Fall 2020
Biochemical Engineering
16:155:531

Course Instructor: Professor Charlie Roth, cmroth@rutgers.edu

Time and Location: Class Wednesdays 5:00-8:00 PM, Zoom.
Office hours Mondays 4:00-5:00 PM, Zoom

LMS: Canvas

Textbook: *Bioprocess Engineering: Basic Concepts* by M. L. Shuler, F. Kargi, and M. DeLisa, 3rd edition, Prentice Hall, 2017.

Additional readings will be provided on Canvas.

Synopsis: This course will provide an overview of major products of biotechnology and the engineering principles, unit operations, and processes involved in their production. Topics will include enzyme kinetics and reactors, cell growth and bioreactors, and applications.

Modes of instruction and assessment: During fall 2020, this course will be delivered in a fully remote format with both asynchronous and synchronous components. To this end, a set of online materials (voice over Power Point, online videos, and readings) will be available on Canvas each week for initial presentation of core material. In class, we will primarily: (a) review key or difficult conceptual points; (b) go over example and/or HW problems; (c) conduct class discussions, some of which will be associated with journal articles that you will read before class. In some instances, we will have a guest lecturer/discussant. You will be expected to review the online materials, attempt example problems, and in some cases engage in online discussions **before each class meeting**.

Assessment will be based on weekly assignments, class and/or online discussions, 2 quizzes, and 2 design/case studies. One of the studies will emphasize calculation and design while the other will emphasize integration of engineering fundamentals with prevalent applications. Both are intended to integrate core concepts into a deeper understanding of biochemical engineering applications

Grading: HW 10%, Discussion 10%, Quizzes 20% each, Case studies 20% each.

Academic Integrity: This course requires students to summarize the work of others and to create original work. It is critical that work submitted is the student's own work and that due credit is given to others whose work is cited or otherwise utilized. Please review the updated Academy Integrity policy for Rutgers-New Brunswick at http://nbacademicintegrity.rutgers.edu/home/for-students/.

Students agree that by taking this course relevant papers may be subject to submission for textual similarity review to Turnitin.com (directly or via learning management system, i.e. Canvas) for the detection of plagiarism. All submitted papers will be included as source documents in the Turnitin.com reference database solely for the purpose of detecting plagiarism of such papers. Use of the Turnitin.com service is subject to the Usage Policy posted on the Turnitin.com site. Students who do not agree should contact the course instructor immediately.

Accommodations for Disabilities: Rutgers University welcomes students with disabilities into all of the University's educational programs. In order to receive consideration for reasonable accommodations, a student with a disability must contact the appropriate disability services office

at the campus where you are officially enrolled, participate in an intake interview, and provide documentation: https://ods.rutgers.edu/students/documentation-guidelines. If the documentation supports your request for reasonable accommodations, your campus's disability services office will provide you with a Letter of Accommodations. Please share this letter with your instructors and discuss the accommodations with them as early in your courses as possible. To begin this process, please complete the Registration form on the ODS web site at: https://ods.rutgers.edu/students/registration-form.

Note: I reserve the right to amend course policies, including the grading rubric, due to changing circumstances at my discretion.

Syllabus (subject to slight alterations)

Module	*Topic*	*Chapter*	*Guest*
1	Introduction	1	
2	Protein structure and stability	2.2.1	Prof. Schuster
3	Enzymes	3	Prof. Chundawat
4	Cell growth kinetics	6, 7	
	Quiz 1 (Modules 1-4)		
5	Bioreactors	9	
6	Aeration and Scale-up	10	Dr. Brieva (BMS)
	Design Study (Modules 5-6)		
7	Genetic engineering and cell line development	8,14	
8	Metabolic engineering	5, 14	Prof. Zhang
9	Bioseparations	11	
	Quiz 2 (Modules 7-9)		
10	Monoclonal antibodies		
11	Cell and gene therapies	15	
	Integrative Study (emphasizing Modules 10-11)		