Biomechanics **Spring 2012**

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Office Hours: By appointment
Lecture: W5W6W7

Prerequisites
None, unless your background is not in engineering. If this is the case, then please come talk to me first for "Instructor Permission". In addition, a background in cell and molecular biology as well as mechanics will be helpful in this class (although not required).

Course Objectives
This course discusses how mechanical quantities and processes such as force, motion, and deformation influence body (and cell) behavior and function, with a focus on the connection between mechanics and biochemistry, in advance. Specific topics include: (1) large-scale biomechanics; (2) tissue-level biomechanics; (3) the role of stresses in the cytoskeleton dynamics as related to cell growth, spreading, motility, and adhesion; (4) the generation of force and motion by moot molecules; (5) protein and DNA deformation.

During this course we will introduce you to these subjects, train you to use them in real world applications, allow you to address a specific project, ask you to present and write about the project, and give you experience working as a team. This course will be a learning experience for you. We will have fun, but I demand a high level of application from my students in order to get the most out of it for everyone.

Textbook N/A; class notes/journal papers/magazine articles

Grades
Report (assignment) (4) 40%; 200 words (in English)
Cell Culture Report 25%
Final Report & Presentation 35%; 1000 words (in English)

Approximate Schedule
Week 1-2 (2/29, 3/7): Introduction to biomechanics
Week 3-4 (3/14, 3/21): Introduction to physiology Report #1
Week 5-6 (3/28, 4/11): Large-scale biomechanics (cardiovascular system)
Week 7-9 (4/18, 4/25, 5/2): Large-scale biomechanics (skeletal system); Dr. Po-Liang Lai at Chang Gung Memorial Hospital Report #2
Week 10 (5/9): Why mechanics matters to biology and medicine?
Week 11 (5/16): Mechanics versus biochemistry
Week 12 (5/23): Cell movement and deformation Report #3
Week 13 (5/30): Cell culture (with T.A. – Hung-Hsun Shuai; email: iamnototaku@gmail.com)
Week 14 (6/6): Cytoskeleton dynamics (may include protein and DNA deformation) Report #4
Week 15 (6/13): Final Presentation