

**BIOE 200A: Molecular and Cellular Engineering  
Fall 2006**

**Instructors:**

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**Office Hours:** Prof. Cochran: TBD

CA office hours: Wed 5-6 PM, and as needed  
Location: BIOE student lounge

**Honor Code/Fundamental Standard:**

Violating the Honor Code is a serious offense, even when the violation is unintentional. The Honor Code is included in the Stanford Bulletin, and you are responsible for understanding the university's rules regarding academic integrity. You should familiarize yourself with the code if you haven't already done so. In brief, conduct prohibited by the Honor Code includes all forms of academic dishonesty, among them copying from another's exam, unpermitted collaboration, representing as one's own work the work of another, revising and resubmitting work for regrading without the instructor's knowledge and consent, and plagiarism.

In recent years, most student disciplinary cases have involved Honor Code violations; of those, the most frequent is plagiarism. The ordinary penalty for a first offense is a one-quarter suspension from the University, 40 hours of community service, and a grade of "No Credit" for the class in which the violation occurred.

**Provost's Statement Concerning Students with Disabilities:**

Students who have a disability which may necessitate an academic accommodation or the use of auxiliary aids and services in a class must initiate the request with the Disability Resource Center (DRC). The DRC will evaluate the request with required documentation, recommend appropriate accommodations, and prepare a verification letter dated in the current academic term in which the request is being made. Please contact the DRC as soon as possible (<http://www.stanford.edu/group/DRC/>); timely notice is needed to arrange for appropriate accommodations.

**Grading:** Weekly Homework: 30%  
8 HW sets, assigned on Fri, due next Fri by 5PM in Clark W250  
Done in assigned rotating teams

Class participation and literature assignments: 10%

Midterm: 30%  
October 30<sup>th</sup>, 11AM-1PM, Clark S360—NOTE room change  
Closed book exam

Final Exam: 30%  
December 14<sup>th</sup>, 8:30-11:30AM, Clark S361  
Closed book exam

Students on Pass/Fail grading: B or better in order to pass

**Lectures:** MWF 11:00-11:50AM; Clark Center, S361  
Lecture notes will be posted on CourseWork website prior to class.

**Web Site:** <http://coursework.stanford.edu>  
(Note that only students registered through AXESS will be able to access the class website)

**Suggested Text:** Alberts, Molecular Biology of the Cell, 4<sup>th</sup> Ed, Garland Science.  
Available at the Stanford bookstore, or free on-line:  
<http://www.ncbi.nlm.nih.gov/books/bv.fcgi?call=bv.View..ShowTOC&rid=mboc4.TOC&depth=2>  
Additional readings to be distributed

**Useful References:** Alberts, Essential Cell Biology, 2<sup>nd</sup> Ed, Garland Science (a lighter version of Molecular Biology of the Cell)  
Purves, Life, the Science of Biology, 6<sup>th</sup> Ed, W.H. Freeman  
Lodish, Molecular Cell Biology, 5<sup>th</sup> Ed, W.H. Freeman  
Bronzino, Biomedical Engineering Handbook, 2<sup>nd</sup> Ed, CRC Press

## **Lecture topics to be covered in BIOE200A:**

### **Molecular processes of life**

Molecular Interactions

Cells

DNA

RNA

Proteins

Lipids

Carbohydrates

Metabolism

Systems biology

### **Biophysical Properties**

Thermodynamics

Equilibrium

Kinetics

Affinity/avidity, multivalent binding

Ligand/receptor interactions

Pharmaceutical concepts

### **Biomolecular Engineering**

Rational protein design

In vitro molecular evolution

Cell-free protein expression

Antibody engineering

Hormone and cytokine engineering

Engineering viruses

Engineering molecular probes

Biosensors and microarrays

Molecular motors

Biomaterials

Nucleic acid diagnostics, applications, technology

### **Cell-Cell Communication, Intracellular Transport, and Cell-based Sensors**

Cell compartmentalization/transport

Electrically-active cells

Membrane potentials

Electrical cell communications- gap junctions, synapses

Cell-based biosensors

Biochemical Transduction

Bio-MEMS, cellular mechanotransduction