

SYLLABUS — MOLECULAR BIOLOGY

Spring 2017: BIOL 8003

Instructor: Trinity Hamilton, 731F Rieveschl, trinity.hamilton@uc.edu

Lecture: Tues, Thurs 11:00 AM - 12:00 PM

Room: Rieveschl 713

Office Hours: Friday, 9:00-11:00 AM Rieveschl 731F, by appointment

Grading: Normal

Course Overview

Advanced-level discussions of selected topics in molecular biology. Emphasis is placed on developing molecular biology laboratory skills, reviewing basic concepts in molecular biology and applying these concepts to more advanced topics presented in original research papers. Topics include the genetic code, mutagenesis, mechanisms of DNA replication, recombination, repair, and transposition, gene structure and function and mechanisms of gene regulation, PCR, nucleic acid extraction, next generation sequencing, and bioinformatics. Examples from current and classical literature will be used to illustrate these different areas of molecular biology.

Learning Goals and Objectives

Explain basic molecular biological concepts and principles.

Appreciate the different levels of biological organization, from molecules to organisms.

Demonstrate knowledge and understanding of the principles underpinning important techniques in molecular biology.

Demonstrate knowledge and understanding of application of these techniques in laboratory research.

Demonstrate the ability to design laboratory experiments in molecular biology and bioinformatic analyses, and interpret the results.

Demonstrate the ability to read, comprehend and assess the relevant scientific literature.

Critically evaluate experimental data and primary papers, develop a hypothesis, and design experiments to address a problem.

Demonstrate an in-depth knowledge of the key features and current issues related to the various major theories of biological origins.

Course Policies and Expectations

Attendance Policy. Attendance is mandatory. Please contact Dr. Hamilton if you are unable to attend. Failure to adhere to attendance guidelines will result in class failure.

Instructional delivery. 40% seminar/discussion, 40% in-class activities/exercises, 10% individual presentations, 10% lecture.

Reading. Course readings will consist of papers from the primary literature. See below and additional information for discussion guidelines.

Course Outline. Evolving and subject to change depending on enrollment and interest.

- Week 1: Central Dogma, Introduction
- Week 2: DNA, RNA, and Protein Review
- Week 3: Nucleic Acid Extraction and Analysis
- Week 4: DNA (Lab exercises)
- Week 5: DNA / RNA
- Week 6: RNA
- Week 7: RNA, Next generation sequencing
- Week 8: Next Generation Sequencing
- Week 9: Bioinformatics
- Week 10: Spring Break
- Week 11: Gene/Genome editing
- Week 12: Proteomics
- Week 13: Non-model organisms
- Week 14: Single-cell transcriptomics
- Week 15: Finals week, Final paper due

Please Note. The professor reserves the right to make changes to the syllabus, including the specific topics and papers that will be covered, assignments, and due dates. These changes will be announced as early as possible so that students can adjust their schedules as needed.

Assignments. All assignments, reading, written or other, should be completed prior to the class. In addition, students are expected to arrive to class on time and be courteous to the instructors and fellow students.

What you can expect of me. To the best of my ability, I will provide this information in a fun and relaxed environment. I will be available for help and assistance on a regular basis. If you cannot make office hours, please email me and to set up an appointment.

Grading. Grade is based on attendance, participation, discussion, and completing writing assignments and oral presentations, and in-class activities.

Grades will be calculated as follows:

Participation (attendance required)	70 points (5 points each)
Presentations	20 points (10 points each)
Short papers (1 page)	40 points (10 points each)
Exercises/Activities	60 points (10 points each)
5-page paper	20 points
<u>Final paper/project</u>	<u>40 points</u>
Total	250 points

Course Assessment

Participation will be based on contribution to class discussions and participation in class activities and lectures. There will be opportunities to contribute/participate in most class periods. This includes paper discussions but also lectures, activities, and groups projects. For **class discussions (of primary literature)**, see additional hand out. Instructions for **exercises/activities, assignments, papers, presentations, and projects** will be provided in class.

Assessment of Participation. For each class period, I will assign a score from 1 to 5 (1 is failing to participate/contribute in any way, and 5 is participating to the fullest). Participation will be scored based on the quality (not correctness) of answering questions, asking questions that

allow for forward movement of the discussion, and completing daily activities. **Failure to provide topic questions at the beginning of the class will result in an automatic loss of 2.5 points.**

Due dates. Assignments turned in after the due date will lose 5 points/day they are late.

Assignments. Assignments failing to follow the provided instructions including length, format, material, references, etc. will not be accepted (**will receive 0 points**).

Academic Integrity Statement

The University Rules, including the Student Code of Conduct, (http://www.uc.edu/conduct/Code_of_Conduct.html) and other documented policies of the department, college, and university related to academic integrity will be enforced. Any violation of these regulations, including acts of plagiarism or cheating, will be dealt with on an individual basis according to the severity of the misconduct.

Special Needs Statement

If you have any special needs related to your participation in this course, including identified visual impairment, hearing impairment, physical impairment, communication disorder, and/or specific learning disability that may influence your performance in this course, you should meet with the instructor to arrange for reasonable provisions to ensure an equitable opportunity to meet all the requirements of this course. At the discretion of the instructor, some accommodations may require prior approval by Disability Services (513-556-6823).

Counseling Services, Clifton Campus

Students have access to counseling and mental health care through the University Health Services (UHS), which can provide both psychotherapy and psychiatric services. In addition, Counseling and Psychological Services (CAPS) can provide professional counseling upon request; students may receive five free counseling sessions through CAPS without insurance. Students are encouraged to seek assistance for anxiety, depression, trauma/assault, adjustment to college life, interpersonal/relational difficulty, sexuality, family conflict, grief and loss, disordered eating and body image, alcohol and substance abuse, anger management, identity development and issues related to diversity, concerns associated with sexual orientation and spirituality concerns, as well as any other issue of concerns. After hours, students may call UHS at 513-556-2564 or CAPS Cares at 513-556-0648. For urgent physician consultation after-hours students may call 513-584-7777.

Title IX

Title IX is a federal civil rights law that prohibits discrimination on the basis of your actual or perceived sex, gender, gender identity, gender expression, or sexual orientation. Title IX also covers sexual violence, dating or domestic violence, and stalking. If you disclose a Title IX issue to me, I am required forward that information to the Title IX Office. They will follow up with you about how the University can take steps to address the impact on you and the community and make you aware of your rights and resources. Their priority is to make sure you are safe and successful here. You are not required to talk with the Title IX Office. If you would like to make a report of sex or gender-based discrimination, harassment or violence, or if you would like to know more about your rights and resources on campus, you can consult the website www.uc.edu/titleix or contact the office at 556-3349.