

**Biology 1050 – Introduction to Life**  
**Fall 2018, 3 or 4 Credits**

**Instructor:** Dr. Karen Myhr

**Office Hours for Dr. Myhr:** Rm 2113 Biological Sciences Building, or the STEM Commons

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**Office Phone:** 313-577-1504 (usually voicemail to my email, so it is faster to email directly)

**Course website:** [canvas.wayne.edu](http://canvas.wayne.edu)

**Lectures:** Section 001, 10:30 am to 11:20 pm Mon., Wed. and Fri.; 146 DeRoy

**Lectures:** Sections 002 and 003, 2:30-3:20 pm Mon., Wed. and Fri.; 100 General Lectures

**Objectives:** The overall goal of the course is for you to demonstrate an understanding of basic biology from molecules to ecology and evolution, as stated in learning objective 4. This goal depends on your acquiring the skills necessary for you to learn biology effectively, as stated in learning objectives 1-3.

Learning Objective 1 is that you *set a goal, and a strategy* to meet your goal at the beginning of the semester, and reevaluate your goal & strategy after each exam.

Learning Objective 2 is that you *use the tools & resources* for this course, including learning communities, homework assignments, lectures, textbook, Bio 1050 study room and the academic success center, to help you achieve your goals.

Learning Objective 3 is that you *assess your own learning* to evaluate how to improve by using the assessment tools in the homework three times per week.

Learning Objective 4 is that by applying the first three objectives in the context of biology throughout the semester, you will be able to demonstrate that you are an educated consumer, patient and voter in issues related to biology, and you are able to succeed in biology courses that you enroll in later.

To assist you with these learning objectives, the course includes online homework and class participation via activities including clickers (see below). You also are in a learning community to support you during lecture and an extra expected hour of instruction.

**Textbook:** Biology: Concepts & Connections (Ninth Edition, with the red panda cover) by Taylor, Simon, Dickey, Hogan, and Reece

Access to the textbook (any format) is required for success in this course. If you do not have access yet, or want to study on campus, copies of the textbook are available in the STEM Commons and on reserve in the undergraduate library (ask at the front desk). Excellent digital materials and MasteringBiology (extra practice questions) come with the eBook and are highly recommended.

**Clickers:** We will be using clickers this semester to enhance your experience of the course. Clickers are remote control like devices that allow you to answer questions in class and see how the class answered. Students like clickers because they enable them to participate actively in class, get feedback, and improve learning by engaging with the content. **You are required to have an iClicker2.** See Canvas for more information on buying clickers.

## RESOURCES FOR SUCCESS

**Canvas:** When you go to your Canvas home page (canvas.wayne.edu) you will see a Canvas course for this course. The Canvas site includes announcements, required homework and quizzes, study tools, team areas, lecture slides and recordings, and a Discussions area.

**Homework:** There is **free required** homework in Canvas. The purpose of the homework is to increase your success by helping you come to class prepared and to assess your progress. There will be a lecture-preparation assignment due before each lecture and quiz at least once a week. This homework is worth 10% of your grade, quizzes count as part of exam grades.

There will be optional extra practice homework in MasteringBiology. There is no direct credit for this homework, but it can help you improve your exam grades. This system comes with the eBook, 9th edition. For questions on content, post your questions to Canvas in Discussions.

**Canvas Discussions:** For questions that might also benefit other students, please post to Discussions in Canvas, so everyone can see my answers. You will get information faster this way because I may have already answered your question, and classmates may answer faster than I can. There will be forums for homework, quizzes, exams, etc.

**Lecture Recordings:** The lectures usually will be recorded and posted in Canvas under **Echo360 Recordings**. You are welcome to record lectures for your personal use. Audio and/or video recording are to be used only for the student's personal instructional use. Such recordings are not intended for a wider public audience, such as postings to the internet or sharing with others. You may take pictures, but please disable your flash because flashes are very distracting. **I will post the powerpoint files in Canvas before lecture without the clicker question and activities.**

**Technical Support:** I can help with course-specific Canvas problems, but not system issues. I do not control the Echo365 recordings. If you have problems with Echo360 or the Canvas system, please contact **Computing & Information Technology (C&IT)** at (313)577-4778 or [helpdesk@wayne.edu](mailto:helpdesk@wayne.edu).

For help with technical problems with MasteringBiology, contact the publisher at [help.pearsoncmg.com/integration/cg/canvas/student/en/content/get\\_started.htm](http://help.pearsoncmg.com/integration/cg/canvas/student/en/content/get_started.htm)

**Office Hours:** Office hours are a good time get help with your questions on the material from the course or issues that require discussion or are specific to you, such as concerns about the course, study strategies, grade problems, special needs or career issues.

**Dr. Myhr's office hours are:**

**Mondays from 1:15 to 2:15 pm in Rm 2113 Biological Sciences Building**  
**Thursdays from 2 pm to 4 pm in the STEM Commons**

You do not need an appointment to come to office hours. Our time will be most productive if you bring specific questions. If you cannot make office hours, I am also available by appointment. Email me (kmyhr@wayne.edu) at least one business day in advance with three times that you can meet.

**Email:** Email works for questions that do not require discussions. For example, if you will miss class because you are a student athlete, part of another WSU program have a court date, or jury duty, please email me the dates involved and documentation. Email is also how we can resolve any grade discrepancies. I will provide more guidance on grades after exams.

## **LEARNING COMMUNITY SUPPORT**

**Peer Mentors:** You have a free learning community of peers and a peer mentor that meets once a week (also known as small group meetings, team meetings or discussions) and sits together in lecture. This community is a resource for your success in this course and at WSU. Our data shows the learning community has increased the pass rate in the class by about 15%, but it will only work for you if you take participate.

**Your Learning Community:** The members of your learning community are another resource. Support each other in your mutual success by asking for help when you need it and sharing your strategies for success.

**STEM Commons:** Your peer mentors are available in the [STEM Commons](#) from 9 am to 9 pm Mondays through Thursdays, and 9 am to 5 pm on Fridays. Ask your mentors about the material, study skills, research experiences, how to succeed at WSU. You also will have your weekly team meeting in the Commons. Feel free to talk to any peer mentor there, not just your own. The Commons is also great for independent small group study.

## **WAYNE STATE UNIVERSITY SUPPORT**

**Academic Success Center:** Get free individual **tutoring** and group **workshops** in the Academic Success Center. You can also make a free appointment with a learning specialist to design study strategies just for you. See [success.wayne.edu/](http://success.wayne.edu/) for more.

**Multicultural Student Engagement (OMSE)** [omse.wayne.edu](http://omse.wayne.edu). Rm 799, Student Center

**Counseling and Psychological Services (CAPS)** It is quite common for college students to experience mental health challenges, such as stress, anxiety and depression, that interfere with academic performance and negatively impact daily life. Help is available for any currently enrolled WSU student who is struggling with a mental health difficulty [caps.wayne.edu](http://caps.wayne.edu). Rm 522 Student Center. 313 577-3398

## **COURSE STRUCTURE**

**Exams:** The four unit exams will each be worth 100 points. Your lowest unit exam score will be dropped. The cumulative final will be worth 200 points, for a total of 500 exam points. Exams will consist of multiple-choice questions.

The lowest unit exam score is automatically dropped to accommodate personal reasons that may arise to miss an exam. You do not need to explain or submit an excuse. There are no alternative unit exams. The final exam cannot be dropped or replaced with another assignment.

All exams will be in the regular lecture room. Hourly exams are during lecture as indicated in the schedule at the end of the syllabus. Rules and procedures for exams will be explained before exams and must be followed for all exams.

**Quizzes:** To help you prepare for the exams, some of the exam points will be earned via weekly quizzes and unit quizzes in Canvas. The quizzes are my old exam questions. Due dates for the quizzes will be posted in Canvas. Weekly quizzes will usually be due on Mondays and cumulative quizzes right before the exams.

The quizzes will help you with the study and self-assess steps of the study cycle (See Canvas). The quizzes are open book. You are encouraged to get help from classmates and peer mentors. There are unlimited attempts. The best attempt before the deadline counts for your grade. Although you can get help, you must answer the questions yourself. Assess how well you are learning the material. Each question indicates which learning objective(s) it addresses. If you miss a question, study the materials for that objective. You are ready for the exam when you can earn 90% or better every time you take the quiz, can describe why each wrong answer is wrong, **and** can complete all the related learning objectives from memory. After the deadlines you may continue to use the quizzes for practice. Attempts submitted after deadlines do not affect grades.

**Homework:** You will earn up to 60 points from lecture preparation homework assignments in Canvas. The purpose of lecture preparation homework is to learn effectively and efficiently. Before lecture you should read through the questions, then read the assigned reading. Do any activities for the linked learning objectives, like watching the excellent BioFlix animations that come with your book, or working the interactive powerpoint presentations posted in Canvas. After you have previewed, answer the questions first using what you learned, then looking up anything you need to. You will benefit most if you can answer the lecture preparation questions from memory before lecture, but this is not always possible. Make a note of any questions you have trouble with, so you can get the answer before the end of lecture. If you still don't know, ask a peer mentor.

Like the weekly quizzes, the lecture preparation assignments are to help you learn. You will have unlimited attempts. The best attempt before the deadline will count. You are encouraged to seek help on the homework and help others in person or in Discussions in Canvas. You must submit your own answers. Lecture preparation homework will be available about a week before the due date to accommodate busy schedules.

Homework assignments will be two points each and due 15 minutes before every lecture, with an extension until September 7 as we get started. There will be 40 assignments worth up to 2 points each. Your lowest 10 assignments will be dropped. Your best 30 assignments, for a total of 60 possible points, will be used for your grade. Students who accumulate more than 60 homework points will earn 60 homework points, not more. Dropping the 10 lowest grades (including zeros) is instead of make-up opportunities for missed homework for any reason, including technical failures or personal reasons for missing an assignment. This way you do not need to explain or provide an excuse for a missed assignment. I assume you have a good reason.

**Clickers:** We will be using the IClicker2 system, which enables active participation of every student in lecture classes. You need to buy an IClicker2 and register it in Canvas under i>clicker registration **before exam 1**. Use your clicker as soon as you get one. If you get a new clicker, **add** its number to your old clicker number in Canvas as soon as possible.

There will be up to 30 points for participating in class with your IClicker2. There will be at least 39 opportunities to earn the 30 points (1 point in each of the 39 lectures that are not exams, **starting on Wednesday, 8/29/18**). **You will earn one point every day that you answer at least half of the clicker questions.** You do not have to answer correctly to earn the point because class is a learning opportunity, not an evaluation of final learning for a grade. Do your best to be correct so you can learn as much as possible during class.

The nine lowest clicker scores are dropped to accommodate occasional missed points for any reason, including illness, personal events, not having your clicker, dead batteries or technical failures. This way you do not need to explain or provide an excuse for a missed class or clicker. Students who accumulate more than 30 clicker points will earn 30 clicker points, not more. If there is a long-term clicker problem, please email [kmyhr@wayne.edu](mailto:kmyhr@wayne.edu) and explain the situation, or show me in class.

**You may not have anyone else use your clicker. Using someone else's clicker in lecture or having someone else use your clicker is a violation of the student code of conduct, and may result in penalties from losing all the clicker points for the unit or semester to expulsion from the university.**

**LC:** You have a learning community (LC) for support. From past data, engaging actively in the learning community will increase your exam grades by 10%. You will earn up to 10 points for participating in your Learning Community weekly meetings. There will be 13 meetings with an opportunity to earn one point each. The lowest three scores will be dropped. Learning Communities will meet starting August 29. You will start to earn points starting on September 5.

<b>Grades:</b>	<b>For students enrolled in the three-credit course (no lab):</b>	
	Unit Exams 1-4 (100 points each)	400 points
	Drop one lowest hourly exam	-100
	Final exam	200
	Homework	60
	Learning Community Team Meetings	10
	<u>Classroom Participation (clickers)</u>	<u>30</u>
	<b>Total</b>	<b>600 points</b>

**Labs:** Students enrolled in the four-credit version of this course with the lab will receive an additional lab syllabus from their lab instructor, and will earn up to 200 points in the lab. For lab students grades will be calculated out of 800 points, instead of 600 points. Students in the four-credit version of the course will get one grade on their transcript based on the 800 points at the end of the semester.

**Grading Policy:** Grades will be calculated on the following scale:

A	92.5-100%	B	82.5-87.4%	C	72.5-77.4%	D	62.5-67.4%
A-	90.0-92.4%	B-	80.0-82.4%	C-	70.0-72.4%	D-	60.0-62.4%
B+	87.5-89.9%	C+	77.5-79.9%	D+	67.5-69.9%	F	0-59.9%

I do not curve grades. Everyone can earn an A, if they perform well. I do not offer any extra credit, except for participation in the Halloween parade, and sometimes a survey. Instead, I offer many ways to help you succeed throughout the semester.

## General Policies:

1) **Email: You must email me from your WSU email account because the WSU email system blocks some email from other addresses, to comply with privacy laws.**

Communicating effectively is important for your success at WSU and beyond. I expect emails to be in a professional style, with a subject that includes what the issue is, a proper greeting, e.g. "Dear Dr. Myhr," a proper salutation, e.g. "Sincerely, Chris Smith," correct punctuation, and no texting abbreviations. If I cannot figure out what you need, I cannot help you. These habits will help you succeed at Wayne State and beyond.

2) To request unit exam accommodations for civic duties (jury duty, court dates, or military service), WSU travel, religious holiday conflicts, etc., email [kmyhr@wayne.edu](mailto:kmyhr@wayne.edu) as soon as possible with an explanation of your request and documentation.

If you have a conflict with the final exam time **as defined by the rules of the University** ([reg.wayne.edu/finals/final\\_exam\\_schedule\\_fall\\_2018.pdf](http://reg.wayne.edu/finals/final_exam_schedule_fall_2018.pdf)), please notify me as soon as possible, and at the latest by 12/5/2018. Exceptions are not made for personal travel plans, even if it is for specific important events like weddings.

3) If you have a documented disability that requires accommodations, you will need to register with Student Disability Services for coordination of your academic accommodations. The Student Disability Services (SDS) office is located at 1600 David Adamany Undergraduate Library in the Student Academic Success Services department. The SDS telephone number is 313-577-1851 or 313-202-4216 for videophone use. Once you have met with your disability specialist, I will be glad to meet with you **privately during my office hours** to discuss your accommodations. **If your disability requires specific seating in the lecture hall, please email me as soon as possible so I can accommodate your needs before the first day of class.** Student Disability Services' mission is to assist the university in creating an accessible community where students with disabilities have an equal opportunity to fully participate in their educational experience at Wayne State University. You can learn more about the disability office at [www.studentdisability.wayne.edu](http://www.studentdisability.wayne.edu).

To register with Student Disability Services, complete the online registration form at: [https://wayne-accommodate.symplicity.com/public\\_accommodation/](https://wayne-accommodate.symplicity.com/public_accommodation/)

4) University closures will be publicized through:

- the University Newline (313) 577-5345,
- WSU Homepage ([www.wayne.edu](http://www.wayne.edu)),
- WDET-FM (Public Radio 101.9) and by other local radio and television stations.

You should set up your WSU Broadcast Messaging settings in Academics so you get notices the way that works best for you.

If a unit exam is scheduled on a day when the University or lecture room is officially closed during class, the exam will be held during the next scheduled meeting of lecture that occurs when the University and room are open, or as indicated on the class Canvas site.

5) Only students registered for the course are allowed in the lecture room and labs. Children are **not an exception**. They are adorable, but they are a distraction to other students, and are not safe in a lab setting. **An exception is that you are welcome to host people who are considering enrolling at Wayne State and would like to see a class. Please let Dr. Myhr know if you would like to bring a guest.**

6) Professional and respectful behavior is expected in all parts of this course. You are encouraged to discuss differences of opinion with each other respectfully. Students who do not respect others will be asked to leave, and will lose any points for that day.

7) I do not write letters of recommendation for students who I only know through a lecture course. I need to be able to tell a first-hand story about you that will help you get a position. Consider getting involved in more than classes at Wayne State to get strong letters of recommendation. See [www.clas.wayne.edu/stemcommons/wall-of-opportunity](http://www.clas.wayne.edu/stemcommons/wall-of-opportunity).

8) **Withdrawing:** I encourage you to get help instead of withdrawing. See pages 2 and 3 to find help that meets your needs, so you can save money and graduate sooner. If you need to withdraw, see the website for the Office of the Registrar for details [reg.wayne.edu/withdrawing-from-a-course](http://reg.wayne.edu/withdrawing-from-a-course) After September 27, if you withdraw from the course you will receive a WP if you have greater than 60% of the points possible at the time of your request on exams, class participation and homework; or a WF if you have less than 60% of the points possible at the time of your request. No exams or other grades are dropped or replaced in this calculation. Lab grades are not included in this calculation.

#### 9) Academic Dishonesty

Academic misconduct is any activity that tends to compromise the academic integrity of the institution or undermine the education process. Examples of academic misconduct include:

- **Plagiarism:** To take and use another's words or ideas as your own without appropriate referencing or citation.
- **Cheating:** Intentionally using or attempting to use or intentionally providing unauthorized materials, information or assistance in any academic exercise. This includes copying from another student's test paper, allowing another student to copy from your test, using unauthorized material during an exam and submitting a term paper for a current class that has been submitted in a past class without appropriate permission.
- **Fabrication:** Intentional or unauthorized falsification or invention of any information or citation, such as knowingly attributing citations to the wrong source or listing a fake reference in the paper or bibliography.
- **Other:** Selling, buying or stealing all or part of a test or term paper, unauthorized use of resources, enlisting in the assistance of a substitute when taking exams, destroying another's work, threatening or exploiting students or instructors, or any other violation of course rules as contained in the course syllabus or other written information.

Such activity may result in failure of a specific assignment, an entire course, or, if flagrant, dismissal from Wayne State University. <https://doso.wayne.edu/conduct/academic-misconduct>

I encourage you to work with other students on homework. This is not a cheating, but you need to enter your own answers to earn credit fairly, and to have the homework help you learn and earn exam points. **Note that no electronics are allowed on your person during an exam. This means any electronics, including all watches, must be in a bag away from you during the exam.**

10) For any and all issues not covered in this syllabus, refer to the "Student Code of Conduct", which can be found at: [doso.wayne.edu/conduct/student](http://doso.wayne.edu/conduct/student)

## Bio1050 Schedule, Fall 2018

If changes to the schedule are necessary they will be announced in class and in Canvas. It is unlikely that an exam date will change, unless there is a University closure. Instead of having exams right at the end of a unit, exams are scheduled later so you have time to learn.

### Learning Community Weekly Team Meeting Schedule

Week	Dates	Activities
0	8/29-9/4	Introductions. Orientation. Tour of the cell BioFlix. Cell Pictionary.
1	9/5-9/11	<b>Start earning credit.</b> Homeostasis and diabetes.
2	9/12-9/18	Exercise physiology: Glucose and gasses. Note taking.
3	9/19-9/25	Exam 1 Review: Student questions, BioBattle, Hot Potato
4	9/26-10/2	Exam Wrapper, Careers, hands-on DNA models
5	10/3-10/9	Hands-on models of replication and transcription
6	10/10-10/16	Hands-on models of replication, transcription, and translation
7	10/17-10/23	Exam 2 Review: Modeling gene expression. Student questions.
8	10/24-10/30	Hands-on models of mitosis
9	10/31-11/6	Hands-on models of meiosis. Make final exam study plans.
10	11/7-11/13	Exam 3 Review: Compare mitosis to meiosis
11	11/14-11/20	Exam wrapper. Connecting meiosis and fertilization to inheritance.
	11/26	Make-up meeting for Monday Teams – student questions and non-Mendelian inheritance problem solving
12	11/27-12/3	Applied biology: Ethics & policy discussions (genome editing; and one of food laws, antibiotic use, or growth hormone replacement)
13	12/4-12/10	Aquatic Ecology: Water in Michigan. Exam 4 & Final exam review.

**Notes on scheduling:** Because classes start on a Wednesday, our week generally runs from Wednesday through the following Tuesday.

**Monday Teams:** Because of the Labor Day holiday, the first meeting of the Monday teams is on September 10. Monday team members are strongly encouraged to meet with a peer mentor in the STEM Commons in the first week of classes to make sure they are set up for the semester and have completed the tours of the cell. The missing meeting from Labor Day is made up on November 26. Monday Teams will do an activity on non-Mendelian problem solving on November 26. Students whose teams do not meet on Monday are encouraged to do the problem-solving activity with any peer mentor in the STEM Commons between November 26 and December 11, 2018.

**Unit 1: Diabetes.** Lectures August 29 through September 21, 2018, but no classes on Labor Day, September 3. Exam 1 on Wednesday, September 26, 2018.

*Note that readings in the textbook are indicated by module (section of a chapter). Each module starts with the number of the chapter, then the subsection. For example module 1.1 is the first module of Chapter 1 (page 2). BioFlix are excellent animations on your textbook website.*

*For some learning objectives I have made an interactive powerpoint review for you (Active ppt in the Lecture column).*

<b>Learning Objective</b>	<b>Lecture</b>	<b>Text</b>
1.1) Describe the <b>unity and diversity of life</b> .	1	1.1, 1.2
1.2) Describe <b>diabetes</b> , and compare type I and type II diabetes. <b>UNIT THEME - Diabetes</b>	1, 2, 3, 5	26.8, 26.9,
1.3) Describe the <b>levels of biological organization</b> from molecules to organisms, including examples.	1, 2	1.3, 20.2 BioFlix – tours of cells
1.4) Describe the <b>control systems</b> of multicellular organisms.	2, 3	26.1
1.5) Describe and apply a strategy for interpreting <b>data on graphs</b> .	2, 3, 6, 7, 8	page 535, Q2; pp 85, 87
1.6) Quantitatively and qualitatively describe how the endocrine system maintains <b>homeostasis</b> . Explain why homeostasis is important. Identify and diagram the role of the components of homeostasis. Apply the principles of homeostasis to examples, including regulation of blood [glucose]. <b>UNIT THEME - Homeostasis</b>	2, 3	26.1, 26.8, 26.9, BioFlix - homeostasis
1.7) Compare potential to kinetic <b>energy</b> and give examples.	4	5.10
1.8) Describe <b>how the organ systems work together</b> to allow you to move. Include the digestive, respiratory, cardiovascular, musculoskeletal, nervous and endocrine systems. <b>UNIT THEME – Organ Systems</b>	4, 5	6.2, 6.3, 6.4, 21.2, 22.1, 23.1, 23.2, 23.3, 26.8, 30.11
1.9) Describe the major stages and organs of <b>digestion</b> in mammals.	4	21.2, 21.4, 21.10
1.10) Describe the importance and roles of <b>glucose and ATP</b> .	5	3.4, 5.12, 6.4, 30.11
1.11) Describe how glucose, ATP, muscles and the skeleton interact to generate <b>movement</b> .	5	4.16, 30.7, 30.8, 30.10 (BioFlix – muscles)
1.12) Describe the <b>principles of diffusion</b> and why they matter for organisms.	5	5.3

1.13) Describe, diagram and compare <b>glucose and gas transport</b> through the body, and <b>exchange</b> with tissues and the atmosphere. Include the <b>blood</b> , chambers of the <b>heart</b> , <b>transport blood vessels</b> , <b>capillaries</b> , <b>lungs</b> , <b>small intestines</b> and <b>muscles</b> . <b>UNIT THEME – Organ Systems</b>	5, Active ppt,	22.6, 22.9, 22.10, 23.3, 23.7, BioFlix – gas exchange
1.14) Describe and diagram how the <b>brain</b> generally controls respiration, heart rate and motor output, and processes sensory input.	6	22.9, 28.1, 28.15, 28.16, (BioFlix – neurons)
1.15) Describe why cellular <b>membranes</b> are important. Diagram and describe how membrane structures relate to membrane function. Describe how glucose and insulin interact with cellular membranes in health and diabetes.	6, 7	3.8, 3.10, 4.2, 4.4, Ch.5 intro, 5.1, 5.6, 5.8
1.16) Describe, diagram and give examples of <b>hydrophilic</b> and <b>hydrophobic</b> molecules. Describe how these properties affect permeability across plasma (cellular) membranes.	6	3.8, 3.10
1.17) Describe, graph and give examples of <b>exergonic and endergonic reactions</b> . Predict whether a reaction is endergonic or exergonic given a description or graph. Graph the energy of the reactants and products given a description of a reaction.	7	2.9, 5.11
1.18) Describe the significance and process of <b>coupling reactions</b> by transferring energy from one reaction to another. Include examples, such as ATP to ADP and Pi, and the concept of exergonic and endergonic reactions.	7, 8	5.12, 6.3
1.19) Describe, diagram and graph how <b>enzymes</b> control reactions. Include activation energy and active sites. Describe the importance of enzymes to life.	8	5.13, 5.14
1.20) Describe the significance and process of <b>cellular respiration</b> . Describe the reactants and products of cellular respiration in words and an equation. Describe and diagram the four stages of cellular respiration. Describe the high-energy molecules at the beginning and end of each stage. Describe the flow of the carbon atoms through the stages. <b>UNIT THEME – Cellular Respiration</b>	9, 10 Active ppt	4.13, 6.3, 6.4, 6.5, 6.6, 6.7, 6.8, 6.9, 6.11, Bioflix – cellular respiration
1.21) Describe where <b>photosynthesis</b> takes place, why it is important and the major reactants and products of each of the two phases.	10, Active ppt	7.2, 7.4, 7.5, 7.12, Bioflix – photosynth
1.22) Compare <b>cellular respiration</b> when the <b>input</b> is fats versus proteins versus glucose.	10	6.14
<b>End of material for Exam 1. Exam 1 is during Lecture 12, on Wednesday, September 26.</b>		

**Unit 2: The Code of Life.** Lectures September 24 through October 15, 2018. Exam 2 on Wednesday, October 24, 2018.

<b>Learning Objective</b>	<b>Lecture</b>	<b>Text</b>
2.1) Give examples of <b>proteins</b> and describe why they are important.	11	Examples from Unit 1 and 3.12
2.2) Draw, label and explain <b>polar and non-polar covalent bonds</b> and describe why they are important for the properties of water and other molecules in biological systems. Compare <b>hydrogen bonds</b> to covalent bonds.	11	2.6, 2.8
2.3) Describe the <b>structure of amino acids</b> . Predict whether an amino acid is <b>hydrophobic</b> or <b>hydrophilic</b> based on its structure. Predict how the sequence of different amino acids will affect the resulting protein structure and function.	11	2.8, 3.13, 3.14, 4.2, 5.1
2.4) Describe what <b>antibodies</b> are, where they come from, their role in the immune system and how <b>immunizations</b> work, including how antibody structure determines antibody function.	11, 13	9.12, 24.3, 24.4, 24.5, 24.6, 24.8, 24.9, 24.10
<b>Lecture 12 is Exam 1. See Unit 1.</b>		
2.5) Describe what a <b>polymer</b> is and how polymers are made and degraded, including three biological examples of polymers.	13	3.3, 3.13, 3.15
2.6) Describe and draw <b>where DNA is in a cell</b> , and why this is important.	13	4.5, 10.6
2.7) Give a general overview of how <b>genetic information</b> is stored and used by living organisms.	13, 14	4.4, 10.6
2.8) Describe and make a labeled drawing of the structure of <b>deoxyribonucleotides, ribonucleotides, a single DNA nucleic acid</b> (also known as a DNA molecule, DNA strand or DNA polymer) and two strands of DNA (a <b>double helix</b> ). <b>UNIT THEME - DNA</b>	14, 15, DNA models	3.15, 10.2, 10.3
2.9) Describe how the genetic code determines the sequence of amino acids in proteins, and use the <b>codon chart</b> to predict an amino acid sequence from a nucleic acid sequence.	15	10.7, 10.8
2.10) Compare and relate <b>genomes, types of chromosomes, chromosomes, double helix of DNA, genes, alleles, codons and nucleotides</b> . Recognize and represent them in images and schematics. Describe how each varies or not across different species, and across individuals of one species.	15, 16, make a table	8.19, 12.17, 12.18
2.11) Draw, label and explain the <b>mechanism of transcription</b> , and describe why transcription is important. <b>UNIT THEME - Transcription</b>	16, model	10.9, BioFlix – protein synthesis

2.12) Draw, label and explain what <b>tRNA</b> is, how it is charged with the right amino acid, and why it is important.	16	10.11
2.13) Draw, label and explain the <b>molecules and mechanism of translation</b> . Describe why translation is important. Compare the mechanisms of transcription and translation. <b>UNIT THEME - Translation</b>	16, 17, model, make a table	10.12, 10.13, 10.14, 10.15, BioFlix – protein synth
2.14) Compare how <b>proteins are processed depending on where</b> they will be in the organism. Include the mechanism and role of <b>exocytosis</b> .	17, 18	4.6, 4.7, 4.8, 4.9, 5.9
2.15) Explain why <b>people have different genotypes and phenotypes</b> from each other.	18	10.16
2.16) Name, describe and solve problems related to what happens to the amino acid sequence when you have a nucleotide <b>substitution that is a point mutation, a point mutation that is a deletion or a point mutation that is an addition</b> .	18	10.16
2.17) Draw, label and explain how and why <b>DNA is replicated</b> in a cell. Compare DNA replication to transcription.	18, model	10.4, BioFlix – DNA repl.
2.18) Describe what <b>gene regulation</b> is and why it is important for single-celled organisms and for multicellular organisms.	19, 20	11.1, 11.2
2.19) Draw, label and explain the major differences between <b>prokaryotes and eukaryotes</b> .	19, 20	4.3, 4.4
2.20) Draw, label and explain how the <b>lac operon</b> works and why it is important to bacteria and to humans.	19	11.1, 21.4, 21.10
2.21) Describe what <b>fermentation</b> is and why it is important.	19	6.12
2.22) Draw, label and explain <b>how gene expression is regulated</b> , comparing eukaryotes to prokaryotes. Predict the relationships between transcription rates, [mRNA], and [protein]. Describe what makes one cell different from another in a multicellular organism. <b>UNIT THEME – Gene expression</b>	20	11.1, 11.2, 11.3, Ch 3 intro, 3.16
2.23) Describe how <b>DNA binding proteins</b> bind to the DNA, and give examples of DNA-binding proteins and where they bind.	20	11.1, 11.3
2.24) Predict the amount of mRNA if you know the amount of protein, and vice versa. Be able to explain <b>the relationship between variations the amount of mRNA, protein and copies of a gene</b> .	20	11.1, 11.3
<b>End of material for Exam 2. Exam 2 is during Lecture 24, on Wednesday, October 24.</b>		

**Unit 3: Reproduction.** Lectures October 15 to November 7. Exam 3 is on November 14, 2018. Updates will be posted to Canvas closer to the start of Unit 3.

<b>Learning Objective</b>	<b>Lecture</b>	<b>Text</b>
3.1) Describe generally how and why prokaryotic and eukaryotic <b>cells need to divide.</b>	20, 21	Ch 8 intro, 8.1, 8.2
3.2) Describe what <b>sister chromatids</b> are and when they form.	21, 22	8.3
3.3) Describe generally what needs to happen during the <b>cell cycle</b> in prokaryotes or eukaryotes.	21, 22	8.4
3.4) Describe what a type of a chromosome is. Describe why the <b>number of types of chromosomes (n, the haploid number)</b> is important for organisms and understanding mitosis and meiosis.	21, 22	8.3, 8.12
3.5) Describe the <b>stages of the mitotic cell cycle</b> including the <b>checkpoints.</b> <b>UNIT THEME – Mitotic cell cycle</b>	22	8.5, 8.6
3.6) Describe what affects <b>whether a cell goes through the G1 checkpoint.</b>	22	8.7, 8.8
3.7) Predict what would happen if you add <b>growth factors</b> to cells in a Petri dish. Compare what happens over time to cells with the growth factors to without the growth factors.	22	8.7
3.8) Predict what would happen if you removed cells from a sheet of cells with <b>density-dependent inhibition</b> compared to a sheet without the inhibition.	22	8.7
3.9) Describe and compare how <b>oncogenes</b> and <b>mutated tumor-suppressors</b> affect regulation of the cell cycle.	23	11.10, 11.17
3.10) Describe lifestyle choices that can reduce the risk of <b>cancer.</b>	23	11.18
3.11) Compare the structure and function of the three main types of <b>cytoskeleton.</b>	23	4.16
<b>Lecture 24 is Exam 2. See Unit 2.</b>		
3.12) Draw, label and explain what is happening to the <b>chromosomes, cytoskeleton and membranes at each stage of mitosis and interphase.</b> <b>UNIT THEME - Mitosis</b>	23, 25	8.3, 8.4, 8.5, 8.6, BioFlix - mitosis
3.13) Compare <b>cytokinesis</b> in plant versus animal cells.	25	8.6
3.14) Draw, label and explain the <b>human life cycle.</b>	26	8.12
3.15) Compare <b>asexual and sexual reproduction</b> , including examples and the relative advantages and disadvantages.	26	27.1, 27.2
3.16) Compare the structure and function of <b>homologous chromosomes to sister chromatids.</b>	26, 27	8.3, 8.11
3.17) Describe the <b>purpose of meiosis.</b>	26, 27	8.12

3.18) Draw, label and explain the structure and function of the phases and events of <b>meiosis</b> , including the chromosomes, membranes and cytoskeleton. <b>Compare meiosis to mitosis.</b> <b>UNIT THEME - Meiosis</b>	27, 28	8.12, 8.13, 8.14, BioFlix - meiosis
3.19) Draw, label, explain and compare the structure and function of the parts of the <b>female and reproductive system</b> .	29	27.3, 27.4
3.20) Draw, label and explain how a sperm cell <b>fertilizes</b> an egg and can result in an <b>implanted human embryo</b> .	29	27.9, 27.15
3.21) Compare the mechanisms and treatments for bacterial and viral <b>sexually transmitted diseases</b> with three examples for each.	29	27.7
3.22) Compare the methods, advantages and disadvantages of different types of <b>contraception and birth control</b> .	29	27.8
3.23) Describe <b>fertilization, pregnancy and childbirth</b> . <b>UNIT THEME - Reproduction</b>	29, 30	27.9, 27.15, 27.16, 27.17
<b>End of material for Exam 3. Exam 3 is during Lecture 33, on Wednesday, November 14.</b>		

**Unit 4: Inheritance, Evolution and Ecosystems.** Lectures November 9 through December 10. Unit 4 exam during the University-assigned final exam time, along with cumulative final exam on all four units. Updates will be posted to Canvas closer to the start of Unit 4.

<b>Learning Objective</b>	<b>Lecture</b>	<b>Text</b>
4.1) Describe <b>how traits are inherited</b> .	30	9.2, 9.3, 9.4
4.2) Describe how a <b>Mendelian monohybrid cross</b> works. Describe how genotype relates to phenotype in general and using the examples of the seven characters that Mendel studied. Predict genotype and phenotype ratios.	30, 31	9.2, 9.3
4.3) Describe six types of <b>non-Mendelian inheritance</b> and how non-Mendelian genotypes relate to phenotypes. Compare Mendelian to non-Mendelian inheritance. Solve inheritance problems given phenotypes or genotypes of parents or offspring.	31, 32	9.11, 9.12, 9.13, 9.14, 9.15
4.4) Develop problem solving skills by connecting <b>the biology to tools like Punnett squares, and non-Mendelian problem-solving tables</b> ; and by practicing predicting an answer, solving the problem systematically and reflecting on the two approaches. <b>UNIT THEME - Inheritance</b>	32, 34, worksheet	9.2, 9.3, 9.11, 9.12
<b>Lecture 33 will be exam 3. See Unit 3.</b>		
4.5) Compare artificial selection and natural selection.	34	13.1, 13.6
4.6) Describe Darwin's <b>theory of natural selection</b> and how it provides a <b>mechanism for evolution</b> , and how insects and pesticides are an example. <b>UNIT THEME - Evolution</b>	34	13.6, 13.7, 13.8, 13.9, BioFlix - evolution
4.7) Describe the <b>evidence for evolution</b> .	34	13.2, 13.3, 13.4, 13.5
4.8) Describe and calculate <b>allele frequency and phenotype frequency</b> of a population and <b>how these frequencies change</b> .	34, 35	13.10
4.9) Describe what <b>antibiotic-resistant bacteria</b> are, why they are a concern and what can be done about them.	34	13.16, small group work
4.10) Describe how <b>sexual reproduction</b> leads to <b>new combinations of alleles</b> in offspring and where <b>new alleles</b> come from.	34, 35	13.8, 13.9 and Ch 9
4.11) Describe relative <b>biological fitness</b> and how it is related to natural selection.	35	13.13
4.12) Describe the <b>different definitions of species</b> and when each definition would be most and least useful. Compare a species to a <b>population</b> .	35	14.1, 14.2
4.13) Describe the different <b>reproductive barriers</b> with examples (if we covered one).	36	14.3

4.14) Describe the history of <b>how humans have changed allele frequencies</b> to meet our own needs.	36	Ch 31 intro, 31.1
4.15) Describe how genetic engineering works, including two vectors.	36	12.6, 12.7, 12.8
4.16) Describe the challenges of <b>gene therapy</b> .	36	12.10
4.17) Describe the <u>facts</u> regarding the advantages and disadvantages of <b>genetically modified organisms</b> (GMOs). Also consider separately how your <u>values</u> will affect your decisions.	36, 37, 39	12.8, 12.9
4.18) Describe <b>where the matter</b> of plants <b>comes from</b> .	38	7.4, 32.9
4.19) Describe <b>soil conservation and management</b> and how <b>organic farming</b> and <b>genetic engineering</b> play a role.	39	32.10, 32.11, 32.12
4.20) Describe <b>ecosystems</b> and the roles of <b>chemical cycling, energy flow</b> and the organisms in ecosystems.	39	37.14
4.21) Describe <b>trophic structure, energy budgets, food chains</b> and their energy supply limits	39, 40	37.8, 37.9, 37.15, 37.16, 37.17
4.22) Describe <b>carbon cycling</b> , as an example of chemical cycling. <b>SEMSETER THEME – The Carbon Cycle</b>	39, 40	37.18, 37.19, 6.1, BioFlix – carbon cycle
4.23) Describe how <b>human disruptions to the carbon cycle</b> are causing <b>climate change</b> .	39, 40	7.4, 38.3, 38.4
4.24) Illustrate the <b>aquatic food chain</b> in the Great Lakes ecosystem, and describe the <b>local importance of aquatic ecology</b> .	40, 41	34.6, 34.7
4.25) List <b>limiting factors</b> to freshwater algae growth.	40, 41	34.7, 37.20, 37.22
4.26) Describe the perturbations caused by the <b>invasive mussel species</b> in the Great Lakes ecosystem. <b>UNIT THEME – Aquatic Ecology</b>	40, 41	37.13
4.27) Model the <b>scientific process</b> of posing, testing, and rejecting hypotheses.	40, 41	1.8, 1.9
<b>End of material for Exam 4. Exam 4 is during the final exam time on Wednesday, December 12. There also is a cumulative Final Exam on all four units during the final exam time.</b> The purpose of separating unit 4 from the final exam is so that you do not have extra unit 4 questions in the final exam that cannot be dropped as their own unit exam.		

### Final exam

See [reg.wayne.edu/finals/final\\_exam\\_schedule\\_fall\\_2018.pdf](http://reg.wayne.edu/finals/final_exam_schedule_fall_2018.pdf) for the University final exam schedule and final exam policies. If you have a conflict with the final exam time **as defined by the rules of the University**, please notify me as soon as possible, and at the latest by 12/5/2018. Exceptions are not made for personal travel plans, even if it is for specific important events like weddings.