EBME - Biomedical Engineering

EBME 100  Introduction to Biomedical Engineering: 1 Credits (1 Lec)
PREREQUISITE: Math Level III. This course series serves as the introduction to the Biomedical Engineering major. In the Fall, students will be introduced to the Biomedical Engineering major, career paths in biomedical engineering, biomedical engineering ethics (including the appropriate use of animal models) and select core skills for success in the major.

EBME 102  Introduction to Biomedical Engineering Research: 1 Credits (1 Lec)
PREREQUISITE: AT Math Level 4. Students will learn about current topics in faculty biomedical engineering research and will learn to critically read research articles. Students will then present a poster about a biomedical research topic at a final symposium.

EBME 301  Engineering Analysis of Physiological Systems: 3 Credits (3 Lec)
PREREQUISITE: M 274, ECHM 201. Engineering analysis of human physiology. Physiologic systems are treated as engineering systems with emphasis on input-output considerations, system interrelationships and engineering analogs. Differential equations, Laplace transform, and computer-aided tools will be introduced and used for modeling, simulation, statistical analysis, and error analysis purposes. Topics will cover mass and electrolyte transfer, nervous system, cardiovascular mechanics, respiratory system, renal system, and muscles.

EBME 410  Fundamentals of Bioelectronics for Bioinstrumentation: 4 Credits (3 Lec, 1 Lab)
PREREQUISITE: M 221, EBME 301. This course teaches key topics in biology, electrochemistry, biophysics, biosensors and bioimplants aiming at developing bio instruments using bioelectronic fundamentals. Bioelectronics utilizes the basic concepts of electronic engineering and biophysical principles to biology and medicine. Important aspects of developing bioinstruments for the health care sector are its easy accessibility, easy operability, its interface with soft living structures, such as cells and tissues and ethics. This course will review basic electronic concepts and then introduce spectroscopy techniques, review electrochemical principles and then guide the students into electrode, sensor and sensor interface design.

EBME 440  Biomedical Engineering Laboratory: 3 Credits (1 Lec, 2 Lab)
PREREQUISITE: EBME 310, EIND 354. This course provides students with hands-on experience with experimental design along with measuring and interpreting data from living systems and cell cultures. Students will be gain experience with engineering concepts of sensor calibration; statistical and uncertainty analysis; sampling; signal conditioning; computerized data acquisition. An overview of sensors for measuring various physical quantities (e.g., temperature, pressure, acceleration, load) will be provided along with discussion on measurement uncertainty and appropriate statistical methods to draw conclusions.

EBME 480  Biomedical Engineering Design: 4 Credits (4 Lec)
PREREQUISITE: EBME 301, EBME 410, EMAT 464, EBIO 461. This is the capstone design course that requires students to combine knowledge from many of their previous courses and then to apply that knowledge to the design of useful and safe biomedical products. The design projects are based on open-ended challenges associated with biomedical product needs. Students are will learn to work effectively on a design team and to communicate with a wide range of audiences in both written and verbal form.