

## Cell & Molecular Biology, BIOL 3450 SYLLABUS Fall 2011

### INSTRUCTORS:

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**COURSE HOURS/LOCATION:** MWF 10:05-10:55 am/ Architecture (East) 123

**OFFICE HOURS:** No regular office hours are scheduled, but students are **STRONGLY ENCOURAGED** to meet with the TA and instructors when needed by arranging a time via e-mail.

**COURSE DESCRIPTION:** Modern cell biology is a unifying discipline that describes the structure and function of cells in all their genetic, biochemical, developmental, physiological and pathophysiological aspects. This course will introduce students to the dynamic relationship between the structure of cells and the biochemical reactions that are necessary for cell growth, differentiation, survival and death with an emphasis on eukaryotic cells. The format of the course will consist of **class lectures** (which primarily draw on information found in the textbook), **in-class discussion of topics related to the lecture material**, and **analysis of assigned research articles**, with each student participating in a **GROUP ORAL PRESENTATION** or preparation of a **WRITTEN SYNOPSIS/CRITIQUE**. When possible, the instructors will interject exercises using the Turning Point "clickers." It is estimated that 1-2 hours will be required outside of class to prepare for **EACH** lecture, and each research paper will require additional hours of study/preparation.

**TEXTBOOK:** H. Lodish et al. 2007. *Molecular Cell Biology*, 6th Ed. W.H Freeman and Company (ISBN-13: 978-0-7167-7601-7). Optional reading (on reserve in the library): Gillen, C. M., 2007. *Reading Primary Literature*, Pearson/Benjamin Cummings Pub. (ISBN-13: 978-08053-4599-5). Turning Point transmitter.

**OTHER SOURCES:** The website for the textbook: <http://bcs.whfreeman.com/lodish6e/default.asp>

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

Online journals via the Georgia Tech library: [http://sfx.galib.uga.edu/sfx\\_git1/az](http://sfx.galib.uga.edu/sfx_git1/az)

Link to useful online cell biology resource: <http://www.cellbio.com>

Those taking the laboratory will also perform experiments that illustrate some commonly-used research techniques and their application during a semester-long research project.

**CLASS CONTACTS:** We strongly suggest that you get to know at least a few other students in the class so you can help each other with questions, studying, and in case you are absent from class and need help understanding the posted lecture notes.

### IMPORTANT GEORGIA TECH DATES

Mon	<b>Aug 22</b>	CLASSES BEGIN
Mon	<b>Sep 5</b>	OFFICIAL SCHOOL HOLIDAY
Fri	<b>Oct 14</b>	Last day to withdraw from individual courses with a grade of "W"
Sat-Tues	<b>Oct 15-18</b>	Fall 2010 Student Recess
Thur-Fri	<b>Nov 24-25</b>	OFFICIAL SCHOOL HOLIDAY
Fri	<b>Dec 9</b>	LAST DAY OF CLASSES
Mon – Fri	<b>12/12-12/16</b>	FINALS WEEK (Final exam: Dec 16 (Fri), 11:30am - 2:20pm)

### IMPORTANT COURSE DATES

Fri	<b>Sept. 9</b>	EXAM 1
Fri	<b>Sept. 30</b>	EXAM 2
Fri	<b>Oct 21</b>	EXAM 3
Fri	<b>Nov 11</b>	EXAM 4
<b>FRI</b>	<b>Dec. 16</b>	<b>FINAL EXAM CUMULATIVE, with ca ½ on information after Exam 4</b>

**EVALUATION CRITERIA:**

**Lecture exams: 60% of the final grade.** There will be FOUR one hour-lecture exams. **Your lowest score will be dropped;** therefore, you can miss one exam due to illness or another reason (job or school interview; sports event, etc.) without affecting your grade. Each of the remaining exams is worth 20% of the final grade.

**NO Makeup exams will be given so try to take all exams in case you miss one due to illness.** If you are participating in an excused activity (scientific conference, sports event, etc.) you may take the exam early, but you must arrange when to take it (usually the day before the scheduled exam date) at least two weeks before the scheduled exam date. You may elect to use an exam that you miss as part of such activity as the dropped exam.

**Final exam: 20% of the final grade. THE FINAL EXAM is an integrative overview of all of the cell biology concepts covered in the course. This is achieved by having about half of the questions from the lectures after Exam 4, since they concern how the basic concepts are manifested in more complex cellular processes such as cell differentiation, development, immune cell function, and cancer; the other half of the exam asks more direct questions from the earlier lectures.**

All exams will be closed book and will consist of multiple-choice and short answer questions.

**Class discussions and Research paper analysis: 20% of the final grade.** There are two types of in-class activities—in class discussions of topics related to the lectures and research papers (10% of the final grade) and an in-depth analysis of a research paper (which the student will do as a group or individually) (10% of the final grade).

Class discussions (10%)—These are intended to help students relate to the information presented in class as active participants rather than just listeners, and to give the instructors feed-back on whether the learning objectives are being accomplished. Typically, the instructor will hand out (or project from the computer, for clicker exercises) a series of questions or problems to be solved related to an application or extension of the topics covered in class. The students will be given time to formulate answers/solutions (as individuals or small groups) which will then be discussed. At the end of class, each student will turn in a brief statement of their answer/solution on the form provided, which will let the instructors know that they have participated in the activity (no form will be necessary for clicker exercises because they are automatically recorded). Full credit (i.e., 50 points toward the “Class discussions and Research paper analysis” grade) will be awarded for  $\geq 90\%$  participation (i.e., if the student has been present and turned in  $\geq 90\%$  of the forms and clicker exercises), with lower credit for less participation (i.e., if the student has only turned in half of the forms, they would only get 25 points). There will be no “make up” opportunities for these in-class activities (this has been factored in the 10% that can be missed and still receive full credit, by the formula above), so if you know you will miss more than this number for a justifiable reason, you must notify the course director at the beginning of the semester.

Research paper analysis (10%)—This activity gives the student experience in reading primary, peer-reviewed research papers in cell biology to familiarize them with how research in this area is conducted and reported. Between 6 to 8 papers will be covered during the semester, and each student will be responsible for an in-depth analysis of one as either part of a team that will give a short oral summary of the paper or by writing a short written critique. The first few papers will be presented by students in the Cell Biology Lab (BIOL3341) because the lecturer can meet with them and help them use the correct presentation format (so later groups can follow their model). In addition, presentations from the last semester will be posted on T-Square however, note that this year we have placed a limit on the # of slides, so the composition of the slides will be different from last semester.

The oral presentation should be prepared with PowerPoint (10 to 12 slides) and timed to finish in 15 to 20 min to allow time for questions and class discussion. The first page of the ppt file for the presentation should give the names of all of the students in the group and the statement that: “The preparers of this presentation agree that it can be posted on t-square for use by other students in the class only. None of the material may be reproduced or used for other purposes because it may be covered under copyrights from the original sources.” There should be 2 to 3 slides summarizing the background for this paper and its hypothesis, 2-3 slides explaining key methods; 4-5 slides showing key data; and 1-2 slides summarizing the conclusions, and 1-2

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slides stating some concerns and directions for future work. A copy of the grading template is posed on T-square so students will know what is considered to be most important for them to cover. A single grade will be assigned for the entire group, so the group should prepare and rehearse it early (in the rare event that a member of a group is having difficulty with his/her portion of the presentation, and the others need to help).

For the students who decide to prepare a written report, they will prepare a 2-page analysis/critique of some aspect of the paper (for examples: Was one of the methods used incorrectly? Did the authors misinterpret the data in a figure or table? Did the authors overlook an important paper already in the literature that would have affected their conclusions?). These students are expected to provide documentation for their comments from the scientific literature (in a bibliography with at least 5-6 references from the peer-reviewed research literature) and will be expected to participate in the question and answer period for the oral presentation. Additional instructions about the critique will be provided in class. The oral presentations and written critiques will be graded on a 100 point scale, but since it is only worth 10% of the final class grade, the points will be adjusted to a 50 point scale in the final calculation (see below).

After the oral presentation, the class will be given a number of questions about the paper that they will discuss and turn in as evidence of attendance/participation. For this discussion, the class will be divided into small groups and the discussion will be led by the members of the oral presentation group and the students who prepared written critiques. We will sometimes use clickers to determine how many students arrived at the same conclusions from the paper. These exercises will be credited toward the “Class discussions” (see above).

**Extra credit opportunities:** There are usually several opportunities for extra credit during the semester: (1) If >60% of the class performs the on-line course critique, everyone in the class will receive 1 point; if >80% reply, everyone will earn 2 extra credit points; if >90% reply, everyone will receive 3 extra credit points. (2) Some of the exams have a bonus question that could add several points to the grade for that exam. (3) At the discretion of the lecturers, there may be other opportunities for extra credit.

### **CALCULATION OF FINAL GRADE:**

The final grade is assigned by the scale: A=  $\geq 90$ ; B=  $\geq 80$ , C=  $\geq 70$ , D=  $\geq 60$ , F=  $< 60$  (grades are not “curved”—if we discover that performance was lower than expected on a given exam due to deficiencies in the design of the exam questions, we will adjust the points immediately). Fractions are rounded to the nearest number (e.g., 79.6  $\rightarrow$  80).

Thus, your average for the course is calculated as follows:

Sum of the scores on 3 of the 4 lecture exams—i.e., having dropped the lowest lecture exam score  
(max number of points = 3 x 100)  
+  
Score on the final exam (max number of points = 1 x 100)  
+  
Sum of scores from Class discussions (50 pts max) and Research paper analysis (50 points—note that it is graded on a 100 point scale, but multiplied by 0.5 for final points) (max number of points = 100)  
+  
Sum of extra credit (varies, but typically a max of 8 to 10 points)

The sum of the above (max # of points = 500 + extra credit)/5 = score used to compute final grade.

**POLICY REGARDING LAPTOP USE IN CLASS:** Students are welcome to bring laptops to class to use for note taking, looking up related information on the internet, etc.

**LAPTOPS MAY NOT BE USED DURING CLASS TO SEARCH INFORMATION NOT RELATED TO THE CLASS** (Facebook, etc.)—This regulation will be enforced by the TA because images on a laptop screen that are unrelated to the course content are often distracting to other students. If you are awaiting an important message that must be received during class, sit on the last row of the classroom so you will not be distracting to the other students.

**IMPORTANT INFORMATION ABOUT HONOR CODE:** All students are required to adhere to the Georgia Tech Academic Honor Code ([www.honor.gatech.edu](http://www.honor.gatech.edu)). This includes, but is not limited to, the following issues that pertain to the oral and written critiques, mnemonic tools, and exams for this class:

1. Plagiarism is not allowed. Plagiarizing is defined by Webster's as "to steal and pass off (the ideas or words of another) as one's own; use (another's production) without crediting the source."

In simpler terms: When you use any phrases, sentences, etc. verbatim from another source, they must be identified by quotation marks and citation of the source. In scientific writing, it is generally preferable to rephrase information from other sources and cite the source rather than use the same text, even when you offset the text with quotation marks. When you show diagrams, models and other materials that are not your own, the sources must also be identified.

In science, it is assumed that most of what you write or say has come from another source, even if you are assembling the information into a hypothesis or conclusion that is uniquely your own. Therefore, you are expected to acknowledge those sources.

These rules apply both to published information and information that you might receive from another student, website, previous class report, etc.

Plagiarization will be dealt with according to the GT Academic Honor Code.

2. Students are encouraged to collaborate in some aspects of the preparation of oral and written critiques, such as the early stages where you are achieving an understanding of the assigned papers; however, the final critiques must be written by each student alone.

For team oral presentations, students may collaborate in all aspects of the work, indeed, it is expected that all will contribute equally to the final product and that they will share the single grade that is awarded for the ppt presentation. Students may use copyrighted figures, etc. from publications in the ppt presentation if appropriate citations are given because the ppt will only be posted on access restricted WebCt website. However, if the team uses multiple copies of any copyrighted items (such as the pdf file of a copyrighted article), each student shown download their own copy from the Georgia Tech library website rather than for one student to distribute the pdf.

In the event an assigned paper has been used by a previous class, students are not allowed to use any of the ppt slides in whole or part that were prepared by the other class.

3. Unless specifically identified as group work; quizzes, tests, take-home-tests, homework, etc. are to be completed alone.

4. For Quizzes/Tests: Cheating off of another person's test or quiz is unethical and unacceptable. Cheating off of anyone else's work is a direct violation of the GT Academic Honor Code, and will be dealt with accordingly.

5. Because the exams for this course change every semester, students may use old tests as study tools.

**For any questions involving these or any other Academic Honor Code issues, please consult the professors, teaching assistant, or [www.honor.gatech.edu](http://www.honor.gatech.edu).**

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Class #	DAY	DATE	Chap	LECTURE TOPIC	Lecturer
1	MON	22-Aug	1 & 9	Introduction	AM
2	WED	24-Aug	2,3,10	Chemistry of life	AM
3	FRI	26-Aug	2,3,10	Chemistry of life	AM
4	MON	29-Aug	4	Basic Molecular Genetic Mechanisms	FV
5	WED	31-Aug	4	Basic Molecular Genetic Mechanisms	FV
6	FRI	2-Sep	5	Molecular Genetic Techniques and Genomics	FV
	MON	5-Sep		OFFICIAL SCHOOL HOLIDAY	
7	WED	7-Sep	6	Genomics and Chromosomes	FV
8	FRI	9-Sep		EXAM 1 (Chap. 1-5,9,10)	AM/FV
9	MON	12-Sep	7	Transcriptional Control of Gene Expression	FV
10	WED	14-Sep	7	Transcriptional Control of Gene Expression	FV
11	FRI	16-Sep	8	Post-transcriptional Gene Control	FV
12	MON	19-Sep	11,23	Transmembrane transport of ions & small molecules	AM
13	WED	21-Sep	12	Cell Energetics	AM
14	FRI	23-Sep	13	Moving Proteins into Membranes and Organelles	AM
15	MON	26-Sep		FIRST STUDENT PRESENTATION	AM
16	WED	28-Sep		SECOND STUDENT PRESENTATION	AM
17	FRI	30-Sep		EXAM 2 (Chap. 6-8,11 & 12; 1 <sup>st</sup> Student presentation)	AM/FV
18	MON	3-Oct	14	Vesicular Traffic, Secretion, and Endocytosis	AM
19	WED	5-Oct	14	Vesicular Traffic, Secretion, and Endocytosis	AM
20	FRI	7-Oct	15	Signaling I	AM
21	MON	10-Oct	16	Signaling I and II	AM
22	WED	12-Oct	16	Signaling II	AM
23	FRI	14-Oct		THIRD STUDENT PRESENTATION	AM
		14-Oct		Last day to drop individual courses(s) with a grade of "W"	
	Mon	17-Oct		OFFICIAL SCHOOL HOLIDAY	
24	Wed	19-Oct		FOURTH STUDENT PRESENTATION	AM
25	FRI	21-Oct		EXAM 3 (Chap. 13-16 & Student Presentation 2 & 3)	AM
26	MON	24-Oct	17	Microfilaments and Intermediate Filaments	AM
27	WED	26-Oct	17,18	Microfilaments, IF & Microtubules	AM
28	FRI	28-Oct	18	Cytoskeleton II: Microtubules	AM
29	MON	30-Oct	19	Integrating Cells into Tissues	AM
30	WED	2-Nov	19	Integrating Cells into Tissues	AM
31	FRI	4-Nov	20	Regulating the Eukaryotic Cell Cycle	FV
32	MON	7-Nov	20	Regulating the Eukaryotic Cell Cycle	FV
33	WED	9-Nov		FIFTH STUDENT PRESENTATION	FV
34	FRI	11-Nov		EXAM 4 (Chap. 17-20 & Student Presentation 4)	FV
35	MON	14-Nov	21	Cell Birth, Lineage, and Death	FV
36	WED	16-Nov	21	Cell Birth, Lineage, and Death	FV
37	FRI	18-Nov	22	Molecular biology of development	FV
38	MON	21-Nov	22	Molecular biology of development	FV
39	WED	23-Nov	23	Other complex cells: Nerve cells	FV
	FRI	25-Nov		OFFICIAL SCHOOL HOLIDAY	
40	MON	28-Nov	24	Other complex cells: the immune system	FV
41	WED	30-Nov		SIXTH STUDENT PRESENTATION	FV
42	FRI	2-Dec		SEVENTH STUDENT PRESENTATION	AM
43	MON	5-Dec	25	Cancer	AM
44	WED	7-Dec	25	Cancer	AM
45	FRI	9-Dec		Course Wrap-up	AM/FV
46	FRI	16-Dec		EXAM 5 & FINAL EXAM (11:30 – 2:20 pm)	AM/FV
				~1/2: Chap. 21-25 & Student Presentation 6 & 7	
				~1/2: Questions from the rest of the semester	