

Syllabus

Bio444/Chem444 – Biochemistry – Spring 2014

Instructor: Jeffrey D. Newman Room: Heim 107 Phone: 570-321-4386 email: newman@lycoming.edu office hours: Mon. 3:30-4:30 PM Tues. 3:30-4:30 PM	Instructor: Chriss McDonald Room: Heim 233 Phone: 570-321-4186 email: mcdonald@lycoming.edu office hours: I'm almost always around from 8:15 – 5:00
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Lecture meets MF 2:00 –3:15 PM in Heim G-40

Lab meets W 2:00 – 4:50 PM in Heim 106

Course Web Site: <http://moodle.lycoming.edu/moodle/login/index.php>

Text: Berg, Timoczko & Stryer, Biochemistry, 7th ed, 2012, WH Freeman Publishers.

Catalog Description of Course: Emphasis is given to the metabolism of carbohydrates, lipids, amino acids, proteins, and nucleic acids; integration of metabolism; and biochemical control mechanisms, including allosteric control, induction, repression, signal transduction as well as the various types of inhibitive control mechanisms.

Course Learning Objectives as related to Biology and Chemistry Departmental Learning Objectives

1. Exhibit proficiency in Biochemistry
2. Perform laboratory techniques as appropriate to Biochemistry
3. Understand and use modern biological instrumentation
4. Exhibit ability to work as an individual and in groups
5. Exhibit integrative, problem-solving skills, such as experimental design, quality assurance/quality control in data collection, data manipulation, and data interpretation.
6. Communicate the results of Biochemical investigation effectively in written form.
7. Search the Biochemical literature and/or databases, evaluate the results of the search, access desired research materials, and perform critical analysis of the data therein.
8. Demonstrate responsible conduct in the laboratory, including laboratory safety and ethical research practices.

Contribution to the Mission of Lycoming College:

This course provides opportunities for students to “develop communication and critical thinking skills”, “increase receptivity to new concepts and perspectives” and “explore ... scientific traditions”

Grades will be determined based on the following assessments:

Exams	3 x 100 pts = 300 pts
Final Exam	150 pts
Prep Papers	24 x 3 pts = 72 pts
Lipid Analysis Lab Report	50 pts
Esterase Lab Report	50 pts
Metabolic Reconstruction	50 pts
Homework	up to 68 pts
Quizzes	3 x 20 pts = <u>60 pts</u>
Total possible	<u>800 pts</u>

Attending Chemistry colloquium will earn 3 bonus points, with a maximum of 15 bonus points permitted

	B+ = 86.7 - 89.9%	C+ = 76.7 - 79.9%	D+ = 66.7 - 69.9%	
A = 93.3 - 100%	B = 83.3 - 86.6%	C = 73.3 - 76.6%	D = 63.3 - 66.6%	F = below 60%
A- = 90.0 - 93.2%	B- = 80.0 - 83.2%	C- = 70.0 - 73.2%	D- = 60.0 - 63.2%	

Attendance Policy: Attendance of all lectures and laboratories is expected. Absences will be noted by the instructor, and if excessive (more than 1 lab or 4 lectures), may result in a reduction of the course grade. Absences and participation will be used to determine borderline (within 0.5%) grades. Documentation (note from school nurse, physician, documentation of job interview, etc.) for excused absences must be provided to the instructor as soon as possible.

Daily "Prep Papers" are due at the beginning of each class to encourage the use of writing to organize your thoughts about the course material.

Guidelines:

- Name and date should be indicated on top of page
- 0.5 page summarizing key points from previous class and **asking questions in bold.**
- 0.5 page summarizing key points from reading assignment and **asking questions in bold.**
- **Each paper that meets guidelines earns 3 points**
- 72 points are built into the grading scale
 - If you do 24 prep papers, you score 100% on 72 point part of your grade
 - If you do 26 prep papers, you score 100% on 72 point part of your grade **and get 6 bonus points**
 - If you do 20 prep papers, you score 83% on 72 point part of your grade
- Prep papers may be submitted for missed classes only when accompanied by a documented excuse (Note from Health Care Provider or coach).
- If a class is missed, the prep paper that is submitted upon return to class should summarize the last class attended and the reading assignment given on that day.

Guidelines for Attending Chemistry Colloquium:

- i. Be on time.
- ii. The speaker has expended a lot of effort to prepare for the talk. Be attentive and polite.
- iii. If you can't stay for 45 minutes for an internal speaker or 60 minutes for an external speaker, don't come (please do not ask the speaker how long the talk will last).
- iv. Realize that questions for the speaker at the end is part of the talk and you will be expected to stay for that as well.

A Few Words about Learning Biochemistry. Studying biochemistry is hard work for most people (this is certainly true for us). We would recommend that you work on the lecture material outside of class for **at least** one hour per day, 7 days/week. Once you see how things are going this amount can be adjusted as needed (We suggest a significant increase in study time prior to an exam). If you are having trouble, make sure and come and talk to us. You will be responsible for all of the material listed on the following schedule for the indicated exams and quizzes. It is not sufficient to learn the material from the lecture alone. You are expected to read and think about the material prior to the lecture. We must necessarily cover a large amount of material so our pace must be geared towards those who are ready to learn. The exams will be somewhat cumulative in the sense that we need to know the earlier material to comprehend the latter.

We will spend a great deal of effort studying biochemical pathways in this course. Your understanding of these pathways will be substantially enhanced by becoming familiar with the structures of important biomolecules. Throughout the course of the semester you should strive to learn the following structures.

General structures: amino acids, monosaccharides, fatty acids, sphingomyelin, phosphatidylcholine, polypeptide structure (1^o, 2^o, 3^o)

Specific structures: the 20 most important amino acids, glucose (acyclic, cyclic), amylose, amylopectin, glycogen, starting compounds, intermediates, and products of the following pathways – glycolysis, gluconeogenesis, β oxidation, and fatty acid synthesis

Tentative Schedule-2014

	Lecture Topics	Lab Activities (Wed.)
Week 1 1/6 – 1/12 ch. 1,2	M – Introduction, Concept Reviews (JN & CM) WF–Amino Acids, Peptide Bonds (CM)	Breaking Down a Cell – What is in there and how is it purified and studied?
Week 2 1/13 – 1/17 ch. 2, 6	M - Protein Structure (JN) F – Protein Sequences & Evolution (JN)	Protein structure and sequence analysis with Chime/Protein Explorer. (computer lab) (text ch 3.6)
Week 3 1/20 – 1/24 ch. 7, 8	M - Quiz 1 (1/20) M – Hemoglobin (JN) F – Enzyme Kinetics (JN)	Selective Hydrolysis with Pig Liver Esterase
Week 4 1/27 – 1/31 ch. 9,10	M – Enzyme Catalysis (CM) F – Enzyme Regulation (JN)	Selective Hydrolysis with Pig Liver Esterase/Kinetics Workshop
Week 5 2/3 – 2/7 ch. 12	M – Catch-up, review for exam F - Lipids (CM)	Exam 1 (2/5) Esterase Lab report due 2/7
Week 6 2/10 – 2/14 ch.12,13	M – Membranes (JN) F – Membrane Transport (JN)	Fatty Acid Methyl Ester (FAME) Extraction and Gas Chromatography
Week 7 2/17 – 2/21 ch 14	M - Signal Transduction (JN) F – Signal Transduction (JN)	Quiz 2 (2/19) FAME Data Analysis
Week 8 2/24 – 2/28 ch 11, 15	M - Carbohydrates (CM) F – Metabolic Concepts (CM)	Exam 2 (2/26) FAME lab report due 2/28
Week 9 3/10 – 3/14 ch 16	M – Glycolysis (CM) F – Gluconeogenesis (CM)	1. Induce expression, Extract protein for His Tag purification. 2. Metabolic Reconstruction from Genome Sequences
Week 10 3/17 – 3/21 ch 21, 20	Quiz 3 (3/17) M - Glycogen Metabolism (JN) F - Calvin Cycle & Pentose Phosphate pathway (JN)	1. Purify His tag protein, quantify. 2. Metabolic Reconstruction from Genome Sequences
Week 11 3/24 – 3/28 ch 17	M – Catch-up, review for exam M – Citric Acid Cycle (JN)	Exam 3 (3/26)
Week 12 3/31 – 4/4 ch. 18,22	M – Electron Transport (JN) F – Lipid Catabolism (CM)	1. SDS-PAGE of His tag protein, Beta Galactosidase assay.
Week 13 4/7 – 4/11 ch. 22,24	M - Lipid Synthesis (CM) F - Amino Acid Metabolism (JN)	Analysis of lipophilic pigments and quinones by HPLC
Week 14 4/14 – 4/18 ch 23, 27	M - Integration of Metabolism (JN) F – Good Friday	Analysis of lipophilic pigments and quinones by HPLC Metabolic Reconstructions Due 4/16