

BIOL 112

Introduction to Cellular Biology and Genetics

2025-2026

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COURSE DESCRIPTION

BIOL 112 (4 cr.) – Introduction to Cellular Biology and Genetics: This course provides an overview of basic biochemistry, cell biology and metabolism, and principles of genetics. Course includes wet and dry lab components. Taught at participating high schools to their selected, qualified students. Liberal arts.

MATERIALS

Textbook:

Biology, 10th edition. 2010. Sylvia S. Mader. New York: McGraw-Hill Higher Education
ISBN 978-0-07-352543-3

Lab Manual:

Lab Manual for Biology, 11th edition. 2012. Sylvia S. Mader. New York: McGraw-Hill Higher Education
ISBN 978-0-07-747971-8

**Must also bring a charged iPad and Logitech stylus provided by the school. You are responsible for both and must report any damages.*

LEARNING OBJECTIVES

Departmental goals (DG) and course objectives (CO) reflect the Biology program of Houghton College and include the following:

DG1: Develop a strong foundation of fundamental biological concepts from the major areas within biology.

- **CO:** Define basic physical and chemical principles that underlie cellular and genetic processes.
- **CO:** Identify and expound significant biological theories and concepts.

DG2: Demonstrate familiarity with the key theoretical concepts that unify the major areas of biology.

- **CO:** Describe the molecular and cellular basis for the form and function of processes in cells.
- **CO:** Explain the organization and transfer of genetic information.
- **CO:** Explore relationship between structure and function at the molecular, cellular, and system level.

DG3: Develop critical thinking skills related to experimental design in order to answer biological queries.

- **CO:** Analyze and evaluate methodological procedural elements of the scientific method.
- **CO:** Identify and construct hypotheses and variables to address a scientific question.
- **CO:** Interpret data and draw conclusions based on scientific reasoning.

DG4: Acquire laboratory and field skills necessary to answer biological questions.

- **CO:** Perform a variety of lab techniques successfully including: pipetting, light microscopy, enzymatic reactions including restriction digest, gel electrophoresis, and PCR.
- **CO:** Apply basic statistical principles to understand genetic mechanisms.
- **CO:** Develop laboratory safety acumen.

DG5: Communicate precisely and analytically in written forms.

- **CO:** Produce a research publication-style lab report that combines a summary of relevant research, an application of learned techniques, an analysis of the data, and an evaluation of an executed experiment.

TENTATIVE SCHEDULE AND CONTENT

Week	Content	Reading	Lab
1	Introduction		Metrics and Conversions
2	Nature of Science/Scientific Inquiry	Chapter 1	Scientific Method
3	Basic Chemistry	Chapter 2	Microscopy
4	Water, Acids, and Bases	Chapter 2	pH and Buffers
5	Organic Molecules	Chapter 3	Cell Composition
6	Organic Molecules	Chapter 3	Cell Composition
7	Organic Compound Project/ Presentation and Exam 1 Prep		Project
8	Cell Introduction	Chapter 4	Cell Structure/Function
9	Cell Organelles	Chapter 4	Cell Structure/Function
10	Cell Membrane	Chapter 5	Diffusion/Osmosis
11	Cell Membrane	Chapter 5	Diffusion/Osmosis

12	Metabolism: Energy and Enzymes	Chapter 6	Enzymes
13	Metabolism: Energy and Enzymes	Chapter 6	Enzymes
14	Scientific Writing (Lab Report) and Exam 2 Prep		Lab Report
15	Cell Respiration	Chapter 8	Respiration
16	Cell Fermentation	Chapter 8	Fermentation
17	Photosynthesis	Chapter 7	Photosynthesis
18	Photosynthesis	Chapter 7	Photosynthesis
19	Cell Cycle and Cellular Reproduction	Chapter 9	Cell Cycle and Mitosis
20	Cancer	Chapter 9	Cell Cycle and Mitosis
21	Scientific Writing (Lab Report) and Exam 3 Prep		
22	Meiosis and Sexual Reproduction	Chapter 10	Meiosis and Patterns of Inheritance
23	Meiosis and Sexual Reproduction	Chapter 10	Meiosis and Patterns of Inheritance
24	Mendelian Patterns of Inheritance	Chapter 11	Genetics
25	Mendelian Patterns of Inheritance	Chapter 11	Genetics
26	DNA	Chapter 12	Gel Electrophoresis
27	DNA Replication/Repair	Chapter 12	Gel Electrophoresis
28	Protein Synthesis	Chapter 12	PGLO Bacterial Transformation
29	Protein Synthesis	Chapter 12	PGLO Bacterial Transformation
30	Scientific Writing (Lab Report) and Exam 4 Prep		
31	Gene Regulation	Chapter 13	Animal Development
32	Animal Tissues		Dissections

COURSE POLICIES AND EXPECTATIONS

Academic Honesty/Plagiarism

Students are expected to complete their own work. It is dishonest to ask other students to copy their work such as exams, quizzes, projects, papers, research, etc. or copy sources directly without citation. Be sure to recognize sources that you have used to obtain aid or information. Any work that

involves cheating or plagiarism will result in a score of 0.

Academic Disabilities

If you have an academic disability that requires special accommodations or modifications, such arrangements will be made with the instructor and the Special Education Department of Genesee Valley Central School. IEP and 504 plan accommodations will be followed.

Digital Citizenship

Only authorized devices will be allowed to be used in the room and there should be no interruptions from any electronic devices. Cell phones and earbuds will remain in locker or turned off in bag.

Classroom Expectations

1. **RESPECT**. Respect for fellow classmates, teachers, school property and rules, as well as yourself is expected on a daily basis.
2. Arrive to class **ON TIME AND PREPARED** to begin everyday. I expect all students to be in their seats and have all necessary materials (device, writing utensil, etc.) when the bell rings. There will be a warm-up to start each class and without being told, students should begin this work. After the bell rings, students will be quiet and ready to learn.
3. During instruction time it is expected that students demonstrate respectful body language, actively participate, and raise their hands to speak. Do not blurt out comments, interrupt peers, or disrupt class.
4. When working with partners or groups be respectful of others ideas and keep comments positive. If there is a problem, please speak to me privately and quietly. Although you may work with peers, students will do their **OWN** work.

Late Work

It is expected that you complete assignments on time. Work will be due at the beginning of class and may not be completed during instructional time of the day it is due. A **25%** deduction in the grade will result for each day the assignment is late. After 4 days, assignments will receive a 0.

Attendance and Absences

To be successful it is important to attend each class, arrive on time, and be prepared to actively participate. If you are arriving late, you must come with a signed pass from a teacher or faculty member and be sure to not interrupt instruction for your peers. If you are absent, it is your responsibility to **COMMUNICATE** by coming to me. Please see me *before or after* class but never during class time to discuss what needs to be made up and what you have missed. When you are absent, you are still responsible for all material and announcements made in class. You will have the same number of days that you were absent to make up the missed assignments.

Lab Attendance

If a lab class is missed, it is required to make up the seat time to receive a full credit lab grade. Thirty percent will be deducted from the lab grade if the missed lab is not rescheduled in a timely manner. It will be your responsibility to communicate and reschedule.

Lab Expectations

All rules must be followed when conducting a lab. Failure to comply may result in the student being omitted from lab and possibly receiving a zero on the assignment. Some of the lab rules are as follows:

- Behave responsibly
- Follow the lab directions carefully
- Report any accidents immediately

- Wear appropriate safety equipment such as goggles, gloves and/or apron when instructed
- No eating, drinking, or chewing gum
- Dress appropriately (no dangly jewelry and hair must be pulled back)
- Handle glassware with care
- Be extremely careful around hot items such as burners or hot plates

COURSE REQUIREMENTS

Exams (40%) An exam will be given each quarter for a total of 4 exams throughout the course. Approximately 3-4 chapters will be covered during each exam. Review sessions will be offered.

Quizzes (15%) Quizzes are used often to evaluate student knowledge, address misconceptions, and evaluate progress. Quizzes will be given at the end of each chapter. A lab quiz will also be given at the end of each lab.

Homework (10%) will allow students to practice the concepts they are learning and critically apply their knowledge. These assignments will include reading guides, case studies, and/or practice problems. Students will have at least two homework assignments per week.

Laboratory assignments (20%) help develop appropriate laboratory skills and enhance students' understanding of underlying concepts. Students will work on lab each week and when the lab experience is complete, the lab will be due the following day.

Lab reports and papers (15%) During the **lab report** students will demonstrate their knowledge of scientific writing. A formal lab report will be compiled on a laboratory experience completed in class. The report gives students the opportunity to research, analyze, evaluate, and synthesize their findings and their skills. Due dates TBA on a rough draft and final draft.

The **research paper and presentation** topic will correspond with content from chapter 4. Students will be asked to research a topic using credible sources, create a presentation of their research, and appropriately cite all findings. Students will present to their peers.

GRADING PROCEDURES

Weights

Exams.....	40%
Quizzes.....	15%
Homework.....	10%
Lab Assignments.....	20%
Lab Reports/ Papers.....	15%

Total.....100%

Grading Scale (Departmental) from Houghton

A	95 – 100%	C	74 – 76%
A-	90 – 94%	C-	70 – 73%
B+	87 – 89%	D+	67 – 69%
B	84 – 86%	D	64 – 66%
B-	80 – 83%	D-	60 – 63%
C+	77 – 79%	F	<60%

**The final grade reported to Houghton does not include the 5 bonus points added by Genesee Valley*

TIME ON TASK ESTIMATES

A well-prepared student should spend a minimum of *4 hours per week* beyond direct instructional time. If you are spending less time than this, you might not be dedicating enough time to learn the material thoroughly.

Activity	Minimum Time	Year Sum (min.)
Class time	135 min./week	4,455
Laboratory	90 min./week	2,970
Assigned Reading	4 min/page	1,600
Homework	30 min/assignment	1,980
Formal Lab Report	3 hrs/page	1,800
Research paper and presentation	45min./class	450
Studying for Exams	4 hrs./exam	960
	TOTAL	14,215

For Students

I have read the above procedures and understand the expectations. I am committed to following them over the course of this school year.

Student Signature _____ Date _____