

## Emphasis - Bioinformatics

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## **B.S.B.E. in Biomedical Engineering** **Description**

The Bachelor of Science in Biomedical Engineering (B.S.B.E.) degree program will prepare engineering students at the University of Mississippi to capably apply advanced mathematics, science, and engineering to solve the problems at the interface of engineering, biology, and medicine. Moreover, the curriculum will prepare graduates with the ability to make measurements on and interpret data from living systems, addressing the problems associated with the interaction between living and nonliving materials and systems.

The graduates of the program will be able to pursue (i) employment in biomedical or related industries (ii) graduate studies in biomedical engineering or related disciplines, and (iii) pursue professional careers in medicine, dentistry, pharmacy, or patent law.

### **Program Educational Objectives**

Following graduation and during the first several postgraduate years, biomedical engineering baccalaureate degree holders from the University of Mississippi will possess skill sets to accomplish the following:

1. Meet evolving expectations of future employers in the biomedical engineering workplace as well as other professional careers
2. Exhibit a systematic approach to problem solving in their professional practice including quantitative and analytical skills weighted with considerations towards a sustainable future.
3. Continue their professional development by pursuing advanced studies in medicine and other professional fields if desired.

### **Student Outcomes**

Biomedical engineering students at the University of Mississippi should demonstrate the attainment of the following 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, 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 judgements, 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

## **Minimum Total Credit Hours: 127** **General Education Requirements**

For detailed information see the [the General Education Requirements of the School of Engineering](#).

### **Fifteen Credits of Liberal Arts:**

Students must complete at least 6 credit hours in the social and behavioral sciences, at least 6 credit hours from humanities, and at least 3 credit hours from fine and performing arts appreciation.

#### **For the purpose of these requirements:**

##### **Social/behavioral sciences**

Social/behavioral sciences will include anthropology (Anth), economics (Econ), liberal arts (Liba 203, Liba 313), political science (Pol), psychology (Psy), sociology (Soc), and either Hon 101 or Hon 102 (if not being used to fulfill composition requirements).

##### **Humanities**

Humanities will include African American studies (Aas 201, 202), classics (Clc), English (Eng 220-226), gender studies (G St 201, 202), history (Hst), liberal arts (Liba 202, 305, 312), philosophy (Phil), religion (Rel), Southern studies (S St 100-level), and either Hon 101 or 102 (if not being used to fulfill composition requirements).

##### **Fine and performing arts appreciation**

Fine and performing arts appreciation will include courses in art history (AH), liberal arts (Liba 130, 204, 314), music (Mus 101-105), and theatre & film (Thea 201, 202; Danc 200).

## **Course Requirements**

Specific requirements for the B.S.B.E. include Writ 100, Writ 101, or Hon 101; Writ 102, Liba 102, or Hon 102; Engr 101, 111; Math 261-264, Math 353; Chem 105, 106, 115, 116, 221, 225; Phys 211, 212, 221, 222; Bisc 160, 161, 162, 163; Csci 256 or BME 256; Engr 360; BME 200, 222, 305, 311, 313, 314, 315, 333, 370, 400, 444, 461, 462.

## **Other Academic Requirements**

Students in the Department of Biomedical Engineering who consider independent research as part of their educational experience may take an independent research course (up to 3 hours) in engineering. Additional opportunities for research in chemistry, biology, physics, or pharmacy may be



approved with permission of the BME chair.

## Emphasis - Bioinformatics Description

Bioinformatics is an interdisciplinary field at the interface of engineering, biology, computer science, and statistics that develops methods and software tools for interpreting biological data with the goal of increasing our understanding of health and disease. Bioinformatics is an umbrella term for the body of biological studies that uses computer programming and simulation as part of its methodology, as well specific analysis methods that are used to interpret big data, particularly in the field of genomics.

### Course Requirements

Specific requirements for the bioinformatics emphasis include:

- Bisc 336
- Csci 343, 475;
- 6 hours of Csci electives chosen from 356, 345, 443, 444, 447, 547.
- Two 300+ level classes (6 hours) from Csci or Engr. \*Note: To take Csci 492 (Special Topics in Data Science), Csci 356 must be taken as a Csci elective from Course Requirements above. Special courses with departmental approval may also be considered.

### Other Academic Requirements

Students in the Department of Biomedical Engineering who consider independent research as part of their educational experience may take an independent research course (300 level or higher, 3 hours) to count as an emphasis course. Additional opportunities for research in chemistry, biology, physics, or pharmacy may be approved with permission of the BME chair.

### Degree Requirements

The academic regulations for this degree program, as entered in the University of Mississippi Catalog, are in effect for the current or selected academic year and semester. The University of Mississippi reserves the right to 1) change or withdraw courses; 2) change rules for registration, instruction, and graduation; and 3) change other regulations affecting the student body at any time.

## B.S.B.E. in Biomedical Engineering

### General Education

REQUIREMENT	HOURS	DESCRIPTION
First Year Writing I	3	Successfully complete <a href="#">Hon 101</a> , <a href="#">Writ 100</a> , or <a href="#">Writ 101</a> with a passing grade.
First Year Writing II	3	Successfully complete one of the following courses with a passing grade: <a href="#">Writ 102</a> , <a href="#">Liba 102</a> , <a href="#">Hon 102</a> .
6 hrs humanities	6	Successfully complete 6 hrs of humanities with a passing grade chosen from the following: African American studies ( <a href="#">Aas 201</a> , <a href="#">202</a> ), classics (Clc), English ( <a href="#">Eng 220-226</a> ), gender studies ( <a href="#">G St 201</a> , <a href="#">202</a> ), history (Hst), liberal arts ( <a href="#">Liba 202</a> , <a href="#">305</a> , <a href="#">312</a> ), philosophy (Phil), religion (Rel), Southern studies ( <a href="#">S St 100</a> -level), and either <a href="#">Hon 101</a> or <a href="#">102</a> (if not being used to fulfill composition requirements).
3 hrs fine arts	3	Complete 3 hrs of fine arts with a passing grade chosen from art history, music, dance, and theatre arts. Studio and workshop courses cannot be used to satisfy this requirement. Courses that satisfy this requirement are any Art History (AH); <a href="#">Liba 130</a> , <a href="#">204</a> , <a href="#">314</a> ; <a href="#">Mus 101</a> , <a href="#">102</a> , <a href="#">103</a> , <a href="#">104</a> , <a href="#">105</a> ; <a href="#">Danc 200</a> ; <a href="#">Thea 201</a> , <a href="#">202</a> .

### General Education II

REQUIREMENT	HOURS	DESCRIPTION
<a href="#">Math 261</a>	3	Complete <a href="#">Math 261</a> with a passing grade.
<a href="#">Math 262</a>	3	Complete <a href="#">Math 262</a> with a passing grade.
<a href="#">Math 263</a>	3	Complete <a href="#">Math 263</a> with a passing grade.
<a href="#">Math 264</a>	3	Complete <a href="#">Math 264</a> with a passing grade.
<a href="#">Math 353</a>	3	Complete <a href="#">Math 353</a> with a passing grade.
<a href="#">Bisc 160</a>	3	Complete <a href="#">Bisc 160</a> with a passing grade.
<a href="#">Bisc 161</a>	1	Complete <a href="#">Bisc 161</a> with a passing grade.
<a href="#">Bisc 162</a>	3	Complete <a href="#">Bisc 162</a> with a passing grade.
<a href="#">Bisc 163</a>	1	Complete <a href="#">Bisc 163</a> with a passing grade.
<a href="#">Chem 105</a>	3	Complete <a href="#">Chem 105</a> with a passing grade.
<a href="#">Chem 115</a>	1	Complete <a href="#">Chem 115</a> with a passing grade.
<a href="#">Chem 106</a>	3	Complete <a href="#">Chem 106</a> with a passing grade.
<a href="#">Chem 116</a>	1	Complete <a href="#">Chem 116</a> with a passing grade.



REQUIREMENT	HOURS	DESCRIPTION
<a href="#">Chem 221</a>	3	Complete <a href="#">Chem 221</a> with a passing grade.
<a href="#">Chem 225</a>	1	Complete <a href="#">Chem 225</a> with a passing grade.
<a href="#">Phys 211</a>	3	Complete <a href="#">Phys 211</a> with a passing grade.
<a href="#">Phys 221</a>	1	Complete <a href="#">Phys 221</a> with a passing grade.
<a href="#">Phys 212</a>	3	Complete <a href="#">Phys 212</a> with a passing grade.
<a href="#">Phys 222</a>	1	Complete <a href="#">Phys 222</a> with a passing grade.

### Major Requirements

REQUIREMENT	HOURS	DESCRIPTION
<a href="#">BME 200</a>	2	Complete <a href="#">BME 200</a> with a passing grade.
<a href="#">BME 222</a>	3	Complete <a href="#">BME 222</a> with a passing grade.
<a href="#">BME 305</a>	3	Complete <a href="#">BME 305</a> with a passing grade.
<a href="#">BME 311</a>	3	Complete <a href="#">BME 311</a> with a passing grade.
<a href="#">BME 313</a>	3	Complete <a href="#">BME 313</a> with a passing grade.
<a href="#">BME 314</a>	1	Complete <a href="#">BME 314</a> with a passing grade.
<a href="#">BME 315</a>	3	Complete <a href="#">BME 315</a> with a passing grade.
<a href="#">BME 333</a>	3	Complete <a href="#">BME 333</a> with a passing grade.
<a href="#">BME 400</a>	1	Complete <a href="#">BME 400</a> with a passing grade.
<a href="#">BME 370</a>	3	Complete <a href="#">BME 370</a> with a passing grade.
<a href="#">BME 444</a>	3	Complete <a href="#">BME 444</a> with a passing grade.
<a href="#">BME 461</a>	2	Complete <a href="#">BME 461</a> with a passing grade.
<a href="#">BME 462</a>	2	Complete <a href="#">BME 462</a> with a passing grade.

### Major Requirements II

REQUIREMENT	HOURS	DESCRIPTION
<a href="#">Engr 101</a> & 111	3	Complete <a href="#">Engr 101</a> & 111 with a passing grade.
<a href="#">Engr 360</a>	3	Complete <a href="#">Engr 360</a> with a passing grade.

### Emphasis - Bioinformatics

REQUIREMENT	HOURS	DESCRIPTION
<a href="#">CSci 256</a>	3	Complete <a href="#">CSci 256</a> with a passing grade.
<a href="#">Bisc 336</a>	4	Complete <a href="#">Bisc 336</a> with a passing grade.
<a href="#">Csci 343</a>	3	Complete <a href="#">Csci 343</a> with a passing grade.
<a href="#">Csci 375</a>	3	Complete <a href="#">Csci 375</a> with a passing grade.
6 hrs Csci elective	6	Complete 6 hrs from the following with a passing grade: <a href="#">Csci 345</a> , <a href="#">CSci 356</a> , <a href="#">Csci 443</a> , <a href="#">Csci 444</a> , <a href="#">Csci 447</a> , or <a href="#">Csci 547</a> .
6 hrs 300+ CSci or Engr courses	6	Complete 6 hrs of CSci or Engineering courses at the 300+ level with a passing grade.
6 hrs social sciences	6	Students need to complete 6 hours of social science with a passing grade chosen from the following: anthropology (Anth), economics (Econ), liberal arts ( <a href="#">Liba 203</a> , <a href="#">Liba 313</a> ), political science (Pol), psychology (Psy), sociology (Soc), and either <a href="#">Hon 101</a> or <a href="#">Hon 102</a> (if not being used to fulfill composition requirements).

