INTD 561
MOLECULAR BIOLOGY
"From Genome to Proteome"
4 Units
Fall 2016

Course Description: Topics covered include DNA and RNA structure and function; biochemistry and molecular biology of replication, transcription, RNA processing, translation, and regulation of gene expression. Emphasis is on eukaryotic organisms with comparisons to prokaryotes.

Course Objectives/Goals: Upon successful completion of this course, students should be able to explain the fundamental principles and molecular mechanisms of DNA replication, transcription, and translation in eukaryotic cells.

Meeting Time and Place: Tuesdays and Thursdays from 3-5 PM in MCH256

Course Coordinator:
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Grading: The grade in the course will be based on three exams and a research paper. Exams and the paper will emphasize analytical and problem-solving skills. The various components will contribute as follows to the final grade:

Exam 1 – 21%
Exam 2 – 27%
Exam 3 – 27%
Paper – 25%

Course Web Site: https://blackboard.usc.edu/

Lecture and Exam Schedule for Fall 2016

Tuesdays and Thursdays from 3 to 5 PM

DATE	LECTURE TOPIC	PLACE	INSTRUCTOR
Aug. 23 T	DNA and RNA Structure	MCH256	A. Siemer
Aug. 25 Th	Protein Structure and DNA-Protein Interactions-1	MCH256	A. Siemer
Aug. 30 T	DNA-Protein Interactions-2	MCH256	A. Siemer
Sept. 1 Th	DNA Replication-1	MCH256	S. Reddy
Sept. 6 T	DNA Replication-2	MCH256	S. Reddy
Sept. 8 Th	Eukaryotic DNA Recombination & Repair-1	MCH256	M. Lieber
Sept. 13 T	Eukaryotic DNA Recombination & Repair-2	MCH256	M. Lieber/G. Li
Sept. 15 Th	**REVIEW 1**	MCH256	--
Sept. 20 T	**EXAM 1** (Covering Aug 23 - Sept 13)	MCH256	--
Sept. 22 Th	DNA Transcription	MCH256	W. An
Sept. 27 T	Chromatin Structure and Remodeling	MCH256	W. An
Sept. 29 Th	Chromatin Transcription	MCH256	W. An
Oct. 4 T	Epigenetics	MCH256	J. Rice
Oct. 6 Th	Gene Silencing	MCH256	J. Rice
Oct. 11 T	Enhancers	MCH256	R. Bajpai
Oct. 13 Th	Transcription Control by Extracellular Signals-1	MCH256	E. Zandi
Oct. 18 T	Transcription Control by Extracellular Signals-2	MCH256	E. Zandi
Oct. 20 Th	Chromatin Structure Regulation in Development	MCH256	R. Maxson
Oct. 25 T	**REVIEW 2**	MCH256	--
Oct. 27 Th	**EXAM 2** (Covering Sept 22 - Oct 20)	MCH256	--
Nov. 1 T	RNA-Protein Interactions	MCH256	I. Laird-Offringa
Nov. 3 Th	RNA Processing in Eukaryotes-1	MCH256	S. Tahara
Nov. 8 T	RNA Processing in Eukaryotes-2	MCH256	S. Tahara
Nov. 10 Th	RNA Stability and Export	MCH256	I. Laird-Offringa
Nov. 15 T	Regulatory RNAs -- siRNA / miRNA	MCH256	M. Fabbri
Nov. 17 Th	Exosomes and RNA transfer	MCH256	M. Fabbri
Nov. 22 T	Mechanism of Translation in Eukaryotes-1	MCH256	R. Duncan

Nov.24 Th	**THANKSGIVING RECESS**	MCH256	
Nov. 29 T	Mechanism of Translation in Eukaryotes-2	MCH256	R. Duncan
Dec. 1 Th	Regulation of Translation	MCH256	R. Duncan
Dec. 6 T	**REVIEW 3**	MCH256	--
Dec. 8 Th	**EXAM 3** (Covering Nov 1 - Dec 1)	MCH256	--

Paper Dates

- **Aug. 23** – Paper topic selection form will be posted on Blackboard.
- **Aug. 25** – Students will choose 5 topics and email the form to TA.
- **Sept. 1** – Topic assignments will be announced.
- **Sept. 1 to Sept. 8** – Students are to search the literature and identify 10 journal articles related to their topic. Students must email these articles to the faculty member serving as advisor for their topic by Sept. 8 at the latest. (There will be a penalty for lateness.)
- **Sept. 8 to Sept. 15** – Students are to make an appointment and meet with the faculty member to select 2 articles to be the primary focus of their paper. This meeting must take place by Sept. 15 at the latest. (There will be a penalty for lateness.)
- **Sept. 15 to Nov. 15** – Students should read, think about the topic, and write the paper.
- **Nov. 15** – The completed paper is to be turned in to Dr. An's office (NRT6507) by 5:00 PM.

Examination Procedures

- You will be allowed 4 hours for examinations, from 3-7 PM. The exam should take 2 hours to complete. You can use the other two hours as you choose. Arrange your schedule to stay late on exam days if you think you will need the full 4 hours.
- No texts, papers, or notes may be used during exams.
- No electronic devices of any kind may be used during exams.

Drop Dates

- Sept. 9 -- Last day to drop course without a mark of "W"
- Nov. 11 -- Last day to drop course with a mark of "W" rather than a regular letter grade.

Faculty for Fall 2016

NAME	LOCATION	PHONE	EMAIL
Woojin An	NRT 6507	442-4398	woojinan@usc.edu
Ruchi Bajpai	IGM 263	442-1220	rbajpai@usc.edu
Roger Duncan	PSC 210A	442-1449	rduncan@usc.edu
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HMR (Hoffman Medical Research Center), IGM (Institute for Genetic Medicine)
NOR (Norris Cancer Hospital and Research Institute), NRT (Norris Research Tower)
PSC (Pharmaceutical Sciences Center) ZNI (Zilkha Neurogenetic Institute)
SRT (Children's Hospital Los Angeles, Smith Research Tower)

References for Fall 2016

For each section of the course students should read the specific journal articles, reviews, and text chapters suggested by the instructors.

The following texts are good sources of background information on the topics covered in this course. Some instructors may assign specific readings from these texts, but students are encouraged to read appropriate sections on their own as well.

- Molecular Biology of the Cell, 6th edition. Alberts, Johnson, Lewis, Morgan, Raff, Roberts and Walter. Garland Pub. Co., 2014.
- Molecular Cell Biology, 7th edition. Lodish, Berk, Kaiser, Krieger, Bretscher, Ploegh, Amon and Scott. W.H. Freeman & Co., 2012.
- Lewin's Genes XI. Krebs, Goldstein, Kilpatrick. Jones & Bartlett Learning, 2012.

All of the above books are on Reserve in the Norris Medical Library.

Instructions for Research Paper

Fall 2016

General Requirements

1. **Topic --** The paper is to be written on a topic from a list supplied by the faculty teaching this course. You will select 5 topics from this list and will be assigned your topic among your selections.

2. **References --** After your topic has been assigned, you are to search the scientific literature and find 10 recent references on your topic (published within the last 5 years). These should be original research articles, not reviews or commentaries. You contact your paper advisor and select 2 of these references on which to focus your paper. Each of these activities must be accomplished by the date stated in the schedule or a 5% penalty will be imposed.

3. **Length --** The paper should consist of about 10 pages of double-spaced typed text (not counting any figures or tables or the reference list). You must include a complete bibliography of the literature you used in writing your paper.

4. **Due Date --** The paper is to be turned in at Dr. An's office by 5:00 pm on Tuesday Nov 15. The original and one photocopy are required. No late papers will be accepted.

5. **Originality --** The paper is to be written by you alone and to be done specifically for this course. You may not turn in something written for another purpose, nor may you collaborate with others in the writing of your paper. You may, however, discuss scientific issues related to your topic with others.

Detailed Guidelines for Writing the Paper

1. Search the literature for 10 important journal articles related to your topic. These articles should have been published within the last 5 years and should be research papers, not reviews or commentaries. You should attempt to select substantial papers that appear to make important contributions to the topic. Email the 10 articles to the faculty member who suggested your topic (your paper advisor). The articles must be submitted by Sept. 8. The penalty for lateness will be a reduction in your paper grade by 5%.

2. Make an appointment with your paper advisor for the period between Sept. 8 and Sept. 15. (It is desirable to schedule this appointment early in the course since some faculty members may be unavailable on certain dates.) At this meeting your paper advisor will guide you in selecting 2 articles that will be the major focus of your paper. You may consult review articles or other references to gain insight into the topic, but they may not form the basis of your paper. The meeting with your paper advisor must take place by Sept. 15 at the latest. The penalty for lateness will be a reduction in your paper grade by 5%.

3. You are strongly encouraged to prepare an outline of the paper you plan to write and discuss this outline with your paper adviser before writing your paper. While working on your paper, you may consult with your paper advisor from time to time if you have questions. However, faculty members will not critique preliminary drafts of your paper.

4. Present a logical and well-organized overview of the topic covered in the references you are working with. The organization should be your own and not resemble that used in a published review article. You should indicate the importance of the topic you are describing and explain how it fits into the larger scientific picture. This background and/or introduction section should not exceed 2 pages. Your writing should avoid errors in grammar and spelling and should conform to acceptable standards of English usage.

5. Provide your own interpretation and criticism of the results. Don't simply state information or repeat the conclusions of others. We want to see evidence that you have thought critically about the topic. This is a very important aspect and should probably be at least 30% of your paper. You may find it helpful to ask the following questions and expand on their answers in your analysis:

- What key questions are being addressed in these papers?
- Have the authors used appropriate approaches? What other approaches might be useful?
- Are the data clear? Have all of the appropriate controls been used?
- Is the interpretation of the data reasonable?
- Are the conclusions made by the authors valid?
- Comparing the work of the studies, do they support each other? Why or why not?
- If the results obtained from these studies contradict each other, what might be the reason for this? Can you suggest experiments that might resolve these discrepancies?

6. Indicate what additional experiments should be done and state your opinion as to the direction the work should take in the future. Again, this is an essential part of a good paper. This item should represent about 20% of your paper. You may find it helpful to ask the following questions and expand on their answers in your analysis:

- What direction(s) is this field moving?
- Based on these studies, what future experiments need to be done to clarify the problem?

7. Give proper citations within the text to the appropriate references listed in your bibliography. All sources used must be listed in your bibliography, and each should be cited in the text of your paper whenever you refer to information from that source. Use a standard format for your bibliography, such as that used in a major scientific journal like *Cell*. You should include names of all authors, the full title, the journal name and volume, beginning and ending pages, and the year.

8. Be very careful to use your own words when writing your paper. If you must copy phrases or sentences directly from a published source, enclose the words in quotation marks and cite the source. Copying someone else's words without using quotation marks and without giving credit to the author(s) is plagiarism. For more information on plagiarism and its consequences, see the **SCampus** web site. The information there includes the following (from the section on University Governance):

"General principles of academic honesty include and incorporate the concept of respect for the intellectual property of others, the expectation that individual work will be submitted unless otherwise allowed by an instructor, and the obligations both to protect one's own academic work from misuse by others as well as to avoid using another's work as one's own. All students are expected to understand and abide by these principles."

"Plagiarism:

A. The submission of material authored by another person but represented as the student's own work, whether that material is paraphrased or copied in verbatim or near-verbatim form.
B. The submission of material subjected to editorial revision by another person that results in substantive changes in content or major alteration of writing style.
C. Improper acknowledgment of sources in essays or papers."

Grading of the Paper

1. The paper will count 25% of the final course grade.

2. Each paper will be read by the faculty member who suggested the topic and by one additional faculty member. If there is significant disagreement about the grade, other instructors may evaluate the paper as well.

3. The criteria to be applied in evaluation of the paper will include the following:

a. Scientific accuracy and understanding.
b. Clarity of expression and organization.
c. Originality and evidence of critical judgment (about 30% of the paper grade).
d. Suggestions for future experiments and direction (about 20% of the paper grade).
e. Proper use and citation of the literature.
f. Adherence to the other instructions given here (length, due dates, etc.)