

Biology 4010 - Molecular Biology

Semester: Spring 2014

Time: MWF 10-10:50, 1240 Wolfe Hall

Instructor: Dr. Lirim Shemshedini, 3227 Wolfe Hall

Office Hrs: To be determined

Textbook

Lewin's Genes XI is an excellent reference book on molecular biology. Most of the material for the class will come directly from this textbook. **Note that the lectures on Jan. 6, March 31, and April 2 will be based on earlier versions of this textbook, Genes VI and Genes IX. I have placed these books on reserve at the library.** In cases where material covered in the lectures comes from external sources, appropriate references will be given. Most of the external material will come from **Molecular Biology of the Cell** (by Alberts et al.). While there will be no assigned readings, you are strongly encouraged to complement the lectures by reading the relevant material (either in the textbook or external references).

Grades will be based upon:

Quizzes	90 (10 x 9)
50-min Exams	300 (100 x 3)
Final Exam	<u>200 (200 x 1)</u>
	Total 590

Quizzes and Paper Review

There will be nine 10-min quizzes at the beginning of class. Each quiz will cover the lecture material of the previous week. Those quizzes (quizzes #2, 4, 6, and 8) given during the week preceding an exam will cover not only lecture material, but also an assigned paper. Following this quiz will be a discussion of the quiz and a review of the paper and any lecture material that you have questions about. The papers will be recent publications covering some aspect of the lecture material. You are expected to have read the paper prior to the class and be able to discuss it.

Exams

There will be four 50-min. in-class exams and a final exam; your lowest in-class exam score will be dropped. The final exam will cover the entire Semester, with 50% of the exam covering old material and 50% new material. Exams will consist of the following types of questions:

- Multiple Choice
- True/False
- Definition/Short Answer
- Essay/Data Analysis

Written Report

Those students taking this class for Honor's or graduate credit will have, in addition to all the exams and quizzes given to every student, to submit a written report. This paper should be a concise review of the current literature covering a currently 'hot area' of molecular biology. This area is "the role of chromatin in transcriptional regulation." Based on recent publications, you should cover this topic for the following aspects: 1) what is the current information about the topic, 2) how was that information obtained, and 3) where is the future work in the area going. As a guide, I will provide a copy of a current well-written review. The paper should consist of 5-8 double-spaced, typed pages, plus references. It is due at the beginning of class on April 18, 2014. Papers submitted on April 21, 2014 will still be accepted, but you will lose 25% of the points. No papers will be accepted after April 21, 2014.

Grading For Graduate Students

The grading for students taking this class for graduate credit will be based on the following:

Quizzes	90 (10 x 9)
50-min Exams*	400 (100 x 4)
Final Exam	200 (200 x 1)
Report	<u>100</u>
	Total 790

*Note that all four 50-min exams will count for graduate students.

Important Dates

January 13	Last day to add/drop
March 21	Last day to withdraw
January 24	Exam I
February 17	Exam II
March 21	Exam III
April 11	Exam IV
April 18	Report Due
April 30, 10:15-12:15	Final Exam

Syllabus

- Jan. 6** Introduction: Proteins and Compartments
Chapters 1, 2 (Genes VI Textbook)
- 8 Methods I
Chapters 3
- 10 Methods II
Chapters 3
- 13 **Quiz #1/ Methods III**
Chapter 3
- 15 DNA and Genes I
Chapter 1
- 17 DNA and Genes II
Chapters 1, 2
- 20 **No Class-Martin Luther King Day**
- 22 **Quiz #2/Paper 1 Review**
- 24 **Exam I (covering lectures 1/6-1/22)**
- 27 Eukaryotic Genome I
Chapter 5
- 29 Eukaryotic Genome II
Chapters 6, 7
- 31 Eukaryotic Genome III
Chapter 5
- Feb. 3** **Quiz #3/Eukaryotic Genome IV**
Chapter 9
- 5 Eukaryotic Genome V
Chapters 10
- 7 DNA Replication I
Chapter 14

- 10 DNA Replication II
Chapter 14
- 12 DNA Repair
Chapter 16
- 14 **Quiz #4/Paper 2 Review**
- 17 **Exam II (covering lectures 1/27-2/14)**
- 19 Prokaryotic Gene Expression I
Chapters 19, 26, 27
- 21 Prokaryotic Gene Expression II
Chapters 19, 26, 27
- 24 Prokaryotic Gene Expression III
Chapters 19, 26, 27
- 26 Eukaryotic Transcription I
Chapters 20, 28
- 28 **Quiz #5/Eukaryotic Transcription II**
Chapters 20, 28
- Mar. 3-7 Spring Break**
- 10* Eukaryotic Transcription III
Chapters 20, 28
- 12 Eukaryotic Transcription IV
Chapters 20, 28
- 14 RNA Processing I
Chapter 21
- 17 RNA Processing II
Chapters 21, 23
- 19 **Quiz #6/Paper 3 Review**
- 21 **Exam III (covering lectures 2/19-3/19)**

***Dr. Scott Leisner will be substituting for Dr. Shemshedini**

- 24 Translation I
Chapters 24, 25
- 26 Translation II
Chapters 24, 25
- 28 Translation III
Chapters 24, 25
- 31 Protein Localization I (Genes IX Textbook)
Chapter 10
- Apr. 2 Quiz #7/ Protein Localization II (Genes IX Textbook)**
Chapter 10
- 4 Regulatory Functions of RNA I
Chapter 30
- 7 Regulatory Functions of RNA II
Chapter 30
- 9 **Quiz #8/Paper 4 Review**
- 11 **Exam IV (covering lectures 3/24-4/9)**
- 14 Epigenetic Regulation I
Chapter 29
- 16 Epigenetic Regulation II
Chapter 29
- 18 **Quiz #9/Mobile DNA I**
Chapters 15, 17, 21
- 21 Mobile DNA II
Chapters 15, 17, 21
- 23 Mobile DNA III
Chapters 15, 17, 21
- 25 DNA Rearrangement in the Immune System
Chapter 18

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List of Papers To Be Reviewed (2014)

1. Paper 1 (1/22/14)

Chien et al. The two-hybrid system: A method to identify and clone genes for proteins that interact with a protein of interest. *Proc. Nat. Acad. Sciences USA* 88: 9578-9582 (1991)

2. Paper 2 (2/14/14)

Levin et al. An interaction between DNA ligase I and proliferating cell nuclear antigen: Implications for Okazaki fragment synthesis and joining. *Proc. Natl. Acad. Sciences USA* 94: 12863-12868 (1997)

3. Paper 3 (3/19/14)

Spencer et al. Steroid receptor coactivator-1 is a histone acetyltransferase. *Nature* 389: 194-198 (1997)

4. Paper 4 (4/19/14)

Wang et al. MicroRNA-repressed mRNAs contain 40S but not 60S components. *Proc. Nat. Acad. Sciences USA* 105: 5343-5348 (2008)