

Principles of Genetics (BIOL 222) – Fall 2021

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Office Hours: Tuesday 2:30-4:00 (on zoom), Wednesday 1:00-2:30 (ISC 306 or on zoom)
Student TAs: Gianna Minnuto gmm16@geneseo.edu and Julia May jam56@geneseo.edu
Gianna and Julia will hold tutoring on Sunday 6-9PM and Thursdays from 7-9PM

Textbook: Genetics: Analysis and Principles (6th edition) by Robert J. Brooker.
Publisher: McGraw Hill, ISBN: 978-1259616020
Any format is fine, no online content is needed.
Prior editions (e.g. 5th) are available at very low expense! Please let me know and I can help you identify the correct pages for the required readings.

Principles of Genetics provides a comprehensive introduction to the fields of genetics and molecular biology. In this course, we will investigate genetic phenomena at many levels of biological complexity, from single molecules to populations of free-living organisms. Throughout, we will emphasize how scientific experimentation across these interconnected fields of study contributes to a larger understanding of genetics.

Course Goals / Learning Objectives

- Understand principles of heredity, including analysis of simple and complex traits
- Understand the biochemical structure and function of the genome and its products
- Describe, analyze, and interpret key experiments that contributed to our present understanding of genetics
- Describe and understand the purpose of current experimental approaches in genetics, and technical and societal limits of their use
- Understand how genetic mutations cause observable differences within and between species, including human disease
- Acquire skills and knowledge necessary for advanced study in biology, including genetics/genomics, molecular and cellular biology, and evolutionary biology.

Class Format:

This course is organized into five three week modules, each including a homework assignment and culminating in a unit exam on third Fridays. While exams are not strictly speaking cumulative, each exam builds on material from earlier in the semester so questions will often integrate topics across units. Daily activities include lectures, Tophat questions, demonstrations, and group work and discussion time. I use Canvas heavily – so check often for updates. Additional materials such as review videos and lectures will be posted on Canvas. All homeworks are group homeworks, and group engagement also forms part of your grade. However, group work is a minority of your overall grade. The final, cumulative project for the course will be a research presentation given during the final exam period.

Course evaluation:

A total of 700 points are possible:

- 500 points (71.4%) for Midterm Exams (5 total, 100 pts per exam)
- 75 points (10.7%) for Homeworks (5 total, 15 pts per homework)
- 50 points (7.1%) for In-class (e.g. Tophat, participation)
- 75 points (10.7%) for the Final Presentation

Grading Scale:

The following scale will be used to calculate final grades. The hundredth place is rounded.

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

Course policies

- **COVID safety:** If you have any symptoms or are otherwise sick **DO NOT COME TO CLASS**. Be in communication with me and your homework groups as needed about making up material. If you begin feeling ill during class please let me know and leave promptly. Whether or not you are vaccinated, you are required to wear a mask over your nose and mouth at all times when indoors on campus except when eating and drinking in designated areas or when in your personal room or office. If you don't have a mask, there are masks dispensers around the ISC. With current seating requirements, you will likely be within <6ft of classmates and myself at various points. There are options for making up material if you cannot come to class. In addition to discussions during office hours. I will provide supplemental pre-recorded lectures for some topics, which may be useful viewing either for review or to view if you cannot make it to class. Be in touch if you are absent so I can open Tophat questions if necessary. Nevertheless you are expected to attend class if you are able to do so.
- **Office hours:** Due to resurgence of COVID, I will be holding office hours remotely over zoom.
- **Exams:** will be given on Canvas, during class time, and will be open book/notes. You will need a calculator for each exam as well. Please note that exams are timed to be taken **during class time**. Over-reliance on looking up answers in your book/notes is likely to lead to inability to complete the exam on time. For some questions, you will be expected to also turn in work on paper. Exams are taken on the day they are scheduled in the syllabus, so please check your schedule carefully and let me know if you have anything that would conflict within the first week of class. Make-up exams are allowed for unanticipated, significant emergencies and other allowed events as described in the student handbook (e.g. religious observances, varsity sports, etc). Please reach out if you have any issues as soon as possible.
- **Accessibility and Disability:** 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
- I will use **TopHat** (www.tophat.com join code 770111) to assess student comprehension of the video lectures. Tophat is free to students. You can use your phone, tablet, or computer to access Tophats during class. Use the invitation link you should have received to access the course.
- **Mental Health Policy:** I take mental health problems as seriously as I would issues with your physical health. Diminished mental health, including significant stress, mood changes, excessive

worry, or problems with eating and/or sleeping can interfere with optimal academic performance. If the source of your symptoms is directly related to this class, please speak with me. However, problems with relationships, family worries, loss, or a personal struggle or crisis can also contribute to decreased academic performance. SUNY Geneseo provides mental health services to support the academic success of students. Counseling Services, a part of the Lauderdale Center for Student Health & Counseling, offers free, confidential psychological services to help you manage personal challenges that may threaten your well-being. Call 585-245-5716 to make an appointment and also see this page for [emergency resources](#). If you feel more comfortable talking to peers, Geneseo students also lead a peer counseling group called Pathways. www.geneseo.edu/pathways

- **Group Work Policy:** Students are encouraged to study and work together on practice problem sets, studying, and explicitly on their homework and final presentation. Students are expected to contribute effort and time to the homework assignments. Throughout the semester, surveys will be used to incentivize student participation in group work.
- **Academic Dishonesty & Plagiarism:** Presenting others' work as if it were your own, or providing such help to others constitutes academic dishonesty. The format of this inappropriate help does not matter. This is important not only due to fairness, but also so that instructors can provide feedback that is useful to improving your understanding and skills (feedback on work that is not your own is not useful to anyone!). Of course, in the case of group work the product will include input from all members. Any work that you are presenting as your own *must be original to you*. If you're struggling in class, please ask for help rather than resorting to academic dishonesty! I'm here to assist you if you have any concerns. SUNY Geneseo has instituted policies and procedures that must be followed in the event of an occurrence of Academic dishonesty which can be found here: [Academic Dishonesty](#): https://www.geneseo.edu/dean_office/dishonesty). Immediate consequences include a report to the department chair and Dean of the College and a loss of points on impacted assignment(s).
- **Extra Credit:** There are two opportunities for extra credit in this class. **First**, you may attend a seminar presenting original research on a social or natural science, math, or health-related topic and turn in (on Canvas) a ½ page summary of the talk for 2 pts extra credit (Biology seminars are 2:30 – 3:30 Fridays [on zoom](#), other departments' seminar schedules can be found through those departments). **Second**, end of chapter textbook problems may be completed / turned in for 3 EC points towards the exam of any Module in which **all** assigned end of chapter problem sets are completed. These are due the next class period following each exam.
- **C+ proficiency policy:** Students in Biology and Biochemistry must complete a C+ (2.3 GPA) average in their first two Biology courses **taken at Geneseo** in order to obtain "Proficiency" and continue to upper level courses in the major. Depending on your situation, this course may contribute to your proficiency status. The proficiency policy may be appealed by contacting the department chair (see <https://www.geneseo.edu/biology>)
- **Grading options:** Students should be aware that there are multiple grading options available to them. For example, an incomplete ("I") grade, Withdrawing from a class ("W"), and taking a Pass/Fail grading mode may be options. In addition, students may choose to repeat courses in which they have earned grades of D, E, F, U, or W (however, there are limits on the number of times you can repeat a course and have it count towards your major). Up to date policies on all of these options can be found on the [Academic Policies, Standards, and Information section of the Undergraduate bulletin](#). In addition, please reach out to me and your academic adviser as soon as possible if you are having difficulty in the course.

Course Schedule – Subject to change if needed – check Tophat and email for updates!

Date		Subject	Reading
Aug 30	M	Introduction: What is a gene?	1-15
Sep 1	W	Begin Module 1 material DNA as the genetic material	208-211, Canvas
Sep 3	F	Structure of DNA and RNA	211-224
Sep 6	M	LABOR DAY NO CLASS	--
Sep 8	W	Organization of DNA in cells	229-234,237-245
Sep 10	F	Genome Structure and function	234-237,573-577,580-581
Sep 13	M	DNA replication I	252-256,266-267 HW1
Sep 15	W	DNA replication II	256-262,271-272
Sep 17	F	EXAM I (module I material)	
Sep 20	M	Polymerase chain reaction (PCR) and sequencing	519-522; 524-526
Sep 22	W	Mitosis & Meiosis	46-53,57-64
Sep 24	F	Chromosome Structure & Number	177-192
Sep 27	M	The Laws of Inheritance	18-26
Sep 29	W	Statistical analysis of Inheritance	26-38
Oct 1	F	Sex-linked traits and Chromosome theory	64-70, 86-88
Oct 4	M	Complex and quantitative traits I	76-95,116-121, HW2
Oct 6	W	Complex and quantitative traits II	707-708, 712-714
Oct 8	F	EXAM 2 (module 2 material)	
Oct 11	M	FALL BREAK - no CLASS	
Oct 13	W	Genetic linkage	127-135
Oct 15	F	Genetic mapping in Eukaryotes	135-141
Oct 18	M	Mapping genes in humans	611-622
Oct 20	W	Bacterial Genetics I	155-165
Oct 22	F	Molecular cloning	155-170
Oct 25	M	Viral Genetics & COVID-19	433-444, HW3
Oct 27	W	Methods: blotting	529-531

Oct 29	F	EXAM 3 (module 3 material)	
Nov 1	M	Central Dogma of Molecular Biology: DNA, RNA, Protein	278-280,306-310
Nov 3	W	Transcription – making RNA from DNA	281-284,286-289
Nov 5	F	RNA processing in Eukaryotes	284-285,290-298
Nov 8	M	The Genetic Code	311-319
Nov 10	W	Translation - making proteins from RNA	322-329
Nov 12	F	Gene regulation and expression in bacteria I	336-347
Nov 15	M	Gene regulation and expression – Lac Operon	336-347, HW4
Nov 17	W	Gene regulation in eukaryotes - overview	361-375
Nov 19	F	EXAM 4 (module 4 material)	--
Nov 22	M	Gene regulation in eukaryotes – Role of DNA structure	106-116.376-378,401-402
Nov 24	W	Thanksgiving Break - NO CLASS	--
Nov 26	F	Thanksgiving Break - NO CLASS	--
Nov 29	M	Post-transcriptional regulation	295-297,380-381,417-420, Presentation topics
Dec 1	W	Mutation	461-470
Dec 3	F	DNA Repair	470-485
Dec 6	M	CRISPR	423-426,526-529, Presentation draft slides
Dec 8	W	Human genetics: race, ancestry, forensics	697-699,746-754, Canvas, HW5
Dec 10	F	Human genetics: genetics of cancer	624-634,405-407
Dec 13	M	Exam 5 (module 5 material)	--
Dec 15	W	section 03 (MWF 11:30-12:20) final exam period is 8:00-10:30 AM	FINAL PRESENTATIONS