Principles of Genetics, Spring 2023

BIOL 222, 3.0 credits
MWF from 9:30-10:20 AM, ISC 115
Prerequisites: BIOL 117*/119*, MATH 112 or MATH 221, CHEM 118 or 204
*Biology students with a D or less in BIOL 117 or BIOL 119 will be deregistered
Note: this course counts for the Biology minor, but BIOL 271: Heredity does as well

Instructor

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Office hours: Mondays from 2:30-3:45 PM, Wednesdays from 10:30-11:30 AM, Fridays from 8:15-9:15 AM, or by appt. (format: in person with online option, see Canvas for more details)

Course Description

Principles of Genetics is an investigation of the principles of heredity at the molecular, cellular, organismal, and population levels. This course will emphasize and contrast both classical and modern experimentation that has contributed to our knowledge of genetics. This course is designed as an introductory genetics course.

End of Course Learning Outcomes

At the conclusion of the course……..
*students will be able to explain the fundamental principles of transmission genetics, molecular genetics, and population genetics at the level appropriate for Biology majors.
*students will have practiced problem solving, critical thinking, and communication skills both generally and with respect to genetics problems.
*students will be able to describe, analyze, and interpret both classic and modern experimentation that contribute to our knowledge of genetics.
*students will be able to describe modern experimental approaches in genetics.
*students will obtain training requisite for the advanced study of genetics, molecular biology, and bioinformatics.

Textbook

The required text for the course is Genetics: Analysis and Principles (7th edition) (McGraw Hill, ISBN 9781260571226, 2021) by Robert J. Brooker. Edition 6 of the text may suffice.

Other Requirements

A scientific calculator is required for this course. The calculator will be necessary for specific sessions, especially those dealing with transmission genetics and population genetics.

On Reserve

A copy of the Brooker textbook is available in the library for 4-hour reserve.

Grading

3 semester examinations @100 points each*	300 points
1 final examination (cumulative)*	100 points
Quizzes (probably one per exam, points added to exam)	0 points
Homework assignments (probably 7 @ 8 points each)	56 points
TopHat questions (participation)	20 points
	476 points total

*the lowest exam will be weighted at 50% to give 426 total points

*The course material is copyright protected. Students are not allowed to post materials on websites or give materials to other students.
*Students are expected to check their email/course announcements at least once a day.
*Students are required to take all exams at the day/time specified in the syllabus; no "section switching" is allowed.
*You might be able to change your class schedule if your semester and/or final exam schedule is not feasible/optimal.
*Late assignments will not be accepted for credit (without a valid excuse).
*Any grade disputes must be initiated within 7 days from the date the assignment is handed back. The entire assignment will be reevaluated and the initial score may increase or decrease.

The following scale (minimum averages) will be used to calculate final grades. The grading scheme may be adjusted to reflect course difficulty or section differences (instructor's discretion).

A, 94; A-, 90
B+, 87; B, 84; B-, 80
C+, 77; C, 74; C-, 70
D, 65; E, < 65

How to excel in BIOL 222

As each student is unique, learns by different mechanisms, and has a different background. There is no one, magical formula for success in this or any course.

However, these are some general pieces of advice that are likely important for most students.

*Speak the language. There will be a plethora of new terminology in BIOL 222. A mastery of the terminology is necessary to comprehend new genetic concepts.
*Get help when necessary. You are most likely enrolled in this course in order to experience genetics, and not since you have special expertise in genetics. Therefore, don't expect to understand all concepts without extra reading and help. Do not procrastinate when problems arise.
*Utilize your resources. Take advantage of my office hours and outside guidance. There are numerous textbook resources available for the course including practice questions at the end of all chapters. A tutor(s) will likely be available and his/her contact information and office hours will be provided as soon as possible.
*Realize that different students have different learning styles. The studying strategy that works for your friend may not work for you.

Students With Disabilities

SUNY Geneseo will make reasonable accommodations for persons with documented physical, emotional or learning disabilities. Students should consult with the Office of Accessibility (Erwin 22, access@geneseo.edu) and their individual faculty (Dr. M.) regarding any needed accommodations as early as possible in the semester.

Academic Honesty and Plagiarism

All students are expected to follow the specific rules of academic honesty and plagiarism for SUNY Geneseo. Please refer to the 2022-2023 Undergraduate Bulletin for more details.

Physical and Mental Health

We take physical and mental health seriously, yet do not likely understand the unique challenges each student faces. If you have to miss class, please contact your instructor (Dr. M.) for a make up strategy. See Canvas as well. For all emergencies, call University Police at 585-245-5222 or 911.

Copyright Protection

Date	Subject	Required Reading
1/25/2023	Class Organization, Genetic Methods	(see Canvas for pdf)
1/27/2023	DNA as the genetic material	(ch 9: p. 210-213)
1/30/2023	Nucleic acid structure 1	(ch 9: p. 213-226)
2/1/2023	Nucleic acid structure 2	(ch 9: p. 213-226)
2/3/2023	Bacterial DNA organization	(ch 10: p. 230-235)
2/6/2023	Eukaryotic DNA organization	(ch 10: p. 245-254)
2/8/2023	DNA replication 1	(ch 11: p. 260-276)
2/10/2023	DNA replication 2	(ch 11: p. 276-280)
2/13/2023	Meiosis and sexual reproduction	(ch 3: p. 58-62)
2/15/2023	Mendel 1: Law of segregation	(ch 2: p. 18-27)
2/17/2023	Mendel 2: Law of independent assortment	(ch 2: p. 27-39)
2/20/2023	EXAM 1 (content through 2/13)	
2/22/2023	Mendelian Inheritance in Humans	(ch 2: p. 32-34)
2/24/2023	Linkage/recomb. mapping 1	(ch 6: p. 131-150)
2/27/2023	Linkage/recomb. mapping 2	(ch 6: p. 131-150)
3/1/2023	Central dogma, genetic code	(ch 13: p. 315-324)
3/3/2023	Bacterial Transcription	(ch 12: p. 286-294)
3/6/2023	Eukaryotic Transcription and RNA Processing	(ch 12: p. 294-308)
3/8/2023	RNA splicing and Translation 1	(ch 12: p. 301-306, ch 13: p. 328-339)
3/10/2023	Translation 2	(ch 13: p. 328-339)
3/13/2023	NO CLASSES, SPRING BREAK	
3/15/2023	NO CLASSES, SPRING BREAK	
3/17/2023	NO CLASSES, SPRING BREAK	
3/20/2023	Bacterial gene regulation 1	(ch 14: p. 345-358)
3/22/2023	Bacterial gene regulation 2	(ch 14: p. 345-358)
3/24/2023	EXAM 2 (content from 2/15-3/10)	
3/27/2023	Eukaryotic gene reg. 1, transcriptional control	(ch 15: p. 370-384)
3/29/2023	Eukaryotic gene reg. 2, DNA methylation	(ch 15: p. 385-388)
3/31/2023	Eukaryotic gene reg. 3, RNAi	(ch 17: p. 428-430, Fire/Mello article)
4/3/2023	Bacterial genetics 1	(ch 7: p. 159-173)
4/5/2023	Bacterial genetics 2	(ch 7: p. 159-173)
4/7/2023	Bacterial genetics 3	(ch 17: p. 434-436, ch 20: p. 523-526)
4/10/2023	DNA sequencing	(ch 20: p. 521-523)

4/12/2023	Gene cloning 1	(ch 20: p. 508-516)
4/14/2023	Gene cloning 2	(ch 20: p. 508-516)
4/17/2023	Molecular detection: blotting	(ch 20: p. 526-528)
4/19/2023	Molecular detection: PCR	(ch 20: p. 516-521)
4/21/2023	EXAM 3 (content from 3/20-4/14)	
4/24/2023	Studying genes and genomes	(ch 23: p. 581-583, Lamartine rev., ch 20: p. 523-526)
4/26/2023	NO CLASSES, GREAT DAY	
4/28/2023	Mutations	(ch 19: p. 472-490)
5/1/2023	DNA repair	(ch 19: p. 490-502)
5/3/2023	Genetic diversity 1: Transposons/retrotrans.	(ch 10: p. 238-245)
5/5/2023	Genetic diversity 2: SNPs	TBA
5/8/2023	Genetic diversity 3: microsatellites	TBA
5/10/2023	Exam 4 preparation	TBA
5/12/2023	Exam 4, 800-1030 AM	