

## 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: 126** **General Education Requirements**

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

Students must complete at least 15 semester hours consisting of social/behavioral sciences, humanities, modern or ancient languages, and fine arts course work. At least 6 credit hours must be in the social/behavioral sciences (including Econ 310), and at least 9 credit hours must be in humanities, modern or ancient languages, and fine arts courses with at least 3 semester hours from humanities and at least 3 semester hours from fine arts.

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

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

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

#### **Humanities**

will include African American studies (Aas 201, 202), classics (Clc), environmental studies (Envs 101), gender studies (G St 201, 202), history (Hst), Liba 202, 312, 305, literature (Eng 103, 220-226), philosophy (Phil), religion (Rel), Southern studies 100-level, and either Hon 101 or 102 (if not being used to fulfill composition requirements).

#### **Modern or ancient language courses**

will include courses in Ancient Greek (Gr), Arabic (Arab), Chinese (Chin), French (Fr), German (Germ), Italian (Ital), Japanese (Japn), Korean (Kor), Latin (Lat), Portuguese (Port), Russian (Russ), Spanish (Span), and Swahili (Swa).

#### **Fine arts**

will include courses in art history (AH), Danc 200, Liba 130, Liba 204, Liba 314, Mus 101, Mus 102, Mus 103, Mus 104, Mus 105, Thea 201, and Thea 202.

### **Three credits of additional general education course work:**

Students must complete an additional 3 semester hours of course work beyond the 15 hours required above. These additional 3 hours are to be composed of any additional fine arts, humanities, modern languages, or social science course work (as defined above) or any combination of credits from the courses listed below: AS 301, AS 302, Bus 250, Bus 271, Edld 110, Edld 111, Edld 120, Edld 220, Engr 400, Mgmt 371, GB 370, Msl 102, Nsc 211, Spch 102, Spch 105

## **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; Math 261-264, Math 353; Chem 105, 106,



115, 116, 221, 222, 225, 226; Phys 211, 212, 221, 222; Bisc 160, 161, 162, 163; Csci 251; Engr 360, 400; EI E 331; Ch E 307, 308; BME 200, 222, 313, 314, 333, 370, 444, 461, 462.

## Other Academic Requirements

Students in the Department of Biomedical Engineering who consider independent research as part of their educational experience may use up to 3 hours of Engr 300 or above course or independent research course housed in chemistry, biology or physics as an emphasis elective in the biomolecular and bioinformatics emphases.

## Emphasis - Bioinformatics Description

Bioinformatics is an interdisciplinary field investigating methods/ software tools to understand better biological data. Bioinformatics combines computer science, statistics, mathematics, and engineering to analyze and interpret biological data. Bioinformatics is both an umbrella term for the body of biological studies that uses computer programming and simulation as part of its methodology, and specific analysis "pipelines" that are repeatedly used, 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 345, 443, 444, 447, or 547; 3 hours of emphasis electives chosen from Bisc, Chem, Math, Phys, or School of Engineering 300 level or above or special courses with departmental approval.

## 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> .
3 hrs humanities	3	Successfully complete 3 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), environmental studies ( <a href="#">Envs 101</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> ), literature ( <a href="#">Eng 103</a> , <a href="#">220-226</a> ), philosophy (Phil), religion (Rel), Southern studies 100-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> .
3 hrs FA/Lang/Hum	3	Successfully complete 3 hrs of Fine Arts, Humanities, or Modern language with a passing grade. Modern Language include courses in courses in Ancient Greek (Gr), Arabic (Arab) nd Swahili (Swa). (Japn), Korean (Kor), Latin (Lat), Portuguese (Port), Russian (Russ), Spanish
<a href="#">Econ 310</a>	3	Successfully complete <a href="#">Econ 310</a> with a passing grade.

### 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.



REQUIREMENT	HOURS	DESCRIPTION
<a href="#">Chem 116</a>	1	Complete <a href="#">Chem 116</a> with a passing grade.
<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="#">Chem 222</a>	3	Complete <a href="#">Chem 222</a> with a passing grade.
<a href="#">Chem 226</a>	1	Complete <a href="#">Chem 226</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 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 333</a>	3	Complete <a href="#">BME 333</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="#">Ch E 307</a>	2	Complete <a href="#">Ch E 307</a> with a passing grade.
<a href="#">Ch E 308</a>	2	Complete <a href="#">Ch E 308</a> with a passing grade.
<a href="#">Csci 251</a>	3	Complete <a href="#">Csci 251</a> with a passing grade.
<a href="#">EI E 331</a>	3	Complete <a href="#">EI E 331</a> with a passing grade.
<a href="#">Engr 360</a>	3	Complete <a href="#">Engr 360</a> with a passing grade.
<a href="#">Engr 400</a>	1	Complete <a href="#">Engr 400</a> with a passing grade.

### Emphasis - Bioinformatics

REQUIREMENT	HOURS	DESCRIPTION
<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 475</a>	3	Complete <a href="#">Csci 475</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> .
3 hrs track electives	3	Complete 3 hours of track electives with a passing grade.
3 hrs social sciences	3	Successfully complete 3 hrs of social science with a passing grade chosen from anthropology (Anth), economics (Econ), political science (Pol), psychology (Psy), sociology (Soc), <a href="#">Liba 203</a> , <a href="#">313</a> , or <a href="#">Hon 101</a> , <a href="#">102</a>
3 hrs gen ed, lang, or SS/H/FA	3	Complete 3 additional hours with a passing grade of humanities, languages (modern, Greek, or Latin), social science, or a general education course as defined by the School of Engineering

