Course Title: **Biomolecular Cell Mechanics**

Course Content: This course covers biomolecular basis of cell mechanics and cell motility. In this engineering course, quantitative and model-based approaches will be emphasized. Topics Include: Mechanics of Biological Molecules, Force Effects on Biochemical Reactions, Mechanics of Cytoskeletal Filaments and Networks, Polymerization of Cytoskeletal Filaments, Molecular Motors, Motility Models, Cell Adhesion

Objectives: Upon completion of this course, a student should be able to:

- Describe mechanistically various ways cells use molecules to convert chemical energy into mechanical work or respond to mechanical stresses.
- Develop and apply simple mathematical models for cellular processes that account for the effect of force on reaction and transport rates.
- Have a sense of the relevant time, space, and energy scales for cell adhesion and motility processes.
- Use physical principles and quick "back-of-the-envelope" calculations to evaluate the plausibility of hypothesis regarding cellular processes.

Instructor: Richard Dickinson, Professor of Chemical Engg. and Biomedical Engg.
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Phone: 392-0898 email: dickinso@che.ufl.edu
Office Hours: Wed, Fri 3:30-4:30 pm.

Class Meetings: Mon, Fri-- Periods 7 and part of period 8 (1:55-3:30 pm)

Textbook: J. Howard. *Mechanics of Motor Proteins and the Cytoskeleton.* Sinaur. 2001

Grading Criteria: Grades are assigned by a straight scale (90-100=A, 85-90=B+, 80-85=B, etc.).

Exams (3): 80 % Homework: (10%) Quizzes (10%)

Exams: Each exam of the three exams counts toward 30% of the grade, except the one with the lowest score will count only 20%.

Homework: Six homework (HW) sets will be assigned. Students are encouraged to work together on HW, but not to copy each other's work. Homework problems will be graded on a scale of 0-3. 0: No substantial work. 1: Some work, but incorrect. 2: Complete work, but incorrect. 3: Complete work, completely correct.

Quizzes: Short quizzes will be given on Fridays of most non-exam weeks. The quizzes will generally cover HW or lecture material from the previous few class periods and will require only 10-15 minutes to complete.

Academic Honesty: All students admitted to the University of Florida have signed a statement of academic honesty committing themselves to be honest in all academic work and understanding that failure to comply with this commitment will result in disciplinary action. This statement is a reminder to uphold your obligation as a student at the University of Florida and to be honest in all work submitted and exams taken in this class and all others.