

Syllabus

Biology 434: Advanced Molecular Biology

Fall 2019

UNC-Chapel Hill

Topic: Gene Expression Control Mechanisms

Course Target: This course is designed for upper level undergraduate students who want to explore specific topics related to gene expression control at a more advanced level. An emphasis will be placed on molecular mechanisms used in higher eukaryotic systems, as revealed through experimental analysis.

Prerequisites

Students must have completed coursework in basic Molecular Biology & Genetics (BIOL 202 or its equivalent) and the first semester of Organic Chemistry (CHEM 261 or equivalent). Note, CHEM 261 may be taken concurrently. You do not need prior research experience in order to be successful in this class.

Days and Times

MWF, 10:10 – 11:00 AM

Location, 367 Phillips Hall

Instructor

Prof. Greg Matera (matera@unc.edu)

Office: 3352 Genome Sciences

Office Hrs: Tues 1:30 – 2:30 PM

Teaching Assistant

Alexis Stutzman (astutzman@unc.edu)

Office: 3344 Genome Sciences

Office Hrs: TBD by poll, or by appointment via Zoom

Course Website: <https://sakai.unc.edu/portal/site/biol434.001.fa19>. PowerPoint presentations, review articles, primary papers, and other lecture materials will be posted in the Resources section of the UNC Sakai site listed above. Review articles and papers will be posted at least one week prior to the assigned date.

Textbook: *Molecular Biology of the Gene*, 7th Edition, by Watson et al.

Course Goals: The broad objective of this course is to help students develop skills in critical reading and analysis of published research articles. Understanding not only what is known, but also **how we know what we know** in the realm of Molecular Biology is the primary goal. To facilitate this effort, another objective is to provide a supportive learning environment to cultivate higher-order thinking

skills by synthesizing concepts and by analyzing and interpreting experimental data. In certain instances, we will connect molecular processes to biological phenomena at other levels (e.g., cellular and organismal). We will cover a variety of classical approaches as well as modern techniques used in molecular genetics and genomics research.

Course Structure: The class will utilize an active learning approach that includes a combination of didactic lecture, interactive dialogue, and student-led discussion of the primary scientific literature. At the end of the term, a mini journal-club presentation by small teams (2 students) will also be required.

Assignments: Guided reading questions (optional) will be provided for the textbook reading assignments. In addition, review articles and research papers will be used to explore topics in more depth and at a more complex level. During most class periods, we will discuss a subset of the experiments in a given research paper. These primary papers will be more challenging to comprehend initially, but will get easier over the course of the semester. The papers will be posted on Sakai, and the file name includes the number of the lecture for which the paper is assigned (e.g., paper L2 is assigned for the second lecture). You should expect to spend a total of about 6 hours per week on the reading assignments, and it is important that you read the assignments before each class.

Grading: Students will be evaluated on the basis of written exams, as well as by their participation in class and by the quality of their oral presentations at the end-of-term. Everyone in the class will be expected to participate. This includes explaining figures and tables to the rest of the class, talking about issues raised in the publications, and asking questions.

75% - Written Exams: 2 mid-term exams plus a final (25% each)

15% - Class Participation: in-class discussions

10% - Oral Presentations: Journal club presentations will be graded on content, understanding, development of background information and synthesis into current thinking.

Expectations: This is NOT a class for passive learners. You are expected to be actively engaged in this course through in-class discussions, activities and pre- as well as post-lecture assignments and readings.

Feeling underprepared because of your background? Educational research has shown that students who do the reading before class, actively participate in class, and regularly review their notes, can (and will) succeed. The course is designed to equalize your readiness before class. Although you may take several hours reading and preparing, another student might need less time. When you get to class, your effort will pay off.

How do you know if you are learning the material? When you make mistakes and identify what you don't know. Making mistakes is KEY to learning. It makes more sense to make mistakes in-class when the stakes are very low, rather than on an exam or a job, so speak up if you don't understand something!

Honor Code: The UNC Honor Code will be in effect in this class. Please read the code (<http://honor.unc.edu/honor/index.html>). Note: Outside of class, students may read and discuss the assigned articles together (indeed, this is encouraged).