Biological Interactions with Materials (Biomaterials)
Pharmaceutical Sciences 718-430, Biomedical Engineering 207-430
Spring Semester 2011

Instructor:
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Lab Instructor:
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Teaching Assistants:
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* make sure to call 262-4616 to be let into the lab office. There's a phone next to the 7th fl elevator

Class Time/Location: TTh 9:30-10:45a, 1106 Mechanical Engineering Hall

Lab Time/Location: Selected TTh 9:30-10:45a, 2005 ECB

Grading: A-F system, 3 credits.

(a) 3 in-class quizzes: **(80 pt./each)**
(b) Review questions. See links to questions. Students are to work on these questions and use them as basis for discussion during the review session in preparation for the exam.
(c) 3 in-class lab exercises. Report due within 7 days after your lab session. Submitted through the Learn@UW dropbox **(20 pt./each)**
(d) Total possible points: **300 pt.**

Prerequisites: 1 year of general biology or 2 semesters of zoology, 1 semester of organic chemistry, or instructor's consent.

Recommended Textbook: Biomaterials Science: An Introduction to Materials in Medicine (eds. BD Ratner et. al.), Academic Press 1996 (first edition) or 2004 (second edition). Available in the UW Bookstore. For more current information, refer to these biomaterials journals accessible from UW-Madison linked web server: Journal of Biomaterial Science Polymer Edition, Journal of

Biomedical Materials Research, Biomaterials, Tissue Engineering, Journal of Controlled Release, Acta Biomaterialias

Course Description: Biomaterials are synthetic or biological materials used for the permanent augmentation or replacement of tissues, as well as for applications that require a relative short duration. A wide range of different materials is employed in the construction of biomedical devices such as artificial blood vessels, mechanical heart valves, breast implants, orthopedic joints, dental fillings, and devices such as intravenous catheters and drug delivery vehicles. This course addresses the basic biological systems governing the utilization of biomaterials and the range of materials currently being employed for biomedical applications. Various analytical techniques pertinent to biomaterial research and evaluation will also be discussed. Selected major medical fields in which biomaterials play a critical role will be discussed throughout the course.

Learning Outcomes:

1. to understand and to integrate biology and material science and engineering,
2. to apply this integrated knowledge in the design of materials for a specific biomedical application,
3. to develop critical experimental design and data assessment of data related to biological response to materials,
4. to be aware of the clinical utility and limitation of materials for biomedical applications.

Lectures from previous year are on:

Note: archived lectures are NOT in the same sequence as the current syllabus.
http://mediasite.cae.wisc.edu/Mediasite/Catalog/?cid=bdb3ec6cafb041f1a399352bf1e031f0

Topics	Lecture Date	Textbook Pages for Reading (ed II): download from LearnUW
Orientation	1/18	
Synthetic Polymers	1/20, 25	67-79
Hydrogels and Biodegradable Materials	1/27, 2/1	100-106, 115-127
Natural Materials	2/3	127-137
Group A: Review session 1 (Heather) Group B: lab 1 **Go To Rm 2005ECB**	2/8	download questions from LearnUW Read manual at LearnUW before Lab
Group A: lab 1 **Go To Rm 2005ECB** Group B: Review session 1 (Heather)	2/10	Read manual at LearnUW before Lab download questions from LearnUW
Lab 1 write-up due at Learn@UW drop box: 11:59p on 2/15 for Group B and on 2/17 for Group A		
Quiz 1	2/15	given during class old exams on LearnUW

Tissue Grafts	2/17, 22	127-137, in-class video
Metals, Ceramics, Composites	2/24, 3/1	137-153, 153-170, 181-197
Surface Modification	3/3	201-218, 225-233
Proteins	3/8	237-246
Cells and Tissues	3/10, 22	246-280, in-class video
Group A: Review session 2 (David) Group B: lab 2 **Go To Rm 2005ECB**	3/24	download questions from LearnUW Read manual at LearnUW before Lab
Group A: lab 2 **Go To Rm 2005ECB** Group B: Review session 2 (David)	3/29	Read manual at LearnUW before Lab download questions from LearnUW

Lab 2 write-up due at Learn@UW drop box: 11:59p on 3/31 for Group B and on 4/5 for Group A

Quiz 2	3/31	given during class old exams on LearnUW
Hemostasis	4/5	32-338
Host Response	4/7,12	293-304
COE Expo: No class	4/14	
Immune response, Toxicity Hypersensitivity	4/19	318-332
Material-centered infection	4/21	345-353
Biological Characterization Methods	4/26	355-379
Group A: Review session 3 (Yao) Group B: lab 3 **Go To Rm 2005ECB**	4/28	download questions from LearnUW Read manual at LearnUW before Lab
Group B: lab 3 **Go To Rm 2005ECB** Group B: Review session 3 (Yao)	5/3	Read manual at LearnUW before Lab download questions from LearnUW

Lab 3 write-up due at Learn@UW drop box: 11:59p on 5/5 for Group B and on 5/10 for Group A

Quiz 3	5/5	given during class old exams on LearnUW

********** there will be no cumulative final exam during the final exam week **********