

# BIOLOGY

SCHOOL OF LIFE SCIENCES AND TECHNOLOGIES

**Dean:** (vacant)

**Academic Chair:** Dr. Christopher Riegler

**Faculty:** Michael Baker, Dr. Vince Caiozzo, Dr. Alan Cohen, Tom Engelhardt, David Fretz, Shadi Haeri, Dr. Diana Hurlbut, Dr. Jefferey Kaufmann, Al Klein, Dr. Christopher Riegler, Roland Rodriguez, Priscilla Ross, Dr. Katherine Schmeidler, Sandra Watt

## CURRICULUM

The School of Life Sciences at Irvine Valley College offers a wide range of courses in the biological sciences as well as a course in environmental studies. Introductory courses focus on theories and concepts in five primary areas: cellular and molecular biology, genetics, evolution, ecology, and whole organism biology. More specialized courses examine extensions of these basic principles as they relate to a variety of specific areas of study, including botany, zoology, human anatomy, human physiology, cellular biology, microbiology, natural history, and marine biology. Students may complete courses within the department in order to fulfill general education requirements, to satisfy prerequisites for health-related programs such as nursing, to meet graduation requirements at prospective transfer institutions, or to complete the Associate in Arts degree with a major in biology or health sciences.

## MAJOR

The requirements for majors in the life sciences are intended to provide a solid foundation for the student who wishes to pursue further study at the baccalaureate or graduate level, or enter a preprofessional or professional program in a health-related field. The faculty strongly recommends that students without a firm foundation in basic biological principles complete one of the two introductory sequences in biology (Biology 1/1L or Biology 94/94L) in preparation for the more specialized courses. In addition to the core courses for the major or health-related fields, an introduction to other sciences is usually recommended and necessary for more advanced study. The biology faculty therefore suggests that students complete appropriate courses in chemistry, physics, and mathematics concurrently with biology core courses. Students should refer to the requirements of prospective institutions or seek advice from a member of the biology faculty or a counselor before choosing electives.

## DEGREE OPTIONS

- **Associate in Arts Degree in Biology**
- **Associate in Arts Degree in Health Sciences**

Students must complete a minimum of 60 units of credit, including the courses in the major ("Major Requirements") and general education requirements (pages 56-61), with an overall GPA of 2.0 or better. A minimum of 12 units must be completed at Irvine Valley College. See pages 52-54 for further information.

## TRANSFER PREPARATION

Courses that fulfill major requirements for an associate degree at Irvine Valley College may not be the same as those required for completing the major at a transfer institution offering a baccalaureate degree. Students who plan to transfer to a four-year college or university should (1) refer to the University Studies major (page 185) and "Transfer Planning" (page 64); (2) consult the catalog of their prospective transfer institution (see the IVC Transfer Center for assistance); and (3) schedule an appointment with an IVC counselor to develop a plan of study before beginning their program. It may be helpful to meet with the department faculty at IVC.

## MAJOR REQUIREMENTS: BIOLOGY

**This major is appropriate for most students who plan to transfer to a four-year college or university in a biology program.**

### ASSOCIATE IN ARTS DEGREE

<b>Complete the following courses:</b>	<b>Units</b>
<b>BIO 2</b> Principles of Botany	4
<b>BIO 5</b> Principles of Zoology	4
<b>BIO 6</b> Cellular Biology	3
<b>BIO 6L</b> Cellular Biology Laboratory	1

### Complete 6 units from the following courses:

<b>BIO 4</b> Evolutionary Ecology	3
<b>BIO 11</b> Human Anatomy	4
<b>BIO 12</b> Human Physiology	4
<b>BIO 15</b> General Microbiology	5
<b>BIO 19</b> Marine Biology	4
<b>BIO 43</b> Wild Animal Behavior: The Science of Ethology	3
<b>BIO 93</b> Molecules to Cells	4
<b>CHEM 1A</b> General Chemistry	5
<b>CHEM 1B</b> General Chemistry	5
<b>TOTAL UNITS:</b>	<b>18</b>

**Recommended electives:** Bio. 1 and 1L are recommended prerequisites for Bio. 2 and Bio. 5.

# MAJOR REQUIREMENTS: HEALTH SCIENCES

## ASSOCIATE IN ARTS DEGREE

This major is appropriate for students who plan to enter training in one of the health professions, including nursing, physical therapy, occupational therapy, dental hygiene, physician assistance, and health sciences.

Complete the following courses:	Units
<b>BIO 11</b> Human Anatomy	4
<b>BIO 12</b> Human Physiology	4
<b>BIO 15</b> General Microbiology	5

Complete a minimum of 6 units from the following courses. Select one chemistry course:

<b>BIO 201</b> Biochemistry for Health Sciences	2
<b>CHEM 4</b> Introduction to General and Organic Chemistry and Biochemistry	5
<b>CHEM 108†</b> Introduction to General, Organic and Biochemistry	4
<b>PSYC 1</b> Introduction to Psychology	3
<b>SOC 1</b> Introduction to Sociology	3
<b>TOTAL UNITS:</b>	<b>19</b>

† Course offered only at Saddleback College.

## COURSES

### BIOLOGY (PRINCIPLES)

#### BIO 1: Principles of Biology: Cells to Ecosystems

3 Units  
3 hours lecture

This course is an integrated survey of the major principles of biology. Lectures focus on cellular and molecular biology, biochemistry, reproduction, genetics, organic evolution, population biology, and ecology. This course is recommended for students seeking to fulfill the general education requirement in life sciences or as an introductory course for students pursuing advanced study in the life sciences. UC credit provisions (see UC course list). NR

#### BIO 1L: Principles of Biology: Cells to Ecosystems Laboratory

1 Unit  
3 hours lab  
Prerequisite: Prior completion of or concurrent enrollment in Bio. 1

This is a laboratory survey of the major principles of biology. It is the recommended course to accompany Biology 1. Topics include the application of laboratory equipment and procedures to the investigation of biological systems at the biochemical, cellular, organismal, population, and community levels. This course does not include animal dissections. Students may take Bio. 1L independently or concurrently with the Bio. 1 lecture, but not prior to it. Field trips may be required to fulfill the course objectives. NR

#### BIO 2: Principles of Botany

4 Units  
3 hours lecture, 3 hours lab  
Prerequisite: Bio. 1 or Bio. 94 and Math 253  
This course provides a survey of plants, algae, fungi, and prokaryotes. Lectures focus on the structure, function, genetics, classification, evolution, ecology and natural history of these major groups. Field trips may be required to fulfill course objectives. (CAN BIOL 6; Bio. 6+6L+5+2: CAN BIOL SEQ A) NR

#### BIO 4: Evolutionary Ecology

3 Units  
3 hours lecture  
Prerequisite: Bio. 94  
This course examines the interactions between organisms and their abiotic and biotic environments from an ecological and evolutionary perspective. The focus is on global and local climatology; adaptations to the physical environment; energy production and utilization; food chains and food web analysis; niche theory; biology of populations, including population growth and its regulation, and interactions between and within populations; analysis of community structure and functions; life history; natural and sexual selection, adaptation and genetics; mating systems; problems of spatial and temporal scale; and game theory. This course assumes some knowledge of organismal biology and evolutionary theory. NR

#### BIO 5: Principles of Zoology

4 Units  
3 hours lecture, 3 hours lab  
Prerequisite: Math 253  
This course is a survey of protozoans and animals. Lectures focus on the structure, function, development, classification, evolution, ecology and natural history of major animal and protozoan groups. Field trips may be required to fulfill the course objectives. (CAN BIOL 4; Bio. 6+6L+5+2: CAN BIOL SEQ A) NR

#### BIO 6: Cellular Biology

3 Units  
3 hours lecture  
Prerequisite: Bio. 1, Chem. 1B and Math 253  
This course presents an analysis of living systems at the cellular level. It examines the structure and function of prokaryotic and eukaryotic cells and their organelles; the energetics and biochemistry of metabolism; the processes of intracellular transport; and the process of protein synthesis. (Bio. 6+6L: CAN BIOL 2; Bio. 6+6L+5+2: CAN BIOL SEQ A) NR

#### BIO 6L: Cellular Biology Laboratory

1 Unit  
3 hours lab  
Prerequisite: Prior completion of or concurrent enrollment in Bio. 6  
This course is the laboratory companion to the Biology 6 lecture course. It is designed to introduce students to the techniques of modern cell biology as they relate to the study of intracellular structure and function, genetic expression and transmission, and cell-environment interactions. Techniques may include organelle and macromolecule isolation and purification; chromatography; electrophoresis; Western blots; spectrophotometry; enzymology; histology; cytochemistry; gene transfer; polymerase chain reaction; DNA fingerprinting; immunology and cell culture and cloning. Biology 6L is also listed as Biology 99L; credit will be given in either area, not both. (Bio. 6+6L: CAN BIOL 2; Bio. 6+6L+5+2: CAN BIOL SEQ A) NR

#### BIO 13: Lab Research

2 Units  
1 hour lecture, 3 hours lab  
Prerequisite: Bio. 1, 2, 4, 5, 6, 11, 12, 15, 94, 97 or 99 and Chem. 1A/1B  
This course provides laboratory and field experience for advanced students of biological sciences. It focuses on experimental design; equipment use and care; data collection, analysis, and interpretation; and both verbal and written presentation of results. The granting of UC transfer credit for courses of this kind is contingent upon a review of the course outline by a UC campus. R-E-3

#### BIO 15: General Microbiology

5 Units  
3 hours lecture, 6 hours lab  
Recommended Preparation: Bio. 11 and 201  
This course is an examination of the fundamental biological concepts as they apply to viruses, bacteria, fungi, and protozoans. Theoretical as well as practical applications are discussed in such topics as bacterial morphology, metabolism, genetics, chemotherapy, and antibiotics. Also discussed are resistance and immunity, health and disease, and the role of microorganisms in the environment. Laboratory work will reinforce topics covered in lecture. Field trips may be required to fulfill course objectives. (CAN BIOL 14) NR

**BIO 19: Marine Biology**

4 Units

*3 hours lecture, 3 hours lab**Recommended Preparation: Bio. 1 or 94*

This course presents the biology and natural history of marine organisms within an ecological context. A habitat approach emphasizes the physical features of each marine environment, the community structure of the habitat and adaptations of the constituent organisms. Emphasis is on California marine life. The laboratory component of the course emphasizes observation and experimentation. Experiments address general biological/ecological principles in the context of the marine environment. Students study the classification, anatomy, physiology and behavior of marine organisms. Field trips, an integral part of the course, focus on the structure of marine ecosystems. NR

**BIO 43: Wild Animal Behavior:  
The Science of Ethology**

3 Units

*3 hours lecture*

This course offers an integrated analysis of the biological, ecological and evolutionary (i.e., adaptive) bases of animal behavior (ethology) in the wild. The course considers in detail the psychobiological, ecological, ontological and sociobiological determinants of animal behavior, stressing historical and evolutionary contexts. Field trips may be required to fulfill course objectives. NR

**BIO 93: Integrated Biology: From DNA to  
Organisms**

4 Units

*4 hours lecture**Prerequisite: Math 253**Recommended Preparation: High school biology or chemistry*

This course integrates four broadly defined levels of organismal structure and function into a coherent framework. Biochemistry, cell biology, genetics, and organismal structure and function (with emphasis on organ systems) are woven together using basic themes of structural/functional hierarchy, energetics, and information flow. NR

**BIO 94: Diversity of Life**

3 Units

*3 hours lecture*

This course is a comprehensive survey of life's diversity. Students examine representatives of the kingdoms of organisms within the context of biological classification, biological nomenclature, and evolutionary history. The course integrates principles of genetics, organic evolution and ecology to provide a common rubric within which students may explore the unity and diversity of life. Field trips may be required to fulfill objectives of this course. Biology 94 was formerly Biology 3. NR

**BIO 94L: Diversity of Life Laboratory**

1 Unit

*3 hours lab**Prerequisite: Prior completion of or concurrent enrollment in Bio. 94*

This laboratory course is a comprehensive survey of life's diversity. The course examines representatives of the kingdoms of organisms within the context of biological classification, biological nomenclature, environmental adaptation and evolutionary history. Students survey living specimens, museum specimens, herbarium specimens and microscope slides representing each of the major taxa. Field trips may be required to fulfill the course objectives. Biology 94L was formerly Biology 3L. NR

**BIO 97: Genetics and Evolutionary Biology**

3 Units

*3 hours lecture**Prerequisite: Chem. 1B and either Bio. 1 or Bio. 94*

This course is a comprehensive survey of the processes and products of genetics. Through a review of experimental evidence, students evaluate the basic tenets of molecular, transmission, and population genetics, and use the science of genetics to appraise the relationship of genetics to the processes and products of microevolution and macroevolution. The philosophy and methods of science well as the theory of evolutionary thought are integrated throughout. The course assumes prior knowledge of evolutionary theory, classification and taxonomy, and ecology. Biology 97 was formerly Biology 7. NR

**BIO 99: Molecular Biology and Biochemistry**

3 Units

*3 hours lecture**Prerequisite: Bio. 97 and Chem. 12A*

This course focuses on the structure and functions of major classes of intracellular macromolecules; the metabolic pathways for the synthesis, degradation, and interconversion of carbohydrates, lipids, and proteins; and the molecular mechanisms which control and direct intracellular metabolic processes. Concepts and theories of molecular evolution are also considered. The course assumes prior knowledge of the structure and expression of genetic information. Biology 99 was formerly Biology 8. NR

**BIO 99L: Molecular Biology Laboratory**

1 Unit

*3 hours lab**Prerequisite: Prior completion of or concurrent enrollment in Bio. 99*

This course is the laboratory companion to the Biology 99 lecture course. It is designed to introduce students to the techniques of modern cell biology as they relate to the study of intracellular structure and function, genetic expression and transmission, and cell-environment interactions. Techniques may include organelle and macro-molecule isolation and purification; chromatography; electrophoresis; Western blots; spectrophotometry; enzymology; histology; cytochemistry; gene transfer; polymerase chain reaction; DNA fingerprinting; immunology and cell culture and cloning. Biology 99L is also listed as Biology 6L; credit will be given in either area, not both. Biology 99L was formerly Biology 8L. NR

**BIO 140: Lab Research in Geological and  
Biological Sciences**

1.5 Units

*.5 hour lecture, 2.5 hours lab*

This course provides laboratory and field experience for students of geological and biological sciences. It focuses on experimental design; equipment use and care; data collection, analysis, and interpretation; and verbal and/or written presentation of results. Biology 140 is also listed as Geology 140; credit will be given in either area, not both. Biology 140 was formerly offered as Biology 14. R-E-3

**BIOLOGY****(HUMAN BIOLOGY)****BIO 11: Human Anatomy**

4 Units

*2 hours lecture, 6 hours lab*

This course presents an analysis of human structure integrating cellular, tissue, organ, and organ system levels of structure and relates structure to function. Laboratory emphasis is on histology and gross anatomy. The course is designed for pre-professional students and biology majors. (CAN BIOL 10; Bio. 11+12: CAN BIOL SEQ B) NR

**BIO 12: Human Physiology**

4 Units

*3 hours lecture, 3 hours lab**Prerequisite: Bio. 11 and Bio. 6/6L or Bio. 15**Recommended Preparation: Chem. 4, Wr. 1 and Math 253*

This course applies an integrated systems approach to the study of function in the human body. Emphasis is on major organ systems, their negative feedback controls, and their significance in maintaining homeostasis of the whole body. Each system is analyzed at the molecular, cellular, tissue and organ levels of function. The lab component of the course emphasizes experimental design, data collection and analysis, and evaluation and interpretation of experimental results. (CAN BIOL 12; Bio. 11+12: CAN BIOL SEQ B) NR

**BIO 12D: Human Physiology–Discussion**

1 Unit

*1 hour lecture**Corequisite: Bio. 12*

This discussion course affords students enrolled in Biology 12, Human Physiology, the opportunity to discuss, analyze, and exchange ideas concerning human function. Discussions focus on negative feedback control systems and other key topics covered in Biology 12, as well as background information not generally covered in the lecture. Biology 12D is offered on a credit/no-credit basis only. UC credit provisions (see UC course list) NR

**BIO 44: Biology of Human Sexuality**

3 Units

*3 hours lecture*

This course provides a thorough introduction to the development and practice of sexuality in humans. It is organized into three units:

(1) biochemical function, (2) developmental and sexual differentiation from fertilization through the age of 18 months, and (3) psycho-sexual and physiological development from birth through adulthood. Field trips may be required to fulfill the objectives of this course. NR

**BIO 121: Human Anatomy and Physiology**

4 Units

*3 hours lecture, 3 hours lab**Recommended Preparation: High school biology and eligibility for college-level writing*

This basic course shows the interrelationships between the anatomical and physiological systems of humans. The course presents an analysis that integrates cellular, tissue, organ, and organ system levels of structure and relates structure to function. Laboratory emphasis is on the histology, gross anatomy, and physiology of major systems. This course does not meet the requirements of either anatomy or physiology for nursing students or biology majors. NR

**BIO 200: Human Prosection**

2 Units

*1 hour lecture, 3 hours lab**Prerequisite: Bio. 11*

This course focuses on the gross anatomy of major organs and organ systems of the human body. The course presents detailed regional dissections using human cadaveric specimens. Emphasis is placed on dissection techniques. R-E-3

**BIO 201: Biochemistry for Health Sciences**

2 Units

*2 hours lecture**Recommended Preparation: Math 251 strongly recommended.*

Biology 201 addresses the application of chemical principles to biological systems, especially at the cell level of structure and function. The essential topics include the nature of biologically important solutions and colloids; structure, functions and interactions of biological macromolecules; interactions of biological molecules in the formation and functions of biological membranes; intracellular metabolism and enzyme functions; and genetic control of biological functions. The course is intended for health science students who have no previous background in the sciences. NR

**NATURAL HISTORY****BIO 30: California Wildlife and Wild Places**

3 Units

*3 hours lecture*

This non-major lecture course introduces students to the natural history of California plants and animals in the context of the many ecosystems found in the state. The course presents both ecological and evolutionary perspectives as it examines the role of the environment, species interactions, and adaptation in creating California's surprising biodiversity. The course includes prehistorical and historical changes to California wildlands and the role humans have played in shaping the current landscape. Field trips may be required to fulfill course objectives. NR

**BIOLOGY  
(FIELD STUDIES)****BIO 103: Field Biology: Mountain Ecosystems**

1 Unit

*.5 hours lecture, 1 hour lab**Recommended Preparation: Prior completion of or concurrent enrollment in a college-level science course.*

This field course introduces students to mountain ecosystems. Direct observations and experiments in the field are complemented by lectures and discussions of the physical environment; natural history, biology, and ecology of the flora and fauna; and community structure. The course is taught entirely in the field. It is intended for both biology majors and non-majors. R-E-3

**BIO 104: Field Biology: Desert Ecosystems**

1 Unit

*.5 hours lecture, 1 hour lab**Recommended Preparation: Prior completion of or concurrent enrollment in a college-level science course.*

This field course introduces students to desert ecosystems. Direct observations and experiments in the field are complemented by lectures and discussions of the physical environment; natural history, biology, and ecology of the flora and fauna; and community structure. The course is taught entirely in the field. It is intended for both biology majors and non-majors. R-E-3

**ENVIRONMENTAL  
STUDIES****ENV 1: Introduction to Environmental Studies**

3 Units

*3 hours lecture*

This introductory course emphasizes an interdisciplinary approach to environmental science. It includes topics in biology, chemistry, geology, economics, health, and politics. Field trips will acquaint students with the local environment and the political process. NR