Program Description

The Biology program emphasizes concepts of biology including the diversity of life generated by evolution, how structure and function relate, and how genetic information flows. The program satisfies general education requirements and also prepares students for transfer to bachelor's degree programs in several biological fields including molecular biology, botany, ecology, zoology, allied-health, and medicine. Courses in the biological sciences aid in developing critical thinking skills that are applicable to nearly every discipline, provide an inquiry-based framework to use appropriate tools to solve biological questions, and may also incorporate undergraduate research using well-equipped labs to provide training in essential biological techniques.

Staff

Please dial (661) 722-6300, then the 4 digit extension.

Division:	
Christos Valiotis, Dean	x.6415
Suzanne Olson, Administrative Assistant	x 6415
Vacant, Clerical Assistant III	x.6415
Dr. Jedidiah Lobos, Department Chair	x.6198
Glenn Collins, Lab Technician	x.6272
Jaime Contreras, Lab Technician	x.6944
Jenna Jacobson, Lab Technician	x.6059
Jon Paul Bautista, , Lab Technician	x.6705
STEM	
Christos Valiotis, STEM Director	x.6415
Jamie Jones, STEM Coordinator	x.6992
Denilson Freitas, STEM Lab Technician	x.6157
Faculty:	
Dr. Andres Carrillo	x 6155
Lena Coleman	x.6095
Dr. Lauren Conroy	x.6139
Dr. Joseph Esdin	x.6075
Dr. Jedidiah Lobos	x.6198
Dr. Zia Nisani	x.6916
Osvaldo Larios-Perez	x.6730
Dr. Patricia Palavecino	x.6897
Dr. Matthew Rainbow	x.6369
Dr. Nikki Riley	x.6758
Dr. Bassam Salameh	x.6920
Dr. George Shahla	x.6625
Joshua Shipp	x.6160
Adjunct Faculty:	V.M.
Suda Anunta	2204
Ashley Aparicio	2448
Kaitlin Bessinger	2506
Dr. Patricia Butterworth	2232
Diana Doan	2638
Dang Huynh	2097
Debra Feickert	2576
Patricia Medina	2490
Jason Newman	2507
Christie Sukhdeo	
Junko Suzuki	2322
Dr. Leslie Uhazy	6417

Career Options

Agricultural Biologist	Industrial Hygienist
Bacteriologist	Marine Biologist
Biologist	Medical Technologist
Biotechnologist	Parasitologist
Botanist	Physician
Clinical Lab Technologist	Physician's Assistant
Curator	Pharmaceutical Sales
Dental Hygienist	Physical Therapist
Dentist	Physiologist
Ecologist	Public Health Technician
Environmental Scientist	Registered Nurse
Fish/Game Warden	Teacher
Food/Drug Inspector	Veterinarian
Geneticist	Wildlife Biologist
Horticulturist	Zoologist

(Careers may require education beyond the two-year college level.)

Program Learning Outcomes

1. Demonstrate a practical working knowledge of the scientific method, and the ability to collect, evaluate, and analyze scientific data.
2. Demonstrate an understanding of the cell structure, function, and chemistry at the molecular, cellular, tissue, and organismal levels.
3. Develop an understanding of the interactive role of living organisms in ecosystems and the environment.
4. Examine and evaluate the role of evolution and natural selection at the cellular and organismal levels.
5. Demonstrate the ability to use laboratory equipment and methods safely and proficiently as an individual or as a group.

Associate Degree

Associate in Science in Biology for Transfer

Biology is the scientific study of life through the observation of structure, function, reproduction, growth, origin, evolution, and behavior of living organisms and their relation to each other and their environment. Biologists have deepened our understanding of processes and interactions on all levels of biological organization from elucidating cellular processes to fight cancer to assessing interactions in communities that might help prevent the extinction of species. Studying biology provides a background for students to evaluate and understand new discoveries and to make informed decisions about the use of scientific knowledge to benefit all living organisms.

The AS-T in Biology is designed to prepare students for transfer to a baccalaureate degree program in biology, particularly at the California State University.

The Associate of Science in Biology for Transfer (AS-T) prepares student for upper division biology courses, including general biology, cell or molecular biology, organism biology, marine biology, botany, zoology, ecology, evolution, genetics, anatomy, physiology, microbiology, and agricultural sciences.

To earn an Associate in Science in Biology for Transfer (AS-T in Biology) degree a student must complete the following:

(1) Completion of 60 semester units or 90 quarter units that are eligible for transfer to the California State University, including both of the following:

(A) The Intersegmental General Education Transfer Curriculum (IGETC) or the California State University General Education – Breadth Requirements.

(B) A minimum of 18 semester units or 27 quarter units in a major or area of emphasis, as determined by the community college district.

(2) Obtainment of a minimum grade point average of 2.0.

ADTs also require that students must earn a "C" or better in all courses required for the major or area of emphasis. A "P" (Pass) grade is also an acceptable grade for courses in the major if the course is taken on a Pass/No Pass basis.

***This degree may only be earned by completing the Intersegmental General Education Transfer Curriculum (IGETC) for STEM or the California State University General Education – Breadth Requirements for STEM. Please consult a counselor for additional information.**

Required Courses (10 units):	**units**
BIOL 110, General Molecular Cell Biology	5
BIOL 120, General Organismal, Ecological and Evolutionary Biology	5

Required Electives A (Select 23 units):	**units**
CHEM 110, General Chemistry	5
CHEM 120, General Chemistry	5
MATH 150, Calculus and Analytic Geometry	5
PHYS 101, Intro. Physics ***and*** PHYS 102, Intro. Physics ***OR*** PHYS 110, General Physics ***and*** PHYS 120, General Physics	8

Courses required for the major may also satisfy general education requirements.

Recommended Pathway

Fall, First Semester	**units**
Required Elective A (CHEM 110, General Chemistry IGETC 5A/5C)	5
Required Elective A (MATH 150, Calculus and Analytic Geometry IGETC 2)	5
GE requirement area IGETC 1a (ENGL 101)	3
GE requirement area IGETC 3H	3
Total	**16**
Spring, Second Semester	
Required Elective A (CHEM 120, General Chemistry)	5
Electives	3
GE requirement area IGETC 4 (recommended POLS 101)	3
GE requirement area IGETC 1b (recommended ENGL 102 or ENGL 103 or PHIL 201)	3
Total	**14**
Summer	
GE requirement area IGETC 3A	3
Total	**3**
Fall, Third Semester	
BIOL 110, General Molecular Cell Biology (IGETC 5B/5C)	5
Required Elective A (PHYS 101, Introduction to Physics ***or*** PHYS 110, General Physics	4
GE requirement IGETC 1c (recommended COMM 101)	3
Electives	3
Total	**15**
Spring, Fourth Semester	
BIOL 120, General Organismal, Ecological and Evolutionary Biology	5
Required Elective A (PHYS 102, Introduction to Physics ***or*** PHYS 120, General Physics)	4
GE requirement IGETC 4	3
Total	**12**
Degree Total	**60**

Associate in Science in Biology

Biology is the scientific study of life through the observation of structure, function, reproduction, growth, origin, evolution, and behavior of living organisms and their relation to each other and their environment. Biologists have deepened our understanding of processes and interactions on all levels of biological organization from elucidating cellular processes to fight cancer to assessing interactions in communities that might help prevent the extinction of species. Studying biology provides a background for students to evaluate and understand new discoveries and to make informed decisions about the use of scientific knowledge to benefit all living organisms.

The Associate of Science in Biology prepares student for upper division biology courses, including general biology, cell or molecular biology, organism biology, marine biology, botany, zoology, ecology, evolution, genetics, anatomy, physiology, microbiology, and agricultural sciences.

Students must receive a minimum grade of "C" or better in all required core courses and the specific courses listed as program electives in order to qualify for the degree or certificate.

Required Courses (18-20 units):	**units**
BIOL 110, General Molecular Cell Biology	5
BIOL 120, General Organismal, Ecological & Evolutionary Biology	5
Program Electives	8-10
Total	**18-20**

Program Electives (8 or more units):	**units**
BIOL 201, General Human Anatomy	4
BIOL 202, General Human Physiology	4
BIOL 204, General Microbiology	5
CHEM 110, General Chemistry	5
CHEM 120, General Chemistry	5

Note: if choosing a CHEM Program elective, we recommend taking the combination of CHEM 110 + 120. Please speak with a counselor and check the requirements for your transfer institution.

Specific areas of study, e.g., Environmental Science, Anatomy, Physiology, Microbiology, etc. should be arranged with the assistance of the biology faculty. The faculty suggests that appropriate courses in chemistry, physics, and mathematics be taken concurrently with the biology courses.

Suggested Courses:	**units**
MATH 140, Precalculus	4
PHYS 101, Introductory Physics	4
PHYS 102, Introductory Physics	4

Completion of this degree is only a partial fulfillment of the requirements for transfer as a Biology major to an institution granting a baccalaureate degree. (See Graduation/Associate Degree Requirements.)

Recommended Pathway

Fall, First Semester	**units**
GE requirement area B (recommended ANTH 102, ANTH 112, GEOG 106, or POLS 101)	3
GE requirement area D1 (ENGL 101)	3
GE requirement area D2 (recommended MATH 140)	4
GE requirement area E (recommended COMM 107 or 219)	3
	Total 14
Spring, Second Semester	
BIOL 120, General Organismal, Ecological and Evolutionary Biology (AVC GE A)	5
Program Elective: CHEM 110, General Chemistry	5
GE requirement area C (recommended PHIL 106)	3
Electives	3
	Total 16
Fall, Third Semester	
BIOL 110, General Molecular Cell Biology	5
PHYS 101, Introduction to Physics	4
GE requirement area F	3
Electives	3
	Total 15
Spring, Fourth Semester	
PHYS 102, Introduction to Physics	4
Program Elective: CHEM 120, General Chemistry	5
Electives	6
	Total 15
	Degree Total 60

Note: If following a CSU GE pattern, please see a counselor.

Transfer

Students planning to continue studies at a four-year college or university after AVC should visit the Transfer Resource Center and consult with a counselor as soon as possible. Additional information on official transfer articulation agreements from AVC to many CSU/UC campuses can be found at www.assist.org

Prerequisite Completion

All prerequisite courses must be completed with a satisfactory grade in order to enroll in the next course. According to Title 5, Section 55200(d), a satisfactory grade is a grade of "A," "B," "C" or "P". Classes in which the Pass/No Pass option is available are indicated with an asterisk **(*)** before the course title. See "Pass/No Pass Option" in the catalog for full explanation.

Biological Sciences Courses

BIOL 100 ELEMENTARY HUMAN ANATOMY AND PHYSIOLOGY

3 units
5 hours weekly [2 lecture, 3 lab]
This course covers the basic structure and function of the human body. Knowledge obtained may be used by students entering either an allied health science or non-transfer level field. (AVC)

BIOL 101 GENERAL BIOLOGY

3 units
3 hours weekly
Corequisite: *Concurrent enrollment in BIOL 101L.*
A general education non-major biology course designed to acquaint the students with the nature of science, the unity of life processes, the diversity of living things, the interdependence of organisms in the biosphere, the mechanisms that have shaped life on Earth, and with humans as biological entities. This course has a corequisite and must be taken concurrently with BIOL 101L. **NOTE**: Biology majors should take BIOL 110 and BIOL 120 instead of this course. (CSU, UC, AVC)

BIOL 101L GENERAL BIOLOGY LAB

1 unit
3 hours weekly
Corequisite: *Concurrent enrollment in BIOL 101.*
A general education non-major laboratory biology course designed to be corequisite and taken concurrently with BIOL 101 to acquaint the students with the nature of science, the unity of life processes, the diversity of living things, the interdependence of organisms in the biosphere. the mechanisms that have shaped life on Earth, and with humans as biological entities. The laboratory focuses on the kinds of living things, and the structures and functions they share. **NOTE:** Biology majors should take BIOL 110 and BIOL 120 instead of this course. (CSU, UC, AVC)

BIOL 102 *HUMAN BIOLOGY

4 units
6 hours weekly
(3 hours lecture, 3 hours lab)
Advisory: *Completion of ENGL 101 or placement by multiple measures.*
This course explores the principles of biology using the human species as its primary tool. It is an introductory level, transfer course designed for non-science majors, students who want to further their professional development, or to enrich their knowledge of biology in general and their bodies in particular. Topics discussed include the scientific method, cell biology, genetics, evolution, aging, major concepts of structure, function and pathology of most organ systems, as well as how humans interact with their internal and external environment. (CSU, UC, AVC)

BIOL 103 INTRODUCTION TO BOTANY

4 units
6 hours weekly [3 lecture; 3 lab]
This is an introduction course in the study of plants. This course deals with the structure of plants, how plants grow and function and types of plants. Plant ecology and geography will also be discussed. (CSU, UC, AVC)

BIOL 104 ENVIRONMENTAL BIOLOGY

3 units
3 hours weekly
Advisory: *Completion of ENGL 101 or placement by multiple measures.*
A general education biology course dealing with current environmental issues. Topics include environmental sustainability, ecological principles, human population impact, energy, climate change, species extinction, pollution and toxic wastes. (CSU, UC, AVC)

BIOL 110 GENERAL MOLECULAR CELL BIOLOGY

5 units
7 hours weekly [4 lecture, 3 lab]
Advisory: *Completion of a general biology course is recommended and eligibility for ENGL 101 or placement by multiple measures.*
Prerequisite: *Completion of Intermediate Algebra or higher or placement by multiple measures.*
Co-requisite: *Completion of CHEM 110 or concurrent enrollment*
A comprehensive and in-depth introduction for all biology majors (as well as physics, chemistry, engineering, computer science, and math majors who will concern themselves with biology) to the unifying principles of modern cellular biology, molecular biology and biochemistry. Topics include the structure of the atom, quantum mechanics, the nature of the chemical bond, general principles of thermodynamics and equilibrium, prokaryotic and eukaryotic cell structure, lipid chemistry and membrane biology, protein structure and function, photosynthesis and cellular respiration, nucleic acids (DNA and RNA) and their role in protein synthesis, principles of classical and molecular genetics, the control of gene expression, cell signaling systems, molecular embryology, evolutionary developmental biology, and biotechnology. Lab work includes investigations with live bacteria, protists, flowering plants and fruit flies as model organisms, and includes experiments in photosynthesis, enzymology, gel electrophoresis, genetics and biotechnology. This course stresses evolutionary mechanisms. (C-ID: BIOL 190) (CSU, UC, AVC)

BIOL 120 GENERAL ORGANISMAL, ECOLOGICAL AND EVOLUTIONARY BIOLOGY

5 units
7 hours weekly [4 lecture, 3 lab]
Advisory: *Completion of a general biology course and/or BIOL 110.*
Prerequisite: *Completion of Intermediate Algebra or higher or placement by multiple measures.*
A comprehensive, in-depth course designed for biology majors to complement the cell molecular perspective presented in BIOL 110. A survey of unicellular and multicellular organisms, emphasizing morphology, systematics, evolution, physiology, heredity, development, behavior and ecology. Laboratories consist of dissection and analysis of representative taxa and student projects. Data analysis and preparation of scientific reports are taught and applied to individual research projects. (C-ID: BIOL 140) (CSU, UC, AVC)

BIOL 201 GENERAL HUMAN ANATOMY

4 units
8 hours weekly [2 lecture, 6 lab]
Prerequisite: *Completion of BIOL 100 or 101 or 102 or 110 or 120.*
Introduction to the structure and function of the human body. Included are lectures and demonstrations using models, isolated specimens and multimedia images of human anatomy. Laboratory study includes demonstrations and dissections of a cat and other animal and human material, including the cadaver. Completion of this class requires full participation and use of all lab materials. **NOTE:** This course is taken by students who wish to enter the Associate Degree Nursing Program, students who plan to combine their education in various healthcare fields, and students who plan to transfer to four-year institutions to major in biology. (C-ID: BIOL 110B) (CSU, UC, AVC)

BIOL 202 GENERAL HUMAN PHYSIOLOGY

4 units
6 hours weekly [3 lecture, 3 lab]
Prerequisite: *Completion of BIOL 201 and CHEM 101.*
An analysis of basic processes of the human body, emphasizing the coordinated physical and chemical mechanisms of cell biology, neuromuscular, cardiovascular, respiratory, digestive, skeletal, integumentary, immune, renal, endocrine and reproductive systems. Includes work with computerized instrumentation and living animals. Completion of this course requires full participation and use of all laboratory materials. **NOTE:** This course is necessary for students entering many healthcare professions including the Associate Degree Nursing Program. It is also applicable for transfer students in the biological sciences. (C-ID: BIOL 120B) (CSU, UC, AVC)

BIOL 204 GENERAL MICROBIOLOGY

5 units
9 hours weekly [3 lecture, 6 lab]
Advisory: *Completion of BIOL 201, Band, eligibility for ENGL 101 or placement by multiple measures.*
Prerequisite: *Completion of BIOL 101 or 110 or 120, and CHEM 101.*
This course is designed to present an overview of the biology of microorganisms including bacteria, viruses, protozoa, fungi and helminths. Information is directed towards students in preprofessional programs for nursing, dental hygiene, surgical technology, physicians assistant, food science, environmental monitoring, animal and crop sciences as well as biological science majors. Wherever possible, new development in Biotechnology, Virology and Immunology are discussed to provide students with current knowledge in this important field of science. The laboratory introduces a broad spectrum of microorganisms and the concepts and techniques required to identify and classify unknown bacteria. (CSU, UC, AVC)

BIOL 205 *INTRODUCTION TO BIOTECHNOLOGY

3 units
5 hours weekly [2 lecture, 3 lab]
Advisory: *Completion of BIOL 204.*
Prerequisite: *Completion of BIOL 110 or higher, and CHEM 101 or higher.*
The course will introduce the student to theoretical and applied concepts of Biotechnology- the use of living organisms or their products to enhance our lives and our environment. The content will cover the concepts of DNA structure, gene expression and protein synthesis. The laboratory techniques used in the Biotechnology industry will be learned and practiced by the students, including keeping a detailed lab notebook, learning and using calculations for solution preparation, preparing and analyzing DNA and protein samples by enzyme digest and gel electrophoresis, amplifying DNA by Polymerase Chain Reaction, and isolation of protein and DNA with separation techniques. Applications of these techniques in the Agricultural, Medical, Pharmaceutical and Forensic fields will be discussed. (CSU, UC, AVC)

BIOL 304 A SURVEY OF EMERGING AND RE-EMERGING INFECTIOUS DISEASES

3 units
3 hours weekly
Limitation on Enrollment: *Must be selected as part of the AFMT BS Degree cohort to take this course.*
Prerequisite: *Completion of ENGL 101.*
This is an upper division General Education course, covering a survey of selected emerging and re-emerging infectious diseases, addressing the Biological, Historical, Sociological, Geographical, and Epidemiological factors that have had an impact on the human populations worldwide throughout history. The content will cover the basic concepts of infectious disease agents (Viruses, Prions, Bacteria, Protozoa, and Helminths), human biology, and the Public Health measures used to identify, treat, and prevent these diseases. Also covered are the various human factors that have influenced the trends of these diseases, including historical events, Geopolitics, and cultural and Sociological changes affecting human populations. (AVC)