

155:210 Biological Foundations of Chemical Engineering (March 14, 2018)

Web Page: <http://sakai.rutgers.edu>

Class Schedule: Wed. 12:00-1:20 PM, Fri. 1:40-3:00 PM, SEC-111; Index # 14509

Instructor: Professor Prabhav Moghe, Distinguished Professor of Biomedical Engineering and Chemical & Biochemical Engineering, moghe@rutgers.edu

Office hours: **By Reservations**, after class: Wed. 2:00-3:00 pm, BME-315

Pre-requisite Courses: 160:160 or 160:171; 640:152

Textbook: Shuler, Kargi, and Delisa, Bioprocess Engineering: Basic Concepts, Third edition, Prentice Hall, 2017

The syllabus will complement the textbook with additional in-class discussion and graphical materials (slides/handouts).

Teaching Assistant: Nanxia Zhao; Email: nz128@scarletmail.rutgers.edu

Office hours Friday 4:30-5:30 pm in the cubicle area 314 (outside office 315) in Biomedical Engineering Building (BME).

Learning Assistant: Raghav Chawla

Please note that there are two study group sessions each week: Monday 3:20-4:40 pm and Wednesday 3:20-4:40 pm. The location for both is SERC 104.

Study groups begin Tuesday, January 23rd and end Monday, April 30th.

Class Participation:

Students are responsible for all information disseminated in class. Questions and participation are encouraged. We may optionally use Clickers for in-class assessment of understanding. Responses will be tracked and will factor into your grade.

Overall Educational Objective:

This course provides background in biology necessary for chemical engineers to appreciate the basic considerations for synthesis and properties of biological products in industry. It also serves as a foundation for the senior year Biochemical Engineering course.

Assessment (approximate criteria)

Reading homework based clicker-polls and in-class assignments/quizzes 40%

One mid-term test and one end-term test 60% (higher 35% + lower 25%)

Student Learning Outcomes

After successfully completing the course, students should be able to do the following:

- Develop familiarity with the basic components of biology that are relevant to bioprocess industry
- Understand the requirements for growth and maintenance of prokaryotic and eukaryotic cells
- Understand stoichiometric and thermodynamic interdependencies in cellular metabolism
- Understand the capabilities and principles behind basic techniques of molecular biology
- Identify a range of products of biotechnology and be familiar with bioprocessing techniques

Academic Integrity:

Students are expected to familiarize themselves with and adhere to the University policy on academic integrity at: <http://academicintegrity.rutgers.edu/academic-integrity-policy/>.

SPRING 2018 COURSE SYLLABUS AND SCHEDULE (Version updated, March 13, 2018)

--2-3 lectures will be devoted to visits by experts from industry

Dates	Topics	Reading Assignments
Jan 17, Wed	Bioprocess Engineering Introduction	Ch. 1
Jan 19, Fri	Biology Basics: Classification of Organisms	Ch. 2 (section 2.1)
Jan 24, Wed	Biology Basics II: Proteins,	Ch. 2 (sections 2.2, 2.3)
Jan 26, Fri	Biology Basics III: Carbohydrates, Lipids	Ch. 2 contd.
Jan 31, Wed	Biology basics: nucleotides	Ch. 2 contd.
Feb 2, Fri	Enzymes	Ch. 3 Sections 3.1, 3.2
Feb 7, Wed	Enzyme Kinetics;	3.1, 3.2
Feb 9, Fri	Immobilized Enzyme Systems	Section 3.3
Feb 14, Wed	Immobilized Enzyme Systems	3.3
Feb 16, Fri	Molecular Biology of Cell/DNA Replication	Ch. 4
Feb 21, Wed	Molecular Biology, Contd.;	Ch. 4
Feb 23, Fri	Metabolic Pathways	Ch. 5
Feb 28, Wed	Metabolic Pathways	Ch. 5
Mar 2, Fri	Metabolic Pathways, Contd.	Ch. 5
Mar 7, Wed	Weather Related Closure	
Mar 9, Fri	Mid-term Rescheduled	Ch. 6
<i>Mar 14, Wed</i>	<i>SPRING BREAK</i>	<i>NO CLASS</i>
<i>Mar 16, Fri</i>	<i>SPRING BREAK</i>	<i>NO CLASS</i>
Mar 21, Wed	No Class	<i>NO CLASS</i>
Mar 23 Fri	Cell Growth & Kinetics; Dr. Colette Ranucci, Industrial Speaker # 1, Merck	Ch. 6
Mar 28, Wed	Continuous Cultures and Cell Growth, contd.	Ch. 5
Mar 30, Fri	Dr. Latrisha Petersen, Industrial Speaker #2, Johnson & Johnson	Ch. 7
Apr 4, Wed	Metabolic Pathways	Ch. 5
Apr 6, Fri	Quiz Metabolic Pathways, Contd.	Ch. 5
Apr 11, Wed	Stoichiometry & Cell Growth	Ch. 7
Apr 13, Fri	Stoichiometry, continued	Ch. 7
Apr 18, Wed	Genetic Alterations	Ch. 8
Apr 20, Fri	Dr. Thomas Brieva, Industrial Speaker # 3, Celgene	Chapter 8
Apr 25, Wed	TEST 2 (in class)	
Apr 27, Fri	Genetic Alterations Contd;	

	Class Wrap-up	
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