

BIOL 110 - Introduction to Biology

General Information

Author(s):	Tina Christensen
Proposal Start:	Fall 2025 Credit/Noncredit
Distance Education Approved:	No
TOP Code:	0401.00
TOP Code Name:	Biology, General
CIP Code:	26.0101
CIP Code Name:	Biology/Biological Sciences, General
SAM Code:	E = Non-occupational
Course Control Number:	CCC000346501
Curriculum Committee Approval Date :	February 18, 2025
Board of Trustees Approval Date :	February 18, 2025
External Review Approval Date:	February 18, 2025
Course Description:	(Prerequisites: Eligibility for college-level composition, ENGL C1000/ ENGL C1000H/ ENGL C1000E/C-ID ENGL 100 or equivalent; and Completion of Basic and Intermediate Math Skills or the equivalent or placement based on AB 705 Mandates. Advisory: Concurrent enrollment in BIOL 110L.) An introduction to the science of biology for nonmajors and the most basic course for biology majors, this course gives a broad overview of modern biology that should be equally useful to those needing a foundation for later work in biology, health sciences, the environmental sciences, or to those simply wanting to understand and participate more intelligently in a human society more and more influenced by biological discoveries. It presents the essentials of most of the principal areas of biology: ecology, evolution, genetics, anatomy, physiology, cell biology and molecular biology. (CSU/UC) AA/AS COM GE Area 5, Cal-GETC Area 5B (formerly AA/AS Area A, CSU Area B-2, IGETC Area 5B)
Submission Rationale:	Add Distance Education

Faculty Minimum Qualifications

Master Discipline Preferred:	No value
Alternate Master Discipline Preferred :	No value
Bachelor's Discipline Preferred :	No value

Alternative Master's Discipline Allowed with Preferred Bachelor's :

No value

Emergency DE

This course is offered online in emergency situations only.

No

Course Development Options

Course Basic Skill Status

Allowed Number of Retakes

Grade Options

Course is not a basic skills course.

0

Pass/No Pass
Letter Grade Methods

Allow Students to Gain Credit by Exam/Challenge

No

Rationale For Credit By Exam/Challenge

Retake Policy Description

Allow Students To Audit Course

No value

No value

No

Course Prior to College Level

Not applicable.

Associated Programs

Associated Program	Award Type	Active
A.A. in Liberal Arts: Natural Science Emphasis	A.A. Degree Major	Fall 2024 Credit/Noncredit to Fall 2025 Credit/Noncredit
A.A. in Liberal Arts: Natural Science Emphasis	A.A. Degree Major	Fall 2025 Credit/Noncredit
AA-T Psychology	A.A. Degree for Transfer	Fall 2024 Credit/Noncredit to Fall 2025 Credit/Noncredit
AA-T Psychology	A.A. Degree for Transfer	Fall 2025 Credit/Noncredit
AA-T Social Work and Human Services	A.A. Degree for Transfer	Fall 2025 Credit/Noncredit
AS-T Nutrition and Dietetics	A.S. Degree for Transfer	Fall 2024 Credit/Noncredit to Fall 2025 Credit/Noncredit
AS-T Nutrition and Dietetics	A.S. Degree for Transfer	Fall 2025 Credit/Noncredit
Certificate of Achievement, Cal-GETC (In Development)	Certificate	Fall 2025 Credit/Noncredit
Certificate of Achievement: CSU GE Breadth (In Development)	Certificate of Completion	Fall 2024 Credit/Noncredit
Certificate of Achievement: IGETC GE for UC or CSU (In Development)	Certificate of Completion	Fall 2024 Credit/Noncredit
Skills Certificate, Environmental Science	Certificate	Spring 2020 Credit/Noncredit
Skills Certificate, Environmental Science (In Development)	Certificate	Fall 2023 Credit/Noncredit

Transferability & Gen. Ed. Options

Request for Transferability

Transferable to both UC and CSU

Transferability Status

Approved

College of Marin General Education Categories**Pattern**

AREA 5. NATURAL SCIENCES

5. NATURAL SCIENCES (3 Units
Minimum)**Transferability Status Comparable Course**

Approved

No Comparable Course defined

Cal-GETC

AREA 5B - BIOLOGICAL SCIENCE

Categories

BIOLOGICAL SCIENCE

Transferability Status Comparable Course

Approved

No Comparable Course defined

Units and Hours**Summary**

Minimum Credit Units	3
Maximum Credit Units	3
Total Course In-Class (Contact) Hours	52.5
Total Course Out-of-Class Hours	105
Total Student Learning Hours	157.5
Faculty Load	3

Detail**Weekly Student Hours**

	In Class	Out of Class
Lecture Hours	3	6
Laboratory Hours	0	0
Activity Hours	0	0

Course Student Hours

Course Duration (Weeks)	17.5
Hours per unit divisor	52.5

Course In-Class (Contact) Hours

Lecture Hours	52.5
Laboratory Hours	0
Activity Hours	0
Total	52.5

Course Out-of-Class Hours

Lecture Hours	105
Laboratory Hours	0
Activity Hours	0
Total	105

Units and Hours - Weekly Specialty Hours

Activity Name	Type	In Class	Out of Class
No value	No value	No value	No value

Requisites**Advisory**

Entrance Skills

Skill Rationale

Math skills

1. Know how to use rulers and measure objects correctly
2. Able to do basic arithmetic
3. Able to understand place-value
4. Able to calculate percentages, rates, area, volume and averages.
5. Able to convert fractions to decimal form to percentages
6. Able to read graphs and figure out slopes of linear lines
7. Able to do metric system conversions
8. Evaluate mathematical expressions using the order of operations.
9. Solve equations in one variable.
10. Solve applications involving signed numbers.
11. Find the perimeter of a polygon. Find the area of a rectangle, square, parallelogram, triangle, trapezoid, and circle. Find the volume of a rectangular solid, cylinder, cone, pyramid, and sphere.
12. Solve applications involving ratios, proportions, and percentages.
13. Use the order of operations to evaluate expressions involving fractions and decimals. Solve equations and applications involving addition, subtraction, multiplication, and division of fractions and decimals. Simplify complex fractions.

English skills

1. Be able to read and comprehend dense scientific writing in textbooks and other supplemental readings
2. Develop organized essays (500 words) with thesis statements and topic sentences, providing relevant details and examples for support;
3. Identify main points and supporting information needed to summarize, synthesize, and make inferences from appropriately leveled texts
4. Recognize and/or use a variety of sentence structures to express relationships among ideas, the rules of grammar, punctuation, and usage.

Limitations on Enrollment

Limitation

No value

Provide Rationale

No value

Specifications

Methods of Instruction Rationale

Lecture This course is primarily a lecture course. Lectures, however, may include guest appearances and audiovisual aids. Lectures are complemented by the Museum Project, which requires active participation by students in examining displays in the Biology Museum and answering questions about them.

Assignments Students practice how to distinguish science from pseudoscience and primary scientific information from secondary scientific information. Students are giving two articles that refer to a topic in biology, for example, origin of life. Students review and analyze the information in each article, the quality of the publication, assess the scientific evidence presented, the methods used to obtain the evidence, the expertise of the authors and conclude which article has better scientific evidence than the other.

Students are expected to complete assigned reading in the textbook and all handouts before coming to class.

There are biweekly museum observations that require students to interact individually with museum displays explaining major groups of living things and to answer questions about them.

Students submit list of concepts covered during lecture and the instructor provides feedback to the students about the quality of their notes. This allows the instructor to assess how well the information presented in class is transmitted to students and the ability of students to take notes during class.

Methods of Evaluation**Methods of Evaluation Rationale**

Objective examinations rely heavily on multiple-choice questions, but include a minimum number of short-essay questions that may vary with instructor.

Different types of homework assignments (may vary between instructors) such as solving problems in the back of the chapters, writing short essays or research papers, make drawings or labeling worksheets.

Biweekly museum observation answer sheets are scored and included with exam scores in total semester

Equipment No value

Textbooks

Author	Title	Publisher	Date	Extra Info
Jay Phelan	What is Life?	W. H. Freeman; Fifth edition	(January 18, 2021)	978-1319272531
George Johnson	The Living World, 10th Edition	McGraw Hill	February 19, 2020	978-1260259056

Other Instructional Materials

Description	Author	Citation
No value	No value	No value

Learning Outcomes and Objectives**Course Objectives**

- ✓ A. Students will be able to describe and explain various structures in a an animal and plant cell.
- ✓ B. Students will contrast the structure of functions of cellular structures such as the mitochondrion and the chloroplast.
- ✓ C. Students will explain current theories about the origin of life
- ✓ D. Students will discuss the structure of atoms and key molecules important for biological processes.
- ✓ E. Students will explain the process of photosynthesis
- ✓ F. Students will describe the role of natural selection in evolution
- ✓ G. Students will contrast the structure and role of DNA and RNA in cellular processes
- ✓ H. Students will illustrate the process of protein synthesis
- ✓ I. Students will describe how ecosystems function
- ✓ J. Students will explain energy flow in ecosystems
- ✓ K. Students will describe different groups of organisms
- ✓ L. Students will explain function of various systems in organisms

CSLOs

Explain the process of scientific analysis and discovery.

Expected SLO Performance:

70

Explain evolutionary connections between organisms, describe major groups of organisms, identify their unique structures and functions.

Expected SLO Performance:

70

Describe basic cell biology concepts such as the chemical origin, cellular structures and functions.	Expected SLO Performance: 70
Describe basic molecular biology concepts including nucleic acids structure and function and protein synthesis.	Expected SLO Performance: 70
Explain the concept of energy flow in life and ecosystems.	Expected SLO Performance: 70
Compare and contrast major systems in organisms.	Expected SLO Performance: 70

Course Outline

Course Outline

A. Biology as a Science

1. Common and Unique Qualities of Living and Non-Living Things
2. Characteristics of Science as a Unique Human Activity
3. Scientific Information and its Reliability
4. Systems Approaches to Understanding Biology

B. Parts and Interactions of the Large-Scale World

1. Biotic and Abiotic Components - Lithosphere, Hydrosphere, Atmosphere, Biosphere
2. Population Ecology
 - a. Arithmetic and Exponential Growth, Regulation, Carrying Capacity and Extinction
 - b. Mathematical Models
3. Organismal Ecology
 - a. Species Concepts
 - b. Habitats and Niches, Specialists and Generalists, Keystone Species
4. Community Ecology
 - a. Measurements - Richness, Evenness and Diversity
 - b. Interactions - Intraspecific/Interspecific, Trophic/Non-Trophic
 - c. Community Structure - Food Webs, Food Chains and Trophic Pyramids
5. Ecosystem Ecology
 - a. Energy and Nutrients
 - b. Energy Flow
 - c. Biogeochemical Cycles
 - d. Explain the ecological principles described ecosystem, community and population ecology.
6. Modern Ecological Theory

C. Parts and Interactions of the Medium-Scale World

1. Basic Concepts of the Anatomy of Organisms
 - a. Physical Constraints - Diffusion, Flow, Strength
 - b. Allometry and Scaling - Length, Area, Volume
2. Basic Concepts of the Physiology of Organisms
 - a. Homeostasis
 - b. Positive and Negative Feedback
3. Basic Tissue Types in Animals, Plants and Fungi
4. Organs and Organ Systems
 - a. Systems for Support and Movement
 - b. Systems for Fast and Slow Control
 - c. Systems for Defense from Microorganisms
 - d. Systems for Circulation of Gases
 - e. Systems for Circulation of Liquids
 - f. Systems for Nutrition
 - g. Systems for Excretion of Waste Products and Salt and Water Balance
 - h. Systems for Reproduction
5. Modern Theory of Organismal Health and Disease

D. Parts and Interactions of the Small-Scale World

1. Divisible and Indivisible Units
2. Atoms
 - a. Subatomic Particles and Atomic Structure
 - b. Keys to Properties of Different Elements
3. Molecules

- a. Simple and Structural Formulas
- b. Covalent, Ionic and Hydrogen Bonds; pH
- c. Functional Groups d. Monomers and Polymers - Biological Macromolecules
- e. Keys to Properties of Molecules of Different Classes
- 4. Chemical Reactions a. Energy and Molecular Stability b. Chemical Equations c. Activation Energy, Catalysts and Enzymes
- 5. Cells
 - a. The Difference between Living Cells and Non-Living Components
 - b. Cell Structure and Function - Organelles and Other Key Parts
 - c. The Cell Cycle
- 6. Energy Reactions in Cells - Photosynthesis and Respiration
- 7. Information Reactions in Cells - Transcription, Translation and Replication
- 8. Information Transmission Across Generations - Genetics
- 9. Modern Cell Theory
- E. Changes in the World Through Time
 - 1. Evidence for Change and Mechanisms for Change
 - 2. Change in the Abiotic World
 - a. Rocks, Continents and Oceans - Plate Tectonics
 - b. Weather and Climate - Global Energy Balance
 - 3. Change in the Biotic World
 - a. Evidence - Fossils and Dating Methods, Resistance to Chemicals
 - b. Macroevolution and Microevolution
 - c. Explanation - Natural and Artificial Selection
 - d. Discuss evolutionary processes and connections between organisms, describe major groups of organisms, identify their unique structures and functions
 - 4. Biological Classification and Evolutionary History
 - a. The Challenge and Concept of Classification
 - b. Artificial Systems - Linnaeus
 - c. Natural Systems - From Darwin to Hennig
 - d. Cladistics
 - 5. Evolution and Classification of Living Things
 - a. Archaea and Bacteria
 - b. Eukarya - Animalia, Plantae, Fungi - Major Phyla
 - 6. Modern Evolutionary Theory
- F. Humans in the World
 - 1. Biological and Cultural Evolutionary History
 - 2. Science and Technology
 - 3. Human Impacts on Environment
 - 4. Environmental Impacts on Humans
 - 5. Biological Contributions to Environmental Ethics
 - 6. Future Prospects
 - 7. Analyze critical changes in the relationship between humans and their environment.

Lab Outline
N/A

Workflow Step for Additional Course Information/Goals

Maximum Enrollment: Answer with a number. If changing the maximum, provide a rationale.	55
What is the justification for the new/revised course?	Mandatory revision
What is the primary course goal?	Transfer
What is the justification for the Service Unit(s)? (e.g. lecture, lab, activity, etc.)	Aligned with CBA contract
Does this new or revised course represent Substantive Change? Answer YES or NO.	No

What are the Critical Thinking expectations?
Answer this question for UC transferable courses.

The student learning outcomes listed above include critical thinking. Here are a few representative examples of critical thinking to achieve some of the SLO's of this class:

Exercise 1. The scientific process; Addresses SLO A. Students practice how to distinguish science from pseudoscience and primary scientific information from secondary scientific information. Students are given two articles that refer to a topic in biology, for example, origin of life. Students review and analyze the information in each article, the quality of the publication, assess the scientific evidence presented, the methods used to obtain the evidence, the expertise of the authors and conclude which article has better scientific evidence than the other.

Exercise 2. Origin of organelles. Addresses SLO B. Students are asked to analyze the following: a) structure of function of two cell organelles: Chloroplasts and mitochondria, b) structure and function of free living bacteria, including those that perform photosynthesis and c, the process of endosymbiosis. Based on their review, students consider the possibility that chloroplasts and mitochondria became cell organelles by the process of endosymbiosis.

Exercise 3. Building a trophic pyramid. Addresses SLO D. Students are given a list of different organisms and are asked to arrange them at various levels in pyramid based on the energy relationship between the organisms. Student should study the biology of those organisms, know their feeding habits and their classification as producers or consumers. The organization of the organisms on the pyramid should reflect the flow of energy between the various organisms. The base of the pyramid will be the first level and will be occupied by photosynthetic organisms. The other levels of the pyramid will be occupied by the nonphotosynthetic organisms.

Exercise 4: Human Organ System Diagrams; Addresses SLO F: Students will diagram and label the key tissues or organs that are involved with different functions in the human body. Students can compare and contrast the complexity of different organ systems and can identify similarities and shared organs involved in multiple systems.

Exercise 5: Phylogenetic Tree of Life; Addresses SLO E: Students are given a list of organisms with descriptions of traits and characteristics. The students then have to organize the organisms into a phylogenetic tree of life by determining the evolutionary relationships between the different organisms. The closer the evolutionary origins of the organisms, the closer the organisms will be situated on the phylogenetic tree.

What is the level of Information Competency expected by this course?

No value

Is this a Stand Alone Course?

No

What is the course start date?

Ongoing

Accessibility: Are all course materials, including videos, webcasts, podcasts, audio, and visual, accessible to students (per The Americans with Disabilities Act of 1990, section 508 of the Rehabilitation Act of 1973, and California

Yes

Government Code section 11135)? Answer YES or NO.

For Approvers ONLY: Do you certify that the following requirements have been met? Answer YES or NO to each. o Accessibility (Title 5, section 55200): Course content and delivery is accessible to all students. o Course Quality: The course meets a "3" on the OEI rubric (Accomplished). o Evidence of instructor contact: Regular and effective contact is demonstrated between the instructor and students and students with other students.

No value

Workflow step for Library Resources/Textbooks

Does this course include online library resources? Y or N

No value

Does this course include periodicals as library resources? Y or N

No value

Does this course include reference books as library resources? Y or N

No value

Does this course include data base(s) as library resources? Y or N

No value

Are there assigned textbooks for this course? (If so, list full reference.)

No value

Workflow Step for Special Materials

Are any Special Materials required?

No

Materials Fee Effective Term?

No value

What is the justification for the Materials Fee?

No value

Workflow Step for Distance Education Course (if applicable)

Have you reviewed the current policy on Distance Education courses?
<http://policies.marin.edu/sites/policies/files/AP4105-DistanceEducation.pdf> Respond YES or NO.

YES

Delivery Mode: Is this course is Hybrid (a minimum of one mandatory face-to-face meeting) OR Online (no face-to-face meetings required)? Choose either HYBRID or ONLINE.

This course may be taught online or hybrid under normal circumstances.

What type of HYBRID contact (if applicable) will be incorporated into this course? Examples include: o Orientation sessions o In-person group meetings o In-person review sessions o In-person exams o Other (please describe):

Orientation meeting
In-person exam
Field trip

How will course objectives and student learning outcomes be adapted to an online or hybrid format?

Recorded lecture videos, written lectures, and/or slide presentations
Zoom meetings

Please describe activities, enhanced lecture materials, discussions, forums, etc.

Online quizzes and exams
Electronic assignment submissions
Discussion forums
Group assignments/projects
Video demonstrations of science topics
Virtual interactive websites
At-home activities

Please provide a description of activities in this course that demonstrate instructor-to-student contact and student-to-student contact. Examples of activities: o Announcements o Course materials o Modules o Customized and personalized audio and video content o Online videos that are annotated and contextualized o Internet resources o Library and database resources o Webcasts o Web Conferencing o Podcasts o Discussion forms o Listserv o Other (please describe):

Announcements reminding students of the weekly content, activities and assessments
Feedback on assignments
Zoom meetings
Flipgrid activities
VoiceThread discussions
Responds to student Q&A forum, discussions and emails
Students can post and respond to other students in the Q&A forum.
Students respond to each other's discussion posts.
Student collaboration on group assignments/projects

How will regular and effective instructor-to-student contact and student-to-student contact be demonstrated in this course? o Messages via the LMS o Telephone and office hours o Regular announcements in LMS o Chat rooms o Video messages o Timely feedback and return of student work in LMS o Discussion forums that are facilitated and engage students in regular dialogue o Roster management to ensure that every enrolled student is fully participating in course o E portfolios, blogs, etc. o Orientation and review sessions o Field trips o Library workshops o Webcasts o Podcasts o Other (please describe):

Weekly announcements reminding students of the unit objectives and content, activities and pending assessments
Feedback on assignments via Canvas (rubrics, gradebook comments, annotations on submissions, media comments, turn-it-in comments)
Uses announcements as reminders, post additional readings or resources and clarifications.
Asynchronous correspondence via email and/or Canvas message system.
Has scheduled office hours (both in-person and zoom) and provides students with a communication policy so students know how long to expect a reply after being emailed
Instructor responds to student Q&A forum and discussions.
Students can post and respond to other students in the Q&A forum.
Students respond to each other's discussion posts.
Peer review assignments
Group assignments/projects
VoiceThread discussions
Flipgrid activities

Please specify the expected course hours for students: this includes content delivery, instructor-student interaction, student-student interaction, and out-of-class hours. Ratio: 1 Lecture unit = 1 hour weekly of class time + 2 hours out-of-class time weekly. 1 Laboratory unit = 3 hours weekly of class time. 1 Activity unit = 3 hours weekly of class time + 1.5 hour out-of-class weekly. Please also specify the students activities that take place to fulfill in-class time. Activities may include reading modules, quizzes, exams, participation in discussion forums, etc. In-class activities do not include homework that may include reading the textbook and preparing and studying for exams.

Students can expect to spend approximately 9 hours per week on the course: approximately 3 hours per week online reviewing the module, watching videos, participating in discussion forums, taking quizzes or exams, and submitting assignments. An additional approximately 6 hours may be spent on reading the online textbook, researching, doing worksheets, writing and studying.
