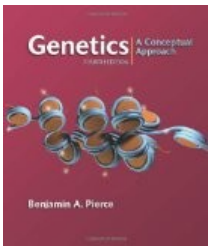
BIOL260: Genetics
Fall, 2013

Instructor: ***Paul Overvoorde***
Olin-Rice 211; phone: 696-6460; email: overvoorde@macalester.edu

Text: *Genetics- A Conceptual Approach- 4th Edition,* by Benjamin Pierce (Freeman Publishers). ***NOTE: The reading schedule and assigned problems for the semester are based the 4th edition.*

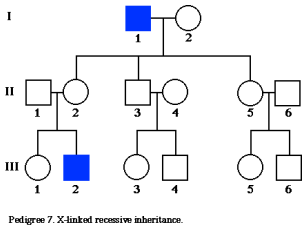


Class Meetings: Monday, Wednesday, and Friday; 1:10-2:10 pm
Olin-Rice 100

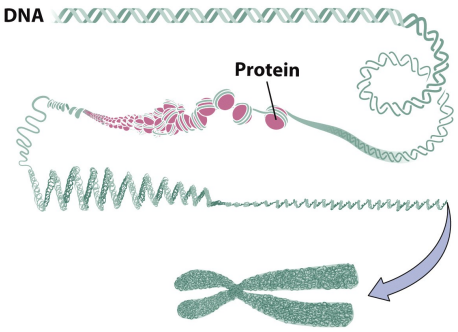
Office Hours: *by appointment (time slots available using GoogleCalender)*

Final Exam: **Thursday, December 12 (10:30 a.m.-12:30 p.m.).** *Please take this information into account when making travel plans for Winter break.*

Why bother with a course about "genetics"? Simply put, genetics is everywhere. As a sub-discipline of biology, geneticists work to explain the transmission of traits from parent to offspring (heredity), as well as the variation we see in living organisms. The molecular structure and function of genes and genomes underpins the explanations of heredity. Given that genes are universal to living organisms, genetics applies to the study of all living systems, from viruses and bacteria, through plants and domesticated animals, to humans. In addition, the social and ethical decisions about the application of genetic technologies in the fields such as medicine and agriculture require an understanding of the terms, concepts, techniques, and organizing principles of genetics.


Pedigree 7. X-linked recessive inheritance.

Course Description. In this course you will learn to recognize, describe, and apply the theories and methodologies that define both classical and molecular genetics. We will begin by considering Mendelian patterns of inheritance and variation. You will learn to discuss how the behavior of chromosomes governs these patterns and how the genetic information (e.g. DNA) of an organism contains information about its history and potential future. In the second unit, we will turn our attention to the molecular aspects of a gene. You will learn to explain what a gene is and how variations of a gene can give rise to different traits. In this unit you will also construct an understanding of how genetic information becomes "expressed" as an observable organismal trait. In the final unit, we will consider the modern tools, techniques, and methods used to describe and manipulate genes and genomes. In each unit, you will also be asked to develop a scientifically informed position on some of the bioethical and social issues related to the application of genetics.



Prerequisites: None, although if you are considering being a biology major, you should also be concurrently enrolled in CHEM111 or CHEM115.

How does this course connect to other courses in Biology? The understanding of biological processes emerges from the continuous gathering of empirical observations that allows the validity of ideas to be tested. As technologies improve the rate of acquiring data, and thus the capacity to form and test hypothesis, accelerates. Such advances have important implications for how we learn about biological systems and genetics. Four recent reports emphasize that students who major in biology should demonstrate analytical, experimental, and technical skills to explain the following core concepts[1]:

1. ***Evolution:*** The diversity of life evolved over time by processes of mutation, selection, and genetic change.
2. ***Structure and Function:*** Basic units of structure define the function of all living things.
3. ***Information Flow, Exchange, and Storage:*** The growth and behavior of organisms are activated through the expression of genetic information in context.
4. ***Pathways and Transformation of Energy and Matter:*** Biological systems grow and change by processes based upon chemical transformation pathways and are governed by the laws of thermodynamics.
5. ***Systems:*** Living systems are connected and interacting.

In addition to the knowledge of core *concepts*, these reports recommend that students develop *competencies* for disciplinary practice. They[1] recommend that students develop the ability to:

1. ***apply the process of science:*** Biology is evidence based and grounded on the formal practices of empirical observation of the living world, hypothesis formation, and experimentation.
2. ***use quantitative reasoning:*** Biology relies on applications of quantitative analysis and mathematical reasoning.
3. ***use modeling and simulation:*** Biology focuses on the study of complex systems.
4. ***tap into the interdisciplinary nature of science:*** Integration among subfields of biology, as well as integration of concepts and knowledge from outside of biology, inform and reinforce interpretations of biological phenomena.
5. ***to communicate and collaborate effectively*:** Biology is a collaborative scientific discipline and as such, effective communication is a basic skill required for participating in diverse scientific communities.
6. ***–to understand the relationship between science and society:*** Biology is conducted in a societal context.

Clearly learning all of these concepts and developing each of these competencies is not something that will occur in a single course. As such, you should know that in this course, **we will focus primarily on <u>concepts</u> #2 (Structure and function) and #3 (Information Flow, Exchange, and Storage).** The other concepts, especially #1 (Evolution) will be touched on at points of the course, but will not be a primary focus. While you will be encouraged to develop each of the competencies to some extent, the primary focus will be to develop the level of your **<u>competency</u> relative to #1, #5, and #6.**

[1] Adapted from Brewer et al. (2011). *Vision and Change in Undergraduate Biology Education: A Call to Action*.

My goals for your learning in this course.

Upon successful completion of this course, you should be able to

1. Produce an overview of the field of genetics and use a concept map to explain the relationship between classical genetics and molecular genetics. A complete map would include the central theories (i.e. Mendel's two laws, structure of DNA, transcription and translation, mutation), methodologies (i.e. crosses, PCR, DNA sequencing, recombinant DNA technology), and a subset of key terms (way to many to list here, but these are listed at the end of each assigned chapter).
2. Design (or interpret) an experiment that defines the genetic nature of a heritable trait and provide possible explanations for deviations in the expected number of progeny that exhibit the trait.
3. Draw an annotated diagram or create a concept map that explains the flow of genetic information that leads to an observable trait such as eye color, lactose tolerance, or seed shape.
4. Apply an understanding of mitosis and meiosis to predict and explain patterns of inheritance and the genetic make-up of cells in a multi-cellular organism.
5. Choose and describe the appropriate molecular genetic tools that enable a gene of interest to be identified, amplified, and introduced into another organism for expression.
6. Communicate a scientifically informed description of genetic testing and describe the potential benefits and limitations of genetic testing in newborns from the viewpoint of a parent, a doctor, a legislator, or an officer from a health insurance company.
7. Describe at least three examples from the field of genetics that demonstrates scientific knowledge results from a continual process of investigation, experimentation, and interpretation.
8. Summarize at least four behaviors or attitudes that contribute to effective group collaboration.

Class time

In the past century an extensive body of research has revealed many of the rules that govern learning, intellecutal development, cognitive theory, and the physiology of the brain. In the last three years, several of these books, convesations with colleagues, and national reports reference above have had a profound influene on my approaoch to teaching and use of class time. While you will learn more about some of these issues as the semester unfolds, know going in that during class we will make extensive use of *collaborative, active learning activities*.

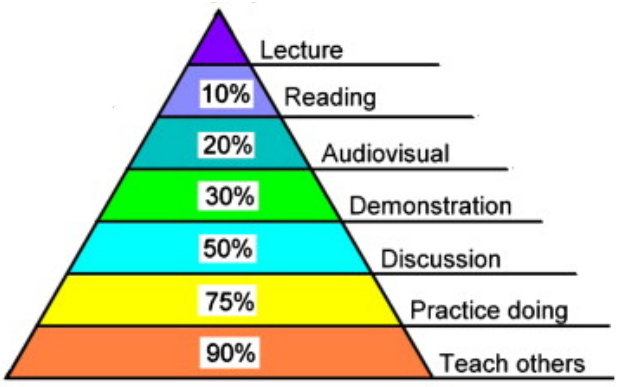


Figure 1. Learning Pyramid showing the amount of information retained after two weeks based on engagement with material. Source: National Training Laboratories, Bethel, Maine.

Figure 1 represents what much research has uncovered-- active engagement with new information promotes the learning and retention of material. When learning is an active process (e.g. you talking with peers, you creating models, you presenting information to others) you build neural networks that allow you to recall information. As such, you store information to be retrieved and applied. In our classroom activities you will present and defend models, question the conceptual frameworks of others, and actively engage in your own learning.

Feedback and evaluation of your learning. Your learning in this course will be monitored using reading reflections, problem sets, quizzes, exams, and a series of writing assignments.

Evaluation of Learning

Final course grades will be assigned on the following basis:

Reading Reflections & Reading Response	5%
Problem sets	25%
Tests/Quizzes	50%
Poster Project	5%
On-line participation	7.5%
In class participation	7.5%
TOTAL	100%

1. **Reading Reflections and Reading Response assignments (5 %)**

   A. *What is a reading reflection or reading response?* The reading reflections (RRs) will ask that you provide several sentences in response to 2 of the following 3 questions:

   1. What is the main point of this reading?
   2. What information or questions at the end of the chapter did you find surprising? *Why?*
   3. What did you find confusing? *Why?*

   The reading response and reflections appear as on-line assignments in Moodle. The reading response requires that you respond to a set of prompts related to the readings of scientific or popular press articles. These responses can be created in Word-documents and then posted to Moodle. You will receive a **full 10 points** for each submission that demonstrates *significant reflection* on the reading assignment, **5 points** for each posting that addresses one question or indicates hasty response, or **0 points** for no responses. You will be allowed to miss 2 reading reflections without penalty.

   B. *Why do these RRs and how are they helpful?* Almost everyone learns new or complex information better by processing the same material multiple times in different formats (e.g. reading, hearing, visualizing, speaking). These reflections help make reading active. You are asked to identify key points of information and think about ways that it relates to what you already know. This process helps with constructing your knowledge and helps you identify issues that you do not understand. Please see p. 7 for tips on effective reading.

   On a more pragmatic level, numerous students in courses I have taught comment that the RRs become an effective tool when preparing for quizzes and exams. The time they invested in re-stating the key points of a reading become useful review material, especially for the cumulative final exam.

Here is an example of a thorough reading reflection completed by a student in a Cell Biology course.

This part of chapter 15 focuses on protein sorting and the methods/components needed to carry them from organelle to organelle. The synthesis of virtually all proteins begins on the ribosomes in the cytosol. After that, the proteins can take one of three different paths on their way to target organelles. 1. Transport through nuclear pores into the nucleus is a process that observes molecular traffic in both directions. Newly made proteins enter the nucleus at the same time that synthesized RNA molecules exit the nucleus. This process is primarily regulated by size of the molecule, as the water-filled passages are non-selective. 2. Transport by protein translocators located in the membrane is another way for proteins to squeeze into organelles. Proteins usually have to unfold themselves in order to snake through the membrane. 3. Transport by transport vesicles is another common process. Vesicles bud off from an existing membrane in order to find their way to another membrane, with which they can fuse and release their cargo into. Very important in these processes are the roles of signaling sequences in guiding a protein to its correct organelle and position on said organelle. Proteins usually have a sorting sequence that is around 15 to 60 amino acids long and that is removed from the protein after it has been sorted. Such signaling is also able to start and stop protein transfer among transmembrane proteins as well as determine a protein's arrangement within the lipid bilayer.

This chapter surprised me by showing me how complex and synchronized the processes are that ferry proteins about the interior of the cell. Every component seems to be linked by a signal or a molecule that sets off a chain of reactions, and this cycle of events is happening constantly and rapidly within our cells! I thought that protein transport through nuclear pores was an interesting topic to read about. How is the nucleus able to keep its pores free or the movement of molecules in and out of the nucleus flowing when traffic flows in both directions? Are the pores able to expand? Or are the pore selective enough to only allow certain amounts of proteins/RNA in and out of the cell at one time? This chapter also made me wonder as to why the cell needs so many methods of transport to get proteins to and from organelles. Why don't all organelles have size-selective pores like the nucleus? Or why can't all proteins be transferred via vesicles? Is there a specific reason as to why the cell and its organelles need such specificity for each protein destination?

2. Problem sets (25%)

You will complete 3 problem sets (PS) outside of scheduled class time. These assignments will provide you with the opportunity to practice and apply the genetic concepts you are learning. Often drawing on data, graphs, or ideas from current scientific literature, the solution to the problems you will be asked to solve demand more creative, critical, and analytical thinking. As such, these questions take more time to answer than those that might be asked on a quiz or in-class exam.

Each individual is to turn in a **hard copy** of the assignment at the start of the indicated class period. As with credit cards, ***for each 24-hour period after the start of class, you will be penalized 20% of the points.***

I encourage you to work on these problems collaboratively with student enrolled in this course this semester. You may consult your textbook, class materials, notes, the TAs, and Paul. The final solutions you write, however, MUST be your original work (e.g. you should not copy from or consult another's answers as you write your own, even if you have worked on the problems together).

3. Quizzes and Exams (50%)

A. *Quizzes.* You will complete 8 quizzes using Moodle. The quizzes will consist of 5-8 questions that are worth 1-2 points each. The questions will most frequently be multiple choice or involve a numerical answer based on calculations you do to solve the stated problem. **You will have 20 minutes to complete each quiz and once you start you can only submit your answers once.** These exams are intended as "closed notes and closed book" and you be asked to affirm that you took each quiz by yourself without the assistance of notes or text.

Why are you asked to complete these quizzes? The goal of these exercises is to provide feedback to both you and me about the level at which you understand the material. The quizzes will encourage you to regularly review and organize notes. Research has shown that exams that require recall promote learning and retention of ideas. As such, these "lower stakes" quizzes should better prepare you for the "higher stakes" exams.

***Quizzes* cannot be made up if missed**. If you do not complete the quiz by hitting the submit button before the time and date deadline, it scores as a zero. Generally, the quizzes will become available at 4:30 p.m. on Friday and will end Sunday evening at 11:55 p.m. This means that if you want the full 20 minutes, you need to **start the quiz by 11:35 p.m. at the latest.** You are best off starting well before these, as technical glitches seem to happen more frequently closer to deadlines, but may NOT be an excuse for missing the deadline. You are responsible for remembering to take the quizzes. The lowest quiz score will be dropped when final grades are calculated.

B. *Exams.* Three exams (each worth 75-85 points) covering course material will be given during the semester. A cumulative final exam worth a similar point value will also be given. You can expect the questions on the exam to test your ability to apply concepts, solve-problems, and to interpret or analyze data. The format of the questions will include short answer (ranging from short phrase responses to paragraph answers), multiple choices, matching, and diagraming. The exam scores will be normalized against the highest score.

IMPORTANT NOTES ABOUT IN CLASS TESTS

Exam dates and assignment deadlines will **NOT** be rescheduled unless **prior** arrangements have been made for a Macalester activity. If you have a Macalester activity (i.e. sport, concert, etc.) that causes a conflict, you will be expected to make arrangements with me at least 48 hours prior to the class period that will be affected.

Normally, the exams will be in class and written to be completed in an hour. I do this not because I find value in timed exams, but because other students have classes or commitments before and after this class. As such, it isn't fair to give some students more time than others. Having said that, I will make pre-arranged exceptions for individuals who need more time to complete the exams (please see section on Accommodations on p. 4).

4. Poster Project (5%)

You will work with 2-3 other students to create a poster that provides information about genetic screening of newborn infant, that explores the genetic basis of a human or agricultural trait, or that describes the environmental and epigenetic factors influencing a trait or condition. The purpose of this project is to provide an opportunity to apply what you learn during this course to a societally relevant question.

Posters are a means to convey information in a concise manner, often with the use of visual aids. The presentation of a poster during a "poster session" provides a interactive means to discuss this information. Scientists regularly use this means of communication at regional, national, and international meetings to summarize recent findings.

You will work with two or three others to research, design, and present findings on a 3'x 3'poster. Each member of your group is expected to make equal contributions to the poster project and to be able to summarize the group's findings during the end of the semester poster sessions. More detailed information about developing your poster, the expectations for the project, and the rubric that will be used to evaluate the poster and your presentation will be made available on Moodle. In addition, we will discuss expectations for successfully working as a group and how group members will evaluate your contributions to the project. A secondary goal of this project is that you will learn to work effectively as a member of a team and practice communicating in both written and oral forms, skills that are as essential in science as in other disciplines.

5. On-line Participation (7.5%)

We are in class together only 3 hours per week. It's simply not enough time to answer all the questions you may have, or discuss all the great ideas or connections you may be making. I welcome students to my office by appointment, but sometimes scheduling can be complicated. Also, I am not the font of all information (and neither is the Web, although it's getting close…). Peer--to--peer instruction is a critical aspect of learning, but equally important is the sense that you are part of a vibrant intellectual community. Thus, I am adding an online community component to the course this year, using the online tool *Piazza*. It is my hope that discussions started in class continue afterwards using this forum and that questions you have about course material will be posted here for others to see and attempt to answer. Overall, the online community component of the course should make the class more enjoyable and richer for all participants. I am taking this endeavor seriously and assigning it 7.5% of your final grade.

6. In-class Participation (7.5%)

Learning requires thoughtful, consistent, and intentional interaction with a subject and connecting it to things you think are important. Participation is a key for active learning and the success of some of the group efforts required in this class. Your preparation and participation in class discussions and activities will also be monitored. Finally, since participation requires showing up, unexcused absences from class will negatively affect this aspect of your grade.

Final course grades will be assigned on the following basis:

100-92% = A; 91-82% = B; 81-61% C; 60-50 % =D

The top and bottom third of each letter grade will receive +'s and –'s, respectively.

NOTE: No grading curves (i.e. only X% of the class will get As, Y% will get Bs, Z% will get Cs) will be used. This means that <u>every person</u> in the class can earn an A <u>if</u> they do consistently EXCELLENT work.

Academic integrity and plagiarism. Cheating and plagiarism represent serious breaches of academic integrity and will not be tolerated. Any student found to have cheated will receive a zero for the given assignment or exam. In addition the student will be referred to the Dean of Students for any additional disciplinary action.

- **The Macalester College statement of Academic integrity can be found in the student handbook or on-line at (http://www.macalester.edu/~dstudent/handbook/academic_policies.html)**

Digital Etiquette

This should go without saying, but I'll put it in writing any way: you should turn OFF your cell phone and/or other devices (iPods, iPads, etc.) before you enter the classroom. I understand that your phones connect you with friends and family, but the classroom is a place to be apart, however briefly, from the outside world. Briefly put, you will learn more if you concentrate on the course while you are in the course. So, if your phone rings once during classtime this semester, we'll all stare at you and I'll ask you to turn it off. If your phone rings again during classtime, this semester, we'll need to talk.

Other suggestions to get the most out of this class

1. *Form and participate in a small group.* Perhaps the single best thing *you* could do to enhance your learning in this class is to form a study group that meets regularly to review notes, key terms, and the questions at the end of the chapters. Working in groups allows one the opportunity to use the words and ideas that are central to forming a solid basis for future studies in biology.

2. *TEST yourself.* You don't have to wait for an assignment to study by recalling what you know. Some suggestions: Use on-line problem sets and tutorials to test your recall and understanding of information. Do problems in the textbook without your notes or looking at the chapter. Remember, familiarity does not equate with being able to explain something to others or to solve a problem on a quiz, exam, or in the lab.

3. *Ask questions!!* Make time to come to my office hours. I'm always happy to talk about science! The best strategy is to ask questions as they arise rather than when you feel overwhelmed.

4. *Spend, on average, 2-3 hours actively engaged with the material* outside of class for each hour in class. This doesn't mean reading and re-reading the textbook, but rather using active approaches to learn the materials. This might involve creating a concept map for a lecture with many new terms. Or it might involve using a two-column note-taking strategy, where the left ½ of the page is used for taking notes in class and the right ½ is used to summarize key points, indicate related pages in the textbook, draw a model to explain a number of details, or write questions you should come ask.

How to Most Effectively Complete a Reading Assignment

1. *Read with a purpose* (for information, concepts, structure of an argument, or application of a technique)
2. *Preview* before diving in—scan the headings, diagrams, photos, and Knowledge Survey items before starting to read for general ideas
3. *First read for major ideas; re-read to check understanding* (summarize/paraphrase in your own words, relate the information in the reading to other things you know and check for consistency, discuss with or explain to others what you've read.
4. *Question the text*—formulate questions about the text. For example, change the headings into questions and see if you can answer after reading.
5. *Avoid highlighting* entire lines or paragraphs—the process of choosing what to highlight or underline promotes deeper learning
6. Focus on "*making*" rather than "*taking*" notes—summarize readings and lectures by making outlines, flowcharts, diagrams, or concept maps.

Support from the MAX Center The Macalester Academic Excellence (MAX) Center (x6121; Kagin Commons) is here to help you do your best at Macalester in meeting your own goals and highest standards. Through academic enrichment and support services, ranging from workshops to individual assistance, the MAX Center can help you excel in your academics.

General Hours: 9:00 A.M. – 4:30 P.M., M-F and 7 P.M. – 10 P.M., S-Th. Dave Ehren and Stephanie Alden also provide mathematics and science assistance to students. You may drop in for help or call x6121 (daytime) or x6193 during evening hours to schedule an appointment.

The MAX Center also provides testing accommodations through the Dean of Students Office.

Accommodations. I am committed to providing the assistance you might need to be successful in this course. Reasonable accommodations (e.g. note taking, testing environment or time, etc.) will be made for students with documented disabilities. If you have special needs for note taking or test taking, please contact me as soon as possible so we can begin planning for proper arrangements. All accommodations MUST be approved through the **Associate Dean of Students, Lisa Landreman** (119 Weyerhaeuser Hall). Contact Lisa by phone (651-696-6136) or e-mail (llandrem@macalester.edu) to schedule an appointment. Additional information regarding the accommodations process for students with disabilities can be found at: www.macalester.edu/studentaffairs/disabilityservices/"

				v4: BIOL260: Genetics Reading Fall, 2013		
Week	#	Day	Date	Topic/notes		Reading
1		M	2-Sep	Labor day- no class		
	1	W	4-Sep	Model organisms/Fundamental Concept Inventory		Ch 1: 1-13
	2	F	6-Sep	Mitosis and Meiosis	**RR1**	Ch 2: 15-35
2		*Su*	*8-Sep*		***Quiz 1***	
	3	M	9-Sep	Mendelian genetics I: monohybrid cross and probability in genetics		Ch 3: 43-56
	4	W	11-Sep	Mendelian genetics II: multi-locus crosses and the Chi Square statistical test	**RR2**	Ch 3: 57-65
	5	F	13-Sep	Sex determination and discovery of sex-linked genes		Ch 4: 73-92
3		*Su*	*15-Sep*		***Quiz 2***	
	6	M	16-Sep	Modified Mendelian Ratios I: incomplete dominance, lethal alleles, multi-allele traits, epistasis		Ch 5:99-114
	7	W	18-Sep	Modified Mendelian Ratios II: maternal effects, gene x environment interactions	**RR3**	Ch 5: 115-121
	8	F	20-Sep	Quantitative Traits	**PS #1 Due**	Ch 24: 659-683
4	9	M	23-Sep	Pedigrees, probabilities, Eugenics	**Reading Response 4- Beckwith**	Ch 6: 135-146
	10	W	25-Sep	Catch-up and review		
	11	F	27-Sep	**EXAM 1**		
5	12	M	30-Sep	Linkage and genetic maps		Ch. 7:161-175
	13	W	2-Oct	Linkage- Genome-wide Association Studies (GWAS)		see Moodle; pp. 186-187, 565-567
	14	F	4-Oct	Structure of DNA	**RR5- Watson and Crick**	see Moodle for paper; Ch. 10: 271-287
6		*Su*	*6-Oct*		***Quiz 3***	
	15	M	7-Oct	DNA replication		Ch. 12: 321-342
	16	W	9-Oct	Transcription: intiation and termination in prokaryotes and eukaryote	**Poster topics selected RR6**	Ch. 13: 351-370
	17	F	11-Oct	*Roundtable and ORI Poster Session:* attend round table discussion Th-Sat and provide a 200-word reflective response by 5 pm on Sunday, 13-Oct	***Session summary due by 5pm on Sunday, 13-Oct***	
7		*Su*	*13-Oct*		***Quiz 4***	
	18	M	14-Oct	RNA processing and alternative splicing		Ch. 14: 375- 387
	19	W	16-Oct	Translation- genetic code, tRNA	**RR7**	Ch. 15: 389-393; 407-413
	20	F	18-Oct	Translation- ribosome start/stop		Ch. 15: 414-423
8		*Su*	*20-Oct*		***Quiz 5***	
	21	M	21-Oct	Control of gene expression at level of DNA: operon		Ch 16: 431-448
	22	W	23-Oct	Control of gene expression: histones/enhancers; epigenetics;	**RR8**	Ch 17: 459-476;
		F	25-Oct	***Fall break***		
9	24	M	28-Oct	Mutations		Ch. 18: 481-506
	25	W	30-Oct	catch-up and review		
	26	F	1-Nov	**EXAM 2**		
10	27	M	4-Nov	DNA sequencing		Ch. 19.4: p.533-538
	28	W	6-Nov	Genome Assembly		Ch. 20: 558-565
	29	F	8-Nov	ESTs and Genome annotation		p. 567-569; 577-582
11		*Su*	*10-Nov*		***Quiz 6***	
	30	M	11-Nov	Molecular Genetics: RE, Recombinant DNA plasmids and bacterial transformation	**5pm Individual Annotated Bibliography for poster due**	Ch. 19: p. 514-522
	31	W	13-Nov	Molecular Genetics: Determining RNA tanscript levels and determining gene function		Ch. 19: p. 523, 525-527 Ch. 20: p. 570-575
	32	F	15-Nov	Molecular Genetics:Polymerase Chain Reaction (PCR), RT-PCR, qRT-PCR	**RR9**	Ch 19: p. 524-525
12		*Su*			***Quiz 7***	
	33	M	18-Nov	Synthetic Biology I: Biobricks and iGEM	**PS #2 Due**	iGEM website
	34	W	20-Nov	Synthetic Biology II: Venter and ethics	**R10**	see Moodle for paper
		F	22-Nov	Catch-up and review		
13	35	M	25-Nov	**EXAM 3**		
	36	W	27-Nov	In class poster work day		
	37	F	29-Nov	Thanksgiving break		
14		Su	1-Dec		**Poster Uploaded for Printing**	
	38	M	2-Dec	Genetic testing- Discussion of Pinker article	**RR11- Pinker Article**	see Moodle for paper; Ch 6.4: p. 146-153
	39	W	4-Dec	Poster Session I	Poster present	
	40	F	6-Dec	Poster Session II	Poster present	
		Su	*8-Dec*		***Quiz 8***	
	41	M	9-Dec	course recap		
		Th	12-Dec	**Comprehensive FINAL EXAM: 10:30 am - 12:30 pm**		