

BMME 740
Advanced Biomaterials
Course Syllabus

Department: Joint Dept. of Biom. Engr. *Number:* BMME 740 *Credit Hours:* 1
Title: Advanced Biomaterials

2. Course Description:

Each week a topic will be highlighted addressing a biomaterial or implant. Articles from current scientific and medical literature as well as personal experience and articles from the Wall Street Journal will be used to accent the topics.

3. Prerequisite(s): BMME 112

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

Primary Course Reading Text:

Biomaterials Science – An Introduction to Materials in Medicine. Buddy D. Rattner, Allan S. Hoffman, Frederick J. Schoen, Jack E. Lemmons, editors, Academic Press, 1996.

Other Texts:

High Performance Biomaterials. Michael Szycher, Editor, Technomic, 1991.

Biomaterials: An Introduction (2nd edition). Joon B. Park and Roderic S. Lakes, Plenum Press, 1992.

5. Course objectives.

By the end of this course, the student should be able to: understand the current biomaterials scene, know how these materials are synthesized and fabricated and know the applications in which they are used. The student will also be able to design devices for specific scientific, industrial and medical applications using current biomaterials. The student will be able to present a novel hypothesis in an NIH grant format and defend this hypothesis in class.

6. *Topics covered (number of lectures per topic, based on 37 50-minute lectures):*

Novel Biomaterials and Uses in Engineering and Tissue Engineering:

Hydrogels, self-assembling peptides, nanostructured devices

Orthopaedic Materials, Procedures and devices:

Fracture Fixation

Total Joint Bearing Surfaces

Orthopaedic Implants (Hip, Knee, etc.)

Soft Tissue Anchors

Artificial Muscle, Tendon, Ligament, & Cartilage

Orthotics

Dentistry Procedures and Materials:

Maxillofacial Prosthetics

Dental Implants

Adhesives & Sealants

General Surgery and Plastic Surgery

Wound Dressings/Synthetic Skin

Nerve Regeneration Scaffolds

Artificial Kidneys & Livers

Cardiovascular Surgery

Arterial & Vascular Grafts

Artificial Heart

Otolaryngology

Cochlear Implants

Ophthalmology

Ophthalmologic Implants

Drug Delivery

Timed release materials

Implantable materials

Cutting Edge Technologies and Materials

Nanostructure Devices (DNA-templated FETs and nanowires)

Microstructure diagnostic kit chemistry (gene arrays, lab on a chip chemistry)

Date of preparation and person(s) who prepared this description:
A.J. Banes, Ph.D., 2005