

Lecture: Monday, Wednesday, Friday 8:00-8:50 am
Amundson Hall, B75

Recitation: Tuesday sessions will be held weekly:

002-	8:00 am-8:50 am	Wei-Shou Hu	Amundson Hall 124
003-	9:05 am-9:55 am	Wei-Shou Hu	Vincent Hall 209
006-	12:20 pm –1:10 pm	Friedrich Srienc	Vincent Hall 206
007-	2:30 pm – 3:20 pm	Friedrich Srienc	Folwell Hall 151

Thursday sessions will be held during your normal section time (see above) in:

002-	8:00 am-8:50 am	Amundson Hall 124
003-	9:05 am-9:55 am	Vincent Hall 209
006-	12:20 pm –1:10 pm	Vincent Hall 206
007-	2:30 pm – 3:20 pm	Folwell Hall 151

There will be three mandatory Thursday computer tutorial sessions. All other Thursday sessions you may use to complete your computer problem assignments or to seek consultation from TAs.

Instructors:

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Objective:

To obtain the knowledge of basic biological processes including transcription, translation, protein/enzyme function, cellular energetics, protein secretion and modifications; and to gain experience applying quantitative engineering principles to the analysis of biological processes, including thermodynamics, kinetics and stoichiometry.

Overview:

This course is designed for students with an engineering background to learn the biological fundamentals of biotechnology. The course emphasizes conceptual appreciation of the molecular interplays which are the basis of “chemical processes” in living systems. The objective of the course is to provide students with a comprehensive and concise overview of biochemical science with emphases on quantitative, especially stoichiometric and kinetic, perspectives.

Text and Instructional Materials:

Textbook: H. Lodish, A. Berk, et al., Molecular Cell Biology, 5th Ed. (2004), or 6th Ed. (2007) W.H. Freeman & Co. Handouts will be provided. Selected articles will be assigned.

Grading Policy:

Homework assignments are due in class. Late homework will not be accepted. Students must not miss more than 20% of lectures or fail to submit at least 80% of homework. Students who fail to comply with this policy will not receive a passing grade.

Academic Dishonesty

Academic dishonesty, as defined by the University, will not be tolerated. "The Institute of Technology expects the highest standards of honesty and integrity in the academic performance of its students. The Institute of Technology defines scholastic dishonesty as submission of false records of academic achievement; cheating on assignments or examinations; plagiarizing; altering, forging, or misusing an academic record; taking, acquiring, or using test materials without faculty permission; acting alone or in cooperation with another to obtain dishonestly grades, honors, awards, or professional endorsement. Aiding and abetting an act of scholastic dishonesty is also considered a serious offense." Regent's Policy on Student Conduct:

www1.umn.edu/regents/policies/academic/StudentCounduct.html

ChEn 3701 Recitation – Thursdays

As part of the course, you will have 3 quantitative computer assignments that are designed to make the connection between this course and traditional topics in chemical engineering (in particular what you learned in ChEn 4001). The problems will be distributed on Thursdays and due later in class. The detailed schedule is below:

Thursday recitations will provide you time to work on these problems. There will be one TA at each Thursday recitation that can provide you with assistance, if needed. It is expected that you already possess the computational tools to solve problems #1 and #3 from ChEn 4001. For problem #2, you will need to use the ordinary differential equation solver `ode45` in MatLab. We will have a special Thursday recitation session to explain how to use this solver.

You may work in groups of up to 3 to develop the short MatLab programs/Excel sheets needed to solve these problems. However, you **must** turn in an individual assignment with your own explanation of the results. If you work as a group on the computer part, you must include the names of your co-workers when you turn in your assignment. The computer code (either a spreadsheet or the MatLab program used to solve the problem) must be included with your solution. All graphs must be prepared with clearly labeled axes and curves to receive full credit.

ChEn 3701 Lecture Schedule - Fall 2009

Date	Lecture Topic	Lecturer	Readings 5th ed.	Readings 6th ed.
9/9W	Topic 1: Diversity and Structural Organization of Living Systems	WSH	Chap 1	Chap 1
9/11F	Topic 2: From Molecules to Cells - building blocks, organelles, and cellular structure	WSH		Chap 2.1; Chap 2.2; Chap 9.1
9/14M	Topic 3: Carbohydrates and Amino Acids	WSH	Chap 2.1	Chap 2.3
9/16W	Topic 4: Lipids and Membrane	WSH	Chap 2.2; Chap 2.3	
9/18F	Topic 5: Nucleic Acids	WSH	Chap 2; Chap 4.1, p.102-108	Chap 2.4; Chap 4.1
9/21M	Topic 6: Proteins (structure)	WSH	Chap 3.1, p. 59-68	Chap 3.1; Chap 3.2
9/23W	Topic 6 cont'd: Proteins (structure and function)	WSH	Chap 3.4, p.79-82; Chap 3.5-Chap 3.6, p. 82-96; Chap 8, p. 326-329	Chap 3.4; Chap 3.5; Chap 3.6
9/25F	Topic 6 cont'd: Proteins (structure and function)	WSH		
9/28M	Topic 7: Enzyme Kinetics and Enzyme Catalysis	WSH	Chap 3.3, p. 73-79	Chap 3.3
9/30W	Topic 7 cont'd: Enzyme catalysis	WSH	p.304-307; Handouts	Handouts
10/2F	Topic 8: Metabolic Flux Analysis	WSH	Readings posted on webvista	Readings posted on webvista
10/5M	Topic 9: Energy Metabolism – Overview, glycolysis	WSH	Chap 8.1	Chap 12.1
10/7W	Topic 10: Energy Metabolism – TCA cycle and relationship to intermediate metabolism	WSH	Chap 8.1, p. 307-315	Chap 12.1, p. 487-491
10/9F	Hour Exam			
10/12M	Topic 10 cont'd: Energy Metabolism – TCA cycle and relationship to intermediate metabolism	WSH		
10/14W	Topic 11: Electron Transport	WSH		
10/16F	Topic 11 cont'd: Electron Transport	WSH	Chap 8.2	Chap 12.2
10/19M	Topic 12: Pentose Phosphate Pathway and Regulation of Energy Metabolism	WSH	Chap 8. 3	
10/21W	Topic 12 cont'd: Pentose Phosphate Pathway and Regulation of Energy Metabolism			
10/23F	Topic 13: Stoichiometry of Energy Metabolism	WSH	Class notes	Class notes
10/26M	Topic 14: Metabolic Reaction Network	FS	Class notes	Class notes
10/28W	Topic 14 cont'd: Metabolic Reaction Network	FS	Class notes	Class notes
10/30F	Topic 15: Gene Expression and Introduction to Kinetics	WSH	Chap 4.2	
11/2M	Topic 16: Transcription - Prokaryote	WSH	Chap 4.2	Chap 4.2, p. 120-126

11/4W	Topic 17: Transcription - Eukaryote	FS	Chap 4.3	Chap 4.3, p. 127-139
11/6F	Topic 17 cont'd: Transcription	FS		
11/9M	Topic 18: Transcriptional Regulation	FS	Chap. 4.3	Chap 7.1
11/11W	Topic 18 cont'd: Transcriptional Regulation	FS		
11/13F	Topic 19: Translation	FS	Chap 4.4; Chap 4.5	Chap 4.4
11/16M	Hour Exam			
11/18W	Topic 19 cont'd: Translation	FS		
11/20F	Fredrickson Lecture			
11/23M	Topic 20: Transport Across Membrane	FS	Chap 7.1-7.2; Chap 7.4	Chap 11.1 – Chap 11.5
11/25W	Topic 20 cont'd: Transport Across Membrane	FS	Chap 7.5; Chap 7.6	
11/27F	Thanksgiving Holiday			
11/30M	Topic 21: Recombinant DNA Technology	FS	Chap 9.2; Chap 9.3	Chap 5.2; Chap 5.3
12/2W	Topic 21 cont'd: Recombinant DNA Technology	FS		
12/4F	Topic 22: Metabolic Engineering		Readings posted on webvista	Readings posted on webvista
12/7M	Topic 22 cont'd: Metabolic Engineering	FS	Chap 16.1	Chap 9.1, p. 372-376; Chap 13.1, p. 534-540; Chap 13.2, p. 542-546
12/9W	Topic 22 cont'd: Metabolic Engineering	FS	Chap 16.3	Chap 13.3, p. 549-555
12/11F	Topic 24: Antibody Diversity	FS		Chap 24.2; Chap 24.3
12/14M	Topic 24 cont'd: Antibody Diversity	FS		
12/16W	Topic 25: Genomics and its technology	FS		Chap 5.3; Chap 5.2, p. 184-187
12/22	FINAL EXAM 1:30-3:30 p.m.			