

# College of Engineering (Dean's Office) Courses

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## Courses

### **BME 5101. Research Seminar I.**

Involves formal presentations and discussion by MS students in the program or Ph.D. students in their first year. Prerequisite: Departmental approval required. Restricted to level of GR.

**Department:** Biomedical Engineering

**1 Credit Hour**

**1 Total Contact Hour**

0 Lab Hour

1 Lecture Hour

0 Other Hour

### **BME 5102. Research Seminar II.**

Involves formal presentations and discussion by MS students in the program or Ph.D. students in their first year. Prerequisite: Departmental approval required. Restricted to level of GR.

**Department:** Biomedical Engineering

**1 Credit Hour**

**1 Total Contact Hour**

0 Lab Hour

1 Lecture Hour

0 Other Hour

### **BME 5192. Clinical Rotations for Eng.**

This course facilitates the recognition of the importance of designing medical devices and biologics with the end-user in mind. Each rotation will include background in terms of theory and clinical application provided by a physician, including selected case studies, followed by "hands-on" experience (whenever possible) with technical personnel. Clinical rotations will be at the Foster School of Medicine, the William Beaumont Army Medical Center, and the US-Mexico Border Health Association. Prerequisites: BIOL 6304, DRSC 5495, and (BME 5301 or BME 6301) with a grade of "C" or better. Departmental approval also required. Restricted to level of GR.

**Department:** Biomedical Engineering

**1 Credit Hour**

**3 Total Contact Hour**

0 Lab Hour

0 Lecture Hour

3 Other Hour

**Prerequisite(s):** (BIOL 6304 w/C or better ) AND (DRSC 5495 w/C or better ) AND (BME 5301 w/C or better ) OR (BME 6301 w/C or better)

### **BME 5193. Graduate Clinical Research.**

The student is matched with a research clinician and will "shadow" the clinician throughout the course. The following activities are conducted: direct observation of procedures (diagnostic and interventional), development of Institutional Review Board protocols, clinical data analysis, and interaction with the company sponsoring a device/drug trial. Prerequisites: BIOL 6304, DRSC 5495, and (BME 5301 or BME 6301) with a grade of "C" or better. Departmental approval also required. Restricted to level of GR.

**Department:** Biomedical Engineering

**1 Credit Hour**

**3 Total Contact Hour**

0 Lab Hour

0 Lecture Hour

3 Other Hour

**Prerequisite(s):** (BIOL 6304 w/C or better ) AND (DRSC 5495 w/C or better ) AND (BME 5301 w/C or better ) OR (BME 6301 w/C or better)

### **BME 5194. Graduate Research.**

Graduate Research. Prerequisite: Department approval required. Restricted to level of GR.

**Department:** Biomedical Engineering

**1 Credit Hour**

**1 Total Contact Hour**

0 Lab Hour

0 Lecture Hour

1 Other Hour

**BME 5196. Medical Device Practicum.**

The use of structured techniques for client needs identification will be taught. Student teams will follow a structured process for the concept generation design of a biomedical device. Students will consult experts, perform patent searches, and conduct competitive benchmarking as part of external searches for solutions. Prerequisites: BME 5192 or 6192 and MGMT 5314, with a grade of "C" or better. Departmental approval also required. Restricted to level of GR.

**Department:** Biomedical Engineering

**1 Credit Hour**

**3 Total Contact Hour**

0 Lab Hour

0 Lecture Hour

3 Other Hour

**Prerequisite(s):** (BME 5192 w/C or better ) OR (BME 6192 w/C or better ) AND (MGMT 5314 w/C or better)

**BME 5294. Graduate Research.**

Graduate Research. Prerequisites: Department approval required. Restricted to level of GR.

**Department:** Biomedical Engineering

**2 Credit Hours**

**2 Total Contact Hours**

0 Lab Hours

0 Lecture Hours

2 Other Hours

**BME 5301. BME for Global Health.**

Graduate level course that provides an overview of the role of engineering technological advances to improve human health. The following points will be emphasized throughout the semester, What are the challenges in healthcare delivery in remote locations; How are we paying for healthcare delivery? What is the role of engineering to solve healthcare problems; and how do new healthcare technologies move from the lab to the bedside. Prerequisite: Departmental approval required. Restricted to level of GR.

**Department:** Biomedical Engineering

**3 Credit Hours**

**3 Total Contact Hours**

0 Lab Hours

3 Lecture Hours

0 Other Hours

**BME 5302. Telemedicine & Imaging Info..**

This course focuses on applications of point-of-care diagnostics for chronic disease management. It also introduces basic concepts in telemedicine. Students will gain the knowledge, understanding and practical preparation needed to implement a program to diagnose and treat patients in remote areas. Prerequisite: Departmental approval required. Restricted to level of GR.

**Department:** Biomedical Engineering

**3 Credit Hours**

**3 Total Contact Hours**

0 Lab Hours

3 Lecture Hours

0 Other Hours

**BME 5303. Research & Lab Methods.**

An introduction to biomedical engineering research laboratory principles and procedures involving living systems with emphasis on lab safety, experimental design, data collection, analysis, and interpretation; and ethical issues including scientific integrity and the use of human and animal subjects in research experiments. Prerequisite: Departmental approval required. Restricted to level of GR.

**Department:** Biomedical Engineering

**3 Credit Hours**

**5 Total Contact Hours**

3 Lab Hours

2 Lecture Hours

0 Other Hours

**BME 5304. BME Device Design & Regulation.**

This course introduces the regulatory requirements for the design, testing, and clinical implementation of medical devices and biologics. The first part covers the FDA regulatory process. The second part covers key legal and policy issues involved in a clinical organization: Health Insurance Portability and Accountability Act and Joint Commission on the Accreditation of Health Care Organizations rules on risk management, standards, regulations, compliance and ethics. Prerequisites: BME 5301 or 6301 and BME 5302 or 6302 with a grade of "C" or better; may be taken concurrently. Departmental approval also required. Restricted to level of GR.

**Department:** Biomedical Engineering

**3 Credit Hours**

**3 Total Contact Hours**

0 Lab Hours

3 Lecture Hours

0 Other Hours

**Prerequisite(s):** (BME 5301 w/C or better ) OR (BME 6301 w/C or better ) AND (BME 5302 w/C or better ) OR (BME 6302 w/C or better)

**BME 5310. Biomaterials.**

This course discusses various aspects pertaining to the selection, processing, testing (in vitro and in vivo) and performance of hard and soft biomaterials, orthopedic devices, and cardiovascular, ophthalmologic and dental applications. The biocompatibility and surgical applicability of metallic, polymeric and ceramic implants and prosthetic devices are discussed. The physicochemical interactions between the implant material and the physiological environment will be described. Biomaterials in maxillofacial, orthopedic, dental, ophthalmic and neuromuscular applications will be emphasized. Prerequisite: Departmental approval required. Restricted to level of GR.

**Department:** Biomedical Engineering

**3 Credit Hours**

**3 Total Contact Hours**

0 Lab Hours

3 Lecture Hours

0 Other Hours

**BME 5313. Tissue Engineering.**

Principles and practices of bioartificial organ and tissue development; cellular/material interaction and translation of information from two-dimensional surfaces to three-dimensional scaffolds; selection and processing of bio-materials to form tissue scaffolds; analysis of tissue engineered devices, standards, and regulation. Topics include: material selection and processing, mechanisms and kinetics of material degradation, cell-material interaction and interfaces, effect of construct architecture on tissue growth, and transport through engineered tissues. Examples of engineering tissues for replacing cartilage, bone, tendons, ligaments, skin and liver will be presented. Prerequisite: BME 5310 with a grade of "C" or better. Departmental approval also required. Restricted to level of GR.

**Department:** Biomedical Engineering

**3 Credit Hours**

**3 Total Contact Hours**

0 Lab Hours

3 Lecture Hours

0 Other Hours

**Prerequisite(s):** (BME 5310 w/C or better)

**BME 5321. Biomechanics.**

This course will offer an introduction to rehabilitation engineering, i.e. mechanics of gait/locomotion, muscle mechanics, electromyography, musculoskeletal anatomy, hand functions, soft tissue mechanics, amputation surgery, upper and lower extremity prosthetics, upper and lower extremity orthotics, seating and positioning, and assistive devices. Prerequisites: Departmental approval required. Restricted to level of GR.

**Department:** Biomedical Engineering

**3 Credit Hours**

**3 Total Contact Hours**

0 Lab Hours

3 Lecture Hours

0 Other Hours

**BME 5390. Special Topics in BME.**

Advanced topics of contemporary interest in metallurgical and materials engineering. May be repeated for credit when topic varies. Prerequisites: Departmental approval required. Restricted to level of GR.

**Department:** Biomedical Engineering

**3 Credit Hours**

**3 Total Contact Hours**

0 Lab Hours

3 Lecture Hours

0 Other Hours

**BME 5394. Graduate Research.**

Graduate Research. Prerequisites: Department approval required. Restricted to level of GR.

**Department:** Biomedical Engineering

**3 Credit Hours**

**3 Total Contact Hours**

0 Lab Hours

0 Lecture Hours

3 Other Hours

**BME 5395. Project or Internship.**

Project with BME faculty or internship in a company. Prerequisites: Department approval required. Restricted to level of GR.

**Department:** Biomedical Engineering

**3 Credit Hours**

**3 Total Contact Hours**

0 Lab Hours

0 Lecture Hours

3 Other Hours

**BME 5398. Thesis.**

Graduate Thesis. Prerequisite: Department approval required. Restricted to level of GR.

**Department:** Biomedical Engineering

**3 Credit Hours**

**3 Total Contact Hours**

0 Lab Hours

0 Lecture Hours

3 Other Hours

**BME 5399. Thesis.**

Graduate Thesis. Prerequisite: BME 5398; Departmental approval also required. Restricted to level of GR.

**Department:** Biomedical Engineering

**3 Credit Hours**

**3 Total Contact Hours**

0 Lab Hours

0 Lecture Hours

3 Other Hours

**Prerequisite(s):** (BME 5398 w/P or better)

**BME 5494. Graduate Research.**

Graduate Research. Prerequisites: Department approval required. Restricted to level of GR.

**Department:** Biomedical Engineering

**4 Credit Hours**

**4 Total Contact Hours**

0 Lab Hours

0 Lecture Hours

4 Other Hours

**BME 5594. Graduate Research.**

Graduate Research. Prerequisites: Department approval required. Restricted to level of GR.

**Department:** Biomedical Engineering

**5 Credit Hours**

**5 Total Contact Hours**

0 Lab Hours

0 Lecture Hours

5 Other Hours

**BME 5694. Graduate Research.**

Graduate Research. Prerequisites: Department approval required. Restricted to level of GR.

**Department:** Biomedical Engineering

**6 Credit Hours**

**6 Total Contact Hours**

0 Lab Hours

0 Lecture Hours

6 Other Hours

**BME 6101. Doctoral Research Symposium I.**

Involves formal presentations and discussion by MS students in the program or Ph.D. students. Prerequisite: Departmental approval required. Restricted to level of GR, DR.

**Department:** Biomedical Engineering

**1 Credit Hour**

**1 Total Contact Hour**

0 Lab Hour

1 Lecture Hour

0 Other Hour

**BME 6102. Doctoral Research Symposium II.**

Involves formal presentations and discussion by MS students in the program or Ph.D. students. Prerequisite: Departmental approval required. Restricted to level of GR, DR.

**Department:** Biomedical Engineering

**1 Credit Hour**

**1 Total Contact Hour**

0 Lab Hour

1 Lecture Hour

0 Other Hour

**BME 6192. Clinical Rotations for Eng.**

This course facilitates the recognition of the importance of designing medical devices and biologics with the end-user in mind. Each rotation will include background in terms of theory and clinical application provided by a physician, including selected case studies, followed by "hands-on" experience (whenever possible) with technical personnel. Clinical rotations will be at the Foster School of Medicine, the William Beaumont Army Medical Center, and the US-Mexico Border Health Association. Prerequisites: BIOL 6304, DRSC 5495, and (BME 5301 or BME 6301) with a grade of "C" or better. Departmental approval also required. Restricted to level of GR, DR.

**Department:** Biomedical Engineering

**1 Credit Hour**

**3 Total Contact Hour**

0 Lab Hour

0 Lecture Hour

3 Other Hour

**Prerequisite(s):** (BIOL 6304 w/C or better ) AND (DRSC 5495 w/C or better ) AND (BME 5301 w/C or better ) OR (BME 6301 w/C or better)

**BME 6193. Doctoral Clinical Research.**

The PhD student is matched with a research clinician and will "shadow" the clinician throughout the course. The following activities are conducted: direct observation of procedures (diagnostic and interventional), development of Institutional Review Board protocols, clinical data analysis, and interaction with the company sponsoring a device/drug trial. Prerequisites: BIOL 6304, DRSC 5495, and (BME 5301 or BME 6301) with a grade of "C" or better. Departmental approval also required. Restricted to level of GR, DR.

**Department:** Biomedical Engineering

**1 Credit Hour**

**3 Total Contact Hour**

0 Lab Hour

0 Lecture Hour

3 Other Hour

**Prerequisite(s):** (BIOL 6304 w/C or better ) AND (DRSC 5495 w/C or better ) AND (BME 5301 w/C or better ) OR (BME 6301 w/C or better)

**BME 6194. Doctoral Research.**

Graduate Research. Prerequisites: Department approval required. Restricted to level of GR, DR.

**Department:** Biomedical Engineering

**1 Credit Hour**

**1 Total Contact Hour**

0 Lab Hour

0 Lecture Hour

1 Other Hour

**BME 6196. Medical Device Practicum.**

The use of structured techniques for client needs identification will be taught. Student teams will follow a structured process for the concept generation design of a biomedical device. Students will consult experts, perform patent searches, and conduct competitive benchmarking as part of external searches for solutions. Prerequisites: BME 5192 or 6192 and MGMT 5314, with a grade of "C" or better. Departmental approval also required. Restricted to level of GR, DR.

**Department:** Biomedical Engineering

**1 Credit Hour**

**3 Total Contact Hour**

0 Lab Hour

0 Lecture Hour

3 Other Hour

**Prerequisite(s):** (BME 6192 w/C or better ) OR (BME 5192 w/C or better ) AND (MGMT 5314 w/C or better)

**BME 6294. Doctoral Research.**

Graduate Research. Prerequisites: Department approval required. Restricted to level of GR, DR.

**Department:** Biomedical Engineering

**2 Credit Hours**

**2 Total Contact Hours**

0 Lab Hours

0 Lecture Hours

2 Other Hours

**BME 6301. BME for Global Health.**

Graduate level course that provides an overview of the role of engineering technological advances to improve human health. The following points will be emphasized throughout the semester, What are the challenges in healthcare delivery in remote locations; How are we paying for healthcare delivery? What is the role of engineering to solve healthcare problems; and how do new healthcare technologies move from the lab to the bedside. Prerequisite: Departmental approval required. Restricted to level of GR, DR.

**Department:** Biomedical Engineering

**3 Credit Hours**

**3 Total Contact Hours**

0 Lab Hours

3 Lecture Hours

0 Other Hours

**BME 6302. Telemedicine & Imaging Info.**

This course focuses on applications of point-of-care diagnostics for chronic disease management. It also introduces basic concepts in telemedicine. Students will gain the knowledge, understanding and practical preparation needed to implement a program to diagnose and treat patients in remote areas. Prerequisite: Departmental approval required. Restricted to level of GR, DR.

**Department:** Biomedical Engineering

**3 Credit Hours**

**3 Total Contact Hours**

0 Lab Hours

3 Lecture Hours

0 Other Hours

**BME 6304. BME Device Design & Regulation.**

This course introduces the regulatory requirements for the design, testing, and clinical implementation of medical devices and biologics. The first part covers the FDA regulatory process. The second part covers key legal and policy issues involved in a clinical organization: Health Insurance Portability and Accountability Act and Joint Commission on the Accreditation of Health Care Organizations rules on risk management, standards, regulations, compliance and ethics. Prerequisites: BME 5301 or 6301 and BME 5302 or 6302, with a grade of C or better; may be taken concurrently. Restricted to level of GR, DR.

**Department:** Biomedical Engineering

**3 Credit Hours**

**3 Total Contact Hours**

0 Lab Hours

3 Lecture Hours

0 Other Hours

**Prerequisite(s):** (BME 6301 w/C or better ) OR (BME 5301 w/C or better ) AND (BME 6302 w/C or better ) OR (BME 5302 w/C or better)

**BME 6391. Individual Studies.**

Independent studies in Biomedical Engineering. Prerequisites: Departmental approval required. Restricted to level of GR, DR.

**Department:** Biomedical Engineering

**3 Credit Hours**

**3 Total Contact Hours**

0 Lab Hours

3 Lecture Hours

0 Other Hours

**BME 6394. Doctoral Research.**

Graduate Research. Prerequisites: Department approval required. Restricted to level of GR, DR.

**Department:** Biomedical Engineering

**3 Credit Hours**

**3 Total Contact Hours**

0 Lab Hours

0 Lecture Hours

3 Other Hours

**BME 6398. Dissertation.**

PhD dissertation. Prerequisite: Department approval required. Restricted to level of GR, DR.

**Department:** Biomedical Engineering

**3 Credit Hours**

**3 Total Contact Hours**

0 Lab Hours

0 Lecture Hours

3 Other Hours

**BME 6399. Dissertation.**

PhD dissertation. Prerequisites: BME 6398; Department approval also required. Restricted to level of GR, DR.

**Department:** Biomedical Engineering

**3 Credit Hours**

**3 Total Contact Hours**

0 Lab Hours

0 Lecture Hours

3 Other Hours

**Prerequisite(s):** (BME 6398 w/P or better)

**BME 6494. Doctoral Research.**

Graduate Research. Prerequisites: Department approval required. Restricted to level of GR, DR.

**Department:** Biomedical Engineering

**4 Credit Hours**

**4 Total Contact Hours**

0 Lab Hours

0 Lecture Hours

4 Other Hours

**BME 6594. Doctoral Research.**

Graduate Research. Prerequisites: Department approval required. Restricted to level of GR, DR.

**Department:** Biomedical Engineering

**5 Credit Hours**

**5 Total Contact Hours**

0 Lab Hours

0 Lecture Hours

5 Other Hours

**BME 6694. Doctoral Research.**

Graduate Research. Prerequisites: Department approval required. Restricted to level of GR, DR.

**Department:** Biomedical Engineering

**6 Credit Hours**

**6 Total Contact Hours**

0 Lab Hours

0 Lecture Hours

6 Other Hours