BE 435: Transport Phenomena in Living Systems
Fall 2011
Tu/Thu : 10-12 am
Room: PSY B33

BME faculty: Prof. Muhammad H. Zaman
Office: 36 Cummington, Rm 309
Office Hours: T, TH: 12-1;
e-mail: zaman@bu.edu
Office Phone: 358-5881.

TA:
Erika Fong; erika.jfong@gmail.com
Office hours: 4-5 Tue
Recitation: 4-5 Thu

Nga Ho; nho2311@gmail.com
Recitation hours: 3-4 Mon
Office hours: 3-4 Wed

Course Description: This course presents an introduction to the principles of heat, mass and momentum transfer and their application to solve problems in living systems.


Course Objectives: Learn the fundamental conservation principles and constitutive laws that govern heat, mass and momentum transport processes and systems and constitutive properties that are encountered in typical biological problems; develop problem solving skills that enable effective expertise for addressing novel biomedical applications. During the course of the term, we will address a number of key problems in biomedical engineering involving various forms of transport phenomenon, we will have experts in blood doping and heat transfer talk about some of the problems discussed in media these days. We will also review a few papers addressing cutting edge transport problems in biology, healthcare and biomedical engineering.

Teaching Approach: The course will be taught using the “How People Learn” method in which new concepts are presented in the context of open ended real-life learning challenges. Students will be directed to appropriate analysis tools to solve the challenges. Much of the learning experience will be organized around team activities. Students will be given frequent opportunities to assess their progress during each of the challenges in order to achieve the best level of learning. Fundamental knowledge skills will be presented in class by the instructor.

Knowledge, Abilities and Skills Students Should have Entering this Course: mathematics through differential equations, freshman biology sequence

Knowledge, Abilities and Skills Students Should Gain from this Course: an understanding of the conservation of heat, mass and momentum plus the associated constitutive laws; knowledge of constitutive data unique to living systems including their magnitude and scale; how to determine which laws and data are relevant to a specific biological system and process; how to apply these laws to the solution of biological problems; development/refinement of effective general engineering problem definition and solving skills leading to adaptive expertise.
Program Outcomes Achieved:
1. Apply knowledge of biological and physical sciences, mathematics, and engineering to solve problems at the interface of engineering and biology.
2. Identify, formulate and solve biomedical engineering problems that address contemporary issues within a global societal and economic context.
3. Recognize the need to pursue continuing educational opportunities in biomedical engineering and have the ability to do so.

Attendance: required for all class periods. The course is designed for much of the learning experience to occur during the class period.

Student Feedback: I take teaching very seriously, and want to constantly improve and want to address problems students may be having during class. Therefore in addition to the end of term class evaluations, we will have two other completely “anonymous” evaluations after 1/3 and 2/3 of the term. The students will be given an opportunity to raise any concerns they may have about the course teaching and other course related issues. I will try my best to address these issues.

Exam Schedule: There will be three in-class exams during the semester plus a required final exam during the finals week. All exams will be in an open book and open notes format and will typically have 2-3 problems.

Academic Honesty: I am assuming we all will uphold the highest standards of academic honesty. The class will be highly interactive, and hopefully a lot of fun. However, any kind of academic dishonesty in an exam will not be tolerated and severe disciplinary action will be taken.

Course Assignments and Announcements: will be posted on the course website. Problem sets will be given each week on a Monday and will be due next the Monday before class. Typically problem sets will have 3-4 problems. There will be 10 assignments in all and I will drop your two lowest scores in problem sets and take only the top 8 of the problem sets.

Class Etiquette: I am a big fan of technology and collect the latest gadgets, however, there is a place for everything. Any kind of cell phone use will not be tolerated in class. This includes talking on the phone, receiving phone calls, SMS text messaging or even checking voice mail. I am expecting that all of us will keep our phones “OFF”, putting them on vibrate is not sufficient.

Grading Format: The course grade will be based on class participation, performance on three exams, the final, and homework assignments. Performance will be assessed for acquisition of key knowledge components, the ability to use these knowledge tools to solve defined bioransport problems, and the development of expertise to transfer this ability to identify and solve problems in new contexts.

The basis for determining grades will be as follows:
- Three in class exams during the semester: 60% (20% x 3)
- Final exam: 25%
- Homework: 10%
- Class participation: 5%