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Prerequisites: High-school biology and chemistry

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

Additional Information: www.portagelearning.edu^{1*}

Course Meeting Times: BIOL 101 is offered continuously

Course Description: This course will provide students with an introduction to the fundamental laws, theories, and concepts of biology. Topics include chemical principles and the biological chemistry associated with cellular structure and function; taxonomy and the organization of life; the structure and function of macromolecules; the basic structure of cells; energy and cellular respiration; the genetic basis of cellular division, regulation, and the means of inheritance; the mechanistic approaches to cellular signaling; microbiology and the mechanisms employed by both foreign and host defenses. The laboratory component of this course is delivered using virtual labs and interactive simulations with detailed instruction and demonstrations from an experienced instructor.

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

- Explain the principles of cellular structure, organization, function, and biological chemistry.
- Define the basic characteristics of life and general guidelines for the classification of organisms.
- Explain the processes and biological reactions involved in cellular respiration.
- Define the processes underlying the cell cycle, mitosis, and meiosis.
- Describe the basic structure of DNA and the principles of inheritance.
- Describe the molecular concepts of cell signaling and controlled cell death.
- Explain the immunological responses to various microbiological pathogens.

**Please see the [Module & Lab Topics](#) section below for expanded course outcomes.*

^{1*} 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.

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

- To define laboratory safety, experimental techniques, and best practices
- To identify and explain the various components of a light microscope
- To explain the concept of variables with a laboratory experiment and the essential components of scientific writing
- Explain the principles of fluid and ion movements relative to osmosis, diffusion and tonicity
- To evaluate how varying conditions can alter cellular respiration
- To describe and then evaluate changes in enzymatic activity
- Explain the principle of DNA gel electrophoresis

Each of these BIOL 101 student learning outcomes is measured:

- Directly by:
- (1) Module application problems (with instructor feedback)
 - (2) Adaptive learning exercises
 - (3) Case studies
 - (4) Module exams
 - (5) 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 45 - 55 hours of reviewed module assignments with instructor feedback, 6 contact hours of secure online module exams, 12 – 16 hours of observation of demonstration labs and 7 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: In this module, students will be introduced to the chemical principles and the biological chemistry associated with cellular structure and function. Students will learn how to identify cellular organelles, understand the major functions of each, and how they work together within a cell. The role of macromolecules within a cell will be examined. Students will then be introduced to the structural and functional aspects of the cell membrane as well as the different types of osmotic gradients and modes of transport utilized within the cellular environment.
- Module 2: In this module, the major characteristics and levels of structure will be explained for the 3 major domains. In addition, classifications and cell features (organelles and organization) will be discussed, compared, and contrasted for the different kingdoms. This module will also introduce a variety of model systems commonly used to study biological processes.
- Module 3: In this module, students will begin with an introduction to basic catabolic and anabolic biological reactions. Students will then receive a comprehensive overview of the key metabolic processes of aerobic (glycolysis, TCA and ETC) and anerobic (fermentation) respiration and how energy (ATP) is harvested and used by the cell. Enzymatic reactions, including an overview of competitive and non-competitive inhibition will be discussed.
- Module 4: This module contains an in-depth discussion on the cell cycle (mitosis and meiosis) and the cellular machinery that governs the processes. In addition, common disease states that arise as a consequence of cell cycle dysregulation will be examined. Mendelian genetics and the concepts of inheritance and genetic crosses will be discussed. Examples of genetic disorders and conditions will be discussed.
- Module 5: In this module, students will be introduced to cellular signaling. Content includes a comprehensive biological overview of the molecular signaling mechanisms that governs cell

communication. Receptors and the modes of signal transduction, secondary messengers, and downstream response cascades will be discussed. Signal termination, feedback pathways, and apoptotic signaling will be included as well.

- Module 6: In this module, students will be introduced to microbiology and immune responses. Methods for identifying and visualizing prokaryotic and eukaryotic cells based upon structural characteristics, shape, and movement are emphasized. Strategies of the innate and adaptive immune system defenses and the mechanisms employed when activated are examined. Common pathogens and the disease states associated from evading host defenses are also included.
- Lab 1: In this lab, students will be introduced to the principles of lab safety and personal protective equipment (PPE), the scientific method, and the components of a laboratory notebook.
- Lab 2: In this lab, students will be introduced to the metric system as it pertains to recording length, mass, and volumetric measurements and the conversions often required between SI and metric units within health-related fields.
- Lab 3: In this lab, students will cover the basic components and functions of a light microscope. The principles of magnification, resolution, and contrast are covered and then expanded into the different types of microscopy including fluorescence, SEM, and TEM.
- Lab 4: In this lab, students will cover the principles of osmosis, tonicity, and concentrations. Lab experiments are designed to demonstrate how gradients can affect cell viability and cellular composition.
- Lab 5: In this lab, students will examine cellular respiration and the associated regulatory and feedback mechanisms used to maintain equilibrium.
- Lab 6: In this lab, students will assess enzymatic activity under varying conditions of temperature and pH. Students will be tasked with analyzing and then determining the optimal ranges for maximum enzymatic activity.
- Lab 7: In this lab, students will be introduced to the technique of gel electrophoresis. The associated processes of restriction enzyme digests and polymerase chain reactions (PCR) will be discussed, along with various applications.

Required labs and assignments:

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 and only mark the lab as “done” when it is completed. **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 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.”

<u>Time Period</u>	<u>Assignments</u>	<u>Subject Matter</u>
Days 1-14 (2 weeks)	Module 1, Exam 1 Lab 1 and Lab Exam 1 Lab 2 and Lab Exam 2	Overview of biological chemistry and cell biology
Days 15-28 (2 weeks)	Module 2, Exam 2 Lab 3 and Lab Exam 3	Properties of Life
Days 29-43 (2 weeks)	Module 3, Exam 3 Lab 4 and Lab Exam 4 Lab 5 and Lab Exam 5	Cellular Respiration
Days 44-58 (2 weeks)	Module 4, Exam 4 Labs 6 and Lab Exam 6	Heredity, Inheritance, and the Cell Cycle
Days 59-73 (2 weeks)	Module 5, Exam 5 Lab 7 and Lab Exam 7	Cell Signaling
Days 74-88 (2 weeks)	Module 6, Exam 6	Microbiology and Immune Responses
Days 89-95	Final Exam	Based upon module material

Grading Rubric:

Check for Understanding =	1 pt.
6 Sets of Problem Sets = 5 pts each x 6 =	30 pts.
6 Case Studies = 10 pts. each x 6 =	60 pts.
6 Module exams = 100 pts. each x 6 =	600 pts.
7 Lab exams = 30 pts. Each x 7 =	210 pts.
<u>Final exam = 120 pts.</u>	<u>120 pts.</u>
Total	1021 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

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.

- Lisa Urry, et al., **Campbell Biology AP Edition**, 11th edition, Pearson

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. 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

MLK Day

Easter

Memorial Day

Juneteenth

Independence Day

Labor Day

Thanksgiving weekend

Christmas Break

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

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.