Principles of Genetics (BIOL 222) – Spring 2022

Instructors: Dr. Kevin Militello: ISC 357, militello@geneseo.edu
Dr. Josie Reinhardt: ISC 349, reinhardt@geneseo.edu

Office Hours: Reinhardt: Weds 12-2, Thurs 10-12, on zoom: geneseo.zoom.us/j/2611825805
Militello: Mon: 2:00-3:00 PM, Wed: 8:00-9:00 AM, Thurs 8:00-9:00 AM, by appointment, on Zoom, see Canvas for link (contact for in person appointment)

Student Tutors: Gianna Minnuto: gmm16@geneseo.edu and Julia May jam56@geneseo.edu
Hours T.B.D.

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 & problem sets.

Course description (from bulletin): An in-depth treatment of heredity, the gene, and the function of genetic material at the individual and population levels.

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 four modules with an exam at the end of each. 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. The final exam will include mostly material from the final unit, but some material from prior units (to be communicated as the time approaches). Daily activities include lectures, demonstrations, and group work and discussion time. We 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.

Course evaluation:
A total of 700 points are possible:

500 points (71.4%) for 4 Midterm Exams (125 pts per exam)
80 points (11.4%) for Homeworks (20 pts per homework)
70 points (10%) for Final Presentation
50 points (7.1%) for In-class Participation, Quizzes, and Tophats

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%	**D**	60.0-69.9% **E** <60%
A-	90.0-92.9%	**B-**	80.0-82.9%	**C-**	70.0-72.9%		

Course policies

- **COVID safety:** If you have any symptoms or are otherwise sick DO NOT COME TO CLASS. Be in communication with your instructors and classmates as needed about options for making up material. If you begin feeling ill during class please leave promptly and let your instructor know. Please follow current college policies on mask use, social distancing, etc.
- **Exams:** Exams are to be taken on the day they are scheduled in the syllabus, so please check your schedule carefully and let us know if you have anything you know would conflict within the first week of class. Make-up exams are allowed for illnesses, 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**
- **Mental Health Policy:** We take mental health problems as seriously as we 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
- **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 (in this class, primarily exams) *must be original to you*. If you're struggling in class, please ask for help rather than resorting to academic dishonesty! We're 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: Acadamic 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).

- **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 status, 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/or your academic adviser as soon as possible if you are having difficulty in the course.
- **Land Acknowledgment:** Land acknowledgements are expressions of sorrow and remembrance to those whose historic territory one resides on. Geneseo resides on the homeland of the Seneca Nation of Indians and Tonawanda Seneca Nation. We encourage you to learn more about these original occupants and those indigenous to other places you have lived. You may consider using the Native Land app and/or websites such as sni.org to learn more about the community of more than 7,000 enrolled Indigenous Peoples.
- **Please let us know how best to address you:** especially if this differs from what is on the official Canvas / Knightweb record.

Course Schedule – subject to change, see Canvas for the latest schedule

Date		Instructor	Topic	Readings/assignments
Jan 26	W	Reinhardt	Intro/what is a gene?	1-15
Jan 28	F	Reinhardt	Mendelian genetics I (FLIP)	18-38
Jan 31	M	Reinhardt	Mendelian genetics II (FLIP)	18-38
Feb 2	W	Reinhardt	Meiosis / transmission of genes via chromosomes	46-70
Feb 4	F	Reinhardt	Complex traits I - modes of inheritance (FLIP)	76-95
Feb 7	M	Reinhardt	Complex traits II - multiple genes (FLIP)	116-121, 707-708
Feb 9	W	Reinhardt	Euk Mapping I - linkage, 2 point maps (FLIP)	127-135
Feb 11	F	Reinhardt	Euk Mapping II - 3 point maps	135-141

Feb 14	M	Reinhardt	Human Mapping	611-622, **HW1 due**
Feb 16	W		NO CLASS DIVERSITY SUMMIT	
Feb 18	F		Exam 1	
Feb 21	M	Militello	Identification of the genetic material	208-211
Feb 23	W	Militello	Nucleic acid structure I	211-224
Feb 25	F	Militello	Nucleic acid structure II	211-224
Feb 28	M	Militello	Bacterial DNA organization	229-234
Mar 2	W	Militello	Eukaryotic DNA organization	237-245
Mar 4	F	Militello	DNA replication I	252-268
Mar 7	M	Militello	DNA replication II	268-272, **HW2 due**
Mar 9	W	Militello	Polymerase chain reaction	519-524
Mar 11	F		Exam 2	
			Mar14-18: NO CLASS SPRING BREAK	
Mar 21	M	Militello	Central dogma, genetic code	306-318
Mar 23	W	Militello	Bacterial Transcription	278-286
Mar 25	F	Militello	Eukaryotic Transcription and RNA Processing	286-300
Mar 28	M	Militello	RNA splicing and Translation I	293-300, 319-322
Mar 30	W	Militello	Translation II	319-330
Apr 1	F	Militello	Bacterial gene regulation 1	336-349
Apr 4	M	Militello	Bacterial gene regulation 2	336-349
Apr 6	W	Militello	Eukaryotic gene reg. I, transcriptional control, DNA methylation	376-378
Apr 8	F	Militello	Eukaryotic gene reg. II, RNAi	417-420, Fire/Mello article
Apr 11	M	Militello	Blotting	529-531, **HW3 due**
Apr 13	W	Militello	Bacterial genetics I	155-171
Apr 15	F		Exam 3	
Apr 18	M	Reinhardt	Bacterial genetics II (cloning)	525-529
Apr 20	W	Reinhardt	Viral Genetics / COVID	433-444
Apr 22	F	Reinhardt	Mutation & Repair I	461-470
Apr 25	M	Reinhardt	Mutation & Repair II	470-485
Apr 27	W	Reinhardt	CRISPR / Gene Editing	423-436, 526-529
Apr 29	F	Reinhardt	Chromosomal Variation	177-192
May 2	M	Reinhardt	DNA sequencing and Genomics	574-581
May 4	W	Reinhardt	Ancestry and Population Genetics	611-623, 698-699
May 6	F	Reinhardt	Heritability	709-722, **HW4 due**
May 9	M	Reinhardt	Cancer Genetics	624-634
May 11	W		Exam 4	

May 16	M		Final Presentations for 10:30 section (02)	8:00-10:30
May 20	F		Final Presentations for 9:30 section (01)	8:00-10:30