

BME301

Course Syllabus

1. *Department:* Biomedical Engineering *Number:* BME301 *Credit Hours:* 3
Title: Human Physiology for Engineers I *Required*

2. *Course Description:*

This course includes a quantitative approach to human physiology from the biomedical engineering perspective with an emphasis on neural, sensory, muscle, and cardiac physiology. Autonomic neural and somatic motor control will be discussed. Engineering applications, including neural stimulators, functional imaging, cochlear implants, artificial noses, vestibular implants, visual implants, artificial larynges, pacemakers and defibrillators will be discussed. Assignments include computer-based exercises using MATLAB.

3. *Prerequisite(s):* BME201; co-req BME311

4. *Textbook(s) and/or other required material:*

Human Physiology: An Integrated Approach, Dee Silverthorn, 3rd edition, Pearson Education publishing as Benjamin Cummings, San Francisco, CA 2004.

5. *Course objectives. By the end of this course, the student should be able to: (use demonstrative verbs)*

Describe physiologic behavior of neural, cardiac and sensory systems. Identify anatomical features of physiological systems. Predict the behavior of physiological systems in response to changing conditions. Explain state-of-the-art technology designed to interface with electrically excitable physiological systems. Use electronic databases to search for relevant scientific literature.

6. *Topics covered (give the number of lectures per topic, as well as the total number of lectures per semester):*

Introduction to topics (1 lecture)
protein channels and their role in physiology(2 lectures)
Nerves and human/machine interfaces (3 lectures)
Central nervous system, EEGs, and functional imaging (3 lectures)
Cardiac electrophysiology, pacemakers and defibrillation (3 lectures)
Sensory receptors (1 lecture)
somatic receptors (1 lecture)
hearing and cochlear implants (3 lectures)
Smell, taste, artificial nose (3 lectures)
vision and retinal implants (3 lectures)
equilibrium and vestibular implants (1 lecture)
autonomic nervous system (2 lectures)
in class exams and final (4 lectures)

Laboratory Topics
Hodgkin Huxley model
Neural conduction
EEG
Reflexes and reaction times
EKG and heart sounds
Sensory Physiology and two interval forced choice method
Interaural time differences
Cochlear implant simulation
Multidimensional scaling analysis of taste
Autonomic nervous system

7. Class/laboratory schedule (sessions per week and duration of each session):
Two 50 min lectures and one 2-hour lab session per week.