COURSE INFORMATION

COURSE TITLE
BIO 111—Gen College Biology I with Lab

COURSE DESCRIPTION
Examines the fundamental molecular, cellular and genetic principles characterizing plants and animals. Includes cell structure and function, and the metabolic processes of respiration, and photosynthesis, as well as cell reproduction and basic concepts of heredity. The course includes laboratory experience. This course is a Statewide Guaranteed Transfer course.

CREDIT HOURS
5

GUARANTEED TRANSFER (GT) PATHWAYS COURSE STATEMENT:
The Colorado Commission on Higher Education has approved BIO111 for inclusion in the Guaranteed Transfer (GT) Pathways program in the GT- SC1 category. For transferring students, successful completion with a minimum C– grade guarantees transfer and application of credit in this GT Pathways category. For more information on the GT Pathways program, go to https://highered.colorado.gov/academics/transfers/gtpathways/curriculum.html

SUGGESTED PREREQUISITE KNOWLEDGE
None

CCCOnline Course Policies
The CCCOnline Course Policies page contains information about the student's role in the classroom, grading policies, and rights and responsibilities.
COURSE MATERIALS

All course reading material is available online and linked within the course site. You do not need to purchase any additional textbook materials. However, you will need to purchase a microscope and lab kits.

MINIMUM COMPUTER REQUIREMENTS

To complete this course, you will need regular access to a computer from which you can access the internet and use email. In order to ensure that your course functions properly, you must run the System Check. This is a critical step, and taking the time to do it now will eliminate a tremendous amount of frustration for you later. To run the System Check, select Tools in the course NavBar, and then select System Check.

REQUIRED eTEXT

MAIN eTEXT


REQUIRED MICROSCOPE

A 400x or 600x power microscope available through your bookstore, local sources, or online. The microscope is not included with your lab kit and must be purchased separately. If you will be continuing on to take BIO 204—Microbiology, please consider purchasing a microscope that is 600x-1000x with the option for an oil immersion lens.

REQUIRED LAB KIT

Your required lab kit will be shipped to you after the drop date for this semester. You do not need to purchase the lab kit separately; it is included in your course fees.

On the first day you access the course, submit your shipping address one of two ways:

1. Via a pop-up window that appears in your course for you to submit your shipping address. This must be done prior to the drop date.
   - Students who live abroad should complete this form by the third day of class.
   - The address you provide must be a physical address and not a P.O. box. Lab kits are sent via UPS, which is unable to deliver to a P.O. box.
2. Via a link on your course homepage near the top right where you can fill in your address. *This link will be available until the drop date for the semester.*

You only need to submit your address one time.

- Lab kits are ordered 3 days following the drop date and take approximately 10 business days in transit.
- If you do not receive your lab kit tracking information at your student.cccs.edu email account within one week after the drop date, please contact your instructor and the CCCOnline Bookstore at bookstore@ccconline.org. (Make sure to check your spam folder before contacting the instructor and bookstore.)
- Once the kits are ordered, your instructor will tell you the specific date to contact her/him if you have not received your lab kit by that date.
- If you do not receive your lab kit due to an old or inaccurate mailing address, there will be no deadline extensions for lab assignments. CCCOnline is not responsible for delays or lost lab kits due to customs or APO processing.

See the *Lab Kit FAQs* section, located in the *Lab Information* section in the *Syllabus* module, for more information.
COURSE COMPETENCIES AND OUTCOMES

STUDENT COMPETENCIES

The competencies you will demonstrate in this course are as follows:

A. Recognize terminology, specific facts, experimental methodologies, and general concepts related to basic chemistry, cell structure and function, cell reproduction, bioenergetics, and genetics.
B. Read, analyze and apply the concepts learned to interpret new situations.
C. Distinguish between the principles and purposes of procedures and techniques introduced in the laboratory.
D. Describe the role of research in the biological sciences and its impact on society.
E. Employ the scientific method to the extent of formulating a hypothesis, designing a set of experiments with controls, analyzing results, and deriving conclusions.
F. Interpret and manipulate data in a variety of formats, such as graphs, tables, and charts.
G. Select and apply contemporary technologies to solve problems or compile information.
H. Write and speak clearly and logically in presentations and essays.

The module outcomes that will permit you to demonstrate course competencies are:

MODULE 1

<table>
<thead>
<tr>
<th>Outcomes</th>
<th>Competencies</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Define science and biological inquiry, and compare basic and applied biology.</td>
<td>A, D</td>
</tr>
<tr>
<td>2 List and briefly describe the main themes in biology.</td>
<td>A</td>
</tr>
<tr>
<td>3 Recall the correct unit of measurement to measure mass, volume, and length, and convert measurements in the metric system.</td>
<td>F</td>
</tr>
<tr>
<td>4 Recall terminology related to basic biology, chemistry, macromolecules, and cell structure.</td>
<td>A</td>
</tr>
<tr>
<td>5 Describe what pH is and how it is measured, and analyze the pH of a solution.</td>
<td>A, C, G</td>
</tr>
<tr>
<td>6 Describe the basic structure and function of the four classes of macromolecules, including breakdown and synthesis reactions.</td>
<td>A, B, C, G</td>
</tr>
<tr>
<td>7 Determine the biological macromolecules that make up a food item.</td>
<td>B, C, G</td>
</tr>
<tr>
<td>8 Utilize the scientific method to construct a hypothesis, write a method, record results, and draw conclusions.</td>
<td>B, E</td>
</tr>
<tr>
<td>9 Apply basic chemistry, macromolecules, and cell structure concepts to a real-world case.</td>
<td>A, B</td>
</tr>
<tr>
<td>10 Reflect on and critically evaluate labs that are performed to evaluate wherein learning can be applied in new situations.</td>
<td>B, F, H</td>
</tr>
</tbody>
</table>
MODULE 2

Outcomes
1. Predict the effects of changing cell size on surface area to volume ratio and why this limits cell size on the upper end.
2. Recognize and describe the basic structure and function of cell organelles.
3. Recall terminology related to the cell, diffusion, transport, and cell signaling.
4. Compare and contrast the structure of plant and animal cells.
5. Describe how the lipid bilayer and transport proteins impact transport across cell membranes.
6. Apply the knowledge of selective toxicity to how antibiotics function, and predict the efficacy of an antibiotic based on your knowledge of cell structure and selective toxicity.
7. Discuss the rising problem of antibiotic resistance.
8. Identify the parts of a microscope.
9. Recognize whether a cell is from a plant or an animal, and give an appropriate rationale.
10. Reflect on and critically evaluate labs that are performed to evaluate wherein learning can be applied in new situations.
11. Describe the evolutionary similarities and differences between bacterial and eukaryal cells.
12. Differentiate among the types of microscopes used in a biology lab.
13. Demonstrate and explain how to use a compound light microscope.
14. Utilize the scientific method to construct a hypothesis, write a method, record results, and draw conclusions.

Competencies
A, B
A
A
A
A, B
A, B, D
D
C, G
A, B
B, F, H
A
C, G
C, G
B, E

MODULE 3

Outcomes
1. Recall terminology related to enzymes, ATP, photosynthesis, and cellular respiration.
2. Identify the main steps of photosynthesis, and describe the importance of it to life on earth.
3. Utilize the scientific method to construct a hypothesis, write a method, record results, and draw conclusions.
4. Explain the role of metabolites in cellular respiration.
5. Identify the factors that impact enzyme activity.
6. Apply knowledge of cellular respiration to determine the causes of carbon monoxide poisoning.
7. Recognize different types of enzyme regulation, including allosteric activation, allosteric inhibition, and feedback inhibition.
8. Reflect on and critically evaluate labs that are performed to evaluate wherein learning can be applied in new situations.
9. Create a correctly labeled graph of the results.
10. Compare and contrast fermentation, aerobic respiration, and anaerobic respiration.
11. Define chromatography, and explain how it allows for separation of plant pigments.

Competencies
A
A
B, E
A
A, B
A, B
A
A
B, H
F, G
A, B
A, B
Module 4

Outcomes
1. Predict the mode of inheritance of a specific disorder.
2. Determine the health consequences of high cholesterol and its link to genetics.
3. Identify an individual’s phenotype, genotype, and the probability of inheritance disorders.
4. Differentiate between homozygous and heterozygous traits, dominant and recessive alleles, and genotypes and phenotype.
5. Compare and contrast mitosis, meiosis, and binary fission as modes of cell division, including process and function of each.
6. Reflect on and critically evaluate labs that are performed to evaluate wherein learning can be applied in new situations.
7. Explore and describe the effects of various factors (density dependence, growth factors, checkpoints) on the cell cycle.
8. Utilize the scientific method to construct a hypothesis, write a method, record results, and draw conclusions.
9. Demonstrate how to use the chi square test and Punnett squares.
10. Discuss how mutations may lead to uncontrolled mitosis, resulting in cancer.

Competencies
A, B
A
A, B
A
A, B
B, F, H
A, D, E, F, H
B, E
A, E, G
A, B, E

Module 5

Outcomes
1. Explain what types of genes, when mutated, can lead to an increased risk of cancer.
2. Predict how a particular mutation affects, or doesn’t affect, protein structure.
3. Explain how inheritance of a gene increases risk of cancer, but does not lead to the certainty of cancer.
4. Define epigenetics, how it relates to gene expression, and methods for studying it.
5. Reflect on and critically evaluate labs that are performed to evaluate wherein learning can be applied in new situations.
6. Apply biology terminology, specific facts, experimental methodologies, and general concepts related to basic chemistry, cell structure and function, cell reproduction, bioenergetics, and genetics from Modules 1-5 to a real-world case.
7. Utilize the scientific method to construct a hypothesis, write a method, record results, and draw conclusions.
8. Explore information related to DNA structure and function, genes and proteins, gene expression, biotechnology, and genomics.
9. Define transformation, and describe why it is used in molecular biology and genomics labs.
10. Demonstrate transcription and translation using beads, and explain how mutations can impact these processes.
11. Compare and contrast the structure and function of DNA and RNA.

Competencies
A
A, B
A, B
A
A
A, B
A, B
A
A
A
**Grading and Evaluation**

**Methods**

The methods for evaluation include a combination of evaluating discussion participation, labs, and assignments. Rubrics will be provided for the evaluation. Information on accessing rubrics is provided on the *Course Rubrics* page in the *Syllabus* module of course content.

This page summarizes all of the graded assignments for the course. You should print it out and post it somewhere that is easily accessible.

*This course is not self-paced and is not open-exit. All work is to be completed before 11:59 p.m. MT on the due date listed on the Course Schedule page.*

**Grading Policies**

Mark all module due dates on your calendar for this class. You may submit assignments ahead of schedule. Assignments, discussions, and labs will be given throughout the term with set due dates. See the *Course Schedule* page for these dates, and make note of them in your calendar. The instructor will communicate any changes to these due dates to the class.

Your final grade in this course will be based on the total points that you earn. The grades are final and non-negotiable. They are a measure of your own aptitude and effort. It is expected that you will accept your own performance as an integral part of yourself.

**Deadlines**

This course is not designed to be self-paced. Within the schedule of the course, though, you have great flexibility with your study time. For the most part, the course is organized according to the week of the semester. Assignments and labs are spread throughout the course, and they have specific deadlines; you must submit each assignment before its deadline expires. If you have an emergency resulting in a missed due date, contact your instructor as soon as possible. No late work is accepted in this course (except in the case of documented emergencies, such as a doctor’s note, military papers, etc.). Due dates will be enforced. Please remember, due to the nature of an online course, it is the student’s responsibility to have access to a functioning computer in order to complete the coursework. Late assignments will not be accepted without prior approval.

It is strongly recommended that you do not wait until the last minute to complete or submit assignments. There are many things that can and do go wrong: your internet connection might go down, your computer’s hard drive may crash, or you may get ill. You are welcome (and encouraged) to work ahead of schedule to submit work before it is due. Please contact your instructor if you have any
questions about what is being asked in any assignment or discussion question. The goal here is learning. Keep that in mind, and enjoy the course.

COMMUNICATING DIFFICULTIES/ABSENCES

It is your responsibility to contact the instructor in a timely manner if you become ill or have scheduling or computer problems that would keep you from participating in course activities for an entire week.

KEEP A COPY OF ALL SUBMISSIONS

Be sure to save copies of everything you send to the instructor, including both emails and assignments. Murphy's Law of the Computer seems to be that what can go wrong, will.

SUMMARY OF GRADING

<table>
<thead>
<tr>
<th>Assignment</th>
<th>Points</th>
<th>%</th>
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<tbody>
<tr>
<td>Discussions</td>
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<tr>
<td>Discussions (10 @ 15 points each)</td>
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<tr>
<td>Explore and Report</td>
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<tr>
<td>Modules 1-4 (5 @ 60 points each)</td>
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<tr>
<td>Final (1@ 100 points)</td>
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<tr>
<td>Lab Activities</td>
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<tr>
<td>Lab Kits (9 @ 40 points each)</td>
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<tr>
<td>Formal Report (1 @ 40 points each)</td>
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<tr>
<td>Exams</td>
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<tr>
<td>Midterm Exam (1 @ 100 points each)</td>
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<tr>
<td>Final Exam (1 @ 100 points each)</td>
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<tr>
<td>TOTAL</td>
<td>1190</td>
<td>100.0%</td>
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Grading Scale

A = 90 to 100%  B = 80 to 89%  C = 70 to 79%  D = 60 to 69%  F = 59% and below
DISCUSSIONS

1. You have two types of discussions each module: Ask Questions and Construct a Hypothesis discussions AND Drawing Conclusions discussions. In the Ask Questions and Construct a Hypothesis and Drawing Conclusions discussions, you are doing research, asking questions, and drawing conclusions in order to understand biological concepts more deeply. All references must be cited using APA Style. Please refer to the CCCOnline APA Citation Toolkit.

2. In the “Ask Questions and Construction a Hypothesis” and “Drawing Conclusions” discussions, it is expected that you post an initial post and at least two follow-up posts. Initial discussion posts should have a minimum word length of 150 words, and both response posts should be a minimum of 50 words each. However, do not aim to do the minimum.

3. Discussions are a very important part of this class experience and cannot be made up after each week’s discussion ends. Discussions are where we can examine real-life applications of course content, and students benefit from other class members' contributions and questions. **By the third day of the discussion opening, initial posts are made to allow for interaction. Response posts are made on at least 2 separate days.**

ASSIGNMENTS

LAB KITS

1. You will complete the Lab Kit assignments that are loaded in D2L for each module.

2. For Module 3 Lab Kit: Photosynthesis and Plant Pigments, you will complete a brief lab report. Your report will include the following: Abstract, Introduction (includes your hypothesis predicting what you think you will learn by conducting the experiment), Materials and Methods, Results (Worksheets), Discussion, Conclusions (explain what you learned and whether your hypothesis correctly predicted what you would learn), and any possible references. The purpose is for you to briefly summarize each lab in the format of a formal lab report to demonstrate an understanding of what you learned during the experimental processes you conducted. Each lab report should also have attached the worksheets of your answers for each exercise.
3. Be sure to review the grading rubrics for the labs before you submit your lab assignments to the D2L assignment folder.

**Interactive Labs**

1. These labs are integral to your understanding of the scientific process as well as understanding and applying biological concepts. You will design experiments, conduct experiments, collect results, and analyze them all virtually in your own lab.
2. In each module you will engage in interactive labs online.
3. **This is very important!** In some of the labs, you will be prompted to copy and paste your work into a Word document for your assignment submission. Your instructor will grade these labs. Some of the labs will auto-grade. In these labs, you will need to take screenshots of your score, and submit them to the appropriate assignment folder. Learn how to take a screenshot on your computer:
   - Learn how to take a screenshot on a Mac.
   - Learn how to take a screenshot on a PC.
4. For all of your interactive labs, you will turn in your screenshot or your copy-and-pasted answers into the appropriate assignment folder.

**Assessments**

**Explore and Report Case Studies**

Your Explore and Report assignments will be assessed each module. The purpose of these reports is to demonstrate your understanding of the module concepts, apply these concepts to real-world situations, and answer the overarching module question. These are due according to your course schedule.

1. These are an application and synthesis of what you have learned in the module. You may need to conduct additional research to answer all components of the report.
2. All references in your reports must be cited using APA Style. Please refer to the CCCOnline APA Citation Toolkit.
3. All answers should be in complete sentences.
4. You can conduct research through the CCCOnline Library. If you go to the Library's Research and Database resource page and click "Biology," you will
see the many resources pertaining to biology to which the Library has access. Also, you can explore the curated resources that have been prepared specifically for the biology classes.

**Exams**

The midterm and final exams test your knowledge of the terms and concepts covered in this class.

1. The Midterm Exam tests your understanding of the content in Modules 1-3.
2. The Final Exam tests your understanding of the content for the entire class, with a heavy focus on Modules 4-5.
COURSE SCHEDULE (15 WEEK)

The schedule is subject to change as needed.

This page summarizes all of the graded assignments, labs, and reading assignments for the course. If you want, you can print it out and post it somewhere handy.

All assignments are described in detail on the module assignment pages. If you have questions, check there and/or send the instructor an email.

This course is not self-paced and is not open-exit. All assignments, labs, discussions, etc., are to be completed by no later than 11:59 p.m. MST/MDT of the due date.

NOTE: Important CCCOnline semester dates (e.g., drop/withdraw/term end) appear on the CCCOnline Calendar.

**MODULE 1**

**Reading/Assignments/Exams**
- Read Biology, Chapters 1-3
- Exploration of Chemistry and What's in My Lunch?
- Student Icebreaker Discussion
- Discussion 1: Ask Questions and Construct a Hypothesis: What Is Biology?
- Discussion 2: Drawing Conclusions: What's for Lunch?
- Module 1: Interactive Lab
- Module 1 Assignment: Explore and Report: The Case of What’s for Lunch?
- Discussion 3: Think About It!

**MODULE 2**

**Reading/Assignments/Exams**
- Read Biology, Chapters 4, 5, and 9.1-9.3
- Exploration of Why Isn’t My Antibiotic Working?
- Discussion 1: Ask Questions and Construct a Hypothesis: How Does My Antibiotic Work?
- Discussion 2: Drawing Conclusions: My Antibiotic Isn’t Working Because...
- Module 2: Interactive Lab
- Lab Kit: Introduction to the Microscope
- Lab Kit: Diffusion and Osmosis
- Lab Kit: Unicellular Organisms
- Module 2 Assignment: Explore and Report: The Case of Why I sn’t My Antibiotic Working?
- Discussion 3: Think About It!
MODULE 3

**Reading/Assignments/Exams**
Read Biology, Chapters 6-8
Exploration of What Happens When We Can’t Transform Energy?
Discussion 1: Ask Questions and Construct a Hypothesis: How Do Insecticides Work?
Discussion 2: Drawing Conclusions: How Does a Poison Affect Cellular Respiration?
Module 3: Interactive Lab
Lab Kit: Enzyme Catalysis
Lab Kit: Photosynthesis and Plant Pigments
Module 3 Assignment 1: Explore and Report: The Case of the Murdered Midwife
Module 3 Assignment 2: Explore and Report: The Case of What Happened to My Garden?
Discussion 3: Think About It!
Midterm Exam (covers Modules 1-3)

**Due Dates**

MODULE 4

**Reading/Assignments/Exams**
Read Biology, Chapters 10-13
Exploration of How Are Genetic Disorders Passed from One Generation to the Next?
Discussion 1: Ask Questions and Construct a Hypothesis: How Is Information Passed from One Generation to the Next?
Discussion 2: Drawing Conclusions: What Are Different Types of Genetic Disorders?
Module 4: Interactive Lab
Lab Kit: Mitosis and Meiosis
Lab Kit: Genetics of Organisms
Module 4 Assignment: Explore and Report: The Case of High Cholesterol
Discussion 3: Think About It!

**Due Dates**

MODULE 5

**Reading/Assignments/Exams**
Read Biology, Chapters 14, 15, 16, and 17.1
Exploration of How Are Gene Mutations and Cancer Linked?
Discussion 1: Ask Questions and Construct a Hypothesis: What Types of Genes, When Mutated, Can Lead to an Increased Risk of Cancer?
Discussion 2: Drawing Conclusions: How Can Changes in Gene Expression Lead to Cancer?
Lab Kit: Biomolecular Techniques
Lab Kit: Transcription and Translation
Module 5 Assignment: Explore and Report: The Case Study in Cancer
Discussion 3: Think About It!
Final Exam (covers entire class with focus on Modules 4 and 5)

**Due Dates**

Last modified 9/2/2019 tlt

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