BIOLOGY 222: Principles of Genetics, Spring 2024

Section 02: MWF 10:30-11:20 am
Section 03: MWF 11:30-12:20 pm
ISC 115

Prerequisites:
Biology 117*, Biology 119*, Math 112 or Math 221; CHEM 118 or CHEM 211. *If biology students have a D or below in Biology 117 and Biology 119, they will be deregistered from BIOL 222

Instructor
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Office hours: Mon and Wed 12:30-1:30 pm, Thurs 10:30-11:30 am, or by appointment

Tutoring help
TBA

Course Description
Principles of Genetics will provide students with a broad genetics background, and will cover topics ranging from understanding the flow of genetic information within single-celled organisms to how genes and gene products function within multicellular organisms.

Course Learning objectives
*Students will be able to define basic genetics terms, and use these terms to explain fundamental concepts in genetics related to: nucleic acid structure, the central dogma, gene regulation in eukaryotes and prokaryotes, transmission genetics, and molecular genetics.
*Students will be able to describe specific examples of how advances in our understanding of genetics and molecular biology have impacted society
*Students will gain experience analyzing and interpreting data from genetics experiments, both from historical experiments and current genetics methods. In addition, students will be able to explain how model organisms are used to understand genetics principles, providing specific examples.

Asking for help
My goal for the course is for you to learn about genetics, and to help you build a strong foundation for your upper level courses. My job is to create learning materials and assessments that promote learning, and provide you with clear guidelines on how to succeed. My job is also to answer your questions and help to foster your scientific curiosity. I'm here to help, and in fact chatting with students and answering their questions is one of the best parts of my job! So, please don't hesitate to reach out if you

have questions about the course material, or other general student questions. Asking for help is a sign of self-awareness and strength.

Required Textbook
Genetics: Analysis and Principles (7th Ed) (McGraw Hill, ISBN 9781260240856) by Robert J. Brooker. This text is available in the bookstore. Please note: if you'd like to use an older edition or international edition of the text, students have done so successfully in the past. However, you will be responsible for material in the required text, which may differ from other versions.

Calculator
You'll need a simple calculator (no graphing calculators allowed) for exams in this course.

Grading

Assignment	How many?	Percentage (%)
Exams	4	50
Homework	8 + peer eval	25
Semester Group Project	1 (draft + final)	20
Participation	varies	5

Grade disputes must be initiated within one week from when the assignment was handed back Class attendance will not be graded, but will be necessary to get points for participation. For late assignments, 10% will be deducted per day that the assignment is late.

Grading Scale:
The following scale will be used to calculate final grades. Student point totals or grading scheme may be adjusted to reflect course difficulty or section differences at the instructor's discretion.

A 93.0-100% **A-** 90.0-92.9%
B+ 87.0-89.9% **B** 83.0-86.9% **B-** 80.0-82.9%
C+ 77.0-79.9% **C** 73.0-76.9% **C-** 70.0-72.9%
D 60.0-69.9%
E <60%

Standard rounding procedures will apply. For example, an 82.94 would be rounded down to a B-, and an 82.95 would be rounded up to a B.

Exams:
Exams will be administered in class (50 min). Make up exams are <u>not administered without prior approval</u> to missing the exam. Safety is a priority, and please do not attend class or an exam if you are ill and suspect you have COVID. <u>However</u>, it is your responsibility to be in contact with me for (1) approval for missing the exam and (2) scheduling a make-up exam. Please note the exam dates for this course. If you have a

legitimate scheduling conflict you must notify me within the first 2 weeks of class. Otherwise, you will have to take exams as scheduled in the syllabus.

Semester Group Project
As a group, you will prepare a presentation on the inheritance of a genetic trait, and we will have class presentations during the final exam period. Please see the presentation assignment for additional details.

Homework Assignments
Some homework assignments will be completed in groups (one copy will be turned in per group), and others will be shorter, individual assignments that require you to reflect on your learning strategies and progress in the course. Halfway through the semester, you will complete an ungraded peer review of your group members. This will allow you to get feedback about your performance in the group. At the end of the semester, you will then be re-evaluated for your group performance, and this evaluation will count as a HW grade. Homework assignments must be submitted through Brightspace.

Participation
I will intersperse lecture with practice problems and questions, and part of your grade is determined by participation in class discussions. I will randomly call on individuals to answer a question or contribute to discussions, and you earn points by participating. You are not penalized for incorrect answers or for asking for help from other students. Please see the Participation assignment on Brightspace for more details on this part of the course, and for a rationale on why I'm using random calling for this course.

COVID-19 and other illness precautions
For the safety of your fellow students, faculty, and staff, please do not attend class if you feel ill. If you feel ill and have a negative rapid COVID-19 test, you can attend class but should wear a properly fitted mask. If you start to feel ill during class, please feel free to leave if you need to. Lecture slides and corresponding readings are posted online, and I'd recommend getting notes from another student if you're absent. It is imperative that you communicate with me about your absence from class - you should notify me *before class* that you will be absent, unless it's an emergency.

Tips for Success
- Set up a schedule for keeping up with Genetics lectures and homework assignments. Use assignments as a learning tool (after each assignment, assess your learning and where you can improve before the exam. After each exam, assess what went well and what could go better).
- Don't procrastinate - if you're struggling or don't understand something, get help during office hours as soon as possible. There are resources available if you need help, use them!
- Take advantage of the textbook practice questions. Particularly for problems involving complex crosses and calculations, practice problems are extremely helpful!

- Assigned readings for class – my suggestion is to read over the assigned text before viewing the lecture. This will help familiarize you with the topics that will be covered, and if any topics are completely unfamiliar to you then you can do a more in-depth reading of that section. After lecture, take a more careful look at the assigned readings, using what we covered in lecture to focus your reading.

Accessibility
SUNY Geneseo is dedicated to providing an equitable and inclusive educational experience for all students. The Office of Accessibility will coordinate reasonable accommodations for persons with documented physical, emotional, or cognitive disabilities, as well as medical conditions related to pregnancy or parenting. Students with letters of accommodation should submit a letter to each faculty member at the beginning of the semester and discuss specific arrangements. Please contact the Office of Accessibility Services for questions related to access and accommodations: Erwin Hall 22, (585) 245-5112 access@geneseo.edu, www.geneseo.edu/accessibility-office

Academic Dishonesty & Plagiarism
Students are expected to adhere to the University's policy on academic dishonesty and plagiarism, located in the handbook. Academic dishonesty and plagiarism have serious consequences, and if you're struggling, please ask for help rather than resort to dishonesty! Academic dishonesty will result in a zero on the assignment or exam. In addition, a report will be filed to the department chair and Dean of the College, and a record of academic dishonesty will be placed in the student's file at the Dean of Students Office. I have a strict policy regarding cheating and academic dishonesty; it doesn't matter if the incident involves a group practice problem, a homework assignment, or an exam – cheating is cheating, and will be dealt with accordingly as described above. In addition, it is also considered cheating to share your work with someone else and let them copy it – you will get a zero for the assignment and be reported if you let others copy your work.

Use of AI and writing assignments
Technology changes almost as rapidly as genomes mutate and evolve! This is not a bad thing, but it's important to be aware of how it can impact learning, and there are significant potential academic dishonesty issues that can arise. Most of you are likely aware of the popular AI program chatGPT. It's fascinating!

However, I strongly recommend ***not*** using it for your coursework for several reasons: (1) if you don't complete assignments yourself, you are not learning. If you're not going to do the work, honestly it's a waste of your time to take this course; (2) chatGPT is not an expert in Genetics, and may be prone to errors in writing assignments. If you do use chatGPT to generate any text you must cite the program in your references or works cited section. Assignments containing text written by chatGPT will not receive full credit compared to assignments that contain original work. Using AI-written work without citing it constitutes an academic dishonesty violation (see above section).

Tentative Schedule (subject to change at instructor's discretion):

Date	Subject	Assigned Textbook Reading
(M) 01/22	Introduction	--
(W) 01/24	*Begin Module 1 Material* DNA as the genetic material	210-213 (Ch 9)
(F) 01/26	Structure of DNA and RNA I	213-225 (Ch 9)
(M) 01/29	Structure of DNA and RNA II; HW#1 (ind)	213-225 (Ch 9)
(W) 01/31	DNA organization	10.1-10.3, 10.6-10.7
(F) 02/02	DNA Replication I	260-280 (Ch 11)
(M) 02/05	DNA Replication II	260-280 (Ch 11)
(W) 02/07	PCR and quantitative PCR	20.2
(F) 02/09	Mitosis and Meiosis; HW#2 (group)	3.2-3.4
(M) 02/12	*Begin Module 2 Material* Chromosome Structure and Number	178-196 (Ch 8)
(W) 02/14	Exam 1 (Module I)	--
(F) 02/16	Mendel's Laws of Inheritance	18-38 (Ch 2)
(M) 02/19	Mendel's Laws and Probability	18-38 (Ch 2)
(W) 02/21	Inheritance of Sex Chromosomes	65-71 (Ch 3); section 4.5, section 5.2 (skip expt 5A)
(F) 02/23	Complex Traits HW#3 (ind)	78-93 (Ch 4)
(M) 02/26	Pleiotropy and Gene Interactions	4.9
(W) 02/28	Genetic Linkage and Mapping I	131-145 (Ch 6)
(F) 03/01	Genetic Linkage and Mapping II; HW#4 (group)	131-145 (Ch 6)
(M) 03/04	*Begin Module 3 Material* Disease alleles in humans – detection and mapping	602-613 (Ch 24)
(W) 03/06	Exam 2 (Module 2)	--
(F) 03/08	Bacterial Genetics	159-169 (Ch 7)
(M) 03/11	No class – Spring Break	--
(W) 03/13	No class – Spring Break	--
(F) 03/15	No class – Spring Break	--
(M) 03/18	Virus Genetics	444-455 (Ch 18; skip expt 18A section)
(W) 03/20	Methods: Blotting	20.5
(F) 03/22	Central Dogma	12.1; 13.1
(M) 03/25	Transcription – making RNA from DNA HW#5 (ind)	12.2-12.3
(W) 03/27	RNA Processing in Eukaryotes	12.4-12.5
(F) 03/29	Translation	13.2-13.6 (skip expt 13A)
(M) 04/01	Gene Regulation in Bacteria, intro	14.1

(W) 04/03	Gene Regulation in Bacteria, *lac* operon; HW#6 (group)	14.2
(F) 04/05	*Begin Module 4 Material* Gene Regulation in Eukaryotes, intro	15.1
(M) 04/08	No class – Solar Eclipse	--
(W) 04/10	Exam 3 (Module 3)	--
(F) 04/12	Gene Regulation in Eukaryotes, role of DNA Structure	15.2-15.3; 16.5 (agouti phenotype + bees)
(M) 04/15	Gene Regulation by Non-coding RNAs and RNAi; draft of presentation due	17.2-17.3; 14.5
(W) 04/17	Mutations	19.1-19.4
(F) 04/19	DNA Repair; HW#7 (ind)	19.5-19.6
(M) 04/22	CRISPR	read assigned article on Brightspace; 434-436
(W) 04/24	No class –GREAT day	--
(F) 04/26	Human Genetics: race and ancestry	none
(M) 04/29	Genetics in Medicine – Cancer Genetics	25.1-25.3
(W) 05/01	Genetics in Medicine – personalized genomics – genome sequencing HW#8 (group)	22.5
(F) 05/03	Genetics in Medicine – personalized genomics – applications	22.5
(M) 05/06	In-class workday	--
(W) 05/08	Exam 4 (Module 4)	--
05/13 05/14	Presentations for section 03: 12-2:30 Presentations for section 02: 8-10:30	