Bioengineering 555

Cellular and Molecular Biomechanics and Cell Function

Spring Quarter, 2009

3 credit hours

M, W, F 9:30 – 10:20 AM Phys/Astron A 212

Instructor: Gerald H. Pollack
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Class website: **http://courses.washington.edu/bioe555/index.shtml**

Text: Pollack, *Cells, Gels and the Engines of Life*

Optional texts: Alberts et al., *Molecular Biology of the Cell*
Ling, G.N., *A Revolution in the Physiology of the Living Cell*
Howard, J., *Mechanics of Motor Proteins and the Cytoskeleton*
Bagshaw, *Muscle Contraction*
Pollack, *Muscles and Molecules:Uncovering the Principles of Biological Motion*

Grading:

Homework	25%
Classroom presentations	20%
Classroom participation	10%
Midterm exam	20%
Final Exam	25%

Topic Outline:

Cell Basics

- Membrane pumps, channels
- cytoplasm as gel
- role of cell water
- ions and solutes
- gel phase transitions
- cell electrical potentials

Cellular mechanics

- cellular streaming
- cell locomotion
- microtubule transport
- flagella, cilia
- mitosis
- cytokinesis
- muscle contraction

Role of Water

- water ordering
- water chemistry
- light effects on water
- self-assembly
- origin of life
- water and energy