COURSE INFORMATION

COURSE TITLE
BIO 105—Science of Biology with Lab

COURSE DESCRIPTION
Examines the basis of biology in the modern world and surveys the current knowledge and conceptual framework of the discipline. Explores biology as a science, a process of gaining new knowledge, as is the impact of biological science on society. Includes laboratory experiences. Designed for non-science majors. This course is a Statewide Guaranteed Transfer course (GT-SC1).

CREDIT HOURS
4

GUARANTEED TRANSFER (GT) PATHWAYS COURSE STATEMENT:
The Colorado Commission on Higher Education has approved BIO105 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 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 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 him/her 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.

Students must perform lab experiments from the lab kit provided to fulfill grade requirements. Each student is responsible for performing each experiment independently: **no sharing of lab kits.** It is the student’s responsibility to ensure that he or she has all needed materials for this course.

**THE HAZARDS OF PERFORMING LABS WITH A USED OR EXPIRED LAB KIT:**

1. Lab kits acquired prior to this current semester may be out of date and lack appropriate materials due to updates in the lab manual or contents. (If you do not have a complete materials list for a particular lab, your grade for that lab will be adversely affected. The student is responsible for ensuring they have all materials required for any particular lab.)
2. Used kits may contain materials that are expired and create a safety hazard.
3. Used kits may contain parts that have been recalled for safety purposes.
4. Used kits are not covered by the Terms and Conditions or User Agreement of the manufacturer; thus, used kits are a liability issue.

The student takes full responsibility for any hazards from lab experiments performed with a used or expired lab kit.
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 the nature of cells and tissues, principles of inheritance, evolution and diversity of life, relationship of structure and function, and principles of ecology.

B. Apply the concepts learned to interpret new situations.

C. Distinguish between principles and purposes of procedures and techniques introduced in the laboratory.

D. Inspect the role of research in the biological sciences and become aware of its impact on society.

E. Experience the scientific method by examining current and/or classical research.

F. Demonstrate the ability to select and apply contemporary forms of technology to solve problems or compile information.

G. Write and speak clearly and logically in presentations and essays.

H. Read, analyze, and apply written material to new situations.

I. Utilize mathematic principles inherent to scientific research and analysis of biological concepts.

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 Describe the scientific method and how it is used in biology.</td>
<td>A, B, E</td>
</tr>
<tr>
<td>2 Use calculations and measurements to connect percent error,</td>
<td>A, B, E</td>
</tr>
<tr>
<td>significant figures, conversions, accuracy, and precision to scientific reasoning.</td>
<td></td>
</tr>
<tr>
<td>3 Distinguish between factual evidence and nonfactual information.</td>
<td>A, B</td>
</tr>
<tr>
<td>4 Apply the scientific method, including making observations,</td>
<td>C, E, F, I</td>
</tr>
<tr>
<td>developing hypotheses, identifying variables and controls,</td>
<td></td>
</tr>
<tr>
<td>collecting and analyzing data, and drawing conclusions.</td>
<td></td>
</tr>
<tr>
<td>5 Describe biology's role in today's society.</td>
<td>D, E</td>
</tr>
<tr>
<td>6 Explore concepts related to themes and basic concepts of biology.</td>
<td>A</td>
</tr>
<tr>
<td>7 Reflect on and critically evaluate labs.</td>
<td>B, G</td>
</tr>
</tbody>
</table>
MODULE 2
Outcomes
1 Identify and describe a prokaryotic and an eukaryotic cell.  Competencies A
2 Identify eukaryotic cell parts and their function within the cell. A
3 Describe ways in which cells are studied. E, G
4 Explain how cells move materials between the cell and outside of the cell. A
5 Identify how energy is used in the cell and how a specialized cell performs photosynthesis. A
6 Explore concepts related to the cell structure and functions. A
7 Reflect on and critically evaluate labs. B, G
8 Apply general lab safety, chemical bonding fundamentals, basic chemistry, and diffusion concepts in laboratory experiments. B, C, H

MODULE 3
Outcomes
1 Sketch and explain the process of mitosis. Competencies A, G
2 Identify the process of meiosis, and describe how genetic interchange can occur during this process. A, G
3 Explain the benefits and drawbacks of sexual reproduction. A, H
4 Recognize how genetic interchanges lead to changes in organisms, which facilitates evolution. A, B
5 Show the predictability of genetic outcome using Punnett squares. A, C, F, H, I
6 Describe how DNA functions as the molecular base of inheritance and how RNA aids in these processes. A, B
7 Identify current practices in molecular genetics. A, D, F
8 Explore concepts related to cell division, genetics, molecular biology, and biotechnology. A
9 Reflect on and critically evaluate labs. B, G
10 Apply mitosis, DNA and RNA, and Mendelian genetics concepts in laboratory experiments. B, C, H

MODULE 4
Outcomes
1 Explore the process of evolution. Competencies A, E
2 Examine the differences and similarities between microorganisms, protists, and fungi. A, H
3 Describe the origins of eukaryotic organisms. A
4 Examine the diversity of plants and animals. A
5 Use morphological characteristics to sort and name organisms. A, B, E
6 Explain, illustrate, and differentiate how symbiotic relationships occur between living organisms. A, B, G, H
7 Describe how populations change over time. A, B, D, H
8 Explore concepts related to evolution and the diversity of life. A
9 Reflect on and critically evaluate labs. B, G
10 Apply taxonomy and bacteria and archaea concepts in laboratory experiments. B, C, H
**Module 5**

**Outcomes**

1. Explore how population dynamics affect world population and local populations.
2. Distinguish between processes that lead to growth of a population and decline of a population.
3. Construct food chains and food webs applicable to their local environment.
4. Describe what a biogeochemical cycle is and be able to draw a diagram illustrating the cycle.
5. Identify the common biomes on planet Earth.
6. Summarize why biodiversity is important, and give an example to illustrate this idea.
7. Locate marginal areas of biodiversity in their local ecosystem, and explain the threats to this ecosystem.
8. Explore environmental laws and the concept of the informed citizen.
9. Reflect on and critically evaluate labs.
10. Apply energy and photosynthesis concepts in laboratory experiments.

**Competencies**

- A, I
- A, B, F
- A, B, F
- A, B
- A, D
- A, F, H
- A, B, D, H
- A
- B, G
- B, C, H
GRADING AND EVALUATION

METHODS

The methods for evaluation include a combination of discussion participation, labs, and other assignments. Rubrics are provided for assignments and discussions. Information on accessing rubrics is provided on the Course Rubrics page in the Syllabus module of the 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. MST/MDT 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>
</tr>
</thead>
<tbody>
<tr>
<td>Discussions (5 @ 25 points each)</td>
<td>200</td>
<td>20%</td>
</tr>
<tr>
<td>Think About It! Discussions (5 @ 15 points each)</td>
<td>150</td>
<td>15%</td>
</tr>
<tr>
<td>Quizzes (3 @ 50 points each)</td>
<td>125</td>
<td>12.5%</td>
</tr>
<tr>
<td>Assignments (5 @ 25 points each)</td>
<td>125</td>
<td>12.5%</td>
</tr>
<tr>
<td>Midterm Exam (1 @ 125 points)</td>
<td>125</td>
<td>12.5%</td>
</tr>
<tr>
<td>Lab Activities (5 @ 50 points)</td>
<td>250</td>
<td>25%</td>
</tr>
<tr>
<td>Final Exam (1 @ 150 points)</td>
<td>150</td>
<td>15%</td>
</tr>
<tr>
<td>TOTAL</td>
<td>1,000</td>
<td>100%</td>
</tr>
</tbody>
</table>

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 will have two discussions as part of each module. The first discussion will be on some particular subject, aspect, person, living organism, etc., from the module. Please note that some discussion topics are assigned by your instructor and others will be chosen by you. Be sure to check the discussion instructions carefully.

2. Discussion topics will not repeat. Reserve your particular topic by submitting an initial post with your chosen topic in the subject line. If you and a classmate happen to post the same topic at the same time, contact the classmate to settle the issue.

3. All references must be cited using APA Style. Please refer to the CCCOnline APA Citation Toolkit.
4. Through the discussions, you are having a conversation with your classmates. Their responses make take the form of a further question, comparison, or some other form. Just like when talking in person or via text, it is rude to leave someone hanging; be sure you reply.

5. For each discussion, you are expected to reply to at least two classmates. Be sure to respond in at least 50 words.

6. In your Think About It! discussions, you will use notes taken on difficulties, surprises, or things that went right during completion of your lab kits. You will post these reflections and help your peers out by responding to their posts.

7. In each discussion, it is expected that you post an initial post and at least two follow-up posts. Initial posts should be made by the third day of the discussion opening to allow time for interaction. Response posts should be made on at least two separate days.

8. Initial discussion posts should have a minimum length of 75–100 words, and response posts should be a minimum of 50 words each. However, do not aim to do the minimum. Remember, this is a discussion, and as the initial poster, you should respond to classmates as needed. Do not be the one to leave the conversation when there is more to say.

Assignments

Module Assignments

Each module, you will have an assignment that will be turned into a folder for a grade. Be sure to follow the directions for each of the assignments.

Lab Kits

1. You will complete the Lab Kit assignments that are loaded in D2L for each module. Submit only one document per lab to the assignment folder. This means that you will need to compile all the worksheets provided and any pre- and post-lab questions in the same document.

2. For Module 4 Part 2: Bacteria and Archaea, you will also 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; Conclusion (explain what you learned and whether your
hypothesis correctly predicted what you would learn); and any references. Module 1 Part 1 provides a detailed structure and example for you. 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. Your 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 folder.

**Quizzes, Midterm, and Final**

During the course, you will have three quizzes, a midterm, and a final. These tests will be made up of multiple choice questions, true/false questions, and essays. The essay questions will usually be drawn from the *Exploration* page. The midterm will be weighted more heavily towards Module 3, and the final weighted more heavily towards Module 5. Essay questions must be graded by hand, so you will not get a final score until your instructor grades the essay questions.
**COURSE SCHEDULE (15 WEEK)**

The schedule is subject to change as needed.

This page summarizes all of the graded assignments, exams, 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, quizzes, 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 Module 1 Science of Biology Reading Packet

Exploration of How Is Biology Studied?

Student Icebreaker Discussion

Discussion 1: Biologist

Module 1 Assignment: How Is Biology Studied?

Module 1 Lab

- Part 1: Introduction to Science

Discussion 2: Think About It!

Module 1: Quiz

**MODULE 2**

**Reading/Assignments/Exams**

Read Module 2 Science of Biology Reading Packet

Exploration of Basic Unit of Life

Discussion 1: Discussing Cell Parts

Module 2 Assignment: The Cell Exploration

Module 2 Lab

- Part 1: General Lab Safety
- Part 2: Chemical Bonding Fundamentals
- Part 3: The Chemistry of Life
- Part 4: Diffusion

Discussion 2: Think About It!

Module 2: Quiz
MODULE 3

**Reading/Assignments/Exams**
Read Module 3 Science of Biology Reading Packet
Exploration of Reproduction and Change in Living Organisms
Discussion 1: DNA and RNA Technology
Module 3 Assignment: Gene Expression
Module 3 Lab
  • Part 1: Mitosis
  • Part 2: DNA and RNA
  • Part 3: Mendelian Genetics
Discussion 2: Think About It!
Module 3: Midterm Exam

**MODULE 4**

**Reading/Assignments/Exams**
Read Module 4 Science of Biology Reading Packet
Exploration of Relationship Between Living Organisms
Discussion 1: Newly Extinct or Newly Described
Module 4 Assignment: Organisms, Ecosystems, and Evolution
Module 4 Lab
  • Part 1: Taxonomy
  • Part 2: Bacteria and Archaea
Discussion 2: Think About It!
Module 4: Quiz

**MODULE 5**

**Reading/Assignments/Exams**
Read Module 5 Science of Biology Reading Packet
Exploration of Relationship Between Living Organisms and the Nonliving Environment
Discussion 1: When You Believe, You Join
Module 5 Assignment: Should Grizzly Bears Be Reintroduced Into the Bitterroot Ecosystem?
Module 5 Lab
  • Part 1: Energy and Photosynthesis
Discussion 2: Think About It!
Module 5: Final Exam

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