

**Biomaterials (BES)****Minor in Biomaterials****Department of Materials Science and Engineering, College of Engineering and Applied Sciences**

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**Biomaterials (BES)**

The minor in Biomaterials is designed for students enrolled in programs leading to the Bachelor of Engineering (B.E.) degree who wish to obtain an understanding of how materials interact with the human body and how engineering materials can be designed to serve physiological functions. The minor includes a comprehensive selection of courses in materials science, biomechanics, and biology, as well as study of fluids and electricity as they relate to human physiology. The program serves as an excellent background for engineering students who wish to prepare for graduate education in medicine, bioengineering, and the biosciences or a related field, or for a career in which an understanding of biological concepts is essential.

**Requirements for the Minor in Biomaterials (BES)**

Electrical Engineering (ESE), Engineering Science (ESG), and Mechanical Engineering (MEC) majors may choose to complete the sequence of courses for the minor as they relate to their major program. An example of the minor course list for each is listed below, but students should contact the Department of Materials Science and Engineering as early as possible for detailed requirements.

Completion of the minor requires 21-23 credits in addition to courses counting towards the requirements for the majors.

**Students Majoring in Electrical or Computer Engineering:**

1. ESE 304 Applications of Operational Amplifiers
2. ESE 218 Digital Systems Design
3. ESE 380 Embedded Microprocessor Systems Design I
4. ESM 353 Biomaterials: Manufacture, Properties, and Applications
5. Three courses chosen from:
  - BME 301 Bioelectricity
  - BME 303 Engineering Methods in Biomechanics
  - BME 305 Biofluids
  - BME 381 Nanofabrication in Biomedical Applications
6. Two courses chosen from:
  - BIO 202 Fundamentals of Biology: Molecular and Cellular Biology
  - BIO 203 Fundamentals of Biology: Cellular and Organ Physiology
  - BIO 328 Mammalian Physiology
  - BIO 361 Biochemistry I
  - CHE 321 Organic Chemistry I
  - ESG 332 Materials Science I: Structure and Properties of Materials
7. ESG 201 Engineering Responses to Society or BME 201 Biomedical Engineering and Society

**Students Majoring in Engineering Science:**

1. ESM 334 Materials Engineering
2. ESM 335 Strength of Materials
3. ESM 353 Biomaterials: Manufacture, Properties, and Applications
4. ESG 332 Materials Science I: Structure and Properties of Materials
5. Three courses chosen from:
  - BME 301 Bioelectricity
  - BME 303 Engineering Methods in Biomechanics

- BME 305 Biofluids
- BME 381 Nanofabrication in Biomedical Applications

6. One course chosen from:

- BIO 202 Fundamentals of Biology: Molecular and Cellular Biology
- BIO 203 Fundamentals of Biology: Cellular and Organ Physiology
- BIO 328 Mammalian Physiology
- BIO 361 Biochemistry I
- CHE 321 Organic Chemistry I

7. ESG 201 Engineering Responses to Society or BME 201 Biomedical Engineering and Society

**Students Majoring in Mechanical Engineering:**

1. MEC 310 Introduction to Machine Design

2. MEC 410 Design of Machine Elements

3. ESG 332 Materials Science I: Structure and Properties of Materials

4. ESM 353 Biomaterials: Manufacture, Properties, and Applications

5. Three courses chosen from:

- BME 301 Bioelectricity
- BME 303 Engineering Methods in Biomechanics
- BME 305 Biofluids
- BME 420 Computational Biomechanics

6. Two courses chosen from:

- BIO 202 Fundamentals of Biology: Molecular and Cellular Biology
- BIO 203 Fundamentals of Biology: Cellular and Organ Physiology
- BIO 328 Mammalian Physiology
- BIO 361 Biochemistry I
- CHE 321 Organic Chemistry I

7. ESG 201 Engineering Responses to Society or BME 201 Biomedical Engineering and Society