

## Chemistry F450: General Biochemistry – Macromolecules Course Syllabus – Fall 2016

**Course:** General Biochemistry - Macromolecules (CHEM F450); 3 credits

**Prerequisites:** CHEM F322 or equivalent with minimum grade of C-. A student who does not satisfy this requirement may be admitted with permission of instructor.

### Locations and Meeting Times:

**Lecture:** REIC 204; MWF 3:30 pm – 4:30 pm  
August 29, 2016 – December 17, 2016

**Blackboard Link:** <http://classes.uaf.edu>

Course information, supporting documents, and exam scores will be maintained on the UAF Blackboard website. Check the site regularly for updates. Time-sensitive information and reminders may be sent to students by email, so please verify that the email address listed on the Blackboard site is correct.

**Instructor:** Brian Edmonds

**Office Hours:** MWF 10:30 am – 12:00 pm; other times by appointment (email to schedule)

**Office Location:** 113E Murie Building

**Research Lab:** 110 Murie Building

**Office Phone:** (907) 474-6527

**Email:** [bwedmonds@alaska.edu](mailto:bwedmonds@alaska.edu) (preferred contact method)

### Required Course Materials:

Text:

Title: *Lehninger Principles of Biochemistry, Sixth Edition* (2013)  
Author: Nelson, David L. and Cox, Michael M.  
Publisher: W.H. Freeman & Co.  
ISBN: 978-1-4292-3414-6

Additional, optional resources for the text can be found at <http://bcs.whfreeman.com/lehninger6e/>

### Sapling Learning Account:

An account with Sapling Learning must be set up in order to complete mandatory homework assignments. To do this:

1. Go to <http://saplinglearning.com> and click on your "US Higher Ed" at the top right.
- 2a. If you already have a Sapling account, log in and skip to step 3.
- 2b. If you have Facebook account, you can use it to quickly create a Sapling account. Click the blue Facebook button symbol. The form will auto-fill with information from your Facebook account (you may need to log into Facebook in the popup window first). Choose a password and time zone, accept the site policy agreement, and click "Create my new account". You can then skip to step 3.
- 2c. Otherwise, click the "Create an Account" link. Supply the requested information and click "Create My Account". Check your email (and spam filter) for a message from Sapling Learning and click on the link provided in that email.
3. Find your course in the list (you may need to expand the subject and term categories) and click the link.
4. If your course requires payment, select a payment option and follow the remaining instructions.
5. Once you have an account and are enrolled in the course, you can log in at any time to complete or review your homework assignments.
6. If you have problems, contact your instructor or send an email to [support@saplinglearning.com](mailto:support@saplinglearning.com).

**Course Description:**

The focus of this course is on the biochemistry of the two principal macromolecules of living systems: nucleic acids and proteins. Topics include nucleotides, DNA structure and topology, DNA replication, DNA repair and recombination, cell cycle regulation, RNA transcription and processing, gene expression, translation, and protein structure and function. Biomedical relevance and contemporary techniques will be addressed where appropriate.

**Specific Coverage:**

- I. Nucleotides and nucleic acids
- II. Genes and chromosomes
- III. DNA metabolism including repair and recombination
- IV. RNA metabolism including RNA processing
- V. Protein synthesis and targeting
- VI. Regulation of gene expression
- VII. DNA-based information technologies

**Course Goals:**

Students who successfully complete this course will have an understanding of the biochemical underpinnings of the maintenance, replication, and expression of genetic information contained in DNA. Cellular utilization of genetic information (via information pathways) includes DNA replication, transcription of information to RNA, and translation to yield functional proteins. Students will gain an appreciation of the molecular mechanisms that contribute to these major aspects of information processing, and also of processes contributing to regulation of gene expression, cloning, DNA repair, and other DNA-based information technologies. Completion of this course will prepare students for Chem F451 (Gen Biochemistry – Metabolism).

**Learning Outcomes:**

1. Draw structures of DNA and RNA nucleotides and illustrate the chemical basis of base pairing.
2. Discuss the mechanisms of DNA replication, transcription, and translation.
3. Recognize and discuss mechanisms of DNA repair.
4. Describe and discuss the significance of DNA recombination.
5. Illustrate mechanisms of RNA processing.
6. Use the genetic code to predict protein primary structure.
7. Describe and discuss the utility of recombinant DNA technology.

**Instructional Methods:**

The course will be taught using traditional lecture and whiteboard methods. Occasional, small-group discussions will also be used to facilitate learning outcomes.

**Course Policies:**

**Attendance and Participation:** Students are expected to attend class and actively participate. The 'classroom participation' component of the course grade (100 points) is meant to assess students' overall commitment to the course. Students who earn the full 100 points will be asking questions and participating in discussions. Know that the most important determinant of the participation score is providing evidence of having read the textbook assignment prior to class (see Preparation, below).

**Cell phones/Computers:** No cell phone use in class. Computers should only be used for relevant activities.

**Preparation:** Students are expected to read the assigned sections of the textbook (see course calendar, below) prior to class.

**Exams:** Four in class exams will be given (three midterms and a final). Makeup exams will be allowed only with preapproval of the instructor or, alternatively, in cases where the student can provide an acceptable excuse. Acceptable excuses for makeup exams include severe illness, family emergencies, or other unavoidable events including dangerous weather conditions and car accidents. The exam format for makeup exams may be different from the original exam, and it is unlikely that the makeup exam will be easier. Exams dates and times are

indicated in the course calendar. Know that the final exam (worth 150 pts) will include material covered on the Midterm III exam, in addition to the material in chapter 9 of Lehninger.

**Sapling Homework:** Homework assignments must be completed by the posted due date in order to receive credit. Extensions will not be granted for late homework (**no exceptions**), so get started early.

### Grading:

Exam scores will be posted on Blackboard. Sapling homework scores are available on the Sapling website.

Final grades will be calculated as follows:

Midterms I - III: 300 pts (100 points for each exam)

Final Exam: 150 pts

Sapling homework: 100 pts

Classroom participation/discussion: 100 pts

Letter grades will be assigned as follows:

<b>A:</b> 585 – 650 points	<b>D:</b> 390 – 454 points
<b>B:</b> 520 – 584 points	<b>F:</b> Less than 390 points
<b>C:</b> 455 – 519 points	<b>I:</b> Failure to complete course requirements

### Support Services:

Support can be obtained through the University of Alaska Library system, online resources, and the instructor. Additional services are available through Student Support Services (<http://www.uaf.edu/sssp/>) at UAF.

### Disabilities Services:

We will work with the Office of Disabilities Services (<http://www.uaf.edu/disability/>) to provide accommodations for students with disabilities. If you have a disability and require special assistance, please contact the instructor as soon as possible. Students with disabilities must provide a written statement indicating any special requirements that will be necessary as early in the semester as possible (ideally within the first few days).

### Cheating/Academic Dishonesty:

The Department of Chemistry & Biochemistry policy on cheating is: *“Any student caught cheating will be assigned a course grade of F. The student’s academic advisor will be notified of this failing grade, and the student will not be allowed to drop the course.”* Plagiarism is the use of other’s intellectual property without proper citation. Spoken, print, and electronic sources must be credited. Plagiarism is a serious form of academic dishonesty. If you are unsure about what is or is not someone else’s intellectual property, ask the instructor.

### Amending the Syllabus:

The instructor may make changes to this syllabus subject to unanimous approval by the students. Any changes will be communicated via email and posted on Blackboard.

The instructor reserves the right to make minor changes to the lecture schedule (see calendar), and also to the grading policy provided the changes are beneficial to all students enrolled in the course. Neither of these two types of changes is subject to student vote/approval.

<i>Week</i>	<i>Date</i>	<i>Topic</i>	<i>Reading</i>
1	29-Aug	Syllabus and cellular foundations of biochemistry (1.1)	pp. 1 -11
	31-Aug	Chemical, physical, and genetic foundations (1.2 - 1.4)	pp. 11 - 32
	2-Sep	Nucleotide Basics (8.1 - 8.1)	pp. 281 - 297
2	5-Sep	<b>Labor Day</b> (no class)	
	7-Sep	Nucleic acid structure (8.2)	pp. 297 - 306
	9-Sep	Nucleic acid chemistry and other functions (8.3 -8.4)	pp. 306 - 308
3	12-Sep	Chromosomal elements (24.1)	pp. 979 - 985
	14-Sep	DNA Supercoiling (24.2)	pp. 985 - 994
	16-Sep	Supercoiling (cont) and chromosome structure (24.3)	pp. 995 - 1003
4	19-Sep	Chromosome structure cont (24.3)	
	21-Sep	Review	
	23-Sep	<b>Midterm I</b> (Ch's. 1, 8, & 24)	
5	26-Sep	DNA replication (25.1)	pp. 1009 - 1027
	28-Sep	DNA repair (25.2)	pp. 1027 - 1038
	30-Sep	DNA repair cont (25.2)	
6	3-Oct	DNA recombination (25.3)	pp. 1038 - 1052
	5-Oct	DNA recombination cont (25.3)	
	7-Oct	DNA-dependent synthesis of RNA (26.1)	pp. 1057 - 1069
7	10-Oct	RNA processing (26.2)	pp. 1069 - 1085
	12-Oct	RNA processing cont (26.2)	
	14-Oct	Overflow	
8	17-Oct	Review	
	19-Oct	<b>Midterm II</b> (Ch's. 25 & 26)	
	21-Oct	Genetic code (27.1)	pp. 1103 - 1113
9	24-Oct	Genetic code cont (27.1)	
	26-Oct	Protein synthesis I (27.2)	pp. 1113 - 1139
	28-Oct	Protein synthesis II (27.2)	
10	31-Oct	Protein synthesis III (27.2)	
	2-Nov	Protein targeting and degradation (27.3)	pp. 1139 - 1149
	4-Nov	Principles of gene regulation (28.1)	pp. 1155 - 1165
11	7-Nov	Regulation of gene expression in bacteria I (28.2)	pp. 1165 - 1174
	9-Nov	Regulation of gene expression in bacteria II (28.2)	
	11-Nov	Regulation of gene expression in bacteria III (28.3)	
12	14-Nov	Regulation of gene expression in eukaryotes (28.3)	pp. 1175 - 1195
	16-Nov	<b>Midterm III</b> (Ch's. 27 & 28)	
	18-Nov	Studying genes and their products I (9.1)	pp. 313 - 331
13	21-Nov	Studying genes and their products II (9.1)	
	23-Nov	DNA-based methods to study protein function I (9.2)	pp. 331 - 339
	25-Nov	<b>Thanksgiving Holiday</b> (no class)	
14	28-Nov	DNA-based methods to study protein function II (9.2)	
	30-Nov	The human genome I (9.3)	pp. 339 - 351
	2-Dec	The human genome II (9.3)	
15	5-Dec	The human genome III (9.3)	
	7-Dec	Review	
	9-Dec	Review	
16	14-Dec	<b>Final Exam: 3:15 - 5:15 pm (Note 15 min earlier start time.)</b>	