

ADVANCED MOLECULAR GENETICS
BY 433/633 Section 3A; Fall 2007
Dr. Trygve Tollefsbol

Office: Room 175A Campbell Hall

Office Hours: M 1-3 or by appointment (E-mail: trygve@uab.edu; Phone: 934-4573)

Textbook: *Genes IX* (2008); Benjamin Lewin (Jones and Bartlett Publishers)

Optional Textbook: *Molecular Biology of the Cell*, Fourth Edition (2002); Bruce Alberts et al (Garland Science Textbooks)

Description: Examination of the molecular genetics of eukaryotic organisms including analysis of the features and nature of eukaryotic genomes, genes, nucleosomes, and chromosomes as well as the processes involved such as transcription, splicing, epigenetics and signal transduction. The role of molecular genetics in cell growth and tumorigenesis will also be studied.

Objectives: The objective of the course is to provide upper level undergraduate students or graduate students with a thorough understanding of eukaryotic molecular genetics. The nature of the eukaryotic genome itself will be studied in terms of its variations among species and its complexity and components in order to give the students a understanding of the scope of molecular processes in eukaryotes as well as a detailed analysis of these processes. The genes of eukaryotes will be examined to understand their organization, distribution, clustering, types, and processing during transcription. Various structural features of eukaryotic DNA/chromosomes such as telomeres, domains, nucleosomes, and histones will be studied as well as the initiation and regulation of transcription and translation in eukaryotes and the role of catalytic RNA in these organisms. The major pathways of signal transduction will be studied and the role of eukaryotic molecular genetics in cell growth and cancer will also be assessed to provide the students with an understanding of some of the more applied aspects of eukaryotic molecular genetics.

TENTATIVE CLASS SCHEDULE

<u>Date</u>	<u>Topic</u>	<u>Text Pages</u>
August 22	<i>Introduction/ Characteristics of the Genome</i>	pp. 55-67; 76-97
August 27	<i>Studying the Eukaryotic Genome I</i>	Class Notes
August 29	<i>Studying the Eukaryotic Genome I/II</i>	Class Notes
Sept. 3	<i>Holiday (Labor day)</i>	
Sept. 5	<i>Studying the Eukaryotic Genome II</i>	Class Notes
Sept. 10	<i>Gene Organization in Eukaryotes</i>	pp. 37-54
Sept. 12	<i>Gene Organization in Eukaryotes</i>	pp. 37-54
Sept. 17	<i>Organelle Genomes</i>	pp. 67-73

Sept. 19	Exam I	
Sept. 24	<i>Features of Eukaryotic Chromosomes</i>	pp. 729-756
Sept. 26	No class meeting (Dr. Tollefsbol will be attending a scientific conference)	
Oct. 1	<i>Chromatin/Nucleosomes</i>	pp. 757-795; 796-817
Oct. 3	<i>Chromatin/Nucleosomes</i>	pp. 757-795; 796-817
Oct. 8	<i>Initiation of Transcription in Eukaryotes</i>	pp. 609-632
Oct. 10	<i>Eukaryotic Transcriptional Regulation</i>	pp. 649-666
Oct. 15	<i>Eukaryotic Transcriptional Regulation</i>	pp. 649-666
Oct. 17	<i>DNA Methylation in Higher Organisms</i>	pp. 632-639; 818-820; 826-836
Oct. 22	<i>Nuclear Splicing</i>	pp. 667-705
Oct. 24	<i>Nuclear Splicing</i>	pp. 667-705
Oct. 29	No class meeting (Dr. Tollefsbol will be attending a scientific conference)	
Oct. 31	Exam II	
Nov. 5	<i>Catalytic RNA</i>	pp. 706-728
Nov. 7	<i>Catalytic RNA</i>	pp. 706-728
Nov. 12	<i>Signal Transduction</i>	Class Notes
Nov. 14	<i>Signal Transduction</i>	Class Notes
Nov. 19	<i>Growth Regulation of Eukaryotic Cells</i>	Class Notes
Nov. 21	<i>No class held (Wednesday before Thanksgiving Holiday)</i>	
Nov. 26	<i>Growth Regulation of Eukaryotic Cells</i>	Class Notes
Nov. 28	<i>Cancer Molecular Genetics I</i>	Class Notes
Dec. 3	<i>Cancer Molecular Genetics II</i>	Class Notes
Dec. 5	Catch-up	
Dec. 10	Final Exam (Monday, 4:15 pm-6:45 pm)	

Evaluation:

Exam I	100 pts.
Exam II	100 pts.
Final Exam (not comprehensive)	100 pts.
Total	300 pts.

Final Grade:

90-100%	(270-300 pts.)	A
80-89%	(240-269 pts.)	B
70-79%	(210-239 pts.)	C
60-69%	(180-209 pts.)	D
0-59%	(< 180 pts.)	F

Grading: Examinations will be primarily on provided material. Portions of the material (subject to testing) may not be in the text. The text is provided to complement the class notes.

Exams must be taken on the date indicated during the regular class schedule. Makeup exams will only be given in exceptional circumstances (i.e., medical or family emergency documented in writing).

NOTE: This is a course that has both undergraduate and graduate students enrolled. Graduate students must complete all of the requirements indicated above. Graduate students are also expected to write a paper on a topic related to the class material. The paper is due by Dec. 5, 2007 and should be about 10-30 pages in length. This assignment will count as 10% of the final grade. Graduate students should see the instructor for further details regarding the writing of their paper.

Withdrawal Policy:

Undergraduate students may withdraw and receive a grade of W up to and including Oct 22.

Graduate students may withdraw and receive a grade of W up to and including Dec. 5.

Internet Access of Required Class Material:

All of the materials from the class lectures will be placed on the internet. To access these materials, follow these links:

1. Start at the UAB main page (<http://main.uab.edu>)
2. Under "About UAB", click "Campus Services"
3. Scroll down and click "Libraries"
4. Click "Mervyn H. Sterne Library"
5. Click "Local Catalog"
6. Click "Course Reserves"

7. In the "Instructor" box, scroll down to select "Tollefsbol, Dr. Trygve"
8. Click "Search"
9. Select the desired lecture to download. For example, under "Title", click "Introduction/Characteristics of the Genome" to download the first lecture of the course.
10. Select "Click here to access an electronic copy of this item". This will access the handout summary sheet(s) and scans of the transparencies used for the lectures.
11. Bookmark as desired.

If you have any problems with accessing the required online information for the course, please either contact the information desk at the Sterne Library or Dr. Tollefsbol. This should be done relatively early in the course to make sure you know how to access all of the materials. Students are also responsible for the required textbook readings as delineated above.