

**BME111 DESIGN OF BIOMATERIALS**  
(Required for BME and BMEP; Elective for MSE)

**Catalog Data:** **BME111 Design of Biomaterials (Credit Units: 4)**  
Natural and synthetic polymeric materials. Metal and ceramics implant materials. Materials and surface characterization and design. Wound repair, blood clotting, foreign body response, transplantation biology, biocompatibility of material. Artificial organs and medical devices. Government regulations. Corequisite/Prerequisites: BME 50B. (Design units: 3)

**Textbook:** *Biomaterials: An Introduction*, Park, Joon and Lakes, R.S., 3<sup>rd</sup> edition, Springer, 2007

**References:** Class notes

**Coordinator:** Noo Li Jeon

**Relationship to Program Outcomes:** This course relates to Program Outcomes

**BME:** a, b, c, and e as stated at:

<http://undergraduate.eng.uci.edu/degreeprograms/biomedical/mission>

**Course Outcomes / Performance Criteria:** Students will:  
Select appropriate class of materials using knowledge of different materials properties. (BME a)  
Design an implant material, component, or process to meet desired needs. (BME b)  
Identify, formulate, and solve materials selection and surface engineering problems. (BME c)  
Identify materials properties, apply fundamental analytical tools, and predict performance. (BME e)

**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:** Meets for 3 hours of lecture and 1 hour of discussion each week for 10 weeks.

**Computer Usage:**

**Laboratory Projects:**

**Professional Component:** Contributes toward the Biomedical Engineering Topics and Major Design experience.

**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

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**CEP Approved:** Winter 2008