

Principles of Genetics, Spring 2021

BIOL 222, 3.0 credits

Section III, CRN 56244

Online asynchronous (instead of MWF)

Prerequisites: BIOL 117*, BIOL 119*, MATH 112 or MATH 221

*Biology students with a D or less in BIOL 117 or BIOL 119 will be deregistered

Prerequisite or corequisite: CHEM 211

Note: this course counts for the Biology minor, but BIOL 271: Heredity does as well

Instructor

Dr. Kevin T. Militello (Dr. M.)

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Office hours: Mondays from 2:30-4:00 PM, Thursdays from 10:00-11:30AM, or by appt.
(format: online office hours, see Canvas for Zoom link)

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 (6th edition) (McGraw Hill, ISBN 9781259616020, 2018) by Robert J. Brooker. Edition 5 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 edition 6 textbook is available in the library for 4-hour reserve.

Grading

5 semester examinations	72%
quizzes (probably 2 per module)	16%
practice problems	10%
Reflective assignment	<u>2%</u>
	100% total

*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.

*Make up exams will only be administered in special circumstances (required medical documentation).

*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.

*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.

Genetics and the Biology/Biochemistry Proficiency Requirement

Policy: Students must achieve a combined C+ average or better in their first two required Biology lecture courses completed at SUNY Geneseo. Required lecture courses are:

- BIOL 117
- BIOL 119
- BIOL 203* (*not a required lecture for the Biochemistry program)
- BIOL 222
- BIOL 300

For most freshman students, the first two required lecture courses would be BIOL 117 and BIOL 119. For freshman students with a 5 on the AP Biology exam, it would be BIOL 203 and BIOL 222, unless they elect to retake BIOL 117 and BIOL 119 here.

This policy will apply to transfer students as well. They may be further along in the required sequence (e.g. they could have credit for BIOL 117, BIOL 119, and BIOL 203), in which case the first two required lecture courses would be BIOL 222 and BIOL 300. If they already have credit for both BIOL 222 and BIOL 300, they would need to achieve a grade of C+ in BIOL 300 in order to remain a Biology/Biochemistry major.

Students With Disabilities

SUNY Geneseo will make reasonable accommodations for persons with documented physical, emotional or learning disabilities. Students should consult with the Director of the Office of Disability Services (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 2020-2021 Undergraduate Bulletin for more details.

Date	Quiz	Subject	Required Reading
		MODULE I: DNA as the Genetic Material	
2/1/2021		Class Organization, Genetic Methods	(ch 1: p. 1-15; Brooker 5 App. A)
2/3/2021		Identification of the genetic material	(ch 9: p. 208-211)
2/5/2021		Nucleic acid structure I	(ch 9: p. 211-224)
2/8/2021	yes	Nucleic acid structure II	(ch 9: p. 211-224)
2/10/2021		Bacterial DNA organization	(ch 10: p. 229-235)
2/12/2021		Eukaryotic DNA organization	(ch 10: p. 237-245)
2/15/2021		DNA replication I	(ch 11: p. 252-268)
2/17/2021	yes	DNA replication II	(ch 11: p. 268-272)
		MODULE II: Chromosomes and Inheritance	
2/19/2021		Meiosis and sexual reproduction	(ch 3: p. 57-64)
2/22/2021		Mendel I: Law of segregation	(ch 2: p. 18-27, 34-38)
2/24/2021		EXAM I (content through Feb. 17)	
2/26/2021		Mendel II: Law of independent assortment	(ch 2: p. 27-32, 34-38)
3/1/2021	yes	Mendelian Inheritance in Humans	(ch 2: p. 32-38, ch 4: p. 86-89)
3/3/2021		Linkage/recomb. mapping I	(ch 6: p. 127-141)
3/5/2021		Linkage/recomb. mapping II	(ch 6: p. 127-141)
3/8/2021	yes	Chromosomal chaos and cancer	(Duesberg article)
		MODULE III: Central Dogma of Molecular Biology	
3/10/2021		Central dogma, genetic code	(ch 13: p. 306-318)
3/12/2021		EXAM II (content through Feb. 19-Mar. 8)	
3/15/2021		Bacterial Transcription	(ch 12: p. 278-286)
3/17/2021		Eukaryotic Transcription and RNA Processing	(ch 12: p. 286-300)
3/19/2021	yes	RNA splicing and Translation I	(ch 12: p. 293-300, ch13: p. 319-322)
3/22/2021		Translation II	(ch 13: p. 319-330)
3/24/2021		NO CLASSES, REJUVENATION DAY	
3/26/2021		Bacterial gene regulation I	(ch 14: p. 336-349)

3/29/2021	yes	Bacterial gene regulation II	(ch 14: p. 336-349)
		MODULE IV: Advanced Molecular Biology	
3/31/2021		Eukaryotic gene reg. I, transcriptional control	(ch 15: p. 361-375)
4/2/2021		EXAM III (content through Mar. 10-Mar. 29)	
4/5/2021		Eukaryotic gene reg. II, DNA methylation	(ch 15: p. 376-378)
4/7/2021	yes	Eukaryotic gene reg. III, RNAi	(ch 16: p. 417-420, Fire/Mello article)
4/9/2021		Bacterial genetics I	(ch 7: p. 155-171)
4/12/2021		Bacterial genetics II	(ch 7: p. 155-171)
4/14/2021		Bacterial genetics III	(ch17: 423-426, ch21: 527-529)
4/16/2021	yes	DNA sequencing	(ch 21: p. 524-526)
		MODULE V: Genetic Diversity: Detection and Consequences	
4/19/2021		Gene cloning I	(ch 21: p. 511-519)
4/21/2021		Gene cloning II	(ch 21: p. 511-519)
4/23/2021		EXAM IV (content through Mar. 31-Apr. 16)	
4/26/2021		Molecular detection: blotting	(ch 21: p. 529-531)
4/28/2021		Molecular detection: PCR	(ch 20: p. 519-524)
4/30/2021	yes	Studying genes and genomes	(ch 24: p. 590-595, Lamartine rev., ch 21: p. 526-528)
5/3/2021		Mutations	(ch 19: p. 461-479)
5/5/2021		DNA repair	(ch 19: p. 479-485)
5/7/2021		Genetic diversity I: Transposons/retrotrans.	(ch 20: p. 499-507)
5/10/2021	yes	Genetic diversity II: SNPs, microsatellites	(Hartwell chapter)
5/12/2021		Reflective assignment	
5/14/2021		EXAM V (Apr. 19-May 10)	