

## Principles of Genetics, Spring 2016

BIOL 222, 3.0 credits

Monday, Wednesday, and Friday from 9:30AM-10:20AM (section I)

Monday, Wednesday, and Friday from 10:30AM-11:20AM (section II)

Newton 209 (unless otherwise indicated)

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 2:45-4:00 PM, Thursdays from 9:00-10:15 AM, Fridays from 8:15-9:15 AM, or by appt.

### 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 classical and modern experimentation that have contributed to our knowledge of genetics.

\*students will be able to describe modern experimental approaches in genetics.

\*students will obtain training requisite for advanced study in genetics, molecular biology, and bioinformatics.

### Textbook

The required text for the course is Genetics: Analysis and Principles (5th edition) (McGraw Hill, ISBN 978-0073525341, 2014) by Robert J. Brooker. The site for Brooker textbook resources is <http://highered.mheducation.com/sites/007352>.

## Other Requirements

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

## On Reserve

There are no texts on reserve for this course.

## Grading

3 semester examinations @ 100 points each	300 points
Final examination (cumulative)	100 points
homework assignments (probably 7)	<u>56 points</u>
	456 points total

\*Students are expected to check their email at least once a day for course information.

\*Students are required to take all exams at the time specified in the syllabus; no “section switching” is allowed.

\*Make up exams will only be administered in special circumstances (significant medical documentation). No other excuses will be accepted including weddings or vacations. Please change your travel plans if they overlap with an exam.

\*Please change your class schedule if your semester and/or final exam schedule is not feasible.

\*Homework assignments and their respective due dates will be provided during the course. The majority of the assignments will involve solving genetics problems. Homework assignments will be completed in groups. One copy will be turned in per group.

\*Late homework 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.

\*Attendance will be taken at each class by individual sign in.

The following scale (minimum averages) will be used to calculate final grades. Student point totals or 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.

\*Come to class and participate. The unique environment of the classroom cannot be replicated by simply reading the text. The most important concepts will be covered in class.

\*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, online quizzes, flashcards, etc. A tutor will 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.

## Biology Pre-major

Students entering Geneseo in the Fall of 2013 (either as incoming freshman or as transfer students) and students wishing to become Biology/Biochemistry majors in the Fall of 2013 or later are 'premajors' in Biology/Biochemistry. To be able to declare a major in Biology/Biochemistry premajors must first earn at least a C+ average (2.3 GPA) in their first two required biology lecture courses taken at Geneseo. For most students this would be BIOL 117 and 119 but if students have credit for BIOL 117/119 from an AP Biology score of 5 or from the transfer of college credits, the first two required courses (and the ones that will count in terms of advancing to the major) are: BIOL 203 and 222 (for pre-Biology majors) or BIOL 222 and 300 (for pre-Biochemistry majors). Pre-Biology students who have credit for 117, 119, 203 and 222 and pre-Biochemistry students with credit for 117, 119 and 222 will be evaluated on the basis solely of BIOL 300. [Note that although you can repeat courses if you withdraw or earn a D / E you cannot repeat courses with a C- or C and earning these grades in 'premajor course' makes it difficult to achieve a C+ average and to become 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 in the Office of Disability Services (Tabitha Buggie-Hunt, 105D Erwin, tbuggieh@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 2015-2016 Undergraduate Bulletin for more details.

Date	Subject	Required Reading
1/20/2016	Class Organization, Genetic Methods	(ch 1: p. 1-14; App. A)
1/22/2016	DNA as the genetic material	(ch 9: p. 215-221)
1/25/2016	Nucleic acid structure I	(ch 9: p. 221-235)
1/27/2016	Nucleic acid structure II	(ch 9: p. 221-235)
1/29/2016	Bacterial DNA organization	(ch 10: p. 239-243)
2/1/2016	Eukaryotic DNA organization	(ch 10: p. 247-253)
2/3/2016	DNA replication I	(ch 11: p. 261-276)
2/5/2016	DNA replication II	(ch 11: p. 276-281, SciTable-1)
2/8/2016	Meiosis and sexual reproduction	(ch 3: p. 45-59)
2/10/2016	Mendel I: Law of segregation	(ch 2: p. 17-25)
2/12/2016	Mendel II: Law of independent assortment	(ch 2: p. 26-37)
2/15/2016	<b>EXAM I (content through Feb. 8th)</b>	
2/17/2016	Mendelian Inheritance in Humans	(ch 2: p. 30-32, ch 4: p. 84-85)
2/19/2016	Linkage/recomb. mapping I	(ch 6: p. 126-141)
2/22/2016	Linkage/recomb. mapping II	(ch 6: p. 126-141)
2/24/2016	Central dogma, genetic code	(ch 13: p. 315-326)
2/26/2016	Bacterial Transcription	(ch 12: p. 287-295)
2/29/2016	Eukaryotic Transcription and RNA Processing	(ch 12: p. 295-309)
3/2/2016	RNA splicing and Translation I	(ch 12: p. 304-306, SciTable-2, ch13: p. 327-338)
3/4/2016	Translation II	(ch 13: p. 327-339)
3/7/2016	Bacterial gene regulation I	(ch 14: p. 344-356)
3/9/2016	Bacterial gene regulation II	(ch 14: p. 344-356)
3/11/2016	<b>EXAM II (content through March 4th)</b>	
3/14/2016	<b>SPRING BREAK, NO CLASSES</b>	
3/16/2016	<b>SPRING BREAK, NO CLASSES</b>	
3/18/2016	<b>SPRING BREAK, NO CLASSES</b>	
3/21/2016	Eukaryotic gene reg. I, transcriptional control	(ch 15: p. 368-381)
3/23/2016	Eukaryotic gene reg. II, DNA methylation	(ch 15: p. 382-385, SciTable-3)
3/25/2016	Eukaryotic gene reg. III, RNAi	(ch 16: p. 408-411, Fire/Mello article, SciTable-4)

3/28/2016	Bacterial genetics I	(ch 7: p. 156-171)
3/30/2016	Bacterial genetics II	(ch 7: p. 156-171)
4/1/2016	DNA sequencing	(ch 20: p. 512-514, SciTable-5)
4/4/2016	Research article: TBA	
4/6/2016	Research article: TBA	
4/8/2016	Gene cloning I	(ch 20: p. 496-503)
4/11/2016	Gene cloning II	(ch 20: p. 496-503)
4/13/2016	Molecular detection: blotting	(ch 20: p. 515-520)
4/15/2016	<b>EXAM III (content through Apr. 11th)</b>	
4/18/2016	Molecular detection: PCR	(ch 20: p. 503-512, SciTable-6)
4/20/2016	Studying genes and genomes	(ch 23: p. 579-586, Lamartine rev., ch 20: p. 514-515)
4/22/2016	Mutations	(ch 18: p. 443-461)
4/25/2016	DNA repair	(ch 18: p. 461-467)
4/27/2016	Genetic diversity I: Transposons/retrotransp.	(ch 19: p. 481-491)
4/29/2016	Genetic diversity II: SNPs, microsatellites	(ch 22: p. 553-559, Hartwell chapter)
5/2/2016	Restriction mapping, Course wrap up	
5/10/2016	<b>FINAL EXAM, 8:00-10:30AM, section I (Tue)</b>	cumulative
5/11/2016	<b>FINAL EXAM, 8:00-10:30AM, section II (Wed)</b>	cumulative