

Mechanical Engineering (BS) - Biomedical Engineering Track

Degree Requirements

General Education Requirements (54 Hours)

Area I – Written Composition (2 Courses, 6 Hours)

- A. 3 hours: EH 101
- B. 3 hours: EH 102

Area II – Humanities & Fine Arts (3 Courses, 9 Hours)

- A. 3 hours: CA 110
- B. 3 hours from: EH 215, EH 216, EH 225, EH 226, EH 235, EH 236
- C. 3 hours from: ARH 100, ARH 103, ARH 123, ARS 101, DRA 110, MUL 101

Area III – Natural Sciences & Mathematics (3 Courses & Labs, 12 Hours)

- A. 4 hours: MA 125
- B. 8 hours: CH 131 & CH 131L, PH 201 & PH 201L

Area IV – History, Social & Behavioral Sciences (3 Courses, 9 Hours)

- A. 3-6 hours from: HY 101, HY 102, HY 135, HY 136
- B. 3-6 hours from: AN 100, AN 101, CA 100, CA 211, CJ 105, ECO 215, ECO 216, GEO 114, GEO 115, GS 101, HY 101, HY 102, HY 135, HY 136, IS 100, IST 201, NAS 101, PSC 130, PSY 120, PSY 250, SY 109, SY 112

Area V (4 Courses, 18 Hours)

- A. 14 hours: MA 126, MA 227, MA 237, MA 238, PH 202 & PH 202L

Major Requirements (75 Hours)

Engineering Course Requirements (8 Courses, 23 Hours)

- A. 21 hours: EG 220, EG 231, EG 270, EG 283, EG 284, EG 315, EG 360
- B. 2 hours: EG 101/EG 201

Mechanical Engineering Course Requirements (15 Courses & Labs, 37 Hours)

- A. 4 hours: ME 328
- B. 27 hours: ME 135, ME 312, ME 314, ME 316, ME 317, ME 326, ME 410 (W), ME 426, ME 472
- C. 2 hours: ME 416
- D. 4 hour: ME 336 (W), ME 412, ME 414, ME 429

Science Elective (1 Course & Lab, 4 Hours)

- A. 4 hours: CH 132 & CH 132L

Mechanical Elective (1 Course, 3 Hours)

- A. 3 hours: BME 467

Mechanical/Technical (2 Courses & Labs, 8 Hours)

- A. 8 hours: BLY 121 & BLY 121L and BLY 122 & BLY 122L

Minor Requirements (0 Hours)

A minor is not required for this degree program

Notes:

ME 135 – ONLY 2 attempts to earn a grade of C or better. Students who do not meet this requirement will not be allowed to continue in the program.

Additional Information

It is important that students make adequate progress in the Mechanical Engineering program. Satisfactory completion of a set of fundamental courses is required before a student is allowed to take advanced courses. Professional Component Standing (PCS) is awarded by the chair of the department when the student completes the College of Engineering PCS requirements and the WBBJ MABE Departmental PCS requirements.

Mechanical Engineering PCS Courses			
Course Number	Course Title	Credit Hours	Minimum Grade
MA 227	Calculus III	3	C
MA 237	Linear Algebra I	3	C
PH 202	Calculus-Based Physics II + Lab	4	C
EG 283	Statics	3	C
ME 135	Engr Graphics and Comm (maximum 2 attempts)	3	C

College of Engineering PCS Courses			
Course Number	Course Title	Credit Hours	Minimum Grade
EH 101	English Composition I	3	C
EH 102	English Composition II	3	C
CH 131	General Chemistry I + Lab	4	C
MA 125	Calculus I	4	C
MA 126	Calculus II	4	C
PH 201	Calculus-Based Physics I + Lab	4	C

Graduation Plan

Mechanical Engineering (BS): Biomedical Engineering (129 Total Hours)

First Year — Fall Semester

Course ID	Course Description	Hours
EG 101	Intro to Engineering & Design	2

EH 101	English Composition I	3
MA 125	Calculus I	4
CH 131/CH 131L	General Chemistry I & Lab	4
General Education	**Area II or IV	3
Total Hours		16

First Year — Spring Semester

Course ID	Course Description	Hours
EH 102	English Composition II	3
MA 126	Calculus II	4
PH 201/PH 201L	Calculus-Based Physics I & Lab	4
ME 135	Engineering Graphics	3
CH 132/CH 132L	Chemistry II & Lab	4
Total Hours		18

Second Year — Fall Semester

Course ID	Course Description	Hours
MA 227	Calculus III	4
MA 237	Linear Algebra	3
PH 202/PH 202L	Calculus-Based Physics II & Lab	4
EG 283	Statics	3
General Education	**Area II or IV	3
Total Hours		17

Second Year — Spring Semester

Course ID	Course Description	Hours
EG 231	Engineering Econ & Ethics	3
EG 284	Dynamics	3
MA 238	Differential Equations I	3
EG 315	Mechanics of Materials	3
EG 220	Electrical Circuits	3
General Education	**Area II or IV	3
Total Hours		18

Third Year — Fall Semester

Course ID	Course Description	Hours
EG 270	Thermodynamics	3
EG 360	Fluid Mechanics	3
ME 326	Material Science	3
ME 328	Mech Engineering Analysis & Lab	4
CA 110	Public Speaking	3
Total Hours		16

Third Year — Spring Semester

Course ID	Course Description	Hours
ME 312	Mechanical Engineering thermodynamics	3
ME 314	Machine Component Design	3
ME 316	Instrumentation & Experimentation	3
ME 317	Heat Transfer	3
ME 336	Material Science Lab (W)	1
General Education	**Area II or IV	3
Total Hours		16

Fourth Year — Fall Semester

Course ID	Course Description	Hours
ME 410	Principles of Design (W)	3
ME 412	Thermal Science Lab	1
ME 426	Controls	3
ME 429	Controls & Instrumentation Lab	1
BLY 121/BLY 121L	Biology I & Lab	4
General Education	**Area II or IV	3
Total Hours		15

Fourth Year — Spring Semester

Course ID	Course Description	Hours
ME 414	Capstone Design	1
ME 416	Capstone Project	2
ME 472	Vibration Analysis	3
BLY 122/BLY 122I	Biology II & Lab	4
BME 467	Intro to Biomedical Engineering	3

Total Hours

13

Notes

*Recommended Course

**See Degree Requirements

Major Milestones

MECHANICAL ENGINEERING SAMPLE 4-YEAR PLAN WITH MILESTONES

Term 1	Course Description	Pre-req	Cr Hrs	Milestone Notes
EH 101*	English Composition I		3	Must complete at least 12 hours with a 2.0 or higher GPA
MA 125	Calculus I	ACT Math 27	4	
CH 131/CH 131L	General Chemistry I	ACT Math 24	4	
EG 101	Freshman Seminar	ACT Math 24	2	
Fine Arts Elective			3	
			16	
Term 2	Course Description	Pre-req	Cr Hrs	Milestone Notes
EH 102	English Composition II	EH 101 or test score	3	MA 125
MA 126	Calculus II	MA 125	4	CH 131/131L
PH 201/PH 201L	Physics I	MA 125 and MA 126 (cc)	4	EH 101 or EH 105*
ME 135	Engineering Graphics and Communication	MA 125 (cc)	3	
History (US or Western Civ.)			3	
			17	
Term 3	Course Description	Pre-req	Cr Hrs	Milestone Notes
MA 227	Calculus III	MA 126	4	PH 201/201L
MA 237	Linear Algebra I	MA 126	3	MA 126

PH 202/PH 202L	Physics II	PH 201	4	EH 102
EG 283	Statics	MA 126 and PH 201	3	ME 135
CA 110			3	
			17	

Term 4	Course Description	Pre-req	Cr Hrs	Milestone Notes
MA 238	Differential Equations	MA 227 (cc)	3	MA 227
EG 284	Dynamics	EG 283, MA 126	3	PH 202/202L
EG 315	Mechanics of Materials	EG 283, PH 201, MA 227	3	EG 283
EG 231	Engineering Economics and Ethics	MA 126	3	MA 237
EG 220	Electrical Circuits	PH 202, MA 126	3	
			15	

Term 5	Course Description	Pre-req	Cr Hrs	Milestone Notes
EG 360	Fluid Mechanics	EG 284 and MA 238	3	MA 238
ME 326	Materials Science	EG 315, PH 202, CH 131	3	
Science Elective	See advisor for approved course list		3	
EG 270	Thermodynamics	PH 201 and MA 126	3	
ME 328	Mechanical Analysis II	MA 227, MA 237, MA 238	4	
			16	

Term 6	Course Description	Pre-req	Cr Hrs	Milestone Notes
ME 317	Heat Transfer	EG 270, EG 360, MA 238, ME 328	3	Apply for graduation
ME 336 (W)	Materials Science Lab	ME 326, PH 202, CH 131, EG 315	1	Apply for FE Exam
ME 314	Machine Component Design	EG 284, EG 315	3	
ME 312	ME Thermodynamics	EG 270	3	

ME 316	Instrumentation and Experimental Method	MA 238, EG 220, ME 328, PH 202	3	
English Literature			3	
			16	

Term 7	Course Description	Pre-req	Cr Hrs	Milestone Notes
ME 410 (W)	Principles of Design	EG 231, ME 314, ME 316, ME 317, ME 336	3	FE Exam
ME 429	Controls and Instrumentation Lab		1	
ME 426	Controls	ME 238, ME 316, ME 328	3	
ME 412	Thermodynamics Lab	ME 312, ME 316, ME 317, EG 360	1	
ME Elective	See advisor for approved course list		3	
Social/ Behavioral Elective			3	
			14	

Term 8	Course Description	Pre-req	Cr Hrs	Milestone Notes
ME 414	Capstone Design	ME 410	1	
ME 416	Capstone Project	ME 410	2	
BME 467	Intro to Biomedical Engineering	ME 328 (cc)	3	
ME Elective or Technical Elective	See advisor for approved course list		3	
ME 472	Vibrations	EG 284, EG 315, ME 316	3	
Social/ Behavioral Elective			3	
			15	
	**TOTAL		126	

All **bold** courses meet general education requirements.

Courses listed as Milestones are required to obtain Professional Component Standing (PCS).

Prerequisite courses denoted (cc) may be taken concurrently.

*Students who earn an English ACT score of 27, or a written SAT score of 610, can opt out of EH 101.

**Students not Term 1 - Calculus I ready will exceed the 126 hours required for this degree. If math is not started prior to Fall -Year 1, you are likely extending your four-year graduation time table. Students with ACT Math scores 21 and below should begin math courses in the summer before Fall - Year 1.

Two designated writing (W) courses are required with at least one course chosen from offerings in the student's major or minor. Courses carrying this required credit are identified in the University Bulletin by a (W) after the course title.

The Sample 4-year plan is designed as a guide for students preparing for their course selections. This information provides only a suggested schedule. Actual course selections should be made in consultation with an advisor.

Department Information

Department of Mechanical, Aerospace and Biomedical Engineering	(251) 460-6168
Chair	David A. Nelson
Professors	Hsiao, Nelson, Phan
Associate Professors	Cauley, Montalvo, Tambe
Assistant Professors	Kar, Richardson, Dizbay-Onat, Yadollahi
Professors Emeritus	Donovan, Engin
Instructors	Boyd, Thigpen, Webb

[Department of Mechanical, Aerospace and Biomedical Engineering website](https://www.southalabama.edu/colleges/engineering/me/index.html)
<https://www.southalabama.edu/colleges/engineering/me/index.html>

Mechanical Engineering is one of the broadest engineering disciplines. Mechanical engineers invent, analyze and design systems that produce power or convert energy. This encompasses such diverse applications as designing next-generation aircraft and automobiles, inventing novel methods of generating energy from renewable sources, and developing sophisticated new medical devices and systems. Mechanical engineers are in the forefront of exciting new technological fields, including nano-engineering, biomedical engineering, and energy research.

The basic fields of study for mechanical engineers include:

- Materials science, the study of the relationship between structure, properties, and processing of materials.
- Thermodynamics and heat transfer dealing with basic concepts and applications of work, energy, and power. Applications include power generation from fossil fuels, from renewable sources (solar, wind energy) and fuel cells.
- Engineering mechanics, the study of static and dynamic effects of forces applied to rigid and flexible solid bodies.
- Fluid mechanics, the study of the forces and motions of liquids and gases. Included in this area of study are hydraulics, gas dynamics, aerodynamics, and design and application of pumps, compressors, and turbines.
- Control systems including studies of transient and steady-state response of systems to external inputs.
- Design synthesis which integrates all fields of engineering in the production of safe, practical, efficient, and economically feasible solutions to real problems.

The curriculum leading to the degree of Bachelor of Science in Mechanical Engineering (BSME) is designed so that graduates can work in any Mechanical Engineering field, or continue their education at the graduate level.

All BSME students complete a senior-year "capstone" design project, in which a team of students defines and solves a unique, real-world engineering problem.

Aerospace Engineering Track

Students who plan to enter careers or graduate studies in aerospace, aeronautics, astronautics, or a related field may pursue the specialized track in Aerospace Engineering within the BSME program. Students in this track must complete AE 361 Introduction to Aerodynamics, in addition to two other approved aerospace engineering electives.

Students interested in the Aerospace Engineering track within the BSME program should consult their academic advisor.

Biomedical Engineering Track

Students who plan to enter careers or graduate studies in biomedical engineering may pursue the specialized track in Biomedical Engineering within the BSME program. This track may also be appropriate for students planning to pursue a career in the health sciences (medical school, dental school, or other health profession programs).

Students in the Biomedical Engineering track must complete General Biology I & II with labs (BLY 121, BLY 121L, BLY 122, BLY 122L), General Chemistry II with lab (CH 132, CH 132L) and Introduction to Biomedical Engineering (BME 467).

Students interested in the Biomedical Engineering track within the BSME program should consult their academic advisor.

Students planning to apply for admission to a health profession program should also consult a Pre-Health Profession Advisor to identify any additional courses that may be required.

BSME Program Educational Objectives:

Alumni of the Bachelor of Science in Mechanical Engineering (BSME) program should demonstrate the following traits and accomplishments within five years following graduation:

1. Graduates will achieve professional advancements or promotions with progressively higher levels of responsibility, competency, professional and ethical judgment and analysis. They will apply creative and innovative techniques to solve significant problems. They will apply team assimilation skills to successfully manage cross-disciplinary, collaborative projects that require global and multicultural perspectives.
2. Graduates will demonstrate effective written and oral communication skills in presenting, documenting and conveying their work via traditional and new media formats. They will use these skills in creating and supporting new or improved designs, inventions, and intellectual property, thereby contributing to the social, economic, and environmental well-being of local and global communities.
3. Graduates will demonstrate commitment to lifelong learning and continuous professional development through activities such as mentoring, participating in professional societies, completing advanced degrees and achieving professional registration or other certifications.

Mechanical Engineering graduates will accomplish these objectives in the course of professional employment, entrepreneurship, military or public service and postgraduate education.

BSME Student Outcomes:

1. an ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics
2. an ability to apply engineering design to produce solutions that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, and environmental, and economic factors
3. an ability to communicate effectively with a range of audiences
4. an ability to recognize ethical and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental, and societal contexts
5. an ability to function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks, and meet objectives
6. an ability to develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions
7. an ability to acquire and apply new knowledge as needed, using appropriate learning strategies.

The Bachelor of Science in Mechanical Engineering program is accredited by the Engineering Accreditation Commission of ABET, <http://www.abet.org>.

Mechanical Engineering Accelerated Bachelor's To Master's Program

The Department of Mechanical Engineering allows well-qualified undergraduates in the program to follow an "Accelerated Bachelor's to Master's" study plan. This plan permits up to six credit hours of graduate coursework to count towards both the

Bachelor's (as Technical Electives) and the Master's degrees, so that the Master's degree is earned faster than usual. (The coursework concerned must individually satisfy the requirements of both degrees.) See a departmental advisor for specific details.

Exam-Compliant Calculator Policy

Every Mechanical Engineering (ME) student must have an exam-compliant calculator. Only those calculators which are acceptable for use in the Fundamentals of Engineering (FE) exam are considered to be exam-compliant and may be used in Mechanical Engineering classes which allow calculator usage. Use of a calculator which is NOT exam-compliant in an ME test, quiz, or exam will be considered academic misconduct. For a list of exam-compliant calculator models, see <https://ncees.org/exams/calculator/>.