

PRINCIPLES OF GENETICS

Biol 210 Sect 2 – Fall 2020

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Canvas: Biol 110 Sect 1

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Required Text: Meneely. Genetics: Genes, Genomes, and Evolution. For rent in bookstore.

Course Objective: To study general principles of heredity and variation in organisms. This course uses a molecular approach to understanding the basis of transmission, cytological, molecular and population genetics.

Learning Outcomes:

University Level: *Investigation / Understanding the Physical World:* 1) Infer relationships, make predictions and solving problems based on an analysis of evidence or scientific information, 2) Apply scientific concepts, quantitative techniques and methods to solving problems and making decisions, and 3) Describe the relevance of some aspect of the natural science to their lives and society.

Biology/Biochemistry Program Level: 1) Apply the scientific method, using appropriate theoretical and practical skills to design research studies, answer biological questions and/or solve problems. 2) Describe the flow of genetic information, the chromosome theory of heredity, and the relationship between genetics and evolutionary theory. 3) Evaluate and discuss contemporary social and ethical issues related to biology.

Course Level: 1) Compare the basic principles of inheritance at the molecular, cellular and organismal levels, beyond the scope of an introductory course. 2) Compare relationships between molecule/cell level phenomena (modern/molecular genetics) and organism-level patterns of heredity (classical/transmission genetics). 3) Apply this knowledge in a variety of problem-solving situations. 4) Integrate knowledge of DNA with the concepts of cellular function, evolution and biotechnology. 5) Appraise ethical issues involved with the study of genetics, biotechnology and medicine.

Class Meetings: **Synchronous online:** Mon, Tues & Thurs 2:00 pm – 2:50 pm

Face Coverings: At all UW-Stevens Point campus locations, the wearing of face coverings is mandatory in all buildings, including classrooms, laboratories, studios, and other instructional spaces. Any student with a condition that impacts their use of a face covering should contact the [Disability and Assistive Technology Center](#) to discuss accommodations in classes. Please note that unless everyone is wearing a face covering, in-person classes cannot take place. This is university policy and not up to the discretion of individual instructors. Failure to adhere to this requirement could result in formal withdrawal from the course.

Other Guidance:

- Please monitor your own health each day using [this screening tool](#). If you are not feeling well or believe you have been exposed to COVID-19, do not come to class; email your instructor and contact Student Health Service (715-346-4646).
 - As with any type of absence, students are expected to communicate their need to be absent and complete the course requirements as outlined in the syllabus.
- Maintain a minimum of 6 feet of physical distance from others whenever possible.
- Do not congregate in groups before or after class; stagger your arrival and departure from the classroom or lab.
- Wash your hands or use appropriate hand sanitizer regularly and avoid touching your face.
- Please maintain these same healthy practices outside the classroom.

Grading: Grades will be posted on Canvas.

Exams (M/C, Problems)	% Points (out of 100)
Exam I	15
Exam II	15
Exam III	15
Exam IV	15
Comprehensive Final	25
Current Event Project	15
Extra Credit Project	up to 5

Final Letter Grade - out of 100%	
A = 92.5-100	C = 72.5-77.4
A- = 89.5-92.4	C- = 69.5-72.4
B+ = 87.5-89.4	D+ = 67.5-69.4
B = 82.5-87.4	D = 60.0-67.4
B- = 79.5-82.4	F ≤ 60.0
C+ = 77.5-79.4	

Exams: There will be four (4) exams scheduled during our lecture time and extended to a full 2 hours. Each exam will cover 5 or 6 lectures, with the previous lecture **not** included. Each exam is worth 15%.

Comprehensive Final: The final is worth 25% and includes all material covered in lecture.

Research Projects: You will also engage in 1 required project (worth 15%) and 1 optional project (worth up to 5% extra credit). It is your choice as to whether you complete the second project. Each project has its own deadline that is written in the schedule; projects will be accepted any day and time before the lecture of the deadline, but not after – no exceptions.

- Required Project – Paper on a Current Event in genetics.
- Extra Credit Project – Paper on a Genetic Disorder in humans or an organism of your choice.

Weekly Problems: Suggested problems from your textbook will be posted each week on Canvas. Answers are in the back of the textbook for you to refer to. Other practice problems will be posted as well and gone over once a week at a synchronous Zoom meeting. Although all of these problems will not be graded, some **will** be used as actual questions on exams. In addition, you have the option to discuss the genetics problems during the Zoom meetings, with the instructor by appointment, and/or attend weekly tutoring sessions (2 provided per week). Tutoring sessions are a great way to review and get help!

Lecture Guide: On Canvas, I will provide pdf versions of my PPT slides and a narrated version to provide you with explanations and examples of how to solve genetics problems. I recommend printing the Lecture PowerPoint slides, 2 slides per page, so while you are viewing the narrated PPTs, you can then take notes directly on each slide. Please be aware that students who just read over the PowerPoint slides before exams typically earn a “C-” or below in this course. Therefore, I recommend you read your textbook after each lecture to reinforce your understanding of that material. Read especially the paragraphs and captions pertaining to the images shown in lecture while writing your own notes. Then try the practice problems after we complete each chapter. I also recommend each week to make up study-guide sheets. The final is cumulative, meaning it contains material discussed throughout the semester. To succeed on this final, you will need to 1) study from your study-guide sheets that you made before each exam and 2) make sure you understand the answers to each exam question and those I recommended from the textbook and on Canvas. Page 3 describes a **great way to study**.

Attendance Policy: I strongly recommend you keep up with the material weekly. Missing any PPT or practice genetics problems will put you at a distinct disadvantage when test taking. The only valid excuses for a student missing an exam are: death in the family, violent illness, or accident. In such cases: (1) you must provide evidence of some kind (eg. note from health center), **and** (2) you must reschedule **within 24 hours** after the deadline.

E-mail: Students are expected to check their University e-mail regularly for information from the university and/or instructors. If you are using an e-mail account other than your campus account to contact me, be sure your full name is included in the message

Electronic Devices: Cell phones should be turned **off** and **not** be displayed during exam time. No other communication or musical devices are allowed. Students needing a foreign language dictionary during exams may use one with permission from instructor. No video or audio recording of lectures is permitted without the prior written authorization from instructor.

Extra Help: You may schedule a Zoom meeting as an office hour for extra help. Extra help can be scheduled during lecture times. In addition, tutors are available to help you with lecture material and assigned text problems. Interested students are encouraged to contact the Tutoring-Learning Center. Students with a disability requiring accommodations should register with the Disability and Assistive Technology Center in the Learning Resource Center (the Library) and contact me at the beginning of the course.

Academic Conduct: You are responsible for the honest completion and representation of your work and for the respect of others' academic endeavors. Any act of cheating, plagiarism, or academic misconduct is subject to the penalties outlined in UWS Chapter 14. Please refer to this link for more information:

<http://www4.uwsp.edu/natres/nres701/plag.pdf>

Suggested Study Habits:

It is often observed that people learn more when they encounter and interact with subject material in different ways.

The following scale presents representative measures of how we might learn through different forms of interaction.

You learn:

10% of what we **read**
20% of what we **hear**
30% of what we **see**
40% of what we **see & hear**
50% of what we **write**
60% of what is **discussed**
70% of what we **experience**, and
95% of what we **teach**

Before each class:

- a) Read the textbook chapters and summary sections that pertain to the info in the lecture slides (PowerPoint). While reading, take notes on the side of each slide to help clarify the information discussed in class. These notes can be used as lecture slide guide sheets.

Before the exam:

- a) **Rewrite your notes!** For each lecture, continue developing your lecture slide guide sheets and write out the information that was covered for each slide. Try to describe any images/figures on the slide in your own words. Try to do this for each lecture **BEFORE** the next lecture. Then read it over once to see the whole picture or overall theme of that lecture. When appropriate, make a table of info to help compare concepts.
- b) **Anticipate exam questions.** Come up with 1-2 questions of your own from each slide to quiz yourself later. Definitions, short answers, problems, and comparisons are all good types of questions.
- c) **Study your notes.** At the end of each week you will have made lecture slide guide sheets that include your notes for that material. Before the week's lectures, read over your lecture slide guide sheets and highlight only the information you could not remember.
- d) **Focus your studies.** Before the exam you will have made a set of lecture slide guide sheets with the information you need to reinforce already highlighted. Focus on this highlighted material one or two days before the exam. Reread, highlight info that you are having trouble learning or remembering and say it out loud, to yourself, with another person from class, a friend or study group.

- e) **Practice questions.** At the end of each chapter, try the practice questions (suggested on Canvas) before looking at the answers in the back of the book. Write down the ones you do not understand and ask the instructor for guidance with those problems.
- f) **Revisit your study questions.** Try to answer the questions that you generated for each slide. Study with someone in class and try to answer each other's questions.
- g) **Teach your peers.** If you can teach it to another person, then you know it!

The night before the exam:

- a) **Value your sleep.** Being wakeful and well rested can help your performance on the exam. Be sure to get a good night's sleep before the exam. Cramming at the expense of sleep is not the best method.
- b) **Try to relax.** Study hard, but also seek ways to reduce your stress. Take breaks to help refocus your mind.

After the exam:

- a) A good grade can result from **reading** the text and your notes, **listening** to lectures, **seeing** the words and figures, **writing** and **rewriting** notes from class, the **experience** of answering questions from the chapters or provided, and **discussing** topics with another person (saying it out loud).
- b) Your grade should reflect the amount of cumulative effort you put into your studying. Remember, for every hour of lecture, you should have a lot two hours of designated studying time. In other words, for each exam you should be spending about 10-15 hrs studying! It isn't possible to effectively achieve that right before an exam.

If you can teach it to another person, then you know it! **“The best way to learn is to teach!”**

GENETICS SCHEDULE

Week	Date	Topic	Chapter (Slides) Reading
1	Sept 3	Zoom - Syllabus / Overview of Evolution, Genomes, and Genetics	1
2	7	Labor Day	
	8	Central Dogma of Molecular Biology	2
	10	Zoom – problem set	
3	14	Genome Structure, Organization, and Variation	3
	15	Descent with Modification (DNA Replication & Mutation)	4
	17	Zoom – review	
4	21	EXAM I (online 2-4pm)	(1, 2, 3)
	22	Inheritance of Single-Gene Traits	5
	24	Zoom – problem set	
5	28	Mitosis & Meiosis	6
	29	-	
	Oct 1	Zoom – problem set	
6	5	X-Linked Genes and Sex Chromosomes	7
	6	Inheritance of Multiple Genes	8
	8	Zoom – review	

Week	Date	Topic	Chapter (Slides)
7	12	EXAM II (online 2-4pm)	(4, 5, 6, 7)
	13	Locations of genes on Chromosomes, Linkage & Genetic mapping	9
	15	Zoom – problem set	
8	19	Genome-Wide Association Studies	10
	20	Exchange and Evolution	11
	22	Zoom – problem set	
9	26	<i>CURRENT EVENT PROJECT DUE</i> (no later than 2pm)	
	27	Transcription: Reading & Expression Genes	12
	29	Zoom – review	
10	Nov 2	EXAM III (online 2-4pm)	(8, 9, 10, 11)
	3	Translation: From Nucleic Acids to Amino Acids	13
	5	Zoom – problem set	
11	9	Networks of Gene Regulation	14
	10	-	
	12	Zoom – problem set	
12	16	Genetic Analysis of Cellular Processes	15
	17	-	
	19	Zoom – problem set & review	
13	23	EXAM IV (online 2-4pm)	(12, 13, 14, 15)
	24	-	
	26	THANKSGIVING	
14	30	The Genetics of Populations	16
	Dec 1	-	
	3	Zoom – problem set	
15	7	Metagenomics: Genome Analysis of Communities	17
	8	<i>EXTRA CREDIT PROJECT DUE</i> (no later than 2pm)	
	10	Zoom – Review	
FINAL	Mon 12/10	COMPREHENSIVE FINAL: (online 10:15 – 12:15)	Chapters 1 – 17