Sensing II               | 3 |
| PSS 4483  | Introduction to Remote Sensing Technologies | 3 |
| PSS 4733  | Ag. Flight Technologies I                   | 3 |
| PSS 4743  | Ag. Flight Technologies II                  | 3 |
| REF 3333  | Principles of Real Estate                   | 3 |