

SBME Pre-Approved Electives

In general, electives need to be at a 3000-level or above. The sections below serve as a source of pre-approved course options; however, approval from an SBME faculty advisor is recommended when selecting 'Math, Science, & Engineering' electives. Other courses not on this list may be approved with permission by the SBME faculty via the Undergraduate Studies Committee.

Not all classes are offered frequently. **Students are responsible for ensuring that the courses will be offered in the semester they intend to take it, and that all prerequisites or other permissions are acquired before enrolling in electives.**

Courses less than 3 credit hours will have to be supplemented with another course to account for the credit hour discrepancy. A total of at least 6 credit hours are required for BME electives and a total of at least 6 credit hours are required for 'Science, Math, & Engineering' electives. BME elective course credits, in excess of 6 credit hours can be counted toward 'Science, Math, & Engineering' elective credit hours.

Courses not approved as electives:

- Anything below 3000 level
- Courses cannot be double counted for the 'Upper-Level Biology Elective' and a 'Science, Math, & Engineering' Elective
- Courses cannot be double counted for 'Science, Math, & Engineering' and 'BME' electives.
- Any other courses already fulfilling another graduation requirement (e.g., ENGR 3511 Transfer Engineering Experience).

Please refer to the 'BME' Electives list for BME Elective recommendations.

List of Approved Courses for 'Upper-Level Biology' Elective

- BIOL 3113 - Cell Biology
 - Prerequisite: 1114, or 1124, or Biology 1134, or Botany 1114, and Chemistry 3053.
- BIOL 3333 - Genetics
 - Prerequisite: ZOO/BIOL 1124, or ZOO/BIOL 1114 and ZOO/BIOL 1121; Biology 1134 recommended
- BIOL 3833 - Introduction to Neurobiology
 - Prerequisite: BIOL 1124
- BIOL 4843 - Intro to Molecular Biology
 - Prerequisite: 1114 or 1124, or Botany/PBIO 1114, or Microbiology 3813 and 3812, and one course in organic chemistry
- CHEM 3053 - Organic Chemistry I: Biological Emphasis ****only applies to students on the 2021-degree plan****
 - Prerequisite: CHEM 1415 or CHEM 1425 or CHEM 1435.
- CHEM 3653 - Introduction to Biochemistry
 - Prerequisite: CHEM 3013, CHEM 3053, or CHEM 3064.
- MBIO 3813: Fundamentals of Microbiology
 - Prerequisite: BIOL 1005 or BIOL 1114 or BIOL 1124 or BIOL 1134 or PBIO 1114; and CHEM 1315 and CHEM 1415, or CHEM 1335 and CHEM 1435
- MBIO 4833 – Basic Immunology
 - Prerequisite: one semester of organic chemistry, and an introductory biology course, plus one of the following: 3813 and 3812, Zoology 2124, 3113, 3204, 3333.

List of Approved Courses for 'Science, Math, & Engineering' Elective

Anthropology

§ANTH 5273 Bioethics, Biotechnology, Biomedicine
 ANTH 4823 Medical Anthropology

Biology

BIOL 3103 Principles of Physiology
 *BIOL 3113 Cell Biology
 #BIOL 3201 Animal Development Lab
 BIOL 3203 Animal Development
 *BIOL 3333 Genetics
 *BIOL 3833 Intro to Neurobiology
 BIOL 4233 Neurobiology of Disease
 BIOL 4244 Animal Histology
 *BIOL 4843 Intro to Molecular Biology
 BIOL 4853 Neurobiology of Memory
 BIOL 4893 Behavioral Neurobiology
 BIOL 4913 Quantitative Biology
 BIOL 5153 Endocrine Physiology
 BIOL 5293 Cytology Ultrastructure
 BIOL 5343 Developmental Genetics
 BIOL 5364 Transmission Electron Microscopy
 BIOL 5374 Scanning Electron Microscopy
 BIOL 5843 Molecular Biology
 §BIOL 5923 Programming in R for Biology
 MBIO 3673 Practical Bioinformatics
 #MBIO 3812 Fund. Microbiology Lab
 *MBIO 3813 Fundamentals of Microbiology
 *MBIO 4833 Basic Immunology

Chemical, Biological, & Materials Engineering

CHE 3313 Structure & Properties of Materials
 CHE 5463 Polymer Processing

Chemistry

*&CHEM 3053 Organic Chemistry I: Biological
 CHEM 3153 Organic Chemistry II: Biological
 CHEM 3423 Physical Chemistry
 CHEM 3523 Physical Chemistry II
 *CHEM 3653 Biochemistry
 CHEM 3753 Intro to Biochemical Methods
 CHEM 4023 Instrumental Methods in Chemical
 Analysis
 CHEM 4333 Advanced Inorganic Chemistry
 CHEM 5453 Polymer Science
 CHEM 5753 Principles of Biochem I
 CHEM 5853 Principles of Biochem II
 CHEM 6813 Intro to Biochemical Methods
 CHEM 6823 Protein, Nucleic Acids, & Gene
 Expression
 CHEM 6833 Structure & Function of Membranes
 & Hormones

CHEM 6843 Enzyme Mechanisms & Metabolic
 Regulation

CHEM 6853 Protein Structure & Function

Computer Science

CS 4013 Artificial Intelligence
 CS 4033 Machine Learning
 CS 4063 Human Computer Interaction
 CS 4433 Computational Methods in Discrete Optimization
 CS 5043 Advanced Machine Learning
 CS 5073 Artificial Neural Networks Evolution
 CS 5593 Data Mining
 CS 5703 Machine Learning Practice

Data Science & Analytics

DSA 3013 Machine Learning for Data Science
 DSA 3023 Big Data Engineering
 ^DSA 5013 Fundamentals of Engineering Statistical Analysis
 ^DSA 5103 Intelligent Data Analytics
 DSA 5011 Introduction to R
 DSA 5203 Time Series Analysis
 ^DSA 5503 Healthcare Analytics
 DSA 5403 Bayesian Statistic

Engineering

#ENGR 3401 Engineering Economics
 #ENGR 3431 Electromechanical Systems
 #ENGR 3441 Fluid Mechanics
 ENGR 4003 Engineering Practice
 ENGR 4013 Leadership & Management for Engineers
 ENGR 4023 Disruptive & Innovative Technology Ideation
 §ENGR G4510 Global Environmental Health

Electrical and Computer Engineering

ECE 3323 Intro-Solid State Elec Devices
 ECE 3813 Introductory Electronics
 ECE 4813 Electronics
 ECE 5213 Digital Signal Processing
 ECE 5273 Digital Image Processing
 ECE 5523 Random Signals
 ECE 5363 Optical Engineering

Health & Exercise Science

HES 3513 Health Promotion Planning
 HES 3583 Sociocultural Aspects of Health
 HES 3843 Biomechanics
 HES 4543 Comprehensive Stress Management
 HES 4553 Measurement and Evaluation in Health
 Promotion
 HES 4573 Chronic Disease Intervention
 ^HES 5823 Exercise Physiology

Industrial Systems Engineering

ISE 4223 Fundamentals of Engineering Economics
ISE 4553 Data Driven Decision Making I
ISE 4804 Ergonomics in Systems Design
^ISE 5013 Fundamentals of Engineering
Statistical Analysis
ISE 5033 Systems Engineering
^ISE 5103 Intelligent Data Analytics
ISE 4553 Data Driven Decision Making
ISE 5373 Additive Manufacturing
^ISE 5503 Healthcare Analytics
^ISE 5823 Exercise Physiology

Math

MATH 3333 Linear Algebra
MATH 3423 Physical Math II
MATH 4163 Intro Partial Diff. Equations
MATH 4373/5373 Abstract Linear Algebra
MATH 4383/5383 Modern Algebra

Meteorology

METR 4990-024 Foundations of Academic Research
Creative Activity

Physics

PHYS 3043 Physical Mechanics
PHYS 3233-001 Modern Physics for Engineers

Psychology

PSY 3203 Cognitive Psychology
PSY 3803 Physiological Psychology

* *If not taken as Upper-Level Biology Requirement*

Needs to be combined with other 1 credit courses to make 3 credits.

& *Only applies to students on the 2021-degree plan or later.*

^ *No student may earn credit for both sections of cross-listed courses.*

§ *These courses are offered on an irregular basis.*

Career Advising and Professional Development Topics

Research

Research is a balance between collaborative and individual work. Being involved to this experience as early as possible gives undergrad students a perspective of collaborative work. They can understand the way of scientific development and appreciate the published research. Also, by demonstrating their individual contribution to the collaborative work in a lab, they can apply variety of awards and fellowships. Students can have an opportunity to understand their own interest to graduate school, any particular field of science, and collaborative work. If the student finds interest in research, then this experience can be beneficial for obtaining research related recommendation letters from the principal investigators that they worked with. Moreover, based on their contribution, undergrad students' names can be added to the scientific papers, which is an important contribution for landing a high-level graduate college and application for awards and fellowships.

Undergraduate students can work in the lab by helping a graduate student in the beginning. It is important to watch and understand the procedure for at least a couple of months. Students can help the procedure by doing simple lab works under a graduate supervisor. Students, who prefer to work in the same lab more than a semester, can start to be independent in the lab work and produce their results. Under these circumstances, these students can be encouraged to present their results as a poster or a presentation in the OU campus, undergrad related research seminars. If the student is at senior level and has produced results as an undergrad researcher in the same lab in more than two semesters, then those students should be encouraged to attend BMES undergrad symposium and present their results as a poster. Such attempt can increase the graduating successful graduate students from SBME.

Moreover, the students in the senior level and working in a research lab can be encouraged to apply graduate school fellowships from NSF and NIH.

Current research opportunities for undergraduates are listed on the SBME website:

<http://www.ou.edu/coe/sbme/undergrad/research>

Research for Credit: BME 3440/3980 Research Credit Policy

Research as a BME or 'Science, Math, Engineering' elective

Mentored research credit (BME 3440 or BME 3980, honors) may count for a maximum 3 hours of BME elective OR a maximum of 3 hours 'Science, Math, Engineering' (SME) elective credit for a maximum total of 3 hours of research credit counting toward the degree.

To count as a BME elective, mentored research must be completed under the mentorship of either an SBME faculty member or IBEST faculty member. Mentored research in other departments may be applied toward a 'Science, Math, Engineering' Elective with advisor approval.

For research credit outside of SBME/IBEST, in the areas of science, engineering, or math, enrollment in a designated 'SME' section of BME 3440/3980 will be required. Students with external research advisors will provide written feedback as a 1-page summary to the BME 3440/3980 section advisor for official grade entry. Grading will be on an A/B/C/D/F scale as opposed to Pass/Fail.

An SBME faculty member shall be the instructor of record for students enrolling in BME 3440/3980 to perform research for a primary advisor in another department. In those cases, in addition to the 1-page summary, a written statement (e.g., email) from the primary advisor to the SBME faculty instructor to assess the student's performance will be required.

The responsibility for identifying and documenting the primary advisor of each student enrolled in BME 3440/3980 and accurate recording of BME vs. SME credit will reside with the Undergraduate Studies Chair with the assistance of the Student Program Coordinator and will be documented in Degree Navigator.