

**WHERE:**

Lectures in Trumbower 130, on Mon, Wed, and Fri from 10:30-11:20.

Laboratories as scheduled.

Recitations in Shankweiler 243S on Mon or Tue afternoon, as scheduled.

**WHO:****Lecture and Recitation:**

Dr. Bruce Wightman

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Lab: NSB 221

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**Laboratory:**

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**WHAT:**

*"The eventual goal...is the description of [life] in terms of the spatial distribution of [its] constituent atoms, in so far as this may prove possible. This might be called the chemical physics of biology."*

-Francis Crick, 1947

*"That which is simple is false; that which is complex is incomprehensible."*

-Paul Valery

*"It ain't what you don't know that gets you into trouble. It's what you know for sure that just ain't so."*

-Mark Twain

BIO 152 is a survey of life at its smallest level of organization: the cells and molecules that perform the chemistry and physics of life. The greatest biological achievement of the twentieth century was the reckoning of Mendelian genetics with biochemistry via the revolution in molecular biology. The early 20<sup>th</sup> century saw the basis of biochemistry and genetics determined. The 40's-60's saw the birth of molecular biology and the union of biochemistry and genetics. The 70's saw the genesis of recombinant DNA technology. The 90's saw the transition to genomics as biology moved toward realizing Crick's dream of a complete molecular description of life. This course will survey this history and discuss how scientists analyze the mechanisms of life processes.

**SCHEDULE:**

DATE	UNIT	TOPICS	READING
AUG 27	<b>Introduction</b>	Life at the smallest level	Ch. 1-4; pp 68-9
29	<b>ONE: Genetics</b>	Mendelian genetics	Ch. 14
AUG 31		Mendelian genetics	Ch. 14
SEP 3		Meiosis; chromosomes	Ch. 13, 15
5		Chromosomes and linkage	Ch. 15
7		Chromosomes and linkage	Ch. 15
SEP 10		DNA	Ch. 4, pp 86-9
12		DNA discovery and structure	pp 293-8
14		DNA replication	pp 299-307
SEP 17	review		
19	EXAM 1		
21	<b>TWO: Molecular biology</b>	Central dogma	Ch. 17
SEP 24		Central dogma	Ch. 17
26		Central dogma	Ch. 17
28		Microbial genetics	pp 334-51
OCT 1		Recombinant DNA	Ch. 20
3		Recombinant DNA	Ch. 20
5		Recombinant DNA	Ch. 20
OCT 8		Genome Organization & Evolution	pp 359-62, 374-81
10		Gene Regulation	pp 352-6, 362-70
12		Gene Regulation in Development	pp 411-420
OCT 15	FALL BREAK		
17	review		
19	EXAM 2		
OCT 22	<b>THREE: Biochemistry</b>	Proteins	Ch. 4, pp 77-86
24		Proteins	pp 77-86
26	<i>Wightman absent</i>		
OCT 29		Proteins	pp 77-86
31		Carbohydrates	Ch. 4, pp 69-73
NOV 2		Lipids	Ch. 4, pp 74-77
NOV 5		Metabolism	Ch. 8
7		Catabolism	Ch. 9
9		Catabolism	Ch. 9
NOV 12		Photosynthesis	Ch. 10
14		Photosynthesis	Ch. 10
16	review		
NOV 19	EXAM 3		
21	<b>FOUR: Cell biology</b>	Cell ultrastructure	Ch. 6
23	<i>THANKSGIVING</i>		
NOV 26		Membranes and transport	Ch. 7
28		Intercellular communication	Ch. 11
30		Intercellular communication	Ch. 11, 420-431
DEC 3		Cell cycle	Ch. 12
5		Cancer	Ch. 12; pp 370-4
TBA	FINAL EXAM		

### **TEXTBOOKS:**

- Campbell, NA, JB Reece and LG Mitchell, 2005, *Biology, 7<sup>th</sup> Edition*, Benjamin-Cummings, Menlo Park, CA.
- Young, PG, 2008, *Web-based Bioinformatics Tutorials: Exploring Genomes, 2<sup>nd</sup> Edition*, WHFreeman, New York.
- A laboratory manual is also required, and is for sale in the bookstore.

This course uses the basic introductory biology text you used for Principles I and II. We will focus on Units 1-3 in this course. The specific relevant pages are indicated for each lecture in the course schedule. You are responsible for all material in the indicated pages, although exams will be based primarily on material covered in lecture and recitation. Take the self-quiz and the specific genetics problems at the end of each chapter as part of your basic studying pattern. Additional resources that may help your studying are available at the publisher's webpage ([www.campbellbiology.com](http://www.campbellbiology.com)). The booklet by Young will be used in Recitation.

### **CONTACTING YOUR INSTRUCTOR:**

Dr. Wightman's office hours:  
M 9-10; Tu 11-12; Th 9:30-12:30

One of the great advantages of being at a liberal arts college is the access students have to their teachers. I encourage you to stop by with questions or just to chat about the course, biology, science, or other things that interest you. The office hours listed above are really the best times to find me in my office, but I am generally either in my office or lab most of the time Mon 9-2:30, and Tues-Thurs 9:30-4:30. Fridays are spotty, at best, due to meetings. Please note that I *might* be in the laboratory when you stop by; don't hesitate to interrupt me. I am an email junkie and thus will respond promptly to questions submitted electronically. Try to avoid calling me on the telephone other than when an emergency arises; you are much more likely to get a response by email ([wightman@muhlenberg.edu](mailto:wightman@muhlenberg.edu)). Your lab instructor will provide you with information about her office hours.

### **WORKSHOPS:**

We will run regular evening workshops each week to help you review material, learn to do problems, and so forth. The specific day, time and place will be announced. You are strongly encouraged to attend all workshops.

## **RECITATIONS:**

Recitations meet every week on Monday or Tuesday, as indicated on your course schedule. You must attend one recitation section regularly, although we can usually accommodate “swaps” to a different section than the one to which you are assigned. Please discuss this with me during the first week if you need to change recitation sections. Each week, you must take an on-line, closed-book quiz using the *Blackboard* utility. The quiz will always be posted on *Blackboard* by FRIDAY afternoon and will always expire MONDAY AT 9:00AM, so be sure to take the quiz over the weekend. Print out a copy of your quiz and bring it to the next recitation class. Come to every recitation familiar with course material covered up to the previous week. In recitation sections we will review quizzes, go over basic problem-solving, engage in group and individual exercises, review course material, and confront new material related to lecture. Grades for recitation will be assigned based on attendance, participation, completion of assignments, and quizzes. There will be NO “makeup” recitations: if you miss a recitation, you get no credit for that meeting.

## **LABORATORY:**

The laboratory schedule and rationale will be distributed by your lab instructor at your first meeting. You must attend lab section at the time and place indicated on your schedule. Labs CANNOT be “made up.” Missing a lab or failing to complete a lab will result in a loss of credit for that week. You MUST read the relevant experiment in the lab manual BEFORE coming to lab. Failure to prepare properly for labs will result in longer lab sessions for you and a poorer evaluation for the laboratory portion of the course. You will receive a laboratory schedule in your lab section.

## **EVALUATION:**

Grades will be based on students' performance on four in-class exams, 5 recitation quizzes, laboratory reports and attendance. There will be three exams during the semester as indicated on the schedule, each focusing on a particular portion of the course. There will also be a comprehensive final exam. The final grade for Biology 152 will be based on the following formula:

39%	Semester exams (3 x 13% each)
30%	Laboratory
21%	Final exam
10%	Recitation

*Note on numerical grading:* The 90-100 A scheme that is so familiar to students is entirely arbitrary. Why is getting 90% correct an A- and getting 89% correct a B+? There is no natural law at work here. My experience with intensive core courses such as this one is that numerical grades tend to be somewhat lower than a subjective analysis of stu-

dent performance indicates. There are several solutions to this problem, e.g. curving, redefining the standard, extra credit, etc. I have often used curving as a method of solving this problem, however no other faculty at Muhlenberg use a curve (that I know of) and students frequently do not understand it. For this course, we will employ a flat (non-curved) numerical scheme that is consistent with BIO 152 instructors' subjective experience in grade assignment. Thus, the A range will be 88-100, the B range will be 76-87, the C range will be 62-75, the D/F range will be below 61. Scores below 50, and any score below 62 for a student that fails to complete all assignments (including laboratory), will result in an F. Plus and minus grades will be assigned to the final grades within the above ranges (for example, a 76 is a B-).

### ***EXTRA CREDIT:***

Throughout the semester you will have ONE opportunity to raise your overall average in the course. In order to receive extra credit, you must attend one Biology Department Seminar over the course of the semester. You must hand in a two to three page double-spaced essay describes the nature of the seminar ***and provides your analysis of the research discussed*** by the speaker. Note that by "analysis" I DON'T mean, "I liked the talk", "I didn't understand the talk" and so on. You must analyze what you understood. What are some of the strongest and weakest arguments presented in the talk? Why? Do you see any problems with the way the work was done? What are the implications of the work? What experiments might be done next to extend the work? Some seminars may not be appropriate for analysis and I will inform you when a seminar is not fair game for an essay. Unless I tell you otherwise, any Biology Department research seminar is fair game. This does not include talks that focus on trips or career opportunities. With prior approval, I may allow research seminars from Chemistry, Neuroscience, or off-campus to be used. The essay is due ***Wednesday, December 5***, but should be handed in as soon as it is completed. Your essay will be graded, and you will receive zero, one, or two points added to your final grade at the end of the course. The VAST MAJORITY of essays will receive one point; only those that provide truly insightful analysis of the talk will receive two points. Note that this may be enough to make the difference between a half-grade. There will not be any substitute extra effort assignment for students who "can't attend any seminars."

### ***BIOLOGY SEMINARS:***

Biology Department seminars are held on a regular basis throughout the semester. Some of the presentations will be directly relevant to material we cover in this course. Your attendance at these events is expected. Biology Seminars are usually held on one day of the week from 4:30 to 5:30. I will announce specific seminars in class.

## **BLACKBOARD:**

We will make use of Blackboard, the on-line course utility supported by Muhlenberg College. The URL is: <http://blackboard2.muhlenberg.edu/>. You will need to logon to the system in order to take quizzes, view the course schedule updates, view your grades, and any course-related postings. Consult with OIT, or see the instructions on the Blackboard webpage for more information.

## **RESEARCH IN BIOLOGY, BIOCHEMISTRY AND NEUROSCIENCE:**

Undergraduate students from Muhlenberg and other colleges have been active participants in research conducted in the Muhlenberg Biology Department. Students at Muhlenberg publish their work in scholarly journals and have gone on to win competitive national graduate fellowships and acceptance at the nation's top graduate and medical schools, including Harvard, Yale, Stanford, Princeton and Penn. Participation in undergraduate research is now a basic requirement for a student's application for graduate study and is a significant asset for applications for clinical training at medical and dental schools.

The second semester of your sophomore year is an ideal time to join one of Muhlenberg's research labs. Our new building provides new, fully-equipped research spaces for your education and enjoyment. You can receive course credit for performing laboratory research during the academic year and arrange a stipend and free housing for research during the summer. More information about student research can be found at <http://www.muhlenberg.edu/depts/biology/research/getinvolved.html>. Brief descriptions of specific research programs can be found at <http://www.muhlenberg.edu/depts/biology/research/faculty.html>. More detailed information on Dr. Wightman's research on the molecular genetics of animal development can be found at <http://www.muhlenberg.edu/depts/biology/faculty/wightman/resstat.htm>.

## **COURSE POLICIES:**

All assignments are due at the date and time indicated. Late assignments will result in a significant penalty. No assignments will be accepted later than 48 hours after the due date (9 AM Monday morning for Friday deadlines). Students who fail to hand in an assignment within 48 hours will automatically receive a zero for that assignment.

Each exam must be taken on the date and time scheduled. Other exams on the same day are NOT a valid excuse, so please don't ask. There will be no "make-up" exams. Exceptions will be made only for serious illness requiring hospitalization or serious family emergencies and MUST be pre-approved by the instructor 24 hours BEFORE the exam is scheduled and documented by a physician or other official.

Cheating will not be tolerated. A student who is caught cheating will, at the very least, automatically receive a zero for the relevant assignment. No second chances.

Grades received on exams and lab reports are not negotiable. Adjustments to grades given on exams and laboratory assignments are limited to corrections of grading errors (but by all means call such errors to my attention).

Attendance is expected at every class and required at every lab and recitation. The most common cause of poor performance in classes of this sort is irregular attendance. Come to class and participate. If you cannot attend a particular lecture, there is no need to inform the instructor, however it is your responsibility to obtain notes from a classmate. Students who routinely miss lecture will receive a grade penalty. You will find that reading the text will not necessarily be an adequate substitute for your attendance and attention in lectures. Please arrive to lecture on time. If you are late, please use the side entrances to the classroom; using the lower doors disrupts the entire class.

If you have a documented learning or other disability, I strongly encourage you to discuss it with me as soon as possible. I will make whatever appropriate arrangements can be made, according to the recommendations made by Academic Support. Students with disabilities who have taken previous iterations of this course have gone on to medical and professional school and been very successful.