

**BIO 2101: General Biology  
Seattle Pacific University  
Autumn Quarter, 2016**

**Instructor:** Jenny Tenlen, Ph.D.

*Office:* Eaton 113  
*Phone:* 206-281-2007  
*Email:* tenlenj@spu.edu

**Office hours:**

M, W, F 10:30 am - 12:00 pm, or by appointment,  
or feel free to drop in any time my door is open.

**Lecture:** M, W, F 1:30 pm - 2:50 pm

**Lecture room:** Otto Miller 118

**Laboratory:**

Tues., 12:00 pm - 2:50 pm  
Tues., 3:00 pm - 5:50 pm

**Laboratory room:** Eaton 230

TA: Lillie Blair  
TA: Kara Eckley

*“Seattle Pacific University seeks to change the world and engage the culture by graduating students of competence and character, cultivating people of wisdom, and modeling a grace-filled community.”  
[SPU Mission Statement]*

### **Textbooks and other materials**

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**Required textbook:** *[Available in SPU Student Bookstore, (206) 281-2137]*

Freeman, S. 2014. *Biological Science* (5<sup>th</sup> Edition). Pearson/Prentice Hall Publishing, Upper Saddle River, NJ. ISBN 13-978-0321-74367-1. Access to the online materials, called MasteringBiology, is *optional*.

**Lab materials:**

For lab, you will need **goggles** (your goggles from Chemistry are suitable). You will also need a 3-ring binder for your lab notebook (1” should be sufficient).

### **Course Description**

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BIO 2101 is the first quarter of a three-quarter course in General Biology. It covers the structures and functions of biological molecules, cellular structure and communication, respiration, photosynthesis, cell division, genetics, and molecular biology. Students are also exposed to the history of biological research, the unifying theory of evolution, current ethical issues in biology, and the intersection of science and faith. This 5-credit course is a prerequisite for the BIO 2102 and 2103 segments of General Biology and provides a foundation for further studies in cell biology, genetics, biochemistry, biotechnology, and other fields.

Students learn about some topics by listening to lectures. Students also participate in Process-Oriented Guided-Inquiry Learning activities, which require students (1) to prepare for class sessions, (2) to work in small groups (with defined roles for each member) during class sessions in order to explore new material, build skills, and solve problems, and (3) to demonstrate mastery of the content through assessment (homework and exams). An important component of these activities is developing skills in organization, teamwork, communication, and self-reflection. Studies have shown that student-centered active learning improves student mastery and retention of the material.

Students attend a three-hour lab session each week, where they participate in hands-on manipulations of biological systems and carry out experiments, usually in groups of four students. Lab exercises are designed to give students hands-on experience in biology that reinforces selected topics and develops skills in analyzing data and applying the scientific method. A pre-lab worksheet and post-lab worksheet are due each week.

Student assessment is based on three exams and a partially cumulative final exam, an analysis of a scientific paper, participation in class activities, completion of assignments, and completion of laboratory exercises.

## Course Learning Objectives

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### Seattle Pacific University's goals:

*Seattle Pacific University seeks to be a premier university committed to engaging the culture and changing the world by graduating people of competence and character, becoming people of wisdom, and modeling a grace-filled community.*

### Department of Biology's goals:

We seek to produce graduates who understand and respect scientific approaches to the study of life and demonstrate excellence in scientific training. We seek to prepare our graduates to think critically, make informed decisions, and to communicate biological principles effectively. We seek to produce faculty and students who demonstrate personal and professional integrity and wholeness.

### Department of Biology's objectives:

The objectives of the Biology Department can be found online at:

<http://spu.edu/academics/college-of-arts-sciences/biology/about/mission-goals-and-objectives..>

Those objectives that are addressed within this course are listed below.

1. *Science as a way of knowing about the natural world (by comparing it to other disciplines)*
2. *Science as a process (by studying and applying the scientific method)*
3. *Science as a human endeavor (by studying the history of biology, by performing experiments, and by integrating an understanding of biology into one's faith)*
4. *Unifying themes pervading all of biological science (by studying topics such as cell theory, the chemical and physical laws governing biology, and the theory of evolution)*
5. *Fundamental concepts of molecular and cellular biology*
6. *Fundamental concepts of heredity and evolution*
7. *Research methodologies applied in the study of biological science*

## Grading

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Category	Points Possible
Syllabus Quiz	5
Homework assignments	100
Scientific paper analysis	30
Lecture exams (3 x 75 pts each)	225
Final exam	100
Laboratory assignments (pre-lab, post-lab and lab notebook)	150
Participation in class activities	25
<b>total</b>	<b>~635</b>

(Point values may be altered during the course of the class depending on available time and other course constraints.)

Scale:

Percentage	Letter	Percentage	Letter
93-100	A	73-76.9	C
90-92.9	A-	70-72.9	C-
87-89.9	B+	67-69.9	D+
83-86.9	B	60-66.9	D
80-82.9	B-	0-59.9	E
77-79.9	C+		

**Please note:** you must earn a grade of C– or higher in order for BIO 2101 to count as part of a Biology dept. major. You may re-take this course once, which is offered every fall and winter, to try to earn a higher grade (the earlier grade will be overwritten, but will still be calculated in your overall GPA). [Re-taking the class more than once requires permission of the instructor.]

A passing grade in BIO 2101 qualifies you to take either BIO 2102 or 2103. These courses are both offered in the winter and spring. You can take them in either order. If you receive a grade lower than C–, you must re-take BIO 2101 *before* taking BIO 2102 or 2103. These policies are intended to make sure that students wishing to pursue a Biology major are adequately prepared for additional Biology courses.

**Special note:** registration for BIO 2102 and BIO 2103 requires that you are at Math Placement Level B. You can check your Math Placement status at the bottom of your Degree Status Check page in Banner. If you are at Math Placement Level 0, you will need to take the Math Placement test offered by the SPU Math Dept. twice each quarter, or you may take it through the University of Washington. If you do not wish to take the Math Placement test, you will need to pass both MAT 0144 and MAT 0145 to reach Math Placement Level B. More information is available on the Math Dept. website:

<http://spu.edu/academics/college-of-arts-sciences/mathematics/mathematics-placement/math-placement-test-faq>

## Course Policies

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**Academic integrity:** The Undergraduate Catalog contains the University policy and commitment to academic integrity (<http://spu.edu/catalog/undergraduate/20167/academic-policies-procedures/integrity>). Academic dishonesty of any kind is a breach of this policy. Cheating on quizzes, exams, laboratory assignments and any other assignment for this course is NOT tolerated. Copying answers from a fellow student, bringing concealed answers to an exam, turning in someone else’s work as your own are all examples of academic dishonesty. Plagiarism is copying portions of or complete works by another person without giving them appropriate acknowledgment. If you are not sure whether you are in danger of plagiarism ASK before you turn in your assignments. Once they have been turned in you are responsible for the consequences. The first offense will result in a failing grade for the assignment or exam. Any second offense will result in failing the course.

**Lecture Attendance:** I expect you to attend all scheduled sessions. There will be discussions, special assignments, and other activities during the class period that cannot be made up. If you plan to be absent due to a university-sanctioned event (e.g., music performance or athletic competition), please alert the instructor in advance. If you are unable to attend class due to a severe illness or other emergency, you must notify the instructor *before* class if possible. If you

miss a graded class activity for an *unexcused* absence, you will not be able to make it up. If you miss a graded class activity for an *excused* absence, you may be asked to do a makeup assignment, at the instructor's discretion. Excessive absences will be dealt with on a case-by-case basis.

**Course citizenship:** This course depends on participation, both in lab and in lecture. You are expected to respect the learning of others at all times by avoiding the following behaviors:

- a. Arriving obtrusively late
- b. Conversations or whispering
- c. Cell phones ringing
- d. Text messaging/App-playing
- e. Frequent bathroom breaks
- f. Reading newspapers

As a good rule of thumb, consider that you will be expected to behave professionally on the job once you graduate, and such behavior should become a regular habit starting now. This can be reflected in the final evaluation that is your grade. If you behave unprofessionally, you may be "fired" for the day, that is, required to leave the classroom or lab.

**Cell phones** must be turned off and put away during lecture, laboratory and examination periods. If you use a laptop, stay on task!

**Course materials:** All course materials (worksheets, answer keys, lab protocols) are posted on Canvas, through the **Modules** link. (You can access Canvas from mySPU on the SPU website.) The instructor does *not* track student use of either Canvas or the MasteringBiology website; these are study resources only and are not used for formal assessment.

**Scientific Paper Analysis:** See explanation of this assignment in the separate handout (available on Canvas under *Modules > Scientific Paper Analysis*).

**Assessment and grading:** Class activities are graded at the instructor's discretion. This means that you may receive points for providing correct answers or simply for completing an activity. Some activities may not be graded at all. Preparation worksheets and follow-up worksheets may be graded in full, in part, or not at all. In other words, the instructor may choose to count only some of the questions, but you will not know ahead of time which questions will be graded. Raw scores for exams and assignments will be posted on Canvas.

**Late assignments:** Homework assignments will *not* be accepted after the due date. There will be 23 assignments; the **20** best scores will count toward your grade. This allows you 3 "flex" assignments. This policy allows the instructor to post answer keys in a timely manner so that students can check their answers. Worksheets assigned as homework must be printed out in black ink on white paper, although the answers may be either typed or handwritten. You must submit a complete worksheet (questions plus answers); answers alone are not acceptable. Worksheets are due at the start of class. *Points may be subtracted for sloppy or illegible work.* For the Scientific Paper Analysis assignment, late work *will* be accepted, with 10% of the possible points deducted for each calendar day it is late.

**Lecture exams:** Note the date and time of all exams, including the final exam, and make your travel plans accordingly. Make-up exams will be considered only for extraordinary circumstances and only if the instructor has been notified in writing in advance. The format of a makeup exam is the instructor's choice. If these conditions are not met, and an exam is missed, then you will get a 0 for that exam. Please note: I do not grade exams on a curve.

Exams may cover material from lectures, the textbook, assignments, and laboratory exercises (see the last page of this syllabus for a list of topics covered on each exam). The

exams are designed to test basic knowledge of facts as well as the ability to apply knowledge in solving problems. Exam questions may use a variety of formats, including multiple choice and short answer. Approximately one-quarter of the final exam is cumulative, covering material from the entire quarter. Students are not permitted to leave the room during an exam. Correct spelling is required of biological terms.

**Students involved in university sponsored activities that take them away from campus during an exam should notify the instructor a minimum of ONE WEEK prior to the exam so that arrangements can be made with coaches/directors to take the exam during the trip.**

**Course evaluations:** Student feedback is essential for ensuring that the course meets academic expectations. Students will have an opportunity to evaluate the course at the end of the quarter through the Banner Information System. Evaluations submitted through Banner are anonymous and are not available to the instructor until after final grades are recorded by the university. If greater than 80% of the class completes a course evaluation by **Wednesday, December 14, 2016**, then everyone in the class will receive 5 pts extra credit.

**Academic appeals:** If you have questions or concerns about how an assignment or exam was graded, or other issues related to enforcement of course policies, I **strongly** encourage you to schedule a time to meet with me to discuss your concerns. I do my very best to listen to, and work with students to promote a fair and equitable class environment. However, if you have a complaint that cannot be resolved and you wish to pursue the matter further, please follow the process outlined in the Academic Appeals section of the Undergraduate Catalog: <http://spu.edu/catalog/undergraduate/20167/academic-policies-procedures/appeals>

**Disabilities statement:** All students have the right to learn, and your instructors care very deeply that students feel supported and engaged in class. In accordance with Section 504 of the Rehabilitation Act of 1973 and the Americans with Disabilities Act of 1990, students with specific disabilities that qualify for academic accommodations are strongly encouraged to contact Disabled Student Services (DSS) in the Center for Learning (<http://www.spu.edu/depts/cfl/dss/index.asp>). DSS in turn will send a Disability Verification Letter to the course instructor indicating what accommodations have been approved.

**Inclement weather:** The University maintains an Emergency Closure Hotline (206-281-2800). In the event of inclement weather or an emergency that might close the university, please call the Hotline for the most up-to-date closure information or check the SPU website. Both will be updated before 6:00 a.m. In the event that class is cancelled unexpectedly, please check the course Canvas site for makeup information.

**Emergencies:** If there is an emergency during lecture that requires evacuation, meet as a group in the Otto Miller parking lot. If the emergency occurs during lab, meet as a group in Tiffany Loop. Please do not leave this area, as Dr. Tenlen needs to account for all students immediately following the evacuation. If possible, pair up with your nearest neighbor in an emergency and keep track of each other until the situation has been resolved. If there is a lockdown, please stay in the classroom or lab and follow Dr. Tenlen's directions. Additional information about emergency procedures is provided on the next page.

## Emergency Preparedness Information

### Report an Emergency or Suspicious Activity

Call the Office of Safety and Security to report an emergency or suspicious activity by dialing 206-281-2911 or by pressing the call button on a campus emergency phone. SPU Security Officers are trained first responders and will be dispatched to your location. If needed, the SPU Dispatcher will contact local fire/police with the exact address of the location of the emergency.

### SPU-Alert System

The SPU-Alert System is SPU's emergency notification system. It can send information via text message, email, electronic reader board, computer pop-ups (for SPU computers), loudspeaker, and recorded cell phone messages. Text messaging has generally proven to be the quickest way to receive an alert about a campus emergency. In order to receive text messages from SPU-Alert, you must provide SPU with your cell phone number through the Banner Information System on the web, <https://www.spu.edu/banweb/>. Select the Personal Menu then choose the Emergency Alert System tab. Contact the CIS Help Desk if you have questions about entering your personal contact information into the Banner Information System. Emergency announcements may also be made by SPU staff members serving as Building Emergency Coordinators ("BECs").

### Lockdown / Shelter in Place – General Guidance

The University will lock down in response to threats of violence such as a bank robbery or armed intruder on campus. You can assume that all remaining classes and events will be temporarily suspended until the incident is over. Lockdown notifications are sent using the SPU-Alert System.

#### If you are in a building at the time of a lockdown:

- Stay inside and await instruction, unless you are in immediate visible danger.
- Move to a securable area (such as an office or classroom) and lock the doors.
- Close the window coverings then move away from the windows and get low on the floor.
- Remain in your secure area until further direction or the all clear is given (this notification will be sent via the SPU-Alert System).

#### If you are outside at the time of a lockdown:

- Leave the area and seek safe shelter off campus. Remaining in the area of the threat may expose you to danger.
- Return to campus after the all clear is given (this notification will be sent via the SPU-Alert System).

### Evacuation – General Guidance

Students should evacuate a building if the fire alarm sounds or if a faculty member, a staff member, or the SPU-Alert System instructs building occupants to evacuate. In the event of an evacuation, gather your personal belongings quickly and proceed to the nearest exit. Most classrooms contain a wall plaque or poster on or next to the classroom door showing the evacuation route and the assembly site for the building. Do not use the elevator.

Once you have evacuated the building, proceed to the nearest evacuation assembly location. The "Stop. Think. Act." booklet posted in each classroom contains a list of assembly sites for each building. Check in with your instructor or a BEC (they will be easily recognizable by their bright orange vests). During emergencies, give each BEC your full cooperation whenever they issue directions.

### Additional Information

Additional information about emergency preparedness can be found on the SPU web page at <http://www.spu.edu/info/emergency/index.asp> or by calling the Office of Safety and Security at 206-281-2922.

## **Additional Laboratory Policies**

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**Lab attendance**, during your scheduled lab time, is required. You may not skip/make-up lab for any reason other than sponsored SPU events (e.g., athletics, music) or illness. For both of these reasons, a note from you coach or from your physician is required, and we must be made aware of this before you miss lab so arrangement can be made for you to attend another session. Laboratory exercises cannot be made up. An alternate assignment may be considered only for extraordinary circumstances and only if the instructor has been notified in advance. Failure to attend a lab will result in your course grade being dropped one full letter grade (e.g., from a B+ to a C+) at the end of the quarter.

**Laboratory safety** is paramount. You must complete the general lab safety training during the first lab session. You may be asked to leave the lab (and receive a grade of zero for that session) if you fail to follow the safety rules or are not wearing appropriate clothing or shoes. Safety goggles are required for most lab sessions. You may not remove any equipment, chemicals, or specimens from the laboratory, and you may not perform any experiments other than the ones you are instructed to perform. You are responsible for cleaning up your work area. Food and drink are NOT permitted in lab.

**Lab points**: pre-lab and post-lab worksheets for each exercise will be turned in to your teaching assistant for stamping and grading at the START of lab. Use a three-ring notebook or folder to keep lab papers organized. At the end of the quarter, you will turn in your lab notebook, comprising all lab assignments, assembled neatly and in order. The lab notebook itself is worth 10 points.

**Pre-lab questions and lab protocols will be posted on Canvas. It is the students' responsibility to print and bring these sheets to lab on a weekly basis.**

*The instructor reserves the right to deviate from the lecture and exam schedules listed in the syllabus in order to enhance the classroom experience. This may include the use of sessions during normal lecture or lab times for the purpose of providing review periods prior to the exams, to make up lecture time lost due to holidays or instructor absence, and/or to facilitate special programs (i.e. guest speakers, video presentations, group discussions, etc.).*

## Succeeding in General Biology

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We will be covering a LOT of material in this course, and it is important that you study regularly to master course concepts. On the course Canvas site, I will post resources that you may find helpful as you move through the course. Here are a few general tips that I encourage you to follow:

1. Use the syllabus as a schedule for reading the textbook. Check Canvas for assignments that are due at the start of the next class. If you start working on assignments sooner rather than later, you will have more time to seek help if you need it.
2. Prepare for each class and lab session so that you can be a productive member of your team. A general rule is that you should spend at least two hours of study time for every hour of class.
3. Before each class, read the relevant textbook chapter and *think* about it - don't just highlight the book, but take notes, draw concept maps, create flash cards, etc. For each reading assignment, I will post a study guide on Canvas. The study guide will highlight essential vocabulary and concepts you should learn as you read, as well questions you should be able to answer after reading through the section and attending class.
4. Attend all class sessions and labs! Classes will include different types of activities, including lecture, problem-solving, etc. These activities are designed to help you practice applying the concepts introduced in lecture. When you miss class, you miss out on these learning opportunities.
5. Form a study group with your classmates to share notes, pick each other's brains, and review concepts. The study area on the main floor of Eaton includes a white board that students are free to use during their studies.
6. Ask for help! I want all of you to succeed. If you have questions about something we covered in class or lab, or are unsure of how to approach a homework question, please come talk to me, so I can help you.
7. The 3Rs: Read, Review, Re-write
  - a. Read the assigned chapters or articles before class, and identify the key concepts. Write down any questions you have about the material.
  - b. Review class materials and lectures. I will try to make lectures available after class through TechSmith Relay.
  - c. Review answer keys right away so that you can correct your misunderstandings sooner rather than later.
  - d. Re-write your lecture notes after each class – the sooner, the better, since it will still be fresh in your mind. Re-writing your notes will not only allow you to reorganize them, but there is extensive research demonstrating the “hand-brain connection” – writing and re-writing help you to process concepts and information, and move it from short-term to long-term memory.
8. Center for Learning's Study Table
  - a. Valerie Chieng will provide tutoring for BIO 2101 students at the CFL's Study Table. Tutoring will begin the week of October 3, 2016.
  - b. This is a drop-in service and is FREE of charge. Students can come to ask questions, do homework or prepare for exams.
  - c. Times/locations for Study Tables can be found on the CFL website at [www.spu.edu/studytables](http://www.spu.edu/studytables).



# Syllabus

Updated Oct. 16, 2016

(tentative - any changes will be announced in class, and posted on Canvas)

Date	Topic	Readings & Assignments
Mon., 9/26	1. Intro, Evolution	<b>Text:</b> Ch. 1
Tues., 9/27	<b>Lab 1:</b> Scientific Method	<b>Due:</b> Prelab 1
Wed., 9/28	2. Chemistry and Water	<b>Text:</b> Ch. 2.1, 2.2
Fri., 9/30	3. Functional Groups, Reactions, pH	<b>Due:</b> Syllabus quiz (Canvas) <b>Text:</b> Ch. 2.2 – 2.5, 8.1
Mon., 10/3	<b>Guest speaker:</b> Carrie Fry, Science Librarian 4. Carbohydrates	<b>Text:</b> Ch. 5
Tues., 10/4	<b>Lab 2:</b> Molecules	<b>Due:</b> Postlab 1, Prelab 2
Wed., 10/5	5. Proteins	<b>Text:</b> Ch. 3
Fri., 10/7	6. Enzymes	<b>Text:</b> Ch. 8.3, 8.4
Mon., 10/10	7. Nucleic acids, lipids	<b>Text:</b> Ch. 4, 6.1, 6.2
Tues., 10/11	<b>Lab 3:</b> Enzymes	<b>Due:</b> Postlab 2, Prelab 3
<b>Wed., 10/12</b>	<b>EXAM 1</b>	
Fri., 10/14	8. Membranes	<b>Text:</b> Ch. 6.3, 6.4
Mon., 10/17	9. Cell structure	<b>Text:</b> Ch. 7.1 – 7.3
Tues., 10/18	<b>Lab 4:</b> Membranes	<b>Due:</b> Postlab 3, Prelab 4
Wed., 10/19	10. Cell systems	<b>Text:</b> Ch. 7.4 - 7.6
Fri., 10/21	11. Cell contact & Signaling	<b>Due:</b> Paper topic <b>Text:</b> Ch. 11.1 - 11.4
Mon., 10/24	12. Microscopy & Bioenergetics	<b>Text:</b> BioSkill 11; Ch. 2.3, 8.1, 8.2, 8.5
Tues., 10/25	<b>Lab 5:</b> Microscopy	<b>Due:</b> Postlab 4, Prelab 5
<b>Wed., 10/26</b>	<b>NO CLASS - DAY OF COMMON LEARNING</b>	
Fri., 10/28	13. Respiration (part 1)	<b>Text:</b> Ch. 9.1 – 9.5
<b>Mon., 10/31</b>	<b>EXAM 2</b>	
Tues., 11/1	<b>Lab 6:</b> Respiration	<b>Due:</b> Postlab 5, Prelab 6
Wed., 11/2	14. Respiration (part 2)	<b>Text:</b> Ch. 9.6
Fri., 11/4	15. Photosynthesis	<b>Text:</b> Ch. 10
Mon., 11/7	16. Cell cycle and mitosis	<b>Text:</b> Ch. 12.1 – 12.3
Tues., 11/8	<b>Lab 7:</b> Photosynthesis	<b>Due:</b> Postlab 6, Prelab 7
Wed., 11/9	17. Meiosis	<b>Text:</b> Ch. 13
Fri., 11/11	<b>NO CLASS – VETERAN’S DAY</b>	
Mon., 11/14	18. Genetics, part 1	<b>Text:</b> Ch. 14.1 – 14.4
Tues., 11/15	<b>Lab 8:</b> Cell Division	<b>Due:</b> Postlab 7, Prelab 8
<b>Wed., 11/16</b>	<b>EXAM 3</b>	
Fri., 11/18	19. Genetics, part 2	<b>Due:</b> Scientific Paper Analysis <b>Text:</b> Ch. 14.5, 14.6
Mon., 11/21	20. <b>Guest speaker:</b> Dr. Laura Gaydos, FHCRC: Model organisms	<b>Text:</b> posted on Canvas
Tues., 11/22	<b>Lab 9:</b> Genetics	<b>Due:</b> Postlab 8, Prelab 9
Wed., 11/23	21. Central Dogma	<b>Text:</b> Ch. 16
<b>Fri., 11/25</b>	<b>NO CLASS - THANKSGIVING</b>	
Mon., 11/28	22. DNA replication	<b>Text:</b> Ch. 15
Tues., 11/29	<b>Lab 10:</b> Manipulating DNA	<b>Due:</b> Postlab 9, Prelab 10
Wed., 11/30	23. Transcription	<b>Text:</b> Ch. 17.1 – 17.2
Fri., 12/2	24. Translation	<b>Text:</b> Ch. 17.3 – 17.5
<b>Tues., 12/6</b>	<b>FINAL EXAM</b> <b>1:00 PM - 3:00 PM - OMH 118</b>	
Wed, 12/14	<b>Due:</b> Banner course evaluation (5 pts extra credit)	

## **What's On the Exam??**

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(tentative - any changes will be announced in class, and posted on Canvas)

### **Exam 1: Wednesday, October 12, 2016**

#### **Lectures 1 - 5**

#### **Textbook reading**

Chapter 1, Chapter 2, Chapter 3, Chapter 5, Section 8.1

#### **Labs**

1. Scientific Method
2. Macromolecules

### **Exam 2: Monday, October 31, 2016**

#### **Lectures 6 - 11**

#### **Textbook reading**

Chapter 4, Chapter 6, Chapter 7, Section 8.3, 8.4, Chapter 11

#### **Labs**

3. Enzymes
4. Membranes
5. Microscopy

### **Exam 3: Wednesday, November 16, 2016**

#### **Lectures 12 - 17**

#### **Textbook reading**

Section 8.1, 8.2, 8.5, Chapter 9, Chapter 10, Chapter 12, Chapter 13

#### **Labs**

6. Respiration
7. Photosynthesis
8. Cell Division

### **Exam 4 (Final): Tuesday, December 6, 2016**

#### **Lectures 18 - 23**

#### **Textbook reading**

Chapter 14, Chapter 15, Chapter 16, Chapter 17

#### **Lab**

9. Genetics
10. Manipulating DNA

+ 25% of exam will be cumulative