

**Molecular Biomechanics**  
**06-646, 24-657, 42-646**  
**Tuesdays and Thursdays 9-10:30 in WH**

**Instructor:**

Kris Noel Dahl, Departments of Biomedical Engineering and Chemical Engineering  
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**Learning Objectives:**

This class is designed to present concepts of cellular biology and biophysics at the molecular level. Emphasis will be placed both on the biology of the system and on the fundamental physics which describe the molecular level phenomena. In addition to studying the structure, mechanics and energetics of cells at the nano-scale, we will also study and conceptually design biomimetic molecules and structures. At the completing of the class students will be able to write constitutive physical and chemical theories and equations that describe molecular biological phenomena. Also, students will be able to design complex biological systems as well as biomimetic structures based on these theories.

**Recommended Text:**

There are no required books, but useful supplemental texts are:

Most useful texts

- 1) Physical Biochemistry by van Holde, Johnson and Ho
- 2) Physical Biology of the Cell by Phillips, Kondev, Theriot and Orme

Useful texts not available in the library

- 1) Molecular and cellular biophysics by Jackson
- 2) Molecular driving forces by Dill and Bromberg
- 3) Methods in cell biology vol.83 - Cell Mechanics

Books on reserve in E&S Library

- 1) Mechanics of the cell by Boal (electronic)
- 2) The structure and rheology of complex fluids by Larson
- 3) Soft condensed matter physics in molecular and cell biology by Poon
- 4) Cell biology by Pollard

**Class Website:**

Blackboard (<http://www.cmu.edu/blackboard>) is used for announcements, course documents, grading and assignments

**Grading:**

40% for homework assignments, 10% for journal presentations, 25% for final project, 15% for final exam, 10% class participation

**Policies:**

Homework: Homework will be assigned via blackboard and is due at the beginning of the class on the assigned due date. Once Prof. Dahl starts the class the homework is considered late. Homework turned in during or immediately after class is considered tardy. You will receive one

warning for tardy homework, followed by loss of an accumulating 10% for every additional tardy homework. Homework submitted after class will be scored for feedback, not credit.

Regrading: Requests for re-grading must be submitted in writing within one week of the receipt of the graded homework. The entire exam/assignment may be re-graded upon challenge, not just the requested part. The request must clearly identify the issue and justify the request. All regarding requests will go through the professor.

Cheating: Cheating is taken very seriously, and students should familiarize themselves with the university's policies on cheating and plagiarism.

<http://www.cmu.edu/policies/documents/Cheating.html>

[http://www.studentaffairs.cmu.edu/acad\\_integ/acad\\_integ\\_text.html](http://www.studentaffairs.cmu.edu/acad_integ/acad_integ_text.html)