

**Biomedical Engineering 418 (3 credits)  
Quantitative Cell Biology**

**I. Logistics**

Days/Times: Monday/Wednesday 8:30 AM-10:00 AM (Starts at 8:40 AM)  
Classroom: 1005 EECS  
Instructor: Cheri X. Deng, Ph.D. (cxdeng@umich.edu)  
Office Hours: Friday 10:30 PM – Noon, 2111 Gerstacker  
Pre-requisites: MCDB 310, BIOLCHEM 415, 515, or CHEM 351, and PHYSICS 240,  
and MATH 216

Textbook: ***Physical Biology of the Cell*** (PBoC), 1st or 2nd edition (preferred),  
Rob Philips, Jane Kondev, Julie Theriot, Hernan G. Garcia

**II. Course Description, Contents, and Goals**

The course is designed to provide a foundation of basic principles for modeling cell biology problems. We will discuss quantitative or semi-quantitative analysis and approaches applicable to a number of important topics in cell biology, with a central notion best described by the authors in the preface of the textbook: “an appropriate application of a relatively small number of fundamental physical models can serve as the foundation of whole bodies of quantitative biological intuition, broadly useful across a wide range of biological problems.”

We will be using “Physical Biology of the Cell” as textbook, supplemented by research articles related to topics in biophysics and modeling of cell biology.

The goal of this course is therefore to help biomedical engineering students to master a series of quantitative approaches to acquire a biophysical perspective to address problems in cell biology.

**III. Instruction Format and Grading**

A typical class will include both didactic lecture and in-class work sessions. In-class work requires students to actively work on problems, contribute to discussions and Q/A.

- Participation credit (10% of final grade). Active participation is required in the form of full attendance, participation in classroom work as well as asking/answering questions during class.
- Homework assignments (20% of final grade). Regular about one per week, usually assigned on a Wednesday and due the following Monday. No late homework will be accepted.
- There will be four closed-book exams (60% of final grade) (one page of equation sheet will be allowed for each exam), each accounting for 15% of final grade.
- Term papers (10% of final grade, 5% each). Two term papers that are based on current literature of biophysics and biophysical models of cell biology.

**BME 418: Fall 2017****VI. Tentative schedule** (may change slightly based on progress)

Note: chapters indicated below will be supplemented by selected research articles when needed.

Topics: <b>book chapters plus relevant research papers</b>	Dates	
Introduction and selected topics from Chapters 1-4	09/06	
Selected topics from Chapters 1-4	09/11	
Selected topics from Chapters 1-4	09/13	
Chapter 5	09/18	
Chapter 5	09/20	
Chapter 5, catching up	09/25	
<b>Exam 1</b>	<b>09/27</b>	<b>Chapters 1-5</b>
Chapter 6	10/02	
Chapter 6	10/04	
Chapter 7	10/09	
Chapter 7	10/11	
Chapter 8	10/18	
Chapter 8	10/23	
Review	10/25	
<b>Exam 2</b>	<b>10/30</b>	<b>Chapters 6,7,8</b>
Chapter 10	11/01	
Chapter 10	11/06	
Chapter 11	11/08	
Chapter 11	11/13	
Review	11/15	
<b>Exam 3</b>	<b>11/20</b>	<b>Chapters 10, 11</b>
No class (special project)	11/22	
Chapter 15	11/27	
Chapter 15, 16	11/29	
Chapter 16	12/04	
Review	12/06	
<b>Exam 4</b>	<b>12/11</b>	<b>Chapters 15, 16</b>