

## BIOL/CHEM 261 Introduction to Cell and Molecular Biology

4 Credits

Instructor: Dr. Kristin O'Brien

Prerequisites: BIOL and CHEM 105/106

474-5311      ffko@uaf.edu

MWF 10:30 - 11:30,

Irving I 201 office: 226 Arctic Health Research Building

Lab: MW 2:15 – 5:15, Irving I 208 office hrs:      T 9-10 am  
   TH 2-3 pm or by appointment

T.A.: Aaron Kammer

Required items: Essential Cell Biology (2nd edition) by Alberts et al. Garland Publishing; a Turningpoint clicker and a lab manual (available in the bookstore)

Course description: This course will provide an introduction to cell biology and will cover the following topics: cell chemistry, transcription, translation, cell architecture, metabolism, signal transduction pathways, cell division, and the cell cycle. Students will also learn current molecular biological techniques used in the study of cell biology.

Course goals: Students will gain knowledge of cell structure and function, learn techniques commonly used in cell biology, sharpen their critical thinking skills, and gain insight into the cellular and molecular basis of disease.

Instructional methods: This course will be taught through a combination of lectures, laboratories and problem solving.

Policies: Students are expected to attend all lectures and laboratories. Exams will be based on material covered in both the lecture and lab and account for a significant portion of your grade. As a result, missing classes will undoubtedly have a negative impact on your performance in this course. If you anticipate missing an exam for family or work commitments, please let me know in advance so that we can make other arrangements. If you miss an exam because of unexpected, extenuating circumstances (ie; family death, medical excuse), please contact me as soon as possible.

Blackboard: Slides that will be used in lecture will be posted on Blackboard, usually by 6 pm the evening prior to the lecture. Please do not use these as a substitute for taking notes! I post these because the figures do an excellent job of illustrating the complex processes that we will be discussing during class. I use minimal text on the slides. I **STRONGLY** suggest that you take notes to reinforce your learning of the material. Note taking is a skill that requires practice to master, but is essential for learning.

I also use Blackboard to post announcements, exam and homework keys, and any other interesting tidbits. Please check out the BB site on a regular basis. I also use the UAF email accounts to contact students. Please check your UAF account on a regular basis. If you use an alternate account, please have your UAF mail forwarded to that account.

Grading: Your final grades will be based on the following:

Exams (550 pts): There will be four exams during the semester and one final exam (5 total). Each exam during the semester will count for 100 points (400 points total). The final exam will be cumulative and will be worth 150 points (100 points of cumulative material and 50 points on the last 3 subjects covered in class).

Class participation (60 pts): We will be using clickers during lecture. During each lecture, I will ask ~2-4 clicker questions. Each day will be worth 2 points; ½ credit will be awarded for simply being present and answering the question and ½ credit will be given for providing the correct answer. We will begin counting clicker questions on Monday, Sept. 15. There are 32 lectures between Sept 15 and the last day of class. Therefore, you can miss up to 2 days of class without losing credit (or your 2 lowest clicker grades will be dropped). Please have your clicker registered on Blackboard by this time and check with me before or after class to ensure that your clicker is working properly. To register your clicker on Blackboard, click on “Tools” in the menu bar, followed by, “Turningpoint registration tool”. Your clicker ID number is a 6 digit number below the barcode on the backside of the clicker.

Homework (80 pts). Each week (when there are no exams) you will be given approximately 5 short-answer questions, worth a total of 10 points to help you review material that we’ve covered in class. These will be distributed on Friday and will be due the following Monday at the start of class. They will also be posted on Blackboard following lecture on Friday. I encourage you to work together in groups, but do not turn in assignments with answers identical to your study partner’s- put the answers in your own words! No late assignments will be accepted. Homework will be returned and reviewed in lab. Please answer your homework questions using complete sentences and neat handwriting. Points will be deducted for incomplete sentences, misspellings, poor grammar and illegible writing.

Laboratory assignments (120 points): A short assignment will be given following most laboratories (see lab schedule for details). Each assignment will be worth 10 points. Some of the questions will cover material in the lab for the following week. Therefore, it is important for you to read the lab before you come to the lab. Many of the labs we will do are complex. You will enjoy the lab more, understand it better, and are more likely to obtain good results, if you come prepared. Please answer your homework questions using complete sentences and neat handwriting. Points will be deducted for incomplete sentences, misspellings, poor grammar and illegible writing.

Lab report (100 points): We will be spending five weeks in lab using microarrays to study gene expression. You will work together as a class to design an experiment and you will write a formal lab report on your project. You will be given the opportunity to write a first draft that will be edited by your TA prior to the second draft that will be graded (100 points). The rough draft is due on Nov 10 and the final report is due the week of Dec. 1 (both when your lab class meets). You will find details regarding the writing and grading of the lab report in the lab manual.

In summary your grade will be based on the following:

Exams:           4 X 100 = 400

Final exam:	150
Class participation	60
Homework	80
Lab assignments:	120
Lab report:	100
	910 points total

Calendar: I've attached a calendar that notes the topics we will cover during the semester, exam dates, and due dates for homework assignments. Lecture topics are printed in black font; exams are noted in green font; homework due dates are noted in blue font; and lab topics are printed in red font. Lab topics with an asterisk indicate that an assignment is due for that lab the following week.

Tips for succeeding in cell biology: We will cover a large amount of material during this semester. Some of it may be familiar to you, but many topics will be new. Here are some suggestions for doing well in this course (and others as well!).

(1). Read the book before coming to lecture. This will allow you to familiarize yourself with the material before we cover it in lecture. Also, if you have questions about what you have read, you can ask during the lecture. Please, never be reluctant to ask a question! Undoubtedly there is someone else in the room wondering the same thing, and it will help everyone if I have an opportunity to explain something in a slightly different way, or clarify a concept.

(2). Take notes during class. This is an excellent way to reinforce your learning of the material. Although I will post slides on Blackboard before the lecture, I will discuss the material in much more detail than is on each slide and you will be responsible for this material on the exam.

(3). Review your notes shortly after lecture, and ask me again if something is unclear, and/or fill in gaps with information from the text.

(4). Quiz yourself\*\*\*\*. Use the questions at the end of each chapter to test your understanding of the material. These questions are a GREAT way to study!!!!

(5). Ask questions. Please feel free to visit me or your TA during office hours. Ask questions before, during, or after lecture. My job is to ensure that you ALL succeed in this class.

(6). Keep up with the material. You will not do well on exams if you postpone all studying until the night before the exam; there is simply too much material to review in one night. I encourage you to form study groups that meet each week to review the material (and do homework). The material you will learn in this course will form a foundation for most all of your advanced course work in biology. If you put in the effort now, you will do better in your future courses and they will be more enjoyable.

Email etiquette: I will do my best to respond to your email inquiries within 24 hr. Please be considerate in your letters and use proper English grammar. Think before you send and never write anything in an email correspondence that you would not feel comfortable saying to me (or

anyone else!) in person. Lastly, please sign your letter; addresses don't always reveal the identity of the sender.

Disabilities: I will work with the Office of Disabilities Service (203 WHIT, 474-7043) to provide accommodations in both the classroom and laboratory to provide equal access to all materials in this course to all students.

#### Laboratory Schedule:

Week of	Topic
Sept 8	Lab 1: Microscopy*
Sept 15	Lab 2: Protein gel electrophoresis*
Sept 22	Lab 3: Western blotting*
Sept 29	Lab 4: Analysis of protein gels and western blots*
Oct 6	Lab 5: Microarray Part I: Introduction to microarrays*
Oct 13	Lab 6: Microarray Part II: Spectrophotometry and synthesis of cDNA*
Oct 20	Lab 7: Microarray Part III: Hybridization of microarrays*###
Oct. 27	Lab 8: Microarray Part IV: Analysis of microarray data*
Nov. 3	Lab 9: Microarray Part V: Analysis of microarray data
Nov 10	Lab 10: Quantitative PCR*
Nov 17	Lab 11: Agarose gel electrophoresis*
Nov 24	NO LAB THIS WEEK- Thanksgiving
Dec 1	Lab 12: Enzyme analysis*
Dec 8	Lab 13: Cellular respiration*

\* Indicates that an assignment will be due for this laboratory the following week in lab. All assignments are in the lab manual.

###Hybridization of microarrays will begin in this lab, but will continue outside of class. We will discuss schedules for this lab in class.

#### Lecture Schedule

Reading in Alberts et al.

9/5 Overview of the Cell

Ch 1 pgs 1-35

9/8	Overview of the Cell II	
9/10	Cell Chemistry	Ch 2 pgs 39-49; 66-79
9/12	Cell Chemistry II (homework #1 distributed)	Ch 2 pgs 50-65
9/15	Proteins	Ch 4 pgs 117-143
9/17	Proteins II	Ch 4 pgs 143-165
9/19	EXAM 1	
9/22	DNA	Ch 5 pgs 169-182
9/24	DNA II	Ch 5 pgs 183-191
9/26	DNA replication (homework #2 distributed)	Ch 6 pgs 195-208
9/29	DNA replication and repair	Ch 6 pgs 209-223
10/1	Transcription	Ch 7 pgs 229-243
10/3	Translation (homework #3 distributed)	Ch 7 pgs 243-263
10/6	Regulation of gene expression	Ch 8 pgs 267-290
10/8	Catch up/review	
10/10	EXAM 2	
10/13	Membrane structure	Ch 11 pgs 365-374
10/15	Membrane structure (homework #4 distributed)	Ch 11 pgs 374-387
10/17	NO CLASS	
10/20	Membrane transport	Ch 12 pgs 389-410
10/22	Membrane transport II	Ch 12 pgs 411-423
10/24	Protein sorting (homework #5 distributed)	Ch 15 pgs 497-512

10/27 Protein sorting II	Ch 15 pgs 512-529
10/29 Cell communication	Ch 16 pgs 533-546
10/31 Cell communication II	Ch 16 pgs 546-569
11/3 EXAM 3	
11/5 Cytoskeleton	Ch 17 pgs 573-591
11/7 Cytoskeleton II (homework #6 distributed)	Ch 17 pgs 592-607
11/10 Cell cycle	Ch 18 pgs 611-624
11/12 Apoptosis	Ch 18 pgs 625-634
11/14 Mitosis (homework #7 distributed)	Ch 19 pgs 637-656
11/17 Meiosis	Ch 20 pgs 659-672
11/19 Cell junctions	Ch 21 pgs 697-716
11/21 Cancer	Ch 21 pgs 726-738
11/24 EXAM 4	
11/26 Special session	
11/28 No class- Thanksgiving	
12/1 Energy	Ch 3 pgs 83-100
12/3 Metabolism	Ch 13 pgs 427-451
12/5 Oxidative phosphorylation (homework #8 distributed)	Ch 14 pgs 453-477
12/8 Photosynthesis	Ch 14 pgs 478-493
12/10 Aging	Reading will be distributed
12/12 Last day of class- catch up and/or review	
Final Exam: Wednesday, Dec 17, 10:15am - 12 :15pm	



# September

2008

Mon	Tue	Wed	Thu	Fri	Sat	Sun
1	2	3	4 Intro Ch. 1	5	6	7
8 <b>Microscopy*</b> Intro Ch. 1	9	10 Chem Ch 2	11	12 Chem Ch 2	13	14
15 Start clickers <b>Protein gels*</b> <b>HW 1 DUE</b> Proteins Ch 4	16	17 Proteins Ch 4	18	19 <b>EXAM 1</b>	20	21
22 <b>Western blots*</b> DNA Ch 5	23	24 DNA Ch 5	25	26 DNA rep Ch 6	27	28
29 <b>Gel analysis*</b> <b>HW 2 DUE</b> DNA rep Ch 6	30					

# October

2008

Mon	Tue	Wed	Thu	Fri	Sat	Sun
		1 Transcription Ch 7	2	3 Translation Ch 7	4	5
6 <b>Microarrays I*</b> <b>HW 3 DUE</b> Gene exp Ch 8	7	8 Catch up/ review	9	10 <b>EXAM 2</b>	11	12
13 <b>Microarrays II*</b> Membranes Ch 11	14	15 Membranes Ch 11	16	17 <b>NO CLASS</b>	18	19
20 <b>Microarrays III*</b> <b>HW 4 DUE</b> Membrane transport Ch12	21	22 Membrane transport Ch12	23	24 Protein sorting Ch15	25	26
27 <b>Microarrays IV*</b> <b>HW 5 DUE</b> Protein sorting Ch15	28	29 Cell communication Ch16	30	31 Cell communication Ch16		

# November 2008

Mon	Tue	Wed	Thu	Fri	Sat	Sun
					1	2
3 Microarrays V EXAM 3	4	5 Cytoskeleton Ch17	6	7 Cytoskeleton Ch17	8	9
10 Qt- PCR* Rough draft lab report due HW 6 DUE Cell cycle Ch18	11	12 Apoptosis Ch18	13	14 Mitosis Ch19	15	16
17 Agarose gels* Lab reports returned HW 7 DUE Meiosis Ch19	18	19 Junctions Ch 21	20	21 Cancer Ch 21	22	23
24 NO LAB THIS WK EXAM 4	25	26 Class discussion	27	28 NO CLASS- Holiday	29	30

# December 2008

Mon	Tue	Wed	Thu	Fri	Sat	Sun
1 Enzymes* Final lab report due Energy Ch 3	2	3 Metabolism Ch 13	4	5 Ox Phos Ch 14	6	7
8 Respiration* HW 8 DUE Photosynthesis Ch 3	9	10 Aging	11	12 Last Day of Class! Catch up/ review	13	14
15	16	17 FINAL EXAM 10:15- 12:15	18	19	20	21
22	23	24	25	26	27	28
29	30	31				