

Principles of Genetics, Fall 2024

BIOL 222, 3.0 credits

MWF from 9:30-10:20 AM, 10:30-11:20 AM, ISC 131

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

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

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Office hours: Mondays from 2:30-3:45 PM, Wednesdays from 8:15-9:15 AM, Thursdays 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 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

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|---|-------------------------|
| 3 semester examinations @100 points each* | 300 points |
| 1 final examination (semi-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 (class participation) | 20 points |
| | <u>476 points total</u> |

*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 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 2024-2025 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 Brightspace as well. For all emergencies, call University Police at 585-245-5222 or 911.

Copyright Protection

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| Date | Subject | Required Reading |
|------------|---|---|
| 8/26/2024 | Class Organization, Genetic Methods | (see Brightspace for pdf) |
| 8/28/2024 | DNA as the genetic material | (ch 9: p. 210-213) |
| 8/30/2024 | Nucleic acid structure 1 | (ch 9: p. 213-226) |
| | | |
| 9/2/2024 | NO CLASSES, LABOR DAY | |
| 9/4/2024 | Nucleic acid structure 2 | (ch 9: p. 213-226) |
| 9/6/2024 | Bacterial DNA organization | (ch 10: p. 230-235) |
| | | |
| 9/9/2024 | Eukaryotic DNA organization | (ch 10: p. 245-254) |
| 9/11/2024 | DNA replication 1 | (ch 11: p. 260-276) |
| 9/13/2024 | DNA replication 2 | (ch 11: p. 276-280) |
| | | |
| 9/16/2024 | Meiosis and sexual reproduction | (ch 3: p. 58-62) |
| 9/18/2024 | Mendel 1: Law of segregation | (ch 2: p. 18-27) |
| 9/20/2024 | Mendel 2: Law of independent assortment, quiz | (ch 2: p. 27-39) |
| | | |
| 9/23/2024 | EXAM 1 (content through 9/16) | |
| 9/25/2024 | Mendelian Inheritance in Humans | (ch 2: p. 32-34) |
| 9/27/2024 | Linkage/recomb. mapping 1 | (ch 6: p. 131-145) |
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| 9/30/2024 | Linkage/recomb. mapping 2 | (ch 6: p. 131-145) |
| 10/2/2024 | Central dogma, genetic code | (ch 13: p. 315-324) |
| 10/4/2024 | Bacterial Transcription | (ch 12: p. 286-294) |
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| 10/7/2024 | Eukaryotic Transcription and RNA Processing | (ch 12: p. 294-308) |
| 10/9/2024 | RNA splicing and Translation 1 | (ch 12: p. 301-306, ch 13: p. 328-339) |
| 10/11/2024 | Translation 2 | (ch 13: p. 328-339) |
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| 10/14/2024 | NO CLASSES, FALL BREAK | |
| 10/16/2024 | Bacterial gene regulation 1 | (ch 14: p. 345-358) |
| 10/18/2024 | Bacterial gene regulation 2, quiz | (ch 14: p. 345-358) |
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| 10/21/2024 | EXAM 2 (content from 9/18-10/11) | |
| 10/23/2024 | Eukaryotic gene reg. 1, transcriptional control | (ch 15: p. 370-384) |
| 10/25/2024 | Eukaryotic gene reg. 2, DNA methylation | (ch 15: p. 385-388) |
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| 10/28/2024 | Eukaryotic gene reg. 3, RNAi | (ch 17: p. 428-431, Fire/Mello article) |
| 10/30/2024 | Bacterial genetics 1 | (ch 7: p. 159-173) |
| 11/1/2024 | Bacterial genetics 2 | (ch 7: p. 159-173) |
| | | |
| 11/4/2024 | Bacterial genetics 3 | (ch 17: p. 434-436, ch 20: p. 523-526) |
| 11/6/2024 | DNA sequencing | (ch 20: p. 521-523) |
| 11/8/2024 | Gene cloning 1 | (ch 20: p. 508-516) |
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| 11/11/2024 | Gene cloning 2 | (ch 20: p. 508-516) |
| 11/13/2024 | Molecular detection: blotting | (ch 20: p. 526-528) |

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| 11/15/2024 | Molecular detection: PCR, quiz | (ch 20: p. 516-521) |
| 11/18/2024 | EXAM 3 (content from 10/16-11/11) | |
| 11/20/2024 | Studying genes and genomes | (ch 23: p. 581-583, Lamartine rev., ch 20: p. 523-526) |
| 11/22/2024 | Mutations | (ch 19: p. 472-490) |
| 11/25/2024 | DNA repair | (ch 19: p. 490-502) |
| 11/27/2024 | NO CLASSES, THANKSGIVING BREAK | |
| 11/29/2024 | NO CLASSES, THANKSGIVING BREAK | |
| 12/2/2024 | Genetic diversity 1: Transposons/retrotrans. | (ch 10: p. 238-245) |
| 12/4/2024 | Genetic diversity 2: SNPs | Hartwell reading |
| 12/6/2024 | Genetic diversity 3: microsatellites | Hartwell reading |
| 12/9/2024 | Exam 4 preparation | |
| 12/13/2024 | EXAM 4, 1030 AM section, 330-600 PM | |
| 12/16/2024 | EXAM 4, 930 AM section, 1200-230 PM | |