**BIOL 7963: ADVANCES IN MOLECULAR BIOLOGY SYLLABUS Fall, 2012**

**INSTRUCTOR:**

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**CLASS HOURS/LOCATION:** Tuesday 9:05-10:55am/ Cherry Emerson 322

**OFFICE HOURS:** Mon 2-3 PM

(Email contact strongly recommended prior to meetings)

**COURSE DESCRIPTION:**

Molecular biology is advancing rapidly with an avalanche of discoveries and new technologies. This 2-credit graduate course is intended to introduce students to recent developments in this dynamic field with several special topics, particularly focusing on *mechanisms of gene expression*. The focus area of this course includes *chromatin, epigenetics, transcription regulation, stem cell biology, mammalian development, as well as new experimental technologies.* The course is aimed to promote in-depth discussions of current research topics and to enhance appreciation of how genome works. Prior basic background knowledge in Molecular Cell Biology (MCB) is required. The **FORMAT** of the course will consist of lectures on above topics, critical reading of the scientific literature, student oral presentations, round-table discussions and research proposal debates. Since this course weighs heavily on presentations, discussions and problem-based activities, class attendance and active participation are required. Should you miss a class, you must convince the instructor that the absence was excusable. Unexcused absence will result in points deduction.

**TEXTBOOK:**

There are no required textbooks.

Research papers to be discussed will be assigned in class (Online journals via the Georgia Tech library)

Homework/problems are to be distributed in class.

*Suggested books:*

1. Allis CD, Jenuwein T, Reinberg D, Caparros M (ed.)

*Epigenetics* (2007)

Cold Spring Harbor Laboratory Press (ISBN-13: 978-087969724-2)

2. Lodish H., et al, *Molecular Cell Biology, 7th Ed. 2012*

W.H Freeman and Company (ISBN-13: 978-1-4641-2398-6).

(Lodish H., et al, *Molecular Cell Biology, 6th Ed. 2007*

W.H Freeman and Company (ISBN-13: 978-0-7167-7601-7).

3. *Successful Scientific Writing -A Step-by-Step Guide for the Biological and Medical Sciences-* by Janice R. Matthews and Robert W. Matthews 2008 (3rd Edition) Cambridge University Press (ISBN-13: 9780521699273).

**OTHER SOURCES:**

Biomedical search tools: NLM Gateway, <http://gateway.nlm.nih.gov/gw/Cmd>),

UCSC genome browser (<http://genome.ucsc.edu/>)

Google Scholar; Science (<http://www.sciencemag.org/>), Nature: (<http://www.nature.com/>)

**HONOR CODE:** All students are required to adhere to Georgia Tech Academic Honor Code ([www.honor.gatech.edu](http://www.honor.gatech.edu)).

**GRADING:**

Students will be evaluated on performances on oral presentation, proposal debate session, term report and class participation. A class debate will be arranged for the project and group discussion and planning are encouraged prior to the debate session. Term report is to be completed individually. The final course grade is composed of:

1. Paper presentation - 25%

2. Homework /proposal debates (problem-based) - 25%

3. Term-report: 25%

4. Class participation - 25%

**Class participation** will be judged by the extent to which each student participates in class discussions (by asking questions, answering questions, offering ideas, opinions, and critiques of student presentations, etc.).

**IMPORTANT GEORGIA TECH DATES**

Mon **Aug 20** CLASSES BEGIN

Fri Aug 24 Last day to register and/or make schedule changes

(registration closes at 4PM)

Mon **Sep 3** OFFICIAL SCHOOL HOLIDAY

Fri **Oct 12** Last day to withdraw from individual courses with a grade of "W"

Sat-Tues **Oct 13-16** Fall 2012 Student Recess

Thurs-Fri **Nov 22-23** OFFICIAL SCHOOL HOLIDAY

Fri **Dec 7** LAST DAY OF CLASSES

Mon – Fri **12/10-12/14** FINALS WEEK

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| **BIOL7963 Fall 2012 Class Schedule** | | | |
| **Class** | **DATE** | **TOPIC** | **References** |
| 1 | 21-Aug | Introduction and overview (lecture 1) | lecture notes & handouts |
| 2 | 28-Aug | Genes and Genome (lecture 2) | lecture notes, textbook |
| 3 | 4-Sep | Gene expression mechanisms (lecture 3) | lecture notes, textbook |
| 4 | 11-Sep | Epigenetics mechanisms (lecture 4) | lecture notes, textbook |
| 5 | 18-Sep | Stem cells and reprogramming (lecture 5) | lecture notes, ([1-6](#_ENREF_1)) |
| 6 | 25-Sep | Molecular Biology Technologies (lecture 6, P1) | lecture notes |
| 7 | 2-Oct | Genomic analysis (lecture 7, P2) | lecture notes & In-class exercise |
| 8 | 9-Oct | Chromatin (I)- Histones and histone modifications (P3, P4) | ([7-11](#_ENREF_7)) |
|  | 16-Oct | OFFICIAL SCHOOL HOLIDAY |  |
| 9 | 23-Oct | Chromatin (II)- DNA methylation (P5, P6) | ([12-17](#_ENREF_12)) |
| 10 | 30-Oct | Chromatin (III)- ncRNA, RNAi, miroRNAs (P7, P8) | ([18-22](#_ENREF_18)) |
| 11 | 6-Nov | Polycomb Group Proteins and Gene Silencing (P9, P10) | ([23-27](#_ENREF_23)) |
| 12 | 13-Nov | Genomic Imprinting; X-chromosome Inactivation (P11, P12) | ([28-32](#_ENREF_28)) |
| 13 | 20-Nov | Problem-based group discussions/debate session | Assigned problems |
| 14 | 27-Nov | Novel /Integrative approaches in molecular biology (P13-15) | ([33-37](#_ENREF_33)) |
| 15 | 4-Dec | Guest Lecture/ Cancer/ term report prep |  |
| 16 | 12/10-14  13-Dec | Final Exams week  Term report due |  |
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