1. Contact
Matthias F. Schneider
mfs@bu.edu
office hours: Mo: 12-3pm

2. web resources:
None yet

3.Prerequisites
Calculus
Basic Physics

4. Course schedule
Mon, Wed 10-12pm, Room COM 212

5. Textbook and any recommended/reference texts

a) De Gennes: Scaling Concepts in Polymer Physics
b) Nelson: Biological Physics
c) T. Heimburg: Thermal Biophyiscs of Membranes
d) Boal: Mechanics of the Cell
e) Collected papers of A. Einstein (1901 – 1915)

You Do Not need to buy any of these books! Try to check them out from the library or get in touch with me.

6. Course learning objectives

1. Understand how to apply physics and engineering in biology
2. Learn to discuss critically old and new theories
3. Be able to extract and present a scientific concept from literature

7. Grading/assessment policies; how will final grade be assigned.

Presentations and Term papers (50/50)

8. Exam schedule
none

9. Homework policy – weight; frequency; collaboration policy...

10. Lecture by lecture topics and excurses. (may vary)

1. Introduction, the origin of biological physics
2. Introduction to Thermodynamics
3. Thermodynamics like Einstein
4. Diffusion
5. Polymer Physics I

6. Polymer Physic II
7. Elasticity of Biopolymers – Worm Like Chain
8. Single Molecule under Force
9. Enzymes and Motors
10. The Cytoskeleton
11. Life at Low Reynolds Numbers: The Navier Stokes Equation
12. Microfluidics
13. Microswimmers
14. Polymers under Flow
15. Phase Transitions and Landau Theory
16. Membranes as 2D soft films
17. Phase transitions in Lipid membranes
18. Electrostatics of Membranes
19. Ion Channels
20. Nerve Pulse Propagation
21. Anesthesia
22. Elasticity of Membranes
23. Adhesion of Membranes and Cells

11. Schedule of lab exercises

tba