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BIOL M02A: GENERAL BIOLOGY I

Originator
lmai

College
Moorpark College

Discipline (CB01A)
BIOL - Biology

Course Number (CB01B)
M02A

Course Title (CB02)
General Biology I

Banner/Short Title
General Biology I

Credit Type
Credit

Start Term
Summer 2021

Catalog Course Description
Introduces students to major biological themes and principles that are fundamental to an understanding of life processes in any field of biology today. Includes the scientific process, experimental design, biological chemistry, prokaryotic and eukaryotic cell structure and function, cellular metabolism, cell reproduction and its controls, cell communication, genetics, molecular biology, DNA technology and evolutionary processes.
Course Credit Limitations:
1) Students cannot complete both BIOL M02A and BIOL M02AH. Credit will be awarded only for the first course completed with a grade of “C” or better or "P". MC Honors Program requires a letter grade.
2) No credit will be awarded for BIOL M01 if taken after BIOL M02A or BIOL M02AH.

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
Will not be required

Grading method
(L) Letter Graded

Alternate grading methods
(O) Student Option- Letter/Pass
(P) Pass/No Pass Grading

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
Minimum Contact/In-Class Laboratory Hours
52.5
Maximum Contact/In-Class Laboratory Hours
52.5

Total in-Class

Total in-Class
Total Minimum Contact/In-Class Hours
122.5
Total Maximum Contact/In-Class Hours
122.5

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
262.5
Total Maximum Student Learning Hours
262.5

Minimum Units (CB07)
5
Maximum Units (CB06)
5

Prerequisites
MATH M03 or 2 years of high school algebra or placement as determined by the college's multiple measures assessment process and CHEM M12 or high school chemistry

Student Learning Outcomes (CSLOs)

	Upon satisfactory completion of the course, students will be able to:
1	critically analyze data and interpret results from experiments throughout the course.
2	understand how evolutionary principles provide a comprehensive model for understanding the origins and relationships of living organisms.

Course Objectives

	Upon satisfactory completion of the course, students will be able to:
1	demonstrate an understanding and be able to discuss the basic themes of biology that permeate all levels of organization: a.Define the basic vocabulary b.Compare and contrast the interactions between the basic vocabulary words c.Construct mental models for the various systems studied d.Evaluate and appraise the evidence behind the various models discussed e.Given a body of data from a scientific paper, analyze how that evidence affects the scientific models studied.

2	discuss the chemical basis of biological systems including the structure and function of biological molecules and macromolecules: a.Define the basic vocabulary b.Compare and contrast the interactions between the basic vocabulary words c.Construct mental models for the various systems studied d.Evaluate and appraise the evidence behind the various models discussed e.Given a body of data from a scientific paper, analyze how that evidence affects the scientific models studied.
3	explain the concepts and processes of cellular metabolism including photosynthesis, cellular respiration and the roles of enzymes and adenosine triphosphate in the thermodynamics of living systems: a.Define the basic vocabulary b.Compare and contrast the interactions between the basic vocabulary words c.Construct mental models for the various systems studied d.Evaluate and appraise the evidence behind the various models discussed e.Given a body of data from a scientific paper, analyze how that evidence affects the scientific models studied.
4	identify and describe prokaryotic and eukaryotic cell organization and membranes, relating structure to function; discuss the different modes of cellular transport: a.Define the basic vocabulary b.Compare and contrast the interactions between the basic vocabulary words c.Construct mental models for the various systems studied d.Evaluate and appraise the evidence behind the various models discussed e.Given a body of data from a scientific paper, analyze how that evidence affects the scientific models studied.
5	describe the connections that link cells together and how they facilitate cell communication: a.Define the basic vocabulary b.Compare and contrast the interactions between the basic vocabulary words c.Construct mental models for the various systems studied d.Evaluate and appraise the evidence behind the various models discussed e.Given a body of data from a scientific paper, analyze how that evidence affects the scientific models studied.
6	discuss cellular reproduction and its controls in prokaryotes and eukaryotes including sexual and asexual life cycles: a.Define the basic vocabulary b.Compare and contrast the interactions between the basic vocabulary words c.Construct mental models for the various systems studied d.Evaluate and appraise the evidence behind the various models discussed e.Given a body of data from a scientific paper, analyze how that evidence affects the scientific models studied.
7	apply the principles of classical and molecular genetics to solve problems in genetics and/or biotechnology: a.Define the basic vocabulary b.Compare and contrast the interactions between the basic vocabulary words c.Construct mental models for the various systems studied d.Evaluate and appraise the evidence behind the various models discussed e.Given a body of data from a scientific paper, analyze how that evidence affects the scientific models studied.
8	explain prokaryotic and eukaryotic genome organization, DNA structure, DNA replication, transcription, splicing, structure and biochemistry of proteins, translation, gene expression and the control of gene expression. Relate theoretical models to the practical applications of biotechnology: a.Define the basic vocabulary b.Compare and contrast the interactions between the basic vocabulary words c.Construct mental models for the various systems studied d.Evaluate and appraise the evidence behind the various models discussed e.Given a body of data from a scientific paper, analyze how that evidence affects the scientific models studied.
9	discuss and relate evolutionary processes to the origin and evolution of cells, species and populations: a.Define the basic vocabulary b.Compare and contrast the interactions between the basic vocabulary words c.Construct mental models for the various systems studied d.Evaluate and appraise the evidence behind the various models discussed e.Given a body of data from a scientific paper, analyze how that evidence affects the scientific models studied.
10	explain and apply the scientific method in the study of biological concepts and laboratory exercises: a.Define the basic vocabulary b.Compare and contrast the interactions between the basic vocabulary words c.Construct mental models for the various systems studied d.Evaluate and appraise the evidence behind the various models discussed e.Given a body of data from a scientific paper, analyze how that evidence affects the scientific models studied.
11	acquire, read, evaluate, apply and cite scientific literature.

Course Content

Lecture/Course Content

6% Introduction to Biological Processes
Basic themes
Organization of life
Scientific method

13.00% Biological Chemistry
Review of bonding
Water chemistry
Carbon chemistry
Macromolecules

16.00% Cellular Biology
Cell structures and function
Membrane structure and function
Cell transport processes

Cell communication

15.00% Cellular Metabolism
Basic thermodynamics
Enzymes
Cellular respiration
Role of ATP (adenosine triphosphate)
Photosynthesis

4.00% Cellular Reproduction
Prokaryote and eukaryote
Life cycles
Cell cycle controls

12.00% Genetics
Sexual reproduction
Mendelian genetics
Molecular genetics

22.00% Molecular Biology
DNA structure and replication
Gene structure
Gene expression
Genome organization
Regulation of gene expression
Biotechnology
Developmental genetics

12.00% Evolutionary Processes
Darwinian evolution
Population genetics
Speciation

Laboratory or Activity Content

6% Scientific Method
Review the scientific method and demonstrate understanding bydesigning, executing and analyzing an experiment using the Step Test
procedure. Critique our experimental design.

6.00% Scientific Measurement
Review the metric system and conversions. Demonstrate the proper use of laboratory measuring glassware and devices. Calculate conversions.

6.00% Microscope
Introduce the care and use of the compound light microscope and stereoscope. Identify the components of a compound light microscope
and demonstrate its proper use and handling

6.00% pH and Buffers
Review the concepts of pH and buffers and apply this knowledge to determining the buffering capacity of a premade buffering solution.
Compare different techniques to determine pH in solution. Calculate pH from hydrogen ion molarity, and molarity from pH.

6.00% Biological Molecules
Review the major groups of biological molecules and learn biochemical tests to identify them. Understand the importance of positive and negative controls by experimentation.

6.00% Enzymes
Review the function of enzymes, test their optimal temperature, and determine the mechanism of inhibition of enzymes by experimentation

6.00% Cells and Organelles
Observe cells and compare prokaryotic and eukaryotic cells using the compound light microscope. Review and describe the functions of
organelles

6.00% Diffusion and Osmosis
Review the concepts of osmosis, diffusion, and the function of cellular membranes. Compare and contrast the selective permeability of
dialysis tubing model with a biological membrane
Respiration
Review aerobic respiration and compare it to photosynthesis.

6.00% Photosynthesis
Review the process of photosynthesis. Separate photosynthetic pigments by paper chromatography and create an absorbance spectrum for each pigment. Demonstrate the need for light in photosynthesis and the storage of photosynthate in plant tissues

6.00%Cell Division

Distinguish the steps of mitosis and meiosis in cells with a compound light microscope. Describe the changes at each stage of the cell cycle.
Compare and contrast the processes of mitosis and meiosis

6.00% Genetics
Solve monohybrid and dihybrid Mendelian genetics problems.
Determine modes of inheritance patterns from pedigree trees. Relate patterns of inheritance to meiosis and sexual reproduction

16.00% PCR (Polymerase Chain Reaction) and Gel Electrophoresis Isolate DNA for PCR. Review the process of PCR and Gel Electrophoresis. Analyze the results from gel electrophoresis to link genotype to phenotype. Critique the experimental procedure.

6.00% Bacterial Transformation and/or Other Current Biotechnology
Techniques
Introduce and demonstrate sterile techniques and perform bacterial transformation. Analyze experimental results. Define biotechnology,
transformation, recombinant DNA, GMO, plasmid, and selective marker

6.00% Evolution
Demonstrate evolutionary concepts through calculating allele frequency changes using the Hardy-Weinberg equation

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
Skills demonstrations
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):

Classroom Discussion
Essay exams
Laboratory activities
Laboratory reports
Objective exams
Projects
Problem-solving exams
Participation
Reports/Papers/Journals
Skills demonstrations

Instructional Methodology

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

Audio-visual presentations
Computer-aided presentations
Distance Education
Laboratory activities
Lecture
Other (specify)

Specify other method of instruction

Think-pair-share
Concept mapping

Representative Course Assignments

Writing Assignments

written evaluations of assigned readings, such as relating evolutionary processes to the origin and evolution of cells, species, and populations.

laboratory reports.

analyses of Internet research assignments.

essays on examinations that test the application of learned class concepts, such as the understanding of water properties which make life processes possible.

Critical Thinking Assignments

evaluate role of specialization in evolution.

evaluate structure and function of cellular organelles.
compare eukaryotic and microbial genetics.
conduct data analysis and interpretation of scientific results.
use knowledge learned in the class and be able to analyze and apply the information.

Outside Assignments

Representative Outside Assignments
readings from scientific literature that incorporate current scientific research to biology topics discussed in class.
problem sets such as metric conversions, genetics problems, and analyzing/interpreting research data.

Articulation

C-ID Descriptor Number
BIOL 190

Status
Approved

Additional C-ID Descriptor(s)

C-ID Descriptor(s)	Status
BIOL 135S (with BIOL M02B)	Approved

Equivalent Courses at 4 year institutions

University	Course ID	Course Title	Units
Cal Poly San Luis Obispo	BIO 161	Introduction to Cell and Molecular Biology	4
UCLA	LS 7A	Cell and Molecular Biology	5
UC Santa Cruz	BIOL 20A	Cell and Molecular Biology	5
CSU San Bernardino	BIOL 200	Biology of the Cell	5
UC Davis	BIS 002A	Introduction to Biology: Essentials of Life on Earth	5
CSU Channel Islands	BIOL 201	Principles of Cell and Molecular Biology	4

Comparable Courses within the VCCCD
BIOL R120 - Principles of Biology I
BIOL V04 - Introduction to Cell and Molecular Biology
BIOL R120L - Principles of Biology I Lab: Intro to Cellular 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

Course is CSU transferable
Yes

CSU Baccalaureate List effective term:
Fall 1995

CSU GE-Breadth

Area A: English Language Communication and Critical Thinking

Area B: Scientific Inquiry and Quantitative Reasoning

B2 Life Science
Approved

B3 Laboratory Activity
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:

UC TCA

UC TCA
Approved

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 5C: Laboratory Science
Approved

Area 6: Languages Other than English (LOTE)

Textbooks and Lab Manuals

Resource Type
Textbook

Description
Sackheim, George (2007). *An Introduction to Chemistry for Biology Students* (9th). Pearson.

Resource Type
Textbook

Description
Urry, Lisa A., et al (2017). *Campbell Biology* (11th). Pearson.

Resource Type
Other Resource Type

Description
Symbiosis. Laboratory Manual for Biology. (Customized lab manual to accompany Campbell Biology) Benjamin Cummings, latest edition.

Library Resources

Assignments requiring library resources
Research assignments using the Library's print and online resources to access science journals and other periodicals in order to gather information on such topics as cell biology, genetics, and biotechnology.

Sufficient Library Resources exist
Yes

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)	Regular Asynchronous discussion boards will be used to encourage discussion among students where they can compare and contrast/ discuss /identify and analyze elements of course outcomes. Other Discussion boards will also be used for Q&A and general class discussion by students and instructor to facilitate student learning outcomes.

E-mail	Regular Asynchronous discussion boards will be used to encourage discussion among students where they can compare and contrast/ discuss /identify and analyze elements of course outcomes. Other Discussion boards will also be used for Q&A and general class discussion by students and instructor to facilitate student practice in application of Biology terms and concepts to Biological problems.
Other DE (e.g., recorded lectures)	Faculty will use a variety of tools and media integrated within the LMS to help students reach SLO such as: o Recorded Lectures, Narrated Slides, Screencasts o Instructor created content o MC Online Library Resources o Canvas Student Groups (Assignments, Discussions) o Websites and Blogs o Multimedia (YouTube, Films on Demand, 3CMedia, Khan Academy, etc.)

Hybrid (51%–99% online) Modality:

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100% online Modality:

Method of Instruction	**Document typical activities or assignments for each method of instruction**
Asynchronous Dialog (e.g., discussion board)	Regular Asynchronous discussion boards will be used to encourage discussion among students where they can compare and contrast/ discuss /identify and analyze elements of course outcomes. Other Discussion boards will also be used for Q&A and general class discussion by students and instructor to facilitate student learning outcomes.
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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
MM/DD/YYYY

Dean
MM/DD/YYYY

Technical Review
MM/DD/YYYY

Curriculum Committee
MM/DD/YYYY

DTRW-I
MM/DD/YYYY

Curriculum Committee
MM/DD/YYYY

Board
MM/DD/YYYY

CCCCO
MM/DD/YYYY

Control Number
CCC000433570

DOE/accreditation approval date
MM/DD/YYYY