

## BME111 DESIGN OF BIOMATERIALS

- Catalog Data:** **BME111 Design of Biomaterials (Credit Units: 4) S.**  
Natural and synthetic polymeric materials. Materials characterization and design. Wound repair, blood clotting, foreign body response, transplantation biology, biocompatibility of materials, tissue engineering. Artificial organs and medical devices. Government regulations. Patenting, Ethical issues. Prerequisites: BME110A-B. (Design units: 3)
- Textbook:** Ratner, Hoffman, Schoen, and Lemons, *Biomaterials Science.*, Academic Press, 2004
- References:** Class notes.
- Coordinator:** Noo Li Jeon
- Course Outcomes:** Students will be able to:  
Select appropriate class of materials using knowledge of different materials properties.  
Design an implant material, component, or process to meet desired needs.  
Identify, formulate, and solve materials selection and surface engineering problems.  
Identify materials properties, apply fundamental analytical tools, and predict performance.
- Prerequisites By Topic:** Properties of materials.  
Surface properties in materials  
Chemical and mechanical analysis
- Lecture Topics:** Introduction to materials science and biomaterials, natural and synthetic polymer biomaterials, metallic biomaterials, ceramic biomaterials, surface properties of materials, methods for surface engineering, clinical applications of biomaterials, design criteria for synthetic biomaterials.
- Class Schedule:** Each class meets 3 hours per week for 10 weeks and students are assigned to a 1 hour discussion session per week.
- Computer Usage:** None.
- Laboratory Projects:** None.
- Professional Component:** Contributes toward the Biomedical Engineering Topics and Major Design experience.
- Relationship to Program Outcomes:** This course relates to Program Outcomes 1 and 2 as stated at: [http://www.eng.uci.edu/dept/objective\\_biomedical](http://www.eng.uci.edu/dept/objective_biomedical).

**Design Content Description**

**Approach:** Students will learn to select right biomaterials for in vivo and in vitro applications. (50%) Specific discussions on metals, polymers ceramics and other composites. (50%)

**Lectures:** 100%

**Laboratory Portion:**

**Grading Criteria:**

Homework:	5%
Project:	30%
Midterm (2h):	25%
Final (2h):	<u>40%</u>
	100%

**Estimated ABET Category Content:**

Mathematics and Basic Science: 0 credit units or 0%

Engineering Science: 1 credit units or 25%

Engineering Design: 3 credit units or 75%

**Prepared by:** Noo Li Jeon **Date:** July 2005

**CEP Approved:** Fall 2002