THE OHIO STATE UNIVERSITY
COLLEGE OF ENGINEERING

Biological Response to Biomaterials

MATSCEN 3611

Credit Hours:
3.00

Course Levels:
Undergraduate (1000-5000 level)

Course Components:
Lecture

Course Description:
The biological response to biomaterials implanted within the human body.

Prerequisites and Co-requisites:
Prereq: 2010, or permission of instructor.

Course Goals / Objectives:
- Learn the concepts of biology that govern how the body reacts to the presence of modern biomaterials.
- Learn concepts relating to how implants are labeled as `foreign? and the aggressive chemical response that often damages both the implant and surrounding natural tissues.
- Study materials engineering strategies used to minimize or ignore these biological reactions.

Course Topics:

- The Immune System Self and non-self discrimination; Innate and adaptive immune response; molecular basis of T cell, B cell and antibody responses; inflammatory response, inflammatory mediators; surfaces and protein adsorption
- Foreign body response Resorption, Integration, Encapsulation
- Metals Materials selection, effects of mechanical properties, chemistry and corrosion
- Ceramics Materials selection, effects of chemistry and processing
- Polymers: Natural and Synthetic Materials selection, effects of chemistry, molecular weight, degradation rate, wetting angle
- Surface Engineering Surface morphology, surface chemistry, surface energy
- Tissue Engineered Biomaterials Cell sourcing, tissue typing, use of xenogenic and other naturally derived materials
- Modifying the foreign body response: Case studies Orthopaedic Implants, surgical staples/sutures, dental implants, biosensors, cosmetic implants, tissue engineered skin

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Designation:
Required
Elective