

Introduction to Biochemical Engineering

155:411

Fall semester, 2015

Mon/Wed 12pm-1:20 pm

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Office hours: Wed 3 pm-4:30 pm Engineering building C106

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Office hours: Mon 2-3:30 pm BME Graduate fellows area Rm 211

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Office hours: TBD

Textbook: Bioprocessing Engineering: Basic concepts (2nd Edition) M.L. shuler/F. Kargi

Course Description:

Introduction of the basics biochemistry, biology and microbiology with applications in biochemical engineering. Explanation of how biochemical engineering is used for the analysis, control, and development of biological, biochemical, and industrial processes. Quantitative, problem-solving methods emphasized.

Course Objectives:

In this course, students learn the basics of biochemical engineering, and apply the knowledge to answer the following questions.

- What are the major components of cells?
- How do cells grow?
- How do metabolic pathways decide the formation of different compounds?
- How can cells be engineered?
- How can bioprocesses be scaled up?

Grading

Total 100%: Homework and in-class quizzes (30%); Exam 1 (20%); Exam 2 (20%); Final (30%)

Homework should be submitted by the beginning of the class on the designated date. There is a 30% penalty for late submission. Homework submitted one week after the due day will NOT be graded.

Projected Schedule (subject to change)

Lecture	Dates	Topic	Textbook chapter(s)		HW due
1	9/2/2015	Introduction	1		
2	9/7/2015	Overview of Biology	2		
3	9/9/2015	Overview of Biology	2	hw 1	
4	9/14/2015	Enzyme kinetics 1	3		
5	9/16/2015	Enzyme kinetics 2	3	hw 2	hw 1
6	9/21/2015	Cell metabolic pathways 1	5		
7	9/23/2015	Cell metabolic pathways 2	5	hw 3	hw 2
8	9/28/2015	Cell growth 1	6		
9	9/30/2015	Cell growth 2	6	hw 4	hw 3
10	10/5/2015	Stoichiometry of Growth	7		
	10/7/2015	Exam 1			hw 4
	10/12/2015	Exam review			
11	10/14/2015	Genetic alteration 1	8		
12	10/19/2015	Genetic alteration 1	8	hw 5	
13	10/21/2015	Bioreactors 1	9		
14	10/26/2015	Bioreactors 2	9	hw 6	hw 5
15	10/28/2015	Scale up	10		
16	11/2/2015	Sterilization	10.4	hw 7	hw 6
	11/4/2015	Exam 2			
	11/9/2015	Exam review (AICHE)			hw 7
17	11/11/2015	Special topic (AICHE)			
18	11/16/2015	Bioseparations 1	11		
19	11/18/2015	Bioseparations 2	11	hw 8	
20	11/23/2015	Using genetically engineered microbes 1	14		
	11/25/2015	<i>No class: Wednesday=Friday. Happy Thanksgiving!</i>			
21	11/30/2015	Using genetically engineered microbes 2	14	hw 9	hw 8
22	12/2/2015	Metabolic Engineering	14.8		
23	12/7/2015	Cell/Tissue Engineering	15	hw 10	hw 9

24	12/9/2015	Mixed culture	16		
	TBD	Final exam			hw 10