

BME 331 Biodegradable Materials

Instructor Dr Anil Mahapatro anil_ahapatro_wichita.edu
Day Time Monday Wednesday 9:00 AM
Prerequisite BME 331 or ME 331 or instructor consent

Course Description: This course will provide students with a comprehensive overview of biodegradable materials as it relates to their applications in the biomedical and health care fields. The course will cover in details the different classes of biodegradable materials including biodegradable polymers, ceramics and metals. Synthesis, characterization and degradation of these materials in the biological environment will be covered. Biodegradation/biocorrosion mechanisms of these materials, the complexity of the response of the biological environment and the experimental methods for monitoring the degradation process will be discussed. Strategies for surface modification to control the degradation will be touched upon. Finally specific applications of these materials in drug delivery, cancer therapy, regenerative therapies, cardiovascular and orthopedic will be covered and the storage, sterilization and packing of these materials discussed.

Textbook No official text book has been assigned for the course. Materials will be drawn from various books and research journal papers

Tentative Course Outline

- Introduction to biodegradable materials
- Biodegradable metals
 - Iron based materials
 - Magnesium based materials
- Biodegradable polymers
 - synthetic and naturally available biodegradable polymers
- Biodegradable ceramics
 - Hydroxyapatite based materials
- Synthesis, characterization and degradation of these materials in the biological environment
- Biodegradation / bio-corrosion mechanisms
- The response of the biological environment in-vivo
- Experimental methods for monitoring biodegradation
- Strategies for surface modification to control the biodegradation
- Specific applications
 - drug delivery
 - cancer therapy
 - regenerative therapies
 - cardiovascular
 - orthopedic

Representative Laboratory Exercises

- Monitoring surface kinetics using a Quartz crystal microbalance
- Imaging of localized surface interactions

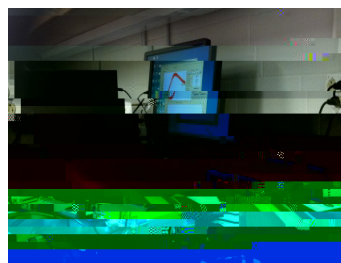


Figure: Gamry eQCM quartz crystal



Figure: Scanning Electrochemical Microscope