I. CATALOG INFORMATION

A. Discipline: BIOLOGY

B. Subject Code and Number: BIOL M02AH

C. Course Title: Honors: General Biology I

D. Credit Course units:

Units: 5

Lecture Hours per week: 4

Lab Hours per week : 3

Variable Units : No

E. Student Learning Hours:

Lecture Hours:

Classroom hours: 70 - 70

Laboratory/Activity Hours:

Laboratory/Activity Hours 52.5 - 52.5

Total Combined Hours in a 17.5 week term: 122.5 - 122.5

F. Non-Credit Course hours per week

G. May be taken a total of: [X] 1 [ ] 2 [ ] 3 [ ] 4 time(s) for credit

H. Is the course co-designated (same as) another course: No [X] Yes [ ]
If YES, designate course Subject Code & Number:

I. 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. Honors work challenges students to be more analytical and creative through expanded assignments, real-world applications, and enrichment opportunities.

J. Entrance Skills

*Prerequisite: No [ ] Yes [X] Course(s)
MATH M03 or 2 years of high school algebra or placement as determined by college's multiple measures assessment process and CHEM M12 or high school chemistry

*Corequisite: No [X] Yes [ ] Course(s)

Limitation on Enrollment: No [X] Yes [ ]

Recommended Preparation: No [X] Yes [ ] Course(s)

Other: No [X] Yes [ ]

K. Other Catalog Information:

Course Credit Limitations:
1. Credit will not be awarded for both the honors and regular versions of a course. Credit will be awarded only for the first course completed with a grade of "C" or better or "P". Honors Program requires a letter grade.
2. No credit for BIOL M01 if taken after BIOL M02A or BIOL M02AH.

C-ID: BIOL 190 and BIOL 135S (with BIOL M02B)

II. COURSE OBJECTIVES

Upon successful completion of the course, a student will be able to:

		Methods of evaluation will be consistent with, but not limited by, the following types or examples.
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.	Quizzes Problem solving and objective exams Essays Skills demonstrations Projects Reports Papers Case studies Classroom discussion
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.	Quizzes Problem solving and objective exams Essays Skills demonstrations Projects Reports Papers Case studies Classroom discussions
	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:	Quizzes

3	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.	Problem solving and objective exams Essays Skills demonstrations Projects Reports Papers Case studies Classroom discussions
4	identify and describe prokaryotic and eukaryotic cell structures, 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.	Quizzes Problem solving and objective exams Essays Skills demonstrations Projects Reports Papers Case studies Classroom discussions
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.	Quizzes Problem solving and objective exams Essays Skills demonstrations Projects Reports Papers Case studies Classroom discussions
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.	Quizzes Problem solving and objective exams Skills demonstrations Projects Reports Papers Case studies Classroom discussions Essays

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.	Quizzes Problem solving and objective exams Essays Skills demonstrations Projects Reports Papers Case studies Classroom discussions
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.	Quizzes Problem solving and objective exams Essays Skills demonstrations Projects Reports Papers Case studies Classroom discussions
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.	Quizzes Problem solving and objective exams Essays Skills demonstrations Projects Reports Papers Case studies Classroom discussions
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	Quizzes Essays Skills demonstration Lab reports Papers Classroom discussions

	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.	Journal article reviews Write-ups Classroom discussions
12	HONORS: critically read, analyze and summarize original scientific data and research.	Journal article reviews Research project/paper Presentations Classroom discussions
13	HONORS: report on seminars, conferences or presentations within the academic setting or community.	Verification of attendance Write-ups Group discussions
14	HONORS: identify, discuss and provide scientific significance and explanations for current biological issues impacting society. 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.	Essays Problem solving and objective exams Projects Reports Journal article reviews Group discussions Papers

III. COURSE CONTENT

Estimated %	Topic	Learning Outcomes
Lecture (must total 100%)		
6.00%	Introduction to Biological Processes Basic themes Organization of life Scientific method	1, 10, 11
13.00%	Biological Chemistry Review of bonding Water chemistry Carbon chemistry Macromolecules	2, 10, 11
16.00%	Cellular Biology Cell structures and function Membrane structure and function Cell transport processes Cell communication	4, 5, 10, 11, 12, 13, 14

15.00%	Cellular Metabolism Basic thermodynamics Enzymes Cellular respiration Role of ATP (adenosine triphosphate) Photosynthesis	3, 10, 11, 12, 13, 14
4.00%	Cellular Reproduction Prokaryote and eukaryote Life cycles Cell cycle controls	6, 10, 11, 12, 13, 14
12.00%	Genetics Sexual reproduction Mendelian genetics Molecular genetics	7, 10, 11, 12, 13, 14
22.00%	Molecular Biology DNA structure and replication Gene structure Gene expression Genome organization Regulation of gene expression Biotechnology Developmental genetics	7, 8, 10, 11, 12, 13, 14
12.00%	Evolutionary Processes Darwinian evolution Population genetics Speciation	9, 10, 11, 12, 13, 14
Lab (must total 100%)		
6.00%	Scientific Method Review the scientific method and demonstrate understanding by designing, executing and analyzing an experiment using the Step Test procedure. Critique our experimental design	10, 11
6.00%	Scientific Measurement Review the metric system and conversions. Demonstrate the proper use of laboratory measuring glassware and devices. Calculate conversions	10
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	4, 10
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	2, 10, 11
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	2, 10, 11, 12
6.00%	Enzymes Review the function of enzymes, test their optimal temperature, and determine the mechanism of inhibition of enzymes by experimentatio	2, 3, 10, 11, 12
6.00%	Cells and Organelles Observe cells and compare prokaryotic and eukaryotic cells using the	4, 10, 11,

	compound light microscope. Review and describe the functions of organelle	12, 14
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 membran	2, 4, 10, 11, 12
6.00%	Respiration Review aerobic respiration and compare it to photosynthesis	3, 10, 11, 12
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 tissue	3, 10, 11, 12
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 meiosi	4, 6, 7, 10, 11, 12, 14
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 reproductio	7, 10, 11, 12, 14
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	7, 8, 10, 11, 12, 14
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 marke	7, 8, 10, 11, 12, 14
6.00%	Evolution Demonstrate evolutionary concepts through calculating allele frequency changes using the Hardy-Weinberg equatio	9, 10, 11, 12, 14

IV. TYPICAL ASSIGNMENTS

A. Writing assignments

Writing assignments are required. Possible assignments may include, but are not limited to:	
1	essays on examinations that test the applications of learned class concepts, such as the understanding of water properties which make life processes possible.
2	analyses of internet research assignments.
3	laboratory reports.
4	written evaluations of assigned readings, such as relating evolutionary processes to the origin and evolution of cells, species, and populations.
5	Honors: research paper on a topic pertinent to the field of Biology. For example, a research paper on cancer research.
6	Honors: summaries of seminars attended.
7	Honors: reviews of scientific journal articles, such as on CRISPR or stem cells.

B. Appropriate outside assignments

Appropriate outside assignments are required. Possible assignments may include, but are

	not limited to:
1	problem sets such as metric conversions, genetics problems, and analyzing/interpreting research data.
2	readings from scientific literature that incorporate current scientific research to biology topics discussed in class.
3	Honors: attendance at seminars, conference or scientific presentations.
4	Honors: evaluation of scientific research as presented in the popular media.

C. Critical thinking assignments

Critical thinking assignments are required. Possible assignments may include, but are not limited to:	
1	conduct data analysis and interpretation of scientific results.
2	compare eukaryotic and microbial genetics.
3	evaluate role of specialization in evolution.
4	evaluate structure and function of cellular organelles
5	read and then critically analyze scientific literature, such as the role climate change in affecting natural systems and biodiversity.
6	use knowledge learned in the class and be able to analyze and apply the information.
7	Honors: read and analyze scientific research articles.
8	Honors: compare various evolutionary adaptations.
9	Honors: evaluate the role of hormones in regulation of digestion.

V. METHODS OF INSTRUCTION

Methods of instruction may include, but are not limited to:

☐ Distance Education – When any portion of class contact hours is replaced by distance education delivery mode (Complete DE Addendum, Section XV)

☒ Lecture/Discussion

☒ Laboratory/Activity

☒ Other (Specify) Group projects
Computer-assisted instruction
Audio-visual
Think-pair-share
Concept mapping

☐ Optional Field Trips

☐ Required Field Trips

VI. METHODS OF EVALUATION

Methods of evaluation may include, but are not limited to:

☒ Essay Exam ☒ Classroom Discussion ☒ Skill Demonstration

☐ ☐ ☐

[X] Problem Solving Exam
[X] Reports/Papers/ Journals
[X] Participation
[X] Objective Exams
[X] Projects
[X] Other (specify)

Lab practicals.

VII. REPRESENTATIVE TEXTS AND OTHER COURSE MATERIALS

Freeman, Scott, et al. Biological Science. 6th ed. Pearson, 2016.

Sackheim, George. An Introduction to Chemistry for Biology Students. 9th ed. Pearson, 2007.

Urry, Lisa, et al. Campbell Biology. 11th ed. Pearson, 2016.

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

VIII. STUDENT MATERIALS FEES

[X] No [ ] Yes

IX. PARALLEL COURSES

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

X. MINIMUM QUALIFICATIONS

Courses Requiring a Masters Degree:
master's degree in any biological science OR bachelor's degree in any biological science AND master's degree in biochemistry, biophysics, or marine science OR the equivalent.

XI. ARTICULATION INFORMATION

A. Title V Course Classification:

1. This course is designed to be taken either:

   [ ] Pass/No Pass only (no letter grade possible); or
   [X] Letter grade (P/NP possible at student option)

2. Degree status:
   Either [X] Associate Degree Applicable; or [ ] Non-associate Degree Applicable

B. Moorpark College General Education:

1. Do you recommend this course for inclusion on the Associate Degree General Education list?
   [ ] [ ]

Yes: [X] No: [ ] If YES, what section(s)?

[X] A1 - Natural Sciences - Biological Science
[ ] A2 - Natural Sciences - Physical Science
[ ] B1 - Social and Behavioral Sciences - American History/Institutions
[ ] B2 - Social and Behavioral Sciences - Other Social Behavioral Science
[ ] C1 - Humanities - Fine or Performing Arts
[ ] C2 - Humanities - Other Humanities
[ ] D1 - Language and Rationality - English Composition
[ ] D2 - Language and Rationality - Communication and Analytical Thinking
[ ] E1 - Health/Physical Education
[ ] E2 - PE or Dance
[ ] F - Ethnic/Gender Studies

C. California State University(CSU) Articulation:

1. Do you recommend this course for transfer credit to CSU? Yes: [X] No: [ ]
2. If YES do you recommend this course for inclusion on the CSU General Education list?
   Yes: [X] No: [ ] If YES, which area(s)?

A1 [ ] A2 [ ] A3 [ ] B1 [ ] B2 [X] B3 [X] B4 [ ]

C1 [ ] C2 [ ] D1 [ ] D2 [ ] D3 [ ] D4 [ ] D5 [ ]

D6 [ ] D7 [ ] D8 [ ] D9 [ ] D10 [ ] E [ ]

D. University of California (UC) Articulation:

1. Do you recommend this course for transfer to the UC? Yes: [X] No: [ ]
2. If YES do you recommend this course for the Intersegmental General Education Transfer Curriculum (IGETC)? Yes: [X] No: [ ]

IGETC Area 1: English Communication

[ ] English Composition
[ ] Critical Thinking-English Composition
[ ] Oral Communication

IGETC Area 2: Mathematical Concepts and Quantitative Reasoning

[ ] Mathematical Concepts

IGETC Area 3: Arts and Humanities

[ ] Arts
[ ] Humanities

IGETC Area 4: Social and Behavioral Sciences

- [ ] Anthropology and Archaeology
- [ ] Economics
- [ ] Ethnic Studies
- [ ] Gender Studies
- [ ] Geography
- [ ] History
- [ ] Interdisciplinary, Social & Behavioral Sciences
- [ ] Political Science, Government & Legal Institutions
- [ ] Psychology
- [ ] Sociology & Criminology

IGETC Area 5: Physical and Biological Sciences (mark all that apply)

- [ ] Physical Science Lab or Physical Science Lab only (none-sequence)
- [ ] Physical Science Lecture only (non-sequence)
- [X] Biological Science
- [ ] Physical Science Courses
- [ ] Physical Science Lab or Biological Science Lab Only (non-sequence)
- [ ] Biological Science Courses
- [ ] Biological Science Lab course
- [ ] First Science course in a Special sequence
- [ ] Second Science course in a Special Sequence
- [X] Laboratory Activity
- [ ] Physical Sciences

IGETC Area 6: Language other than English

- [ ] Languages other than English (UC Requirement Only)
- [ ] U.S. History, Constitution, and American Ideals (CSU Requirement ONLY)
- [ ] U.S. History, Constitution, and American Ideals (CSU Requirement ONLY)

XII. REVIEW OF LIBRARY RESOURCES

A. What planned assignment(s) will require library resources and use?

The following assignments require 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.

B. Are the currently held library resources sufficient to support the course assignment?

YES: [X] NO: [ ]

If NO, please list additional library resources needed to support this course.

XIII. PREREQUISITE AND/OR COREQUISITE JUSTIFICATION

Requisite Justification for MATH M03 or 2 years of high school algebra or placement as determined by college's multiple measures assessment process

- [ ] A. Sequential course within a discipline.
- [X] B. Standard Prerequisite or Corequisite required by universities.

  UC TCA
- [ ] C. Corequisite is linked to companion lecture course.
- [ ] D. Prerequisite or Corequisite is authorized by legal statute or regulation.
  Code Section: _____
- [ ] E. Prerequisite or Corequisite is necessary to protect the students' health and safety.
- [ ] F. Computation or communication skill is needed.
- [ ] G. Performance courses: Audition, portfolio, tryouts, etc. needed.

and

Requisite Justification for CHEM M12 or high school chemistry

- [ ] A. Sequential course within a discipline.
- [X] B. Standard Prerequisite or Corequisite required by universities.

  CSU SB
- [ ] C. Corequisite is linked to companion lecture course.
- [ ] D. Prerequisite or Corequisite is authorized by legal statute or regulation.
  Code Section: _____
- [ ] E. Prerequisite or Corequisite is necessary to protect the students' health and safety.
- [ ] F. Computation or communication skill is needed.

☐ G. Performance courses: Audition, portfolio, tryouts, etc. needed.

XIV. WORKPLACE PREPARATION

BIOL M02AH: Not Applicable

XV. DISTANCE LEARNING COURSE OUTLINE ADDENDUM

BIOL M02AH: Not Applicable

XVI. GENERAL EDUCATION COURSE OUTLINE ADDENDUM

General Education Division of Learning [check all applicable boxes]:

- ☒ Natural Sciences
  - ☒ Biological Science
  - ☐ Physical Science
- ☐ Social and Behavioral Sciences
  - ☐ American History/Institutions
  - ☐ Other Social Science
- ☐ Humanities
  - ☐ Fine or Performing Arts
  - ☐ Other Humanities
- ☐ Language and Rationality
  - ☐ English Composition
  - ☐ Communication and Analytical Thinking
- ☐ Health/Physical Education
- ☐ Ethnic/Women's Studies

Check either Option 1 or Option 2

☒ **OPTION #1:** Moorpark College has already received approval from the CSU and/or UC systems for this course to fulfill a GE requirement. Note: This option applies only to technical revisions and updated courses.

☐ **OPTION #2:** Moorpark College has not received approval from the CSU and/or UC systems for this course to fulfill a GE requirement. This option applies to all new and substantively revised courses.

XVII. STUDENT MATERIALS FEE ADDENDUM

BIOL M02AH: Not Applicable

XVIII. REPEATABILITY JUSTIFICATION TITLE 5, SECTION 55041

BIOL M02AH: Not Applicable

XIX. CURRICULUM APPROVAL

Course Information:

Discipline: BIOLOGY

Discipline Code and Number: BIOL M02AH

Course Revision Category: Outline Update

Course Proposed By:

Originating Faculty Audrey Chen 09/01/2018

Faculty Peer: Melia Tabbakhian 09/02/2018

Curriculum Rep: Beth Miller 09/02/2018

Department Chair: Jazmir Hernandez 09/06/2018

Division Dean: Carol Higashida 09/10/2018

Approved By:

Curriculum Chair: Jerry Mansfield 02/08/2019

Executive Vice President: _____

Articulation Officer: Letrisha Mai 02/06/2019

Librarian: Mary LaBarge 02/03/2019

Implementation Term and Year: Fall 2019

Approval Dates:

Approved by Moorpark College Curriculum Committee: 02/19/2019

Approved by Board of Trustees (if applicable): _____

Approved by State (if applicable): 02/27/2019