

# B.S. IN MECHANICAL ENGINEERING/M.S. IN BIOMEDICAL ENGINEERING

## Overview

The College of Engineering offers a dual-degree program that culminates with students receiving a Bachelor of Science in Mechanical Engineering and a Master of Science in Biomedical Engineering concurrently. The program is intended for exceptional students who are admitted to the graduate program in their junior year. Students applying for this program must have a grade point average of at least 3.0. The two degrees are awarded simultaneously when the combined requirements have been met for both degrees.

- Juniors who have maintained at least a 3.0 GPA have the option to apply for admission to the 5-year BS ME-MS BME program.
- Those who are accepted into this accelerated program must maintain at least a 3.0 GPA and a minimum of a 3.0 GPA for the final 30 credit hours.
- Up to 6 credit hours of Technical electives earned during the fourth year can be counted toward the 30 credit hours required for the MS degree.
- Students must be registered for a minimum of 12 undergraduate credit hours per semester in their fourth year.
- Students can register for a maximum of 6 graduate credit hours in each semester of their fourth year.
- If a student needs to withdraw from the BS ME/MS BME program then all the requirements for the specific BS Concentration must be completed for graduation with the BS degree.

## Admission Requirements

Juniors in the Mechanical and Aerospace Engineering department of the University of Miami who have maintained at least a 3.0 GPA may apply to the dual degree program. Qualified students are strongly advised to apply to the dual degree program as early as possible in their junior year to facilitate academic advising and course selection in the second semester of their junior year. Students opting for an M.S. degree in a discipline different from their B.S. degree may need to take some prerequisite coursework. Before submitting an application, students should discuss the program and possibility of entering with an academic adviser.

## Curriculum Requirements

Code	Title	Credit Hours
<b>BS IN MECHANICAL ENGINEERING REQUIREMENTS (120 CREDIT HOURS)</b>		
<b>Engineering Courses</b>		
CAE 210	Mechanics of Solids I	3
ECE 205	Principles of Electrical Engineering-I	3
ISE 311	Applied Probability and Statistics	3
EGN 123	Computing and Digital Solutions for the future (can also be EGN 110 or EGN 114)	3
MAE 112	Introduction to Engineering II	2
MAE 202	Dynamics	3
MAE 207	Mechanics of Solids II	3
MAE 241	Measurements Laboratory	3
MAE 301	Engineering Materials Science	3
MAE 302	Mechanical Behavior of Materials	3
MAE 303	Thermodynamics	3
MAE 309	Fluid Mechanics	3
MAE 310	Heat Transfer	3
MAE 341	Mechanical Design I	3
MAE 342	Mechanical Design II	3
MAE 351	Mechanics Laboratory	2
MAE 362	Computer Analysis of Mechanical and Aerospace Engineering Problems	3
MAE 404	Experimental Engineering Laboratory	2
MAE 412	System Dynamics	3
MAE 415	Automatic Control	3
MAE 441	Design of Fluid and Thermal Systems	3
MAE 442	Capstone Design Project-I	3
MAE 443	Capstone Design Project-II	3

<b>Math and Science Courses</b>		
MTH 151	Calculus I for Engineers	5
MTH 162	Calculus II	4
MTH 211	Calculus III	3
MTH 311	Introduction to Ordinary Differential Equations	3
CHM 151	Chemistry for Engineers	3
CHM 153	Chemistry Laboratory for Engineers	1
PHY 221	University Physics I	3
PHY 222	University Physics II	3
PHY 223	University Physics III	3
PHY 224	University Physics II Lab	1
PHY 225	University Physics III Lab	1
<b>General Education Requirements</b>		
Written Communication Skills:		
WRS 105	First-Year Writing I	3
WRS 107	First-Year Writing II: STEM	3
Quantitative Skills:		
MTH 151	Calculus I for Engineers (fulfilled through the major)	
Areas of Knowledge:		
Arts and Humanities Cognate		9
People and Society Cognate		9
STEM Cognate (9 credits) (fulfilled through the major)		
<b>MS IN BIOMEDICAL ENGINEERING REQUIREMENTS (30 CREDIT HOURS)</b>		
Graduate Level Electives		18
Two physiology courses		6
BME 601	Biochemistry and Cellular Physiology for Engineers	
BME 602	Human Physiology for Engineers	
BME 603	Neurophysiology for Engineers	
BME 612	Regulatory Control of Biomedical Devices	3
BME 707	Master's Project I	1
BME 708	Master's Project II	2
<b>Total Credit Hours</b>		<b>150</b>

## Plan of Study

<b>Freshman Year</b>		
<b>Fall</b>		<b>Credit Hours</b>
EGN 123	Computing and Digital Solutions for the future (can also be EGN 110 or EGN 114)	3
WRS 105	First-Year Writing I	3
MTH 151	Calculus I for Engineers	5
PHY 221	University Physics I	3
<b>Credit Hours</b>		<b>14</b>
<b>Spring</b>		
MAE 112	Introduction to Engineering II	2
CAE 210	Mechanics of Solids I	3
WRS 107	First-Year Writing II: STEM	3
MTH 162	Calculus II	4
PHY 222	University Physics II	3
PHY 224	University Physics II Lab	1
<b>Credit Hours</b>		<b>16</b>

<b>Sophomore Year</b>		
<b>Fall</b>		
MAE 207	Mechanics of Solids II	3
ISE 311	Applied Probability and Statistics	3
MTH 211	Calculus III	3
PHY 223	University Physics III	3
PHY 225	University Physics III Lab	1
PS Cognate (PS Elective) <sup>1</sup>		3
<b>Credit Hours</b>		<b>16</b>
<b>Spring</b>		
MAE 202	Dynamics	3
MAE 241	Measurements Laboratory	3
CHM 151	Chemistry for Engineers	3
CHM 153	Chemistry Laboratory for Engineers	1
ECE 205	Principles of Electrical Engineering-I	3
HA Cognate (HA Elective) <sup>1</sup>		3
<b>Credit Hours</b>		<b>16</b>
<b>Junior Year</b>		
<b>Fall</b>		
MAE 302	Mechanical Behavior of Materials	3
MAE 303	Thermodynamics	3
MAE 309	Fluid Mechanics	3
MAE 341	Mechanical Design I	3
MTH 311	Introduction to Ordinary Differential Equations	3
HA Cognate (HA Elective)		3
<b>Credit Hours</b>		<b>18</b>
<b>Spring</b>		
MAE 301	Engineering Materials Science	3
MAE 310	Heat Transfer	3
MAE 342	Mechanical Design II	3
MAE 351	Mechanics Laboratory	2
MAE 362	Computer Analysis of Mechanical and Aerospace Engineering Problems	3
PS Cognate (PS Elective) <sup>1</sup>		3
<b>Credit Hours</b>		<b>17</b>
<b>Senior Year</b>		
<b>Fall</b>		
MAE 404	Experimental Engineering Laboratory	2
MAE 412	System Dynamics	3
MAE 441	Design of Fluid and Thermal Systems	3
Technical elective taken as graduate course		3
MAE 442	Capstone Design Project-I	3
Graduate Level Course		3
<b>Credit Hours</b>		<b>17</b>
<b>Spring</b>		
MAE 415	Automatic Control	3
MAE 443	Capstone Design Project-II	3
HA Cognate (HA Elective) <sup>1</sup>		3
PS Cognate (Adv. PS Elective) <sup>1</sup>		3
Graduate Level Course		3
<b>Credit Hours</b>		<b>15</b>

<b>Fifth Year (Graduate)</b>		
<b>Fall</b>		
BME 602	Human Physiology for Engineers	3
BME 612	Regulatory Control of Biomedical Devices	3
BME 707	Master's Project I	1
BME elective <sup>3</sup>		3
<b>Credit Hours</b>		<b>10</b>
<b>Spring</b>		
BME 601 or 603	Biochemistry and Cellular Physiology for Engineers or Neurophysiology for Engineers	3
BME 708	Master's Project II	2
BME elective		3
BME elective		3
<b>Credit Hours</b>		<b>11</b>
<b>Total Credit Hours</b>		<b>150</b>

<sup>1</sup> You must complete a minimum of 1 PS cognate and 1 HA cognate to be selected from the list of available cognates. Each cognate should be a minimum of three courses (9 credit hours).

<sup>2</sup> Technical Electives are advanced courses in mathematics, science or engineering, approved by the Faculty Advisor, as appropriate for individual objectives.