# BIOD 210 Genetics

**3 credits**

**Prerequisites:** BIOD 101- Essential Biology I with/Lab or equivalent
BIOD 102- Essential Biology II with/Lab or equivalent

**Instructors:** Brittany Martinez, Ph.D., Department Co-Chair
Rebekah Stepp, MS, CRNP, Department Co-Chair
Janine Bartholomew, Ph.D.
Renee Correll, DPT
Hannah McGuire, MAT

**Contact Information:** Faculty may be contacted through the Canvas messaging system

**Additional Information:** www.portagelearning.com*

**Course Meeting Times:** BIOD 210 is offered continuously

**Course Description**: This course is designed to teach the basic concepts of both classic and modern genetics. Students will study the functions and structures of chromosomes and their importance in genetic transmission to offspring. They will learn the fundamental process of genetic information transfer from DNA to functional protein products. This course will discuss the importance of genetics in understanding inheritable human diseases, including discussions of how heredity and the environment play a role in affecting our genetic constitutions and the development of disease.

**Course Goals**: As a result of this course experience a student should be able to:

- Describe the concept of hereditable traits and the basics of Mendelian genetics.
- Explain the human chromosome set and the ways that chromosomes contribute to genetic diversity. They should also understand how chromosomal mutations and aberrations can lead to inheritable genetic disorders.
- Describe the fundamentals of the transfer of genetic information from DNA to RNA to functional proteins.
- Explain that there are many genetic disorders that can be passed from parent to offspring, but also know that genetic anomalies can develop from environmental sources.
- Define ways that modern genetics has enabled biotechnology development in society and enhanced understanding and treatment of a multitude of human diseases.

*Please see the *Module Topics* section below for expanded course outcomes.

* Portage Learning college courses are offered by Geneva College, which is accredited by the Middle States Commission on Higher Education. Portage Learning is included in the College's Department of Professional and Online Graduate Studies; courses are delivered through the PortageLearning.com platform.

Each of these BIOD 210 student learning outcomes is measured:

Directly by: (1) Module review questions
(2) Module exams
(3) Final exam

Indirectly: Through use of an end of course student-completed evaluation survey

**Course Delivery:** This course is asynchronously delivered online. Contact hours include 40 - 50 hours of reviewed module assignments with instructor feedback and video lectures. There are 7 additional contact hours composed of secure online exams.

**Course Progression:** It is the policy for all Portage Learning courses that only one (module lecture/final) exam is to be completed within a 48-hour period. Research on the best practices in learning indicates that time is needed to process material for optimal learning. This means that once an exam has been completed, the next exam may not be opened or taken until 48 hours after the submission of the previous module exam. This allows for instructor feedback/class expectations as the student moves through the material. Instructors, like the College, are not available during the weekend; grading, therefore, is M-F and may take up to 72 hours during these days. Also, it is the policy of Portage Learning to support a minimum of 28 days to complete a course; this is not a negotiable time period. Please plan your time accordingly.

**Note**: Professors reserve the right to reset any exam taken in violation of these guidelines.

**Required readings, lectures and assignments:** Students are required to read the online lesson modules written by the course author which contain the standard information covered in a typical course. Please note the exam questions are based upon the readings. Video lectures which support each lesson module subject should be viewed as many times as is necessary to fully understand the material.

*We do not support the use of outside resources to study, except for the ones listed in the syllabus under "Suggested External References"*. If you have questions about the material or would like further explanation of the concepts, please contact your instructor.

**Academic Integrity** is a serious matter. In the educational context, any dishonesty violates freedom and trust, which are essential for effective learning. Dishonesty limits a student's ability to reach his or her potential. Portage places a high value on honest independent work. We depend on the student's desire to succeed in the program he or she is entering. It is in a student's own best interests not to cheat on an exam or put their work into question, as this would compromise the student's preparation for future work. It is the student's responsibility to review the **Student Handbook** and all policies related to academic integrity. If clarification is necessary, the student should reach out to their instructor for further explanation **before** initiating module one.

**Required Computer Accessories**: It is recommended that students use a desktop or laptop computer, PC or Mac, when taking the course. Some tablet computers are potentially compatible with the course, but not all features are available for all tablet computers. The latest full version of Google Chrome, Firefox, Edge, or Safari browser is required for the optimal operation of the Canvas Learning Management System. In addition, this course will use the Respondus Lockdown Browser for exams; a strong internet connection is needed. You are also **required to use LockDown Browser with a webcam**, which will record you during an online, nonproctored exam. (The webcam feature is sometimes referred to as "Respondus Monitor.") **Your computer must have a functioning webcam and microphone. Additionally, students will need a photo ID that includes your picture and full name is required. Please note, Chromebooks and tablets (other than iPad) are not compatible on exams using the Lockdown Browser.** Instructions on downloading and installing this browser will be given at the start of the course. We highly recommend using a high-speed Internet connection to view the video lectures and labs. You may experience significant difficulties viewing the videos using a dial-up connection.

For more information on basic system and browser requirements, please reference the following:
Canvas browser and system requirements: https://community.canvaslms.com/t5/Canvas-Basics-Guide/What-are-the-browser-and-computer-requirements-for-Canvas/ta-p/66
Respondus Requirements: https://web.respondus.com/he/lockdownbrowser/resources/
Respondus Monitor Requirements: https://web.respondus.com/he/monitor/resources/

## Module Topics

Module 1: In this module, students will receive a brief history of the science of Genetics stemming back to the earliest days of selective breeding to the studies of Harvey, Darwin, Mendel, and others and how their findings and theories have shaped how we study Genetics in the 21st Century. Genetic terminology will be introduced including a discussion on genes, how they are passed from parents to offspring, and how they are expressed. Finally, students will learn how the field of Genetics has shaped and is shaping modern science and biotechnology and will be introduced to various genetic models for human diseases.

Module 2: In this module, students will study the work of Gregor Mendel who examined how genetic traits are passed from parents to offspring, and how those traits are observed. Monohybrid and Dihybrid crosses will be discussed in detail with an explanation of how these early experiments and the postulates that stemmed from them shape modern genetics. Other concepts covered include genetic variation, genetic mutation, and codominance.

Module 3: This module discusses DNA, how it is structured and organized, and how it is passed from parents to offspring. The processes of Mitosis and Meiosis are covered in detail which lays the foundation for a discussion on chromosomal segregation and mapping which plays a vital role in the study of genetics. Finally, students will study how certain genes are responsible for the sex determination of offspring.

Module 4: This module focuses on bacteria and bacteriophages. While most of this course is centered around human genetics and disorders, bacteria and bacteriophages have played a vital role in genetic research and have helped scientists to understand DNA, chromosomes, and the regulation of genetic code. Students will look at how bacteria transfer genetic material via the processes of conjugation and transformation and how viruses transfer bacterial genetic material via the process of transduction.

Module 5: In this module students will discover how genetic material is stored and turned into functional molecules that cells use to carry out everyday functions. Starting with DNA replication, the module content will explain how DNA is transcribed into RNA and how RNA is translated into protein. Regulation of these processes will also be discussed.

Module 6: This module focuses on what happens when cellular and genetic regulation goes awry. Chromosomal, mitochondrial, and genetic mutations will be explained, and several resulting disorders will be discussed. Environmental mutagens and the role they play in damaging DNA and/or inducing mutations will be covered as well as a brief overview of the Ames test and how it is used in pharmaceutical development.

Module 7: In this module, students will learn about Cancer, what it is, how it is spread, and how the environment, cell cycle dysregulation, and genetic mutations contribute to it. Traditional cancer therapies will be discussed as well as emerging new therapies centered around the genetic components of the disease including gene and epigenetic therapies.

**Suggested Timed Course Schedule** (to complete the course within a typical college semester)

All Portage courses are offered asynchronously with no required schedule to better fit the normal routine of adult students, but the schedule below is suggested to allow a student to complete the course within a typical college semester. Students may feel free to complete the course on a schedule determined by them within the parameters outlined under “Course Progression.”

| Time Period | Assignments | Subject Matter |
|---|---|---|
| Days 1-14 | Module 1<br>Problem Set 1<br>Module 1 Exam | Intro to Genetics and Modern Implications |
| Days 15-28 | Module 2<br>Problem Set 2<br>Module 2 Exam | Mendelian Genetics |
| Days 29-42 | Module 3<br>Problem Set 3<br>Module 3 Exam | DNA and Chromosomes |
| Days 43-56 | Module 4<br>Problem Set 4<br>Module 4 Exam | Bacteria and Bacteriophages |
| Days 57-70 | Module 5<br>Problem Set 5<br>Module 5 Exam | DNA Replication, Transcription, and Translation |
| Days 71-84 | Module 6<br>Problem Set 6<br>Module 6 Exam | Genetic Mutations and Disorders |
| Day 85-98 | Module 7<br>Problem Set 7<br>Module 7 Exam | Genetics in human cancers |
| Day 99-112 | Final Exam | |

## Grading Rubric:

| | |
|---|---|
| Check for Understanding = | 1 pt. |
| Module Problem Sets = 10 pts. each x 7 = | 70 pts. |
| 7 Module Exams = 100 points each x 7 = | 700 pts. |
| Final Exam = 140 pts. | 140 pts. |
| Total | 911 pts. |

The current course grade and progress is continuously displayed within the student dashboard.

## Grading Scale:

96.5% - 100% = A+
92.5% - 96.4% = A
89.5% - 92.4% = A-
86.5% - 89.4% = B+
82.5% - 86.4% = B
79.5% - 82.4% = B-
76.5% - 79.4% = C+
72.5% - 76.4% = C
69.5% - 72.4% = C-
66.5% - 69.4% = D+
62.5% - 66.4% = D
59.5% - 62.4% = D-
0.00% - 59.4% = F

## Suggested External References:

If the student desires to consult a reference for additional information, the following textbook is recommended as providing complete treatment of the course subject matter:

-William Klug, Michael Cummings, Charlotte Spencer, Michael Palladino, Darrell Killian, **Concepts of Genetics (Masteringgenetics) 12th Edition,** Pearson.

-William Klug, Michael Cummings, Charlotte Spencer, Michael Palladino, Darrell Killian, **Essentials of Genetics 10th Edition,** Pearson.

*Additional works cited throughout the course can be found in the Bibliography section of the course.
**NOTE:** We do not support the use of outside resources to study, except those listed above.

## Learning Support Services:

Each student should be sure to take advantage of and use the following learning support services provided to increase student academic performance:

**Video lectures:** Supports diverse learning styles in conjunction with the text material of each module

**Messaging system**: Provides individual instructor/student interaction

**Tech support:** Available by submitting a help ticket through the student dashboard

## Accommodations for Students with Learning Disabilities:

Students with documented learning disabilities may receive accommodations in the form of an extended time limit on exams, when applicable. To receive the accommodations, the student should furnish documentation of the learning disability at the time of registration, if possible. Scan and e-mail the documentation to studentservices@portagelearning.com. Upon receipt of the learning disability documentation, Portage staff will provide the student with instructions for a variation of the course containing exams with extended time limits. This accommodation does not alter the content of any assignments/exams, change what the exam is intended to measure or otherwise impact the outcomes of objectives of the course.

## One-on-one Instruction:

Each student is assigned to his/her own instructor. Personalized questions are addressed via the student dashboard messaging system.

Online learning presents an opportunity for flexibility; however, a discipline to maintain connection to the course is required; therefore, communication is essential to successful learning. **Check your messages daily.** Instructors are checking messages daily Monday-Friday to be sure to answer any questions that may arise from you. It is important that you do the same, so you do not miss any pertinent information from us.

**Holidays:** During the following holidays, all administrative and instructional functions are suspended, including the grading of exams and issuance of transcripts.

New Year's Day
Memorial Day
Labor Day
Christmas Break
Easter
Independence Day
Thanksgiving weekend

The schedule of holidays for the current calendar year may be found under the Student Services menu at www.portagelearning.com

**Code of Conduct**: Students are expected to conduct themselves in a way that supports learning and teaching and promotes an atmosphere of civility and respect in their interactions with others. Verbal and written aggression, abuse, or misconduct is prohibited and may be grounds for immediate dismissal from the program.

This is a classroom; therefore, instructors have the academic freedom to set forth policy for their respective class. Instructors send a welcome e-mail detailing the policy of their class, which students are required to read prior to beginning the course.

**Grievances:** If a student has a complaint about the course, the student is advised to first consult the instructor of the course. After communicating with the instructor, if the matter is still unresolved, students may file a formal grievance for consideration by the Academic Review Committee. The process must be initiated via written communication to academics@portagelearning.com, with “Academic Grievance” listed in the subject line of the email.

**Remediation:** At Portage Learning we allow a "one-time" only opportunity to re-take an alternate version of **one** module exam on which a student has earned a grade lower than 70%. This option must be exercised before the final exam is started. If an exam is retaken, the original exam grade will be erased, and the new exam grade will become a permanent part of the course grade. However, before scheduling and attempting this retest, the student must resolve the questions they have regarding the material by reviewing both the old exam and the lesson module material. Once ready to attempt the retest of the exam they must contact their instructor to request that the exam be reset for the retest. Remember, any module retest must be requested and completed **before** the final exam is opened.

**Note**: Exams on which a student has been penalized for a violation of the academic integrity policy may not be re-taken.

Syllabi are subject to change as part of ongoing educational review practices.  Students are responsible for accessing and using the most recent version of the course syllabus.