Cell and Tissue-Biomaterials Interaction
(MSE 494/576 & BME 494/599, SPRING 2008)

Professor: Prof. Wei He, Dougherty 209, whe5@utk.edu
Office hours: Friday 10:00 am – 12:00 pm, Dougherty 209 (Other hours are by appointment only)
Webpage: Online@UT

Course Description:

Study of the fundamental principles involved in materials /cell and tissue interactions. Students will learn the underlying cellular and molecular mechanisms in host response to biomaterials. Emphasis will be placed on the integration of biomaterials/neuronal cells and tissue interactions into the design of neural implants (sensors, scaffolds, and therapeutics delivery modalities, etc.).

Course Information: Tuesdays and Thursdays, 3:40 – 4:55 pm in Dougherty 416

Prerequisite:

MSE 474 and/or consent of instructor

Course Objectives:

1. Obtain a broad view of various classes of biomaterials and their applications.
2. Differentiate the cellular and molecular events that occur to biomaterials in contact with tissue and fluids.
3. Understand the role of material properties play in the interaction.
4. Use the knowledge to rationally design and select materials for biomedical related research.
5. Develop analytical and critical thinking skills when evaluating research literature.

Teaching References:

Tissue-Biomaterial Interactions, edited by Kay C Dee, David A. Puleo, Rena Bizios, Wiley

Biomaterials Science: An Introduction to Materials in Medicine, by Ratner, B.D., Hoffman, A.S., Schoen, F. J., Lemons, J.E. 2004, 2nd edition, Academic Press

Indwelling Neural Implants: Strategies for Contending with the In Vivo Environment (Frontiers in Neuroscience), edited by William Reichert, CRC press

Molecular Biology of the Cell, edited by B. Alberts, D. Bray, J. Lewis, M. Raff, K. Roberts, J.D. Watson, 4th edition, Garland

Homework: biweekly reading assignment.

Examinations: There will be a closed book in class midterm exam on March 11, 2008. For those registered for the 400-level class, final exam will be a 20 minute oral presentation on selected topic. For those registered for the 500-level class, final exam will be a written research proposal and a 20 minute oral presentation. Students will work in pair to prepare the proposal using the NIH Ruth L. Kirschstein NRSA pre-doctoral training grant (F31) format (detail information will be given later).

Grading:

Graduate students:
Homework, 20%
Mid-term exam, in class close book, 40%
Final presentation and research proposal, 40%

Undergraduate students:
Homework, 30%
Mid-term exam, in class close book, 40%
Final presentation, 30%

General policy:

1. Missed exam policy: For reasons beyond the control of the student, if a student is unable to take the examination at the scheduled time, the student must submit a written request with appropriate proof for a makeup examination. If the justification is accepted by the instructor, the instructor reserves the right to do one of the following:
   (a) to give a new makeup examination at a time of convenience to the instructor, or
   (b) the score for the missed examination will be given as 50% of the student's score in the very next examination following the missed examination and 50% of the student's score in the comprehensive examination. In the event the student misses the last examination before the final comprehensive examination, the student's score in the final comprehensive examination will be substituted for the missed examination.
2. Feedback and suggestions are welcome
3. Class participation is highly encouraged and attendance will be enforced.
4. Please turn off your cell phone in class, and no listening to music/surfing internet during lecture

Academic Integrity: Assigned work is to be the individual work of each student. Students may discuss the work at any length with others; however, when a student does the work for submission he/she should not refer to the work of any other student, present or past. Upon completion of the work, he/she is not to allow other students to see them. Doing so will be considered as giving unauthorized aid and a violation of the Guidelines for UTK Students on Academic Integrity