



**THE OHIO STATE UNIVERSITY**  
COLLEGE OF ENGINEERING

# Biological Response to Biomaterials

## MATSCEN 3611

**Credit Hours:**

3.00

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**Course Levels:**

Undergraduate (1000-5000 level)

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**Course Components:**

Lecture

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**Course Description:**

The biological response to biomaterials implanted within the human body.

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**Prerequisites and Co-requisites:**

Prereq: 2010, or permission of instructor.

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**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.
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**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