

BENG186A: Principles of Biomaterials Design
Spring 2019

Class time and location: Tu/Th 5-6:30 PM PFBH 191
Discussion sections: W 9-9:50 AM SEQUO 147 (Julia)
W 4-4:50 PM SEQUO 147 (Rebecca)
W 12-12:50 PM SEQUO 148 (Lauren)
W 3-3:50 PM SEQUO 147 (Kevin)

Instructor: Professor Ester J. Kwon (ejkwon@ucsd.edu)
Office Hours: PFBH 287 Th 4-5

Teaching Assistants: Rebecca Kandell (rkandell@eng.ucsd.edu)
Julia Kudryashev (kudryashev@eng.ucsd.edu)
Kevin Rychel (krychel@eng.ucsd.edu)
Lauren Waggoner (lwaggoner@eng.ucsd.edu)

TAs will answer questions on TritonEd, during discussion section, or office hours by appointment.

Text: Biomaterials Science: An Introduction to Materials in medicine
Buddy D. Ratner, Allan S. Hoffman, Frederick J. Schoen, Jack E. Lemons

Course Objectives

At the end of this course you should be able to:

- Describe what a biomaterial is.
- List the major classes of biomaterials and their applications.
- Know major methods for the characterization of biomaterials.
- Be able to provide a rational justification for recommendation of the best material for an application.
- List different strategies to modify and/or design biomaterials.
- Explain how biomaterials interact with the “host”.
- Understand basic principles of federal regulation, intellectual property protection, and economics of biomaterials implementation.
- Read, understand, and analyze scientific publications pertaining to the field of biomaterials and have a broad understanding of biomaterials research.
- Learn how to write an effective proposal.

TritonEd

TritonEd (tritoned.ucsd.edu) will be used as the main source of class resources and communication. In order to facilitate fair access to information for all students, all questions related to class material must be asked via TritonEd.

- Syllabus, reading, and assignments
- Check exam dates and due dates
- General course announcements
- Course related questions will only be answered on TritonEd discussion board to ensure fair access to information. Prof. Kwon and TAs will check the boards regularly. Please direct personal matters to Prof. Kwon by email.
- Keep all posts professional and related to the course.
- Students who help answer questions on the discussion boards will earn participation points

Class Policies

The following policies help ensure that the class is run fairly and efficiently.

- Post all non-personal questions on TritonEd.
- Write neatly. Illegible work cannot and will not be graded.
- Grading: If there is a grade discrepancy, submit the original assignment along with a written request for a re-grade to a TA within one week from the date the assignment is returned. If re-grading is desired, then the entire assignment or project is subject to re-grading.
- The exam may not be missed without prior instructor approval. Exams will be written in pen.
- Academic dishonesty will not be tolerated. The Department of Bioengineering adheres to the UCSD Policy on Integrity of Scholarship. An excerpt of this Policy states that "*Students are expected to complete the course in compliance with the instructor's standards. No student shall engage in any activity that involves attempting to receive a grade by means other than honest effort...*" Any suspected incident will be dealt with in accordance with UCSD policy, which includes reporting the misconduct to the Dean. More information on UCSD's academic dishonesty policy can be found at: <http://senate.ucsd.edu/Operating-Procedures/Senate-Manual/Appendices/2>

Course Evaluation

- 10% Participation (in class, discussion section, TritonEd, and in class assignments)
- 30% Midterm exam
- 30% Comprehensive exam
- 30% Proposal (drafts and final)

Class Schedule

Week	Date	Topic	Reading	Due Date	Discussion
1	Tu 2019/04/02	Syllabus, course overview, introduction			Group formation for SBIR
	Th 2019/04/04	Material Properties	I.1.1-I.1.3		
2	Tu 2019/04/09	Metals, Ceramics	I.2.3-I.2.4		Background & Significance
	Th 2019/04/11	Polymers	1.2.2		
3	Tu 2019/04/16	Hydrogels and Natural Materials	I.2.5, 1.2.7		Specific Aims
	Th 2019/04/18	Research Expo (no class)			
4	Tu 2019/04/23	Degradation of Biomaterials	II.4		Review sessions
	Th 2019/04/25	Surface and Biological Interactions	I.1.5, II.1.2, I.2.12		
5	Tu 2019/04/30	Midterm			
	Th 2019/05/02	Structures of Biomaterials	I.2.14-16		
6	Tu 2019/05/07	Cell Interactions	II.1.3		Research Design and Methods
	Th 2019/05/09	Inflammation and Wound healing	II.2.2	B&S	
7	Tu 2019/05/14	Immune response	II.2.3-4		
	Th 2019/05/16	Potential Problems in Biomaterial Implantation	II.2.5-8, II.4.5		
8	Tu 2019/05/21	Proposal workshop			Proposal workshop
	Th 2019/05/23	Sterilization and Biomaterials Testing	III.1.2,	Aims	
9	Tu 2019/05/28	FDA and Biomaterials	III.2.9		
	Th 2019/05/30	Applications: Drug delivery systems	II.5.16		
10	Tu 2019/06/04	Applications: Tissue Engineering	II.6		Review Sessions
	Th 2019/06/06	Comprehensive Exam			
	Mo 2019/06/10	Final written proposals due 5 PM via Turnitin		Full proposals	