

July, 2025

**Prerequisites:** General biology and chemistry

**Faculty:** Brittany Martinez, Ph.D., Department Co-Chair  
Rebekah Stepp, MS, CRNP, Department Co-Chair  
Tammie Kephart, MS, RDN, LDN, Department Co-Chair  
Heidi Burt, DPT, Department Co-Chair  
Jerrod Poe, Ph.D., and Janine Bartholomew, Ph.D., Course Authors  
[Biology Department Faculty](#)

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

**Additional Information:** [www.portagelearning.edu](http://www.portagelearning.edu)<sup>1\*</sup>

**Course meeting times:** BIOL 271 is offered continuously

**Course Description:** A systematic examination of the microbial world, with an emphasis on pathogens. Topics covered include morphology, physiology, and genetics as well as the metabolic and enzymatic reactions associated. Strategic techniques for the growth, isolation and visualization of microbes are included as are microscopic and diagnostic methods. The causative agents and treatment strategies of various pathogens are emphasized. Viral composition, replication and the associated disease states are also covered in detail. The laboratory component of this course is delivered using virtual labs and interactive simulations with detailed instruction and demonstrations from an experienced microbiologist.

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

- Identify and define the basic building blocks of life (Module 1).
- Describe the structure and function of eukaryotic and prokaryotic cells (Module 1).
- Explain the biochemical and enzymatic mechanisms underlying cellular metabolism and energy utilization (Module 2).
- Describe the different types of microscopy and staining techniques (Module 3).
- Outline the techniques and strategies used to control microbial growth in laboratory settings (Module 4).
- Describe the classifications, symptoms, and treatments of various microbial diseases (Module 5).
- Explain the underlying mechanisms of viral infections and available treatments (Module 6).

---

<sup>1\*</sup> Portage Learning college courses are offered by Geneva College, which is accredited by the Middle States Commission on Higher Education and Bushnell University, which is accredited by Northwest Commission on Colleges and Universities. The Faculty Senate of both institutions have vetted and approved the courses as part of their curriculum.

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

**Lab Outcomes:** As a result of this laboratory experience, students should be able to:

- Practice safe procedures within a laboratory and with all equipment
- Identify and explain various microbes under a microscope and discuss their properties
- Identify and explain various staining techniques used in the laboratory
- Identify and explain various plating techniques used in the laboratory
- Identify and explain various diagnostic tests used in the laboratory

\*Each of these BIOL 271 student learning outcomes is measured:

Directly by: (1) Module application problems (with instructor feedback)  
(2) Module exams  
(3) Case Studies  
(4) Adaptive Learning Exercises  
(5) Lab reports and lab exams  
(6) Cumulative final exam

Indirectly by an end of course student-completed evaluation survey

**Course Delivery:** This course is asynchronously delivered online and is composed of 40 - 50 hours of reviewed module assignments with instructor feedback, 7 contact hours of secure online module exams, 15 – 20 hours of observation of demonstration labs and maintenance of a lab notebook, and 10 hours of lab 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:** Portage courses do not use paper textbooks. 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.

**Module Problem Sets:** The practice problems within the modules are a part of your final grade, and the module work will be reviewed for completeness (not correctness) by the instructor. **Be sure to answer all of the problems, being careful to answer the questions in your own words at all times since this is an important part of adequate preparation for the exams.** After you answer the practice problems, compare your answers to the solutions provided at the end of the module. If your answers do not match those at the end, attempt to figure out why there is a difference. If you have any questions, please contact the instructor via the Canvas messaging system (see Inbox icon).

**NOTE:** Module problem sets are not an option or a choice; they are required. This means that you must complete all the review questions within the modules. Not only are problem sets class participation, they are the best way to prepare for the exams.

**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 & Lab Topics:**

- Module 1: This module includes an in-depth overview of the microbial world. An introduction to macromolecules and how small subunits can form large complex molecules is discussed. Content also includes a comparison of prokaryotic and eukaryotic cells. Cellular organelles and their respective functions are then presented.
- Module 2: In this module students learn about various strategies microbes may exploit in order to maintain and sustain life. Content also includes a complete overview of the biochemical processes of microbial metabolism, enzymatic reactions and alternative energy sources utilized to maintain these processes.
- Module 3: In this module the concepts of microscopy are introduced. Included are discussion on the varying types, benefits and disadvantages of each microscope. Accompanying microscopy, various staining techniques are described in order to visualize varying types of microbes.
- Module 4: In this module students will learn multiple techniques scientists use to grow, isolate and identify bacteria. Content includes an assortment of agar plate types, plating strategies and how to obtain a pure culture. This module also includes a discussion on bacterial isolation for real-world applications and safe practice methodologies.
- Module 5: This module covers appropriate usages for personal protective equipment (PPE). Pathogenic microbes are discussed relative to common causative agents. Symptoms, identification and treatment plans are outlined. Diseases covered affect the skin, the eye, the nervous system, and the cardiovascular/lymphatic systems.
- Module 6: This module contains an in-depth discussion on viruses. Content includes the various forms, structures and types of viruses as well as a generalization of the replication cycle. Pathogenic viruses, disease manifestations, symptoms and treatment options are outlined.

- Lab 1: In this lab students learn lab safety, how to maintain a lab notebook as well as identification and function of general lab equipment.
- Lab 2: In this lab students learn how to use a light microscope. General concepts are discussed as well as its respective parts, purpose and function in microbiology.
- Lab 3: In this lab students learn about gram staining. Content also includes discussion about the properties of various microbes introduced throughout the lab video.
- Lab 4: In this lab students learn about the various forms of liquid and solid (agar plate) growth media and how each can be used to safely cultivate a known or unknown microorganism.
- Lab 5: In this lab students learn about antibiotic sensitivity tests (Kirby-Bauer Method). Included is a discussion on antibiotic resistant bacteria and its impact on the options available for disease treatment.
- Lab 6: In this lab students learn how to test for the presence (or absence) of enzymatic activity within a microbe. Tests include oxidase, catalase, coagulase and lipase.
- Lab 7: In this lab students learn about secondary characterization assays (Indole, TSI and API) and how identifying various metabolic properties can aid in the accurate identification of an unknown microbe.
- Lab 8: In this lab students will learn biochemical assays used to further characterize and identify various microbes. Techniques include Western Blotting, ELISA and agglutination tests.
- Lab 9: In this lab students get a practical application of identifying an unknown microbe by running a series of diagnostic tests. Identification of the unknown microbe is based on the recorded observations (lab notebook) made previously throughout the course.

### Requirements for Lab:

For the laboratory portion of the course, students will observe an experienced lab instructor. It is the responsibility of the student to view each lab video in its entirety. **Students are required to keep an electronic lab notebook.** The electronic notebook should be downloaded and utilized for all lab modules. The provided electronic notebook is located under the section entitled "Lab Resources". It is a graded component of the course and must be submitted prior to the related lab exam. The lab notebook, alone, can be used as a resource to the student while taking their lab exam(s). Please note that the use of outside material (i.e. the internet, textbooks, articles, etc.) is not permitted while taking the lab exams. A recommended lab schedule

can be found on the home page of each lab. The student should follow this schedule in order to meet course objectives.

**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.”

<b><u>Time Period</u></b>	<b><u>Assignments</u></b>	<b><u>Subject Matter</u></b>
Days 1-35 (5 weeks)	Module 1 with Module 1 Exam Lab 1 with Lab 1 Exam Module 2 with Module 2 Exam Module 3 with Module 3 Exam Lab 2 with Lab 2 Exam Lab 3 with Lab 3 Exam	Overview of biochemistry, metabolism and enzymes
Days 36-64 (4 weeks)	Module 4 with Module 4 Exam Lab 4 with Lab 4 Exam Lab 5 with Lab 5 Exam	Overview of microscopy, microbial cultivation, isolation strategies and numerous staining techniques
Days 65-100 (5 weeks)	Module 5 with Module 5 Exam Lab 6 with Lab 6 Exam Lab 7 with Lab 7 Exam Module 6 with Module 6 Exam Lab 8 with Lab 8 Exam	Overview of common pathogenic microbes, viruses and the numerous medical conditions they elicit.
Days 101-108	Final Lab 9 and Lab 9 Exam	Unknown sample based on recorded results in lab notebook
	Final Exam	Based upon module material

### Grading Rubric:

Check for Understanding =	1 pt.
6 Module Problem Sets = 5 pts. each x 6 =	30 pts.
6 Module Exams = 100 points each x 6 =	600 pts.
6 Case Studies = 20 pts. each x 6 =	120 pts.
8 Lab Exams = 30 points each x 8 =	240 pts.
9 Lab Notebooks = 5 points each x 9 =	45 pts.
Final Lab Exam = 50 points each x1 =	50 pts.
<u>Final Exam = 120 pts.</u>	<u>120 pts.</u>
Total	1,206 pts.

The current course grade and progress is continuously displayed on the student desktop.

### 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% - 59.4% = F

### Suggested External References:

If the student desires to consult a reference for additional information, the following textbooks are recommended as providing complete treatment of the course subject matter.

- Bruce Alberts, **Essential Cell Biology**, Garland Science
- Patrick R. Murray, **Medical Microbiology**, Saunders

**NOTE:** We do not support the use of outside resources to study, except the ones 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.edu](mailto:studentservices@portagelearning.edu). 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

Easter

Juneteenth

Labor Day

Christmas Break

MLK Day

Memorial Day

Independence Day

Thanksgiving weekend

The schedule of holidays for the current calendar year may be found under the Student Services menu at [www.portagelearning.edu](http://www.portagelearning.edu)



**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 coursework or the instructor, the student is advised to first consult the instructor, who will be willing to listen and consider your concern. To file a formal grievance for consideration by the Academic Review Committee, the process must be initiated by requesting an appeal form from [academics@portagelearning.edu](mailto:academics@portagelearning.edu).

**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.