Emphasis - Bioinformatics

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, 225; Phys 211, 212, 221, 222; Bisc 160, 161, 162, 163; Csci 256; Engr 360, 400; BME 200, 222, 305, 311, 313, 314, 315, 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 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.

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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.

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General Education

REQUIREMENT	HOURS	DESCRIPTION
First Year Writing I	3	Successfully complete Hon 101, Writ 100, or Writ 101 with a passing grade.
First Year Writing II	3	Successfully complete one of the following courses with a passing grade: Writ 102, Liba 102, Hon 102.
3 hrs humanities	3	Successfully complete 3 hrs of humanities with a passing grade chosen from the following: African American studies (Aas 201, 202), classics (Clc), environmental studies (Envs 101), gender studies (G St 201, 202), history (Hst), liberal arts (Liba 202, 305, 312), 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).
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); Liba 130, 204, 314; Mus 101, 102, 103, 104, 105; Danc 200; Thea 201, 202.
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
Econ 310	3	Successfully complete Econ 310 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), Liba 203, 313, or Hon 101, 102

General Education II

REQUIREMENT	HOURS	DESCRIPTION
Math 261	3	Complete Math 261 with a passing grade.
Math 262	3	Complete Math 262 with a passing grade.
Math 263	3	Complete Math 263 with a passing grade.
Math 264	3	Complete Math 264 with a passing grade.

REQUIREMENT	HOURS	DESCRIPTION
Math 353	3	Complete Math 353 with a passing grade.
Bisc 160	3	Complete Bisc 160 with a passing grade.
Bisc 161	1	Complete Bisc 161 with a passing grade.
Bisc 162	3	Complete Bisc 162 with a passing grade.
Bisc 163	1	Complete Bisc 163 with a passing grade.
Chem 105	3	Complete Chem 105 with a passing grade.
Chem 115	1	Complete Chem 115 with a passing grade.
Chem 106	3	Complete Chem 106 with a passing grade.
Chem 116	1	Complete Chem 116 with a passing grade.
Chem 221	3	Complete Chem 221 with a passing grade.
Chem 225	1	Complete Chem 225 with a passing grade.
Phys 211	3	Complete Phys 211 with a passing grade.
Phys 221	1	Complete Phys 221 with a passing grade.
Phys 212	3	Complete Phys 212 with a passing grade.
Phys 222	1	Complete Phys 222 with a passing grade.

Major Requirements

REQUIREMENT	HOURS	DESCRIPTION
BME 200	2	Complete BME 200 with a passing grade.
BME 222	3	Complete BME 222 with a passing grade.
BME 305	3	Complete BME 305 with a passing grade.
BME 311	3	Complete BME 311 with a passing grade.
BME 313	3	Complete BME 313 with a passing grade.
BME 314	1	Complete BME 314 with a passing grade.
BME 315	3	Complete BME 315 with a passing grade.
BME 333	3	Complete BME 333 with a passing grade.
BME 370	3	Complete BME 370 with a passing grade.
BME 444	3	Complete BME 444 with a passing grade.
BME 461	2	Complete BME 461 with a passing grade.
BME 462	2	Complete BME 462 with a passing grade.

Major Requirements II

REQUIREMENT	HOURS	DESCRIPTION
CSci 256	3	Complete CSci 256 with a passing grade.
Engr 360	3	Complete Engr 360 with a passing grade.
Engr 400	1	Complete Engr 400 with a passing grade.

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REQUIREMENT	HOURS	DESCRIPTION
Bisc 336	4	Complete Bisc 336 with a passing grade.
Csci 343	3	Complete Csci 343 with a passing grade.
Csci 475	3	Complete Csci 475 with a passing grade.

REQUIREMENT	HOURS	DESCRIPTION
6 hrs Csci elective	6	Complete 6 hrs from the following with a passing grade: Csci 345, CSci 356, Csci 443, Csci 444, Csci 447, or Csci 547.