

Biology 6010/8010

Advanced Molecular Biology

Quarter: Fall 2012
Time: MW 5:00-7:00, 3246 Wolfe Hall
Instructors: Dr. Scott Leisner, 4223 Wolfe Hall
 Dr. Lirim Shemshedini, 3227 Wolfe Hall
Office Hrs:
 Dr. Leisner
 Dr. Shemshedini

Textbook: There is no formal textbook for this class. However, **Molecular Biology of the Cell** (5th edition) by B. Alberts et al. is an excellent reference book on molecular biology and we recommend it.

Grades will be based upon:

Quizzes	80
Class Participation	20
2-hr Exam	100
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Final Exam	<u>200</u>
	500

Exams

There will be two 2-hr in-class exams and a final exam. The final exam will cover the entire Semester. Exams will consist of the following types of questions:

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

Quizzes and Papers

There will be eleven 11 sessions, with 10 min devoted to a quiz followed by a paper review. The quizzes will cover the paper(s) to be reviewed and material from the previous lectures. There will be eleven quizzes, each worth 10 points, and your three lowest quiz scores will be dropped. Students are expected to be involved in the class discussion of the paper(s). All papers must be obtained by students directly from the journals. Make sure to read both the main paper and the supplementary information.

Syllabus

August	20	<u>Introduction/DNA and Protein Structure I</u>
	22	<u>Introduction/DNA and Protein Structure II</u>
	27	<u>Methods</u>
	29	<u>Quiz-Paper 1/Chromatin I</u>
September	3	Labor Day
	5	<u>Chromatin II</u>
	10	<u>Quiz-Paper 2/Transcription I</u>
	12	Transcription II
	17	Transcription III
	19	<u>Quiz-Paper 3/Nuclear Receptors I</u>
	24	Nuclear Receptors II/ <u>Quiz Paper 4</u>
	26	Exam I (covering previous materials)
October	1	Fall Break
	3	RNA Processing I
	8	<u>RNA Processing II</u>
	10	<u>RNA Regulation</u>
	15	<u>Quiz-Paper 5/Translation I</u>
	17	Translation II
	22	<u>Quiz-Paper 6/Postranslational Modifications and Protein Function I</u>
	24	<u>Postranslational Modifications and Protein Function II/Quiz-Paper 7</u>

	29	Exam II (covering previous materials)
	31	DNA Replication I
November	5	DNA Replication II/ <i>Quiz-Paper 8</i>
	7	*Genetics I
	12	No Class-Veteran's Day
	14	*Genetics II/ <i>Quiz-Paper 9</i>
	19	Transposable Elements I
	21	Thanksgiving Break
	26	Transposable Elements II/ <i>Quiz-Paper 10</i>
	28	Homeotic Genes I
December	3	Homeotic Genes II/ <i>Quiz-Paper 11</i>
	5	<u>Gene Therapy</u>

Final Exam Date: Dec. 12 5-8 pm

*Note that"

-lectures given by Dr. Leisner are underlined and those given by Dr. Shemshedini are not underlined.

-lectures indicated by an asterisk will be given by Dr. John Plenefisch.

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List of Papers To Be Reviewed

- Paper 1 Jin, et al. (2005) MBD3L2 interacts with MBD3 and components of the NuRD complex and can oppose MBD2-MeCP1-mediated methylation silencing. **J Biol. Chem.** **280**:12700-12709
- Paper 2 Krishnan, et al. (2011) Histone H4 lysine 16 hypoacetylation is associated with defective DNA repair and premature senescence in Zmpste24-deficient mice. **Proc. Natl. Acad. Sci. USA** **108**:12325-12330.
- Paper 3 Hsu et al. (2008) TBP, Mot1, and NC2 establish a regulatory circuit that controls DPE-dependent versus TATA-dependent transcription. **Genes Dev.** **22**: 2353-2358.
- Paper 4 Qin et al. (2009) The Steroid Receptor Coactivator-1 Regulates Twist Expression and Promotes Breast Cancer Metastasis **Can. Res.** **69**: 3819-3827.
- Paper 5 Wierzbicki et al. (2009) RNA polymerase V transcription guides ARGONAUTE4 to chromatin **Nature Genetics** **41**: 630-634.
- Paper 6 Jeske et al. (2011) Smaug assembles an ATP-dependent stable complex repressing nanos mRNA translation at multiple levels. **EMBO J.** **30**: 90-103.
- Paper 7 Won et al. (2011) Recruitment interactions can override catalytic interactions in determining the functional identity of a protein kinase. **Proc. Natl. Acad. Sci. USA** **108**:9809-9814.
- Paper 8 Marques et al. (2009) Specific function of phosphoinositide 3-kinase beta in the control of DNA replication **Proc. Natl. Acad. Sci. USA** **106**: 7525-7530.
- Paper 9 Yang, et al. (2011) A regulatory gene induces trichome formation and embryo lethality in tomato. **Proc. Natl. Acad. Sci. USA** **108**:11836-11841.
- Paper 10 Parks et al. (2009) Transposition into Replicating DNA Occurs through Interaction with the Processivity Factor. **Cell** **138**: 685-695.
- Paper 11 Li et al. (2011) Mammalian Polycomb-Like Pcl2/Mtf2 Is a Novel Regulatory Component of PRC2 That Can Differentially Modulate Polycomb Activity both at the *Hox* Gene Cluster and at *Cdkn2a* Genes. **Mol. Cell. Biol.** **31**: 351-364.