

BIOB 260 Syllabus Summer 2019 Cellular and Molecular Biology

Course Information:

Instructor: Laurie Minns, PhD

Office: 106 Bio Research Building

Phone: 406-243-6013

Office Hours: Tuesdays 12:30-1:30pm; Fridays 10am-11am, by appointment

Email: Laurie.Minns@mso.umt.edu

Class: MTWRF 8:00am-9:50am in HS207 some classes will be held in the Mansfield Library Student learning center (ML283 and ML284).

General Course Information:

This class will focus on the analytical exploration of the structure and function of the cell, the fundamental unit of life, with an emphasis on energy transformations and information flow. Topics include molecular building blocks, membranes, organelles, and mechanisms of replication, gene expression, metabolism, signal transduction, cell birth, cell death, and cell differentiation.

Prerequisites: BIOB160, or BCH 110/111 or B- or higher in BIOH112 and either CHY 123 or CHY143.

Course Goals:

Upon successful completion of this course, you will have a more specific knowledge of cellular and subcellular biology including the relationship between intracellular organelle form and function, molecular building blocks, membranes, the central dogma, metabolism, signal transduction and the regulation of the cell cycle.

Course Objectives:

- 1) Discuss the role of the plasma membrane and its selective permeability.
 - 2) Describe macromolecules and their role in metabolism.
 - 3) Describe intracellular mechanisms that control cellular homeostasis.
 - 4) Describe the central dogma and how it relates to cellular proliferation, differentiation and regulation.
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Course outcomes:

- 1) Demonstrate understanding of cellular and subcellular biological principles and knowledge.
- 2) Understand and analyze cellular processes governing development, growth and normal function of eukaryotic cells.
- 3) Describe the steps of DNA replication, mRNA transcription and translation and how they are controlled to regulate gene expression.
- 4) Describe the functions of various intracellular organelle and structural proteins.
- 5) Differentiate between mitosis and meiosis and describe the mechanism of regulation of each type of cellular division.
- 6) Distinguish prokaryotic transcriptional regulation from eukaryotic transcriptional regulation.

- 7) Practice the scientific method by making predictions, performing biological experiments and interpreting results, and determining the potential biological consequences.

Course Information:

Teaching methods: Lecture and Discussion

Student Responsibilities:

- 1) Students are expected to complete the required reading and assignments prior to class meeting times.
- 2) Students are expected to log on to the course Moodle site regularly to download course materials and read updated course announcements.
- 3) Regular attendance in lectures and discussion is strongly recommended for successful completion of the course.
- 4) If absence from lecture or discussion is necessary due to illness, it is your responsibility to obtain notes from another student.
- 5) Students are expected to be respectful during all course meetings and during meetings with course staff and Dr. Minns. Students who fail to do so will be subject to the student conduct code.

Required Course Materials Information:

Essential Cell Biology, 4th Ed. Alberts. et al., 2013 ISBN 9780815344544

Computers and Course Website Information

Students are expected to be familiar with computers and the Internet. Students are responsible for their own software and computer equipment maintenance and setup as recommended by the University of Montana.

<http://umonline.umt.edu/student-support.php>

Class-Specific Computer and Software Requirements:

- Students will complete activities in the University of Montana Moodle BIOB260 course website. Students are expected to have a 'back up plan' if personal computers become compromised.
- The University of Montana maintains several computer labs on campus:
<http://www.umt.edu/it/support/computerlabs/default.php>
- Students are expected to download copies of course information from the Moodle website and to check email for class announcements.
- For technical support for using Moodle, please contact UM IT support:

<http://www.umt.edu/it/support/default.php>

Course Policies

Dr. Minns and the Laboratory Instructors follow academic policies as stated in the 2018-2019 UM Catalog. Students are responsible for being familiar with these policies.

<http://www.umt.edu/catalog/>

These policies include but are not limited to:

- Student Conduct (http://life.umt.edu/vpsa/student_conduct.php)
- Class attendance
- Credit/No Credit Grading

- No more than 18 CR credits may be counted toward graduation. Courses taken to satisfy General Education Requirements must be taken for traditional letter grade. Courses required for the student's major or minor must be taken for traditional letter grade, except at the discretion of the department concerned.
- A CR is given for work deserving credit (A through D-) and an NCR for work of failing quality (F). CR and NCR grades do not affect grade point averages. The grades of CR and NCR are not defined in terms of their relationship to traditional grades for graduate course work.
- Election of the credit/no credit option must be indicated at registration time or within the first 15 class days on CyberBear. After the fifteenth day, but prior to the end of the 30th day of instruction, an undergraduate student may change a credit/no credit enrollment to an enrollment under the A F grade system, or the reverse by means of a drop/add form.
- The University cautions students that many graduate and professional schools and some employers do not recognize non traditional grades (i.e., those other than A through F) or may discriminate against students who use the credit/no credit option for many courses. Moreover, students are cautioned that some degree programs may have different requirements regarding CR/NCR credits, as stipulated in the catalog.
- Audit
- Incomplete Grading Policy

Plagiarism

- Plagiarism is the representing of another's work as one's own. It is a particularly intolerable offense in the academic community and is strictly forbidden. Students who plagiarize may fail the course and may be remanded to Academic Court for possible suspension or expulsion. (See Student Conduct Code section of this catalog.)
- Students must always be very careful to acknowledge any kind of borrowing that is included in their work. This means not only borrowed wording but also ideas. Acknowledgment of whatever is not one's own original work is the proper and honest use of sources. Failure to acknowledge whatever is not one's own original work is plagiarism.

Students with Disabilities:

The University of Montana assures equal access to instruction through collaboration between students with disabilities, instructors, and Disability Services for Students. If you think you may have a disability adversely affecting your academic performance, and you have not already registered with Disability Services, please contact Disability Services in Lommason Center 154 or 406.243.2243. I will work with you and Disability Services to provide an appropriate modification.

Cell Phones and other electronic devices

The use of cell phones and other electronic devices (including cameras, video recorders) is STRICTLY prohibited during all class times, including examinations.

Disruptive behavior

Students who are being disruptive in lecture by talking, texting or playing computer games will be asked to leave the classroom. Such behaviors impact the learning of other students in the classroom and will not be tolerated. Re-admittance to class is at the discretion of the instructor. Students are expected to be ON TIME to all class meetings.

If students arrive late to class and miss a quiz, that quiz cannot be made up. If students arrive late to group work activities will result in a deduction of points earned in that activity. These lost points CANNOT be made up.

Evaluation Methods:

Your course grade will be determined by your performance in the lecture as well as during mandatory discussion/final project group work that will take place in class and in the Mansfield Library according to the following evaluation methods:

Grading System:

Final Grades will be based upon a total of 400 points (75% points from Lecture exams and 25% from in-class activities).

| Activity | # of points |
|--|-------------|
| Lecture exam 1 | 100 |
| Lecture exam 2 | 100 |
| Lecture exam 3 | 100 |
| In-class activities: | 100 |
| Lecture quizzes (10 pts) | |
| Group Project Computer work (5*10pts each) | |
| Group Final Project presentation (20 pts) | |
| Group project peer-feedback (20 pts) | |
| Total | 400 |

| Grades will be calculated based upon the following system: | |
|--|-------------------------|
| Grade | Percent of Total Points |
| A | 94-100% |
| A- | 90-93% |
| B+ | 87-89% |
| B | 84-86% |
| B- | 80-83% |
| C+ | 77-79% |
| C | 74-76% |
| C- | 70-73% |
| D+ | 67-69% |
| D | 64-66% |
| D- | 60-63% |
| F | 59% and Below |

Make-up Examinations

Make-up examinations are reserved for those students who cannot take an exam on the originally scheduled date due to:

- A documented illness
- Documentation of participation in a University-sanctioned activity

- Participation in a University-sanctioned activity requires written communication from the University of Montana Office of Academic Advising
- Student athletes must provide documentation to Dr. Minns within the first week of classes

After receipt of *written* documentation supporting the reason for absence is received, Dr. will determine whether a make-up exam is merited and Dr. Minns will schedule the make-up exam. Please note that the make-up exam may be different than the original exam and will contain short answer and essay questions. If you do not contact your instructor prior to the scheduled exam, absolutely no make-up will be available. In the case of an emergency that results in a missed exam, you must email Dr. Minns as soon as possible but no more than 24 hours after the emergency. Missed examinations due to personal issues/missed attendance do not constitute grounds for a make up exam and the student will earn a score of 0 on the missed exam.

Correspondence

An official UM student email address must be used for all correspondence.

Late Work and Makeup Work Policy

Late work is not accepted. Make up work is not accepted for missed in-class activities. Group work discussion activities and in-class CANNOT be made up for any reason.

Group Work Policy

15% of your final grade in this class is based off a semester-long group activity. All team members are expected to contribute productively to the final project. Each group member will provide feedback on other group member's contributions equal to 20% of the in-class activity grade. Group work ground rules:

1. Come on time and prepared to work.
2. Communicate professionally in all correspondence.
3. Ask question if you are confused or want clarification.
4. Absolutely no side conversations or cell phone use during in-class assignments; computers are provided so that you can access important databases.
5. Working on 'other' non BIOB260 group project work in the computer labs will result in a 0 for that week's group assignment.
6. Be reliable. If you had a task assigned to you for your group previously, make sure you come prepared to present your completed work and discuss that task.
7. Use credible evidence! I will provide you with several resources to help you along this group project journey. Your textbook will also be an important resource.
8. Determine the strengths and weaknesses of your group and assign tasks accordingly.
9. Do not complain to me about your other group members. Try to work things out with each other first. You will have an opportunity to grade your group members at the end of the semester. Remember, working together effectively is worth 20% of the in-class activity grade.
10. Do not leave early- there is always something you can find to make your final project even better!!!

Important Dates and Assigned Readings (this may be amended by Dr. Minns during the Semester)

Lecture Schedule

| Day of the Week | Dates | Monday | Readings |
|-----------------|------------------|--|------------------------------|
| Monday | May 13 | Review Syllabus and Course Policies Introduction to BIOB260 | |
| Tuesday | May 14 | Cells: The fundamental Unit of Life | Chapter 1 |
| Wednesday | May 15 | Chemical Components of Cells | Chapter 2 |
| Thursday | May 16 | DNA and Chromosomes; polymerase chain reaction | Chapter 5 Chapter 10 |
| <u>Friday</u> | <u>May 17</u> | <u>Group Project Computer lab (ML283)</u> <u>Part 1: Gene Assignments/Primer design</u> | <u>Chapter 10-PCR</u> |
| Monday | May 20 | Energy, catalysis and biosynthesis | Chapter 3 |
| Tuesday | May 21 | Protein Structure and Function | Chapter 4 |
| Wednesday | May 22 | DNA replication, repair and recombination | Chapter 6 |
| Thursday | May 23 | DNA Replication, repair and recombination | Chapter 6 |
| Thursday | May 23 | Exam 1 | Covers Chap 1-6 and 10 (PCR) |
| <u>Friday</u> | <u>May 24</u> | <u>Group Project Computer lab (ML283)</u> <u>Part 2: Translation and Protein Structure</u> | |
| Monday | May 27- no Class | No class: Memorial Day | |
| Tuesday | May 28 | From DNA to Protein: how cells read the genome | Chapter 7 |
| Wednesday | May 29 | Control of Gene expression | Chapter 8 |
| Thursday | May 30 | How Genes and Genomes Evolve | Chapter 9 |
| <u>Friday</u> | <u>May 31</u> | <u>Part 3: Characterization of Protein function</u> <u>Genetic mutations that affect protein structure and function</u> | <u>ML283</u> |
| Monday | June 3 | Modern recombinant DNA Technology | Chapter 10 |
| Tuesday | June 4 | Membrane Structure | Chapter 11 |

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|---------------|----------------|--|---|
| Wednesday | June 5 | Membrane Transport | Chapter 12 |
| Thursday | June 6 | Exam 2 | Chapters 7-12 |
| <u>Friday</u> | <u>June 7</u> | <u>Group Project Computer lab (ML283)</u> <u>Part 4: Strategy for 'fixing' mutations that lead to abhorrent protein structure/function</u> | <u>Group Project Computer work (ML283)</u> |
| Monday | June 10 | Cell Signaling | Chapter 16 |
| Tuesday | June 11 | Energy generation in mitochondria and chloroplasts | Chapter 14 |
| Wednesday | June 12 | Intracellular compartments and protein transport | Chapter 15 |
| Thursday | June 13 | Cell Signaling | Chapter 16 |
| <u>Friday</u> | <u>June 14</u> | <u>Group Project Computer work (ML283)</u> <u>Final Project</u> <u>Group Project Exam questions due to Dr. Minns in MS word document by 5pm oup</u> <u>Assembly</u> | <u>Group Project Computer work (ML283)</u> <u>Final Project Assembly</u> |
| Monday | June 17 | Group Project Presentations | |
| Tuesday | June 18 | Cellular division and the cell cycle | Chapter 18 |
| Wednesday | June 19 | Sexual reproduction and the power of genetics | Chapter 19 |
| Thursday | June 20 | Cell communities: tissues, stem cells and cancer/ Review | Chapter 20 |
| Friday | June 21 | Final exam | Covers Chap. 14-16;18-20 and Final projects |