CM4710: Biochemical Processes (Fall 2015)

Biochemical processes are those that use living cells or biomolecules to carry out a biochemical transformation leading to the production and ultimate recovery of valuable products.

Cross listed with CM5900 Advanced Biochemical Processes (for graduate students)

Class Schedule: MWF 12:05 – 12:55, Room 226, EERC (Bldg. 07)

Prerequisite: CM3110(C)

Catalog Description:
The primary objective of this course is to present an introduction to fundamental and applied aspects of industrial biochemical processing. Topics of lectures include cell structure and composition, cellular metabolism, enzymes and their use in industry, bioreactor analysis and design, bioseparations for product recovery, industrial applications, and an introduction to molecular biology techniques for enhancing productivity. Graduate students will have a higher standard of requirements than undergraduate students.

Objectives:
- To identify major classes of biochemicals, and understand basic elements of cellular metabolism, protein synthesis, and cell growth.
- To perform chemical engineering analyses in the design and operation of bioreactor processes.
- To perform chemical engineering analyses in the design and operation of bioseparation processes.
- To understand basic tools of molecular biology and genetic engineering.

Instructors: Dr. Wen Zhou, 202F CSEB (Bldg. 19), 487-1164, wzhou1@mtu.edu

Office hours: 2:30-4:00 pm Mon. and Tue., room 202F, CSEB, or by appt.


Course Outline

I. Biochemical Fundamentals (Chapters 1-5) week 1-4
   A. Cell structure and composition
   B. Enzymes
   C. Central Dogma and Metabolism

II. Bioreactor Design and Analysis (Chapters 6-7, 9-10) week 5-8
   A. Microbial Growth Kinetics
   B. Bioreactor Design

III. Bioseparations: Recovery and Purification of Products (Chapter 11, handouts) week 9-12
   A. Separating Insoluble Products
   B. Separating Soluble Products

IV. Genetic Engineering Basics and Applications (Chapters 8, 14) week 13
   A. Basic elements of Genetic Engineering
Course Policies and Procedures

Course webpage: Canvas

Expectations: Professionalism requires regular class attendance, participation, and ethical behavior.

Homework
Homework will be assigned at the discretion of the instructor (posted on the Canvas). One week will be allowed for each assignment, and answers are turned-in in class on the due day. Homework will be graded. Neatness and logical development of work is a high priority and points will be deducted for sloppy or unreadable work. Late submission is allowed before solution is posted, and points will be deducted.

Examinations
There will be three mid-term exams and NO final exam. Exams are close-book and close-notes. You can prepare one page letter-size crib sheet (hand-written only). All examinations will have equal weight in calculating the final grade for the course. Make-up exams will be given only for valid written excuses prior to the exam, subject to the arbitrary judgment of the instructor. Discussion of the grading of homework and exams is permitted within one week after students’ answers are returned.

Course Project
One project will be assigned near the middle of the semester. A handout will be provided early in the term describing potential topics, report organization, and other related issues. The writing report of the project will be due at the end of the semester, and a presentation will be given in the class.

Course Grade Policy
The weighting of the examinations and report will be as follows

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Letter Grades will be assigned following this schedule

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University Policies:

Academic Integrity [http://www.studentaffairs.mtu.edu/dean/judicial/policies/academic_integrity.html](http://www.studentaffairs.mtu.edu/dean/judicial/policies/academic_integrity.html)


Disability Services [http://www.mtu.edu/dean/disability/services/](http://www.mtu.edu/dean/disability/services/)