Biology 6010/8010
Advanced Molecular Biology

Quarter: Fall 2011
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	200
	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	22	Introduction/DNA and Protein Structure I
	24	Introduction/DNA and Protein Structure II
	29	Methods
	31	*Quiz-Paper 1*/Chromatin I
September	**5**	**Labor Day**
	7	Chromatin II
	12	*Quiz-Paper 2*/Transcription I
	14	Transcription II
	19	Transcription III
	21	*Quiz-Paper 3*/Nuclear Receptors I
	26	Nuclear Receptors II/*Quiz Paper 4*
	28	**Exam I** (covering previous materials)
October	3	RNA Processing I
	5	RNA Processing II
	10	RNA Regulation
	12	*Quiz-Paper 5*/Translation I
	17	**Fall Break**
	19	Translation II
	24	*Quiz-Paper 6/* Postranslational Modifications and Protein Function I
	26	Postranslational Modifications and Protein Function II/*Quiz-Paper 7*

	31	**Exam II** (covering previous materials)
November	2	DNA Replication I
	7	DNA Replication II/*Quiz-Paper 8*
	9	*****Genetics I
	14	*****Genetics II/*Quiz-Paper 9*
	16	Transposable Elements I
	21	Transposable Elements II/*Quiz-Paper 10*
	23	**Thanksgiving Break**
	28	Homeotic Genes I
	30	Homeotic Genes II/*Quiz-Paper 11*
December	5	<u>Gene Therapy I</u>
	7	<u>Gene Therapy II</u>

Final Exam Date: Dec. 15 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.