Syllabus: BIO 261 Introduction to Cell and Molecular Biology

Instructor: Dr. Karsten Hueffer  
Office: 266 Arctic Health  
Office hours: W 10:15-
And by appointment
474-6313; khueffer@alaska.edu

4 Credits  
Prerequisite: BIOL 115/116 and CHEM 105/106  
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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 that are used to study these topics in the laboratory.

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 to the cellular and molecular basis of disease.

Instructional methods: This course will be taught through a combination of lectures, laboratories, group problem solving, and student-led presentations.

Policies: Students are expected to attend lectures and laboratories. Classes will start and end on time; you are expected to be on time. Exams will be based on material covered in both the lecture and lab and account for a significant portion of your grade. Thus, 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.

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

(1) Exams (600 points): There will be six exams during the semester, one of which is the final exam. Each exam will count for 100 points (600 points total). The final exam will be cumulative. The questions at the end of each chapter are an excellent study guide. I strongly suggest that you test yourself with these questions after reading each chapter. Twenty points from each exam will be in the form of take-home questions in which you apply the knowledge you learn in class to solve problems.
(2) **Current topics in cell biology presentation (50 points):** These presentations are an opportunity for us all to learn more about current issues in cell biology. I will provide one background article to get you started. You will need to research additional material for your presentation. You will work in groups of three, and you can divide the work in any way you choose, however each of you must speak an equivalent length of time. The presentations should be approximately 45 minutes in length (total), so you can estimate ~15 min. per person. You should include sufficient background information on the topic and then cover any controversies related to the topic, including both sides of any argument. For example, in relation to BRCA1, there are some people who are being tested for the presence of a mutation in this gene and then getting mastectomies if they are carriers, regardless of whether or not they have cancer. Do you think this is a good idea, why or why not? Is genetic testing in general a good idea? Everyone must let me know by Jan. 26 which topic they will be working on. Once your groups have been established, I would like to meet with each group to help plan your presentation. You may use either Powerpoint slides or overheads for your presentation.

(4) **Lab questions (70 points):** There will be three to five questions to answer following each lab; these will be worth 10 points each (70 points). One question will cover material in the lab for the following week. Thus, it is important for you to read the lab handouts before you come to lab.

(5) **Lab report (50 points):** You will also have one formal lab write up which will be worth 50 points.

In summary your grade will be based on the following:

- **Exams:** $6 \times 100 = 600$
- **Presentation:** 60
- **Lab questions:** $9 \times 10 = 90$
- **Lab report:** 50

800 points total

**Secrets to success:** 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. There are three techniques you can use to help you to succeed in this course. **First, read the book before coming to lecture.** This will allow you to familiarize yourself with the material before I cover it. Also, if you have questions about what you read, you can ask during the lecture. Please, please, never be afraid 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 point. **Second, 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 the slide and you will be responsible for this material on the exam. **Third, review your notes shortly after lecture,** and ask me again if something is unclear, or fill in missing pieces with information from the text. Also (number 3.5), as I stated above, test yourself by answering the questions at the end of the text. **Most of all, do not procrastinate!** There is no way you can do well on an exam in this course by waiting until the night before the exam to study.

**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:** (Date refers to Monday of the week)

1/18: No Lab

2/1: **Lab 1:** Introduction to laboratory techniques: pipeting, calculations, introduction to laboratory equipment and lab safety, sterile technique

2/8: **Lab 2:** Microscopy: brightfield, phase-contrast, fluorescent, and electron

2/15 **Current issues in cell biology #1:** BRCA1: the breast cancer gene, what is it, and what does it mean if you carry it?

2/22: **Lab 3:** SDS Polyacrylamide Gel Electrophoresis (SDS-PAGE) and Western Blotting

3/1: **Lab 4:** Western Blotting (continued)

3/8: Spring break

3/15: **Lab 5:** Analysis of Protein Gels and Western blots?

3/22: **Current issues in cell biology #2:** Mad Cow Disease: do you really want to eat that steak? What is prion disease, what are the risks to our beef industry, and should there be more rigorous diagnostic testing

3/29: **Lab 6:** PCR

4/5: **Lab 7:** Agarose Gel electrophoresis

4/12: **Current issues in cell biology #3:** Stem cell research: What are stem cells, what are their potential uses in treating diseases and why are they so controversial?

4/19: **Lab 8:** Enzyme Assays

4/26: **Lab 9:** Cellular respiration

5/3 **Current issues in cell biology #4:** Aging and caloric restriction. Will eating fewer candy bars extend your lifespan?
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<th>Topic</th>
<th>Chapter</th>
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4/8       Cytoskeleton             Chapter 17      573-607
          571-606
4/13      Exam 4
4/15      Protein sorting          Chapter 15      497-530  495-529
4/20      Cell communication      Chapter 16      533-569
          531-569
4/22      Exam 5
4/27      Metabolism             Chapter 13      427-449  425-451
4/29      Oxidative phosphorylation Chapter 14      453-477
          453-475
5/4&6 Makeup class and or review session(s)

5/11      8 - 10 a.m., Final exam!

Please note: This schedule is subject to change.