BIOMICROSCOPIC ENGINEERING (4800)

4800:522 Physiological Control Systems (3 Credits)
Prerequisite: 3100:202 and 3450:335. The basic techniques employed in control theory, systems analysis, and model identification as they apply to physiological systems.

4800:530 Design of Medical Imaging Systems (3 Credits)
Prerequisites: 3100:200; 3650:292; 4400:343; 4800:353; 4800:305; or by permission of instructor. Physical principles and engineering design of medical imaging systems, with emphasis on digital radiography, computed tomography, nuclear medicine, ultrasound and magnetic resonance.

4800:560 Experimental Techniques in Biomechanics (3 Credits)
Prerequisites: 3150:153, 3450:335, 3650:292, 4600:203 or by permission. Principles of testing and measuring devices commonly used for biofluid and biosolid mechanics studies. Laboratories for demonstration and hands-on experience.

4800:570 Human Factors Engineering (3 Credits)
Reliability and human error; human capabilities and limitations, crew protection, display systems, controls and controlling actions, interface design principles, risk management, Safety and accident prevention.

4800:600 BME Graduate Colloquium (1 Credit)
(May be repeated for a maximum of 16 credits.) The Biomedical Engineering Colloquium is a seminar series designed to introduce students to current topics in biomedical engineering research, design and business.

4800:605 Fundamentals of Biomedical Engineering (4 Credits)
Prerequisites: Graduate Standing in College of Engineering or permission of instructor. This course covers the fundamental areas of biomedical engineering including biomechanics, biomaterials, signal/image processing, biotransport phenomena, controls, and emerging areas.

4800:606 Physiology for Biomedical Science and Engineering (3 Credits)
An integrative study of the various human body functions with emphasis on cellular, neuromuscular, cardiovascular, and renal physiology and their applications in biomedical engineering.

4800:611 Biometry (3 Credits)
Statistics and experimental design topics for the biomedical and biomedical engineering disciplines including: distributions, hypothesis testing and estimation, ANOVA, probit analysis and nonparametrics statistics.

4800:620 Neural Networks (3 Credits)
Examination of highly parallel, distributed architectures for computing that are, to varying degrees, derived from structures observed in biological nervous systems. After an overview of how real neurons operate, the course will examine both lissial and modern neural computing architectures. Comparisons will be made with traditional serial machines and applications for which neural networks seem most promising will be examined.

4800:627 Advances in Drug and Gene Delivery Systems (3 Credits)
This course will examine technological innovations for the delivery of drugs and genes. Methods of introducing drugs and genes into the body, modeling drug transport, and metabolic responses of cells and organs will be analyzed.
Biomedical Engineering (4800)

4800:655 Rehabilitation Engineering (3 Credits)
Prerequisites: graduate standing in engineering, mathematics, or science; or permission of the instructor. Devices for rehabilitation, interfacing the motor and/or sensory impaired, quantitative assessment techniques, prosthetics and orthotics, bedsore mechanics, emerging technologies.

4800:660 Biomaterials & Laboratory (4 Credits)
Corequisite: Biomaterials Laboratory. Material uses in biological applications. Effect of physiological environment and sterilization on materials. Controlled and uncontrolled degradation. Effect of materials on soft tissue, hard tissue and blood. Laboratory experiments using materials designed for biomedical use and demonstrations of biological/materials interactions.

4800:661 Advanced Biomaterials (3 Credits)
Prerequisite: 4800:660 or permission of instructor. The objective of this course is to provide the fundamental understanding of the host responses when exposed to various implantable devices and biomaterials. Methods for testing biocompatibility will be analyzed.

4800:662 Tissue Engineering & Regenerative Medicine (3 Credits)
Prerequisites: 4800:661 or permission. This course will cover topics including basic developmental biology, quantitative description of biological processes, and integration of cells with materials to regenerate tissue.

4800:663 Artificial Organs (3 Credits)
Prerequisites: graduate standing in the College of Engineering or permission of instructor. Study of the rationale for the engineering and clinical aspects required for the design and variety of artificial organs, with emphasis on the artificial heart and artificial kidney.

4800:665 Biomaterials and Tissue Engineering Methods (3 Credits)
Prerequisite: 4800:660; Corequisite: 4800:661; or permission of the instructor. This course is designed to equip students with knowledge and skills to evaluate biomaterials and to design scaffolds for tissue engineering. Analytical techniques include principles of microscopy, cell culture techniques, and biocompatibility testing.

4800:670 Mathematical Modeling in Biology & Medicine (3 Credits)
Prerequisites: graduate standing in engineering, mathematics, or physics; or permission of instructor. Modeling of pharmacokinetic, cardiovascular, neuromuscular, and immune systems, and artificial organ interactions. Deterministic and stochastic approaches.

4800:685 Medical Devices & Artificial Organs (3 Credits)
Prerequisites: graduate standing in engineering, mathematics, or science; or permission of instructor. Design of medical devices and artificial organs, requirements, safety considerations, tissue constraints, optimization techniques, government regulations, and legal liability.

4800:697 Special Topics: Biomedical Engineering (1-4 Credits)
(May be repeated.) Specialized areas of study as defined by the instructor.

4800:698 Masters Research (1-6 Credits)
Prerequisite: Permission of advisor. (May be repeated.) Research on a suitable topic in biomedical engineering culminating in a master’s thesis.

4800:699 Masters Thesis in Biomedical Engineering (1-6 Credits)
Prerequisite: permission of advisor. (May be repeated) Supervised research in a specific area of biomedical engineering.

4800:898 Preliminary Research (1-15 Credits)
(May be repeated) Prerequisite: Approval of the dissertation director. Preliminary investigations prior to the submission of a dissertation proposal to the Interdisciplinary Doctoral Committee.

4800:899 Doctoral Dissertation (1-15 Credits)
Prerequisite: acceptance of research proposal by the Interdisciplinary Doctoral Committee and approval of the dissertation director. (May be repeated) Original research by the doctoral student.