

BIOL R120: PRINCIPLES OF BIOLOGY I

Originator

mnicholson

College

Oxnard College

Discipline (CB01A)

BIOL - Biology

Course Number (CB01B)

R120

Course Title (CB02)

Principles of Biology I

Banner/Short Title

Principles of Biology I

Credit Type

Credit

Start Term

Fall 2021

Catalog Course Description

The first semester of biology for majors introduces the student to principles of cellular and molecular biology. Knowledge from a breadth of disciplines related to health, medical and research science careers is examined including: biochemistry, metabolism, molecular biology, genetics, cellular biology, recombinant DNA, developmental biology, microbiology and molecular evolution. While the diversity of life is surveyed, an emphasis is placed on the biology worldview derived from experimental data of specific model genera, animal cell culture systems and prokaryotic/eukaryotic viruses. The method of generating hypothesis based research results and the role of paradigms in advancing biological science theory are examined.

Taxonomy of Programs (TOP) Code (CB03)

0401.00 - Biology, General

Course Credit Status (CB04)

D (Credit - Degree Applicable)

Course Transfer Status (CB05) (select one only)

A (Transferable to both UC and CSU)

Course Basic Skills Status (CB08)

N - The Course is Not a Basic Skills Course

SAM Priority Code (CB09)

E - Non-Occupational

Course Cooperative Work Experience Education Status (CB10)

N - Is Not Part of a Cooperative Work Experience Education Program

Course Classification Status (CB11)

Y - Credit Course

Educational Assistance Class Instruction (Approved Special Class) (CB13)

N - The Course is Not an Approved Special Class

Course Prior to Transfer Level (CB21)

Y - Not Applicable

Course Noncredit Category (CB22)

Y - Credit Course

Funding Agency Category (CB23)

Y - Not Applicable (Funding Not Used)

Course Program Status (CB24)

1 - Program Applicable

General Education Status (CB25)

Y - Not Applicable

Support Course Status (CB26)

N - Course is not a support course

Field trips

May be required

Faculty notes on field trips; include possible destinations or other pertinent information

Possible field trip destinations include local parks, beaches, natural areas, botanical gardens, harbors, islands, natural history museums, and aquaria.

Grading method

Letter Graded

Does this course require an instructional materials fee?

No

Repeatable for Credit

No

Is this course part of a family?

No

Units and Hours

Carnegie Unit Override

No

In-Class

Lecture

Minimum Contact/In-Class Lecture Hours

70

Maximum Contact/In-Class Lecture Hours

70

Activity

Laboratory

Total in-Class

Total in-Class

Total Minimum Contact/In-Class Hours

70

Total Maximum Contact/In-Class Hours

70

Outside-of-Class

Internship/Cooperative Work Experience

Paid

Unpaid

Total Outside-of-Class

Total Outside-of-Class

Minimum Outside-of-Class Hours

140

Maximum Outside-of-Class Hours

140

Total Student Learning

Total Student Learning

Total Minimum Student Learning Hours

210

Total Maximum Student Learning Hours

210

Minimum Units (CB07)

4

Maximum Units (CB06)

4

Prerequisites

CHEM R120 and MATH R005 or MATH R015

Advisories on Recommended Preparation

ENGL R097 or ENGL R100 or ENGL R101

Entrance Skills

Entrance Skills

Interpret and solve basic chemistry problems

Prerequisite Course Objectives

CHEM R120-Perform conversions in the metric system using memorized conversions and the technique of dimensional analysis.

CHEM R120-Write the names and symbols of common elements. Name or give the formulas of simple inorganic compounds.

CHEM R120-Write and balance chemical equations including net-ionic equations.

CHEM R120-Perform stoichiometric calculations based on chemical formulas and balanced chemical equations.

CHEM R120-Relate periodic properties to electronic configurations of the elements.

CHEM R120-Identify acids, bases, and salts. Describe solutions of strong, weak, and non-electrolytes. Predict and balance ionic reactions involving precipitation, displacement, and neutralization.

Entrance Skills

Convert and graph mathematical data

Prerequisite Course Objectives

MATH R005-Simplify algebraic expressions.

MATH R005-Solve linear equations.

MATH R005-Solve linear inequalities and graph solutions on a number line.

MATH R005-Graph linear equations by plotting points and using intercepts.

MATH R005-Graph systems of inequalities in two (2) variables.

MATH R005-Simplify expressions involving positive, negative, and rational exponents.

MATH R005-Graph and evaluate elementary functions.

MATH R005-Use definitions, domain and range, algebra and composition of functions on related applications.

MATH R005-Solve elementary exponential and logarithmic equations and related applications.

Entrance Skills

Convert and graph mathematical data

Prerequisite Course Objectives

MATH R015-Evaluate and simplify algebraic expressions.
MATH R015-Solve linear equations.
MATH R015-Add, subtract, and multiply polynomials.
MATH R015-Add, subtract, multiply, divide and simplify rational expressions.
MATH R015-Solve rational equations.
MATH R015-Graph linear functions and write using function notation.
MATH R015-Graph exponential and logarithmic functions.
MATH R015-Solve elementary exponential and logarithmic equations.

Entrance Skills

Demonstrate in writing an ability to evaluate and understand scientific literature that conveys complex concepts and ideas with challenging vocabulary

Prerequisite Course Objectives

ENGL R097-Write short essays of at least five paragraphs with effective introductory paragraphs; well-organized, coherent, and detailed support of thesis; and effective conclusions
ENGL R097-Write essays with acceptable college-level grammar, syntax, spelling, and idiomatic usage
ENGL R097-Analyze essay exam questions and organize and write effective responses
ENGL R097-Demonstrate familiarity with the principles of research and documentation
ENGL R097-Write a short paper incorporating documentation

Entrance Skills

Demonstrate in writing an ability to evaluate and understand scientific literature that conveys complex concepts and ideas with challenging vocabulary

Prerequisite Course Objectives

ENGL R100-Develop a thesis.
ENGL R100-Employ logical organizational strategies in writing essays.
ENGL R100-Write short (500-word) essays with effective introductory paragraphs; well-organized, coherent, and detailed support of thesis; and effective conclusions.
ENGL R100-Revise content and rewrite for fluent expression.
ENGL R100-Write essays with acceptable college-level grammar, syntax, spelling, and idiomatic usage.
ENGL R100-Analyze essay exam questions and organize and write effective responses.
ENGL R100-Successfully use principles of research and documentation systems.
ENGL R100-Read college-level materials and recognize the main idea.
ENGL R100-Summarize and paraphrase.
ENGL R100-Distinguish fact from opinion.

Entrance Skills

Demonstrate in writing an ability to evaluate and understand scientific literature that conveys complex concepts and ideas with challenging vocabulary

Prerequisite Course Objectives

ENGL R101-Write multiple-page expository and persuasive essays
ENGL R101-Demonstrate college-level control of mechanical elements of writing such as grammar, syntax, spelling, vocabulary, and idiomatic usage
ENGL R101-Research a topic, analyze and synthesize information, and report findings in a properly documented essay
ENGL R101-Demonstrate critical thinking skills and rhetorical awareness in analyzing others' non-fiction writing and in developing essays
ENGL R101-Write timed essays in class exhibiting acceptable college-level control of mechanics, organization, development, and coherence

Requisite Justification**Requisite Type**

Prerequisite

Requisite

CHEM R120

Requisite Description

Course in a sequence

Level of Scrutiny/Justification

Required by 4 year institution

Requisite Type

Prerequisite

Requisite

MATH R005

Requisite Description

Course not in a sequence

Level of Scrutiny/Justification

Required by 4 year institution

Requisite Type

Prerequisite

Requisite

MATH R015

Requisite Description

Course not in a sequence

Level of Scrutiny/Justification

Required by 4 year institution

Requisite Type

Advisory

Requisite

ENGL R097

Requisite Description

Course not in a sequence

Level of Scrutiny/Justification

Required communication/computation skill

Requisite Type

Advisory

Requisite

ENGL R100

Requisite Description

Course not in a sequence

Level of Scrutiny/Justification

Required communication/computation skill

Requisite Type

Advisory

Requisite

ENGL R101

Requisite Description

Course not in a sequence

Level of Scrutiny/Justification

Required communication/computation skill

Student Learning Outcomes (CSLOs)**Upon satisfactory completion of the course, students will be able to:**

- | | |
|---|--|
| 1 | Students will be able to describe, compare, and contrast cellular components as well as prokaryotic and eukaryotic cells. |
| 2 | Students will be able to evaluate and discuss biological and scientific information from a variety of sources such as texts, tables, graphs, maps, media, personal communication, observation, and electronic databases. |
| 3 | Students will demonstrate the ability to synthesize biological concepts with descriptions and/or analyses of a biological subject. |

Course Objectives**Upon satisfactory completion of the course, students will be able to:**

- | | |
|---|--|
| 1 | Explain the chemical and molecular aspects of living systems |
| 2 | Identify subcellular structures and describe their functions |
| 3 | Explain the components of cellular metabolism |
| 4 | Describe the process of cell reproduction and relate it to the process of neoplasm |
| 5 | Discuss and compare classical Mendelian genetics and Non-Mendelian genetics |
| 6 | Compare and contrast viral and bacteriophage genetics |
| 7 | Describe the current hypotheses for the origin of life and biological change |
| 8 | Analyze current methods of recombinant DNA and biotechnology |

Course Content**Lecture/Course Content**

1. Themes in the Study of Life
 - a. Characteristics of Living Things
 - b. Evolution
 - c. Scientific Investigation
2. Chemistry of Life
 - a. Atoms
 - b. Molecules
 - c. Chemical Bonds
 - d. Water
 - e. Carbon and Molecular Diversity
 - f. Macromolecules
3. Prokaryotic and Eukaryotic Cell Structure
4. Membrane Structure and Function
 - a. Transport
 - b. Concentration of Nutrients
 - c. Endocytosis

5. Cellular Respiration
 - a. Glycolysis
 - b. Fermentation
 - c. Krebs Cycle
 - d. Electron Transport
 - e. Anaerobic Respiration
6. Photosynthesis
 - a. Plant
 - b. Bacterial
7. Cell Communication
 - a. Signal Reception
 - b. Signal Transduction
8. Neoplasm
 - a. Neoplastic Phenotype
 - b. Neoplastic Progression
 - c. Oncogenes
 - d. Tumor Suppressor Genes
 - e. Ames Test
9. Mendel and the Gene
 - a. Historical Perspective
 - b. Relationships Between Alleles
10. Chromosomal Basis of Inheritance
11. Genome Organization in Eukaryotes and Prokaryotes
12. Gene Expression in Eukaryotes and Prokaryotes
13. Regulation of Gene Expression in Eukaryotes and Prokaryotes
14. Microbial Models
 - a. Gene Modification in Prokaryotes
 - b. Virus Structure
 - c. Virus Replication
 - d. Viral Genetics
15. Recombinant DNA Technologies
 - a. DNA Cloning
 - b. Analysis of Cloned DNA
 - c. Polymerase Chain Reaction
 - d. Gene Therapy
 - e. Practical Applications
16. Genetic Basis for Development
 - a. Segmentation
 - b. Homeobox genetics
 - c. Homologous Body Plans of Worms, Insects and Mammals
 - d. Cancer and other alterations of homeodomains
 - e. Stem Cells for Brain, Bone, Heart and other organ systems
 - f. Transplantation biology including classical bone marrow stem cell exchanges
17. Prokaryotes and the Origin of Metabolic Diversity
18. Protists and the Origin of Eukaryotes
19. Plants and the Colonization of Land
20. Fungi
21. Model organisms for the study of contemporary molecular and cellular biology

Laboratory or Activity Content

No laboratory or activity content.

Methods of Evaluation

Which of these methods will students use to demonstrate proficiency in the subject matter of this course? (Check all that apply):

Problem solving exercises
Written expression

Methods of Evaluation may include, but are not limited to, the following typical classroom assessment techniques/required assignments (check as many as are deemed appropriate):

Computational homework
Essay exams
Essays
Group projects
Individual projects
Objective exams
Oral presentations
Problem-Solving Assignments
Problem-solving exams
Quizzes
Reports/papers
Research papers

Instructional Methodology

Specify the methods of instruction that may be employed in this course

Audio-visual presentations
Computer-aided presentations
Collaborative group work
Class activities
Class discussions
Case studies
Distance Education
Field trips
Group discussions
Instructor-guided interpretation and analysis
Internet research
Lecture
Small group activities

Describe specific examples of the methods the instructor will use:

1. The instructor will present relevant explanations of biological processes and phenomena (e.g., cell respiration, photosynthesis, protein production, etc.) using a variety of media (e.g., written, verbal, video, diagrammed/sketched).
2. The instructor will guide student interactions activities (e.g., discussions, computer simulations, games, etc.) to explore biological processes, research and interpret biological data, and solve problems of biological relevance.

Representative Course Assignments

Writing Assignments

1. Students will demonstrate knowledge and comprehension of biological processes and phenomena in written and illustrated answers to question prompts in homework assignments and on quizzes and exams.
2. Students will summarize a variety of published reports (e.g., primary and secondary sources) on current biological subjects relevant to current course material (e.g., human genetic issues, evolutionary change, and biotechnological advances).
3. Students will exhibit proficiency with interpreting and summarizing data and numerical values using graphs and tables in assignments and assessments (e.g., problems involving metabolic activity, inheritance, evolutionary problems, etc.).

Critical Thinking Assignments

1. Students will demonstrate their ability to analyze and evaluate complex biological subject matter (e.g., cell communication processes or inheritance of a genetic disorder as related to specific sub-cellular organelles) with at least one presentation that summarizes information from several published primary sources and synthesizes a cohesive explanation of the subject (e.g., term paper or thematic essay).

Reading Assignments

1. Students will be assigned regular readings from the required text for the course and from specific scientific articles identified by the instructor.
2. Students will be required become familiar with primary sources published in professional journals and will be tasked with finding and evaluating recently published articles.

Skills Demonstrations

No skills demonstrations.

Other assignments (if applicable)

1. Students will engage in online computer-based simulations and exercises relevant to the biological processes and subjects in the course (e.g., metabolic processes, cell features, inheritance, evolution).

Outside Assignments**Representative Outside Assignments**

1. Students will prepare written essays and a term paper to summarize and describe biological processes and phenomena (often focusing on a genetic disorder).
2. Students will sketch and/or diagram representative biological processes to summarize individual processes and to combine separate processes in a meaningful and instructive way (e.g., to highlight important aspects of cell respiration or photosynthesis).
3. Students will be assigned regular readings from the required text for the course and from specific scientific articles identified by the instructor (e.g., recent advances with biotechnology).
4. Students will be required become familiar with primary sources published in professional journals and will be tasked with finding and evaluating recently published articles (e.g., vaccine development or tentative identification of a previously-unidentified organ system).
5. Students will research recent primary resources (published papers) for information relevant to the different biological subjects in the course and for information supporting a presentation on a specific biological subject.
6. Students will engage in online computer-based simulations and exercises relevant to the biological processes and subjects in the course (e.g., metabolic processes or Mendelian genetics and inheritance).
7. Students will regularly read the text materials as assigned for the different biological subjects in the course.
8. Students will engage with computer-based simulations and tutorials to reinforce and expand understanding of biological subject material being discussed in class.
9. Students will be required to complete or solve various kinds of biological written problems (e.g., problems focused on interpreting the genetic code or predicting outcomes of genetic crosses).

Articulation**Comparable Courses within the VCCCD**

BIOL M02A - General Biology I

BIOL V04 - Introduction to Cell and Molecular Biology

District General Education**A. Natural Sciences****A1. Biological Science**

Approved

B. Social and Behavioral Sciences**C. Humanities****D. Language and Rationality****E. Health and Physical Education/Kinesiology****F. Ethnic Studies/Gender Studies****CSU GE-Breadth****Area A: English Language Communication and Critical Thinking****Area B: Scientific Inquiry and Quantitative Reasoning****B2 Life Science**

Approved

Area C: Arts and Humanities

Area D: Social Sciences

Area E: Lifelong Learning and Self-Development

Area F: Ethnic Studies

CSU Graduation Requirement in U.S. History, Constitution and American Ideals:

IGETC

Area 1: English Communication

Area 2A: Mathematical Concepts & Quantitative Reasoning

Area 3: Arts and Humanities

Area 4: Social and Behavioral Sciences

Area 5: Physical and Biological Sciences

Area 5B: Biological Science

Approved

Area 6: Languages Other than English (LOTE)

Textbooks and Lab Manuals

Resource Type

Textbook

Description

Lisa A. Urry, Michael L. Cain, Steven A. Wasserman, Peter V. Minorsky, Rebecca B. Orr (2021). *Campbell Biology* (12th edition). Pearson. Hoboken, NJ. ISBN 978-0-135-18874-3

Resource Type

Other Resource Type

Description

Video presentations, video clips, and animations

Library Resources

Assignments requiring library resources

Assignments focusing on published primary sources and research articles.

Sufficient Library Resources exist

Yes

Example of Assignments Requiring Library Resources

Term paper on a biological subject such as a specific genetic disorder.

Distance Education Addendum

Definitions

Distance Education Modalities

Hybrid (51%–99% online)

Hybrid (1%–50% online)

100% online

Faculty Certifications

Faculty assigned to teach Hybrid or Fully Online sections of this course will receive training in how to satisfy the Federal and state regulations governing regular effective/substantive contact for distance education. The training will include common elements in the district-supported learning management system (LMS), online teaching methods, regular effective/substantive contact, and best practices.

Yes

Faculty assigned to teach Hybrid or Fully Online sections of this course will meet with the EAC Alternate Media Specialist to ensure that the course content meets the required Federal and state accessibility standards for access by students with disabilities.

Common areas for discussion include accessibility of PDF files, images, captioning of videos, Power Point presentations, math and scientific notation, and ensuring the use of style mark-up in Word documents.

Yes

Regular Effective/Substantive Contact

Hybrid (1%–50% online) Modality:

Method of Instruction	Document typical activities or assignments for each method of instruction
Asynchronous Dialog (e.g., discussion board)	Discussions focusing on a subject for which students will make an original post and then thoughtfully respond to other student postings; may also allow instructor and students to address miscellaneous questions and related subjects.
Video Conferencing	Video meetings to allow the instructor to highlight important information (perhaps lecture) and facilitate immediate student interaction (such as problem-solving/question/answer session).
Other DE (e.g., recorded lectures)	Recorded tutorials, lectures, and video meetings.
Synchronous Dialog (e.g., online chat)	Instant messaging and/or chat to allow instructor-student and student-student dialogue for teaching and/or studying.
Telephone	Communication venue to allow instructor-student and student-student dialogue for problem-solving/question/answer purposes.
E-mail	Communication venue to allow instructor-student and student-student dialogue for problem-solving/question/answer purposes and to submit certain types of assignments.

Hybrid (51%–99% online) Modality:

Method of Instruction	Document typical activities or assignments for each method of instruction
Asynchronous Dialog (e.g., discussion board)	Discussions focusing on a subject for which students will make an original post and then thoughtfully respond to other student postings; may also allow instructor and students to address miscellaneous questions and related subjects.
Video Conferencing	Video meetings to allow the instructor to highlight important information (perhaps lecture) and facilitate immediate student interaction (such as problem-solving/question/answer session).
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Telephone	Communication venue to allow instructor-student and student-student dialogue for problem-solving/question/answer purposes.
E-mail	Communication venue to allow instructor-student and student-student dialogue for problem-solving/question/answer purposes and to submit certain types of assignments.

100% online Modality:

Method of Instruction	Document typical activities or assignments for each method of instruction
Asynchronous Dialog (e.g., discussion board)	Discussions focusing on a subject for which students will make an original post and then thoughtfully respond to other student postings; may also allow instructor and students to address miscellaneous questions and related subjects.
Video Conferencing	Video meetings to allow the instructor to highlight important information (perhaps lecture) and facilitate immediate student interaction (such as problem-solving/question/answer session).
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Examinations**Hybrid (1%–50% online) Modality**

Online
On campus

Hybrid (51%–99% online) Modality

Online
On campus

Primary Minimum Qualification

BIOLOGICAL SCIENCES

Review and Approval Dates**Department Chair**

09/16/2020

Dean

09/16/2020

Technical Review

10/14/2020

Curriculum Committee

10/14/2020

DTRW-I

MM/DD/YYYY

Curriculum Committee

12/09/2020

Board

MM/DD/YYYY

CCCCO

MM/DD/YYYY

Control Number

CCC000211469

DOE/accreditation approval date
MM/DD/YYYY