

Biology/Life Sciences

The Curriculum

The School of Life Sciences at Irvine Valley College offers a wide range of courses in the biological sciences as well as selected courses in environmental studies. The 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 for the Associate degree; 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.

The Associate Degree 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 3/3L) 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.

If you intend to transfer:

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. If you plan to transfer to a four-year college or university, you should (1) refer to the transfer section of this catalog, (2) consult the catalog of your 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 you begin your program. In addition, it may be helpful to meet with the appropriate department faculty at IVC.

If you plan to complete an associate degree:

You must complete one of the following sets of courses to fulfill the major requirement and, in addition, meet the general education requirements listed on page 21 for the Associate in Arts (A.A.) degree. Refer to page 16 for additional options for fulfilling the major requirement.

BIOLOGY MAJOR

(A.A. Degree)

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

Complete the following courses:

		Units			
BIO 1	Principles of Biology	3	BIO 11	Human Anatomy	(4)
BIO 1L	Principles of Biology Laboratory	1	BIO 12	Human Physiology	(3)
BIO 2	Principles of Botany	4	BIO 15	General Microbiology	(5)
BIO 5	Principles of Zoology	4	BIO 19	Marine Biology	(3)
BIO 6	Cellular Biology	3	BIO 30	Introduction to Natural History	(3)
BIO 6L	Cellular Biology Laboratory	1	BIO 43	Animal Behavior (Ethology)	(3)
<i>Select a minimum of 6 units from the following courses:</i>			CHEM 1A	General Chemistry	(5)
BIO 4	Evolutionary Ecology	(3)	CHEM 1B	General Chemistry	(5)
BIO 7	Genetics and Evolutionary Biology	(3)	CHEM 12A	Organic Chemistry	(5)
BIO 8	Molecular Biology and Biochemistry	(3)	CHEM 12B	Organic Chemistry	(5)

Total Units: 22

HEALTH SCIENCES MAJOR

(A.A. 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
BIO 11	Human Anatomy	4
BIO 12	Human Physiology	3
BIO 12L	Human Physiology Laboratory	1
BIO 15	General Microbiology	5
Select a minimum of 5 units from the following courses:		
SOC 1	Introduction to Sociology	(3)
PSYC 1	Introduction to Psychology	(3)
BIO 201	Biochemistry for Health Sciences	(2)
CHEM 1A	General Chemistry	(5)
CHEM 1B	General Chemistry	(5)
CHEM 4	Introduction to General and Organic Chemistry and Biochemistry	(5)
Total Units:		18

Biology Courses

BIOLOGICAL PRINCIPLES

BIO 1 3 units

PRINCIPLES OF BIOLOGY

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

Lecture hours: 3

BIO 1L 1 unit

PRINCIPLES OF BIOLOGY LABORATORY

Prereq: Prior completion of or concurrent enrollment in Bio. 1. This is a laboratory survey of the major principles of biology. Topics include the application of laboratory equipment and procedures to the investigation of biological systems at the biochemical, cellular, organismic, population, and community levels. Field trips may be required to fulfill the objectives of this course. This is the recommended laboratory course to accompany Biology 1, Principles of Biology. NR

Lab hours: 3

BIO 2 4 units

PRINCIPLES OF BOTANY

Prereq: Bio. 1 or 3. 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 the objectives of this course. (CAN BIOL 6; Bio. 6+6L+5+2: CAN BIOL SEQ A) NR

Lecture hours: 3 Lab hours: 3

BIO 3 3 units

DIVERSITY OF LIFE

This course is a comprehensive survey of life's diversity. Representatives of the five biological kingdoms of organisms are examined within the context of biological classification, biological nomenclature, and evolutionary history. Principles of genetics, organic evolution, and ecology are integrated throughout the course to provide a common rubric within which the unity and diversity of life may be explored. Field trips may be required to fulfill the objectives of this course. NR

Lecture hours: 3

BIO 3L 1 unit

DIVERSITY OF LIFE LABORATORY

Prereq: Prior completion of or concurrent enrollment in Bio. 3. This laboratory course is a comprehensive survey of life's diversity. Representatives of the five biological kingdoms of organisms are examined within the context of biological classification, biological nomenclature, and evolutionary history. Students will survey living specimens, museum specimens, herbarium specimens, dissection specimens, and microslides representing each of the major taxa. Field trips may be required. NR

Lab hours: 3

<p>BIO 4 3 units</p> <p>EVOLUTIONARY ECOLOGY</p> <p><i>Prereq:</i> Bio. 3. This course examines the interactions between organisms and their abiotic and biotic environments from an evolutionary perspective. The focus is on global and local climatology; adaptations to the physical environment; energy production and utilization; food chain and food web analysis; biology of populations, including population growth and its regulation, and interactions between and among populations; and analysis of community structure, functions, distributions, and changes through time. The course assumes some knowledge of organismal biology and evolutionary theory. NR</p> <p><i>Lecture hours:</i> 3</p>	<p>BIO 6L 1 unit</p> <p>CELLULAR BIOLOGY LABORATORY</p> <p><i>Prereq:</i> Prior completion of or concurrent enrollment in Bio. 6 or 8. This course is the laboratory companion to the Biology 6 or Biology 8 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; enzymology; cytochemistry; molecular and transmission genetics and gene transfer; measurement of membrane transport systems; and spectrophotometry. (BIOL 6+6L: CAN BIOL 2; Bio. 6+6L+5+2: CAN BIOL SEQ A) NR</p> <p><i>Lab hours:</i> 3</p>	<p>BIO 11 4 units</p> <p>HUMAN ANATOMY</p> <p><i>Recom:</i> Bio. 201 and either Bio.1 or 3. This course presents an analysis of human structure which integrates 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+12L: CAN BIOL SEQ B) NR</p> <p><i>Lecture hours:</i> 2 <i>Lab hours:</i> 6</p>
<p>BIO 5 4 units</p> <p>PRINCIPLES OF ZOOLOGY</p> <p><i>Prereq:</i> Bio. 1 or 3. This course is a survey of protozoans and animals. Lectures focus on the structure, function, development, classification, evolution, ecology, and natural history of these major groups. Field trips may be required to fulfill the objectives of this course. (CAN BIOL 4; Bio. 6+6L+5+2: CAN BIOL SEQ A) NR</p> <p><i>Lecture hours:</i> 3 <i>Lab hours:</i> 3</p>	<p>BIO 7 3 units</p> <p>GENETICS AND EVOLUTIONARY BIOLOGY</p> <p><i>Prereq:</i> Chem. 1B and Bio. 1 or 3. 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 as well as the history of evolutionary thought are integrated throughout. The course assumes prior knowledge of evolutionary theory, classification and taxonomy, and ecology. NR</p> <p><i>Lecture hours:</i> 3</p>	<p>BIO 12 3 units</p> <p>HUMAN PHYSIOLOGY</p> <p><i>Prereq:</i> Bio. 11 and Bio. 1/1L, or 6/6L, or 15. <i>Coreq:</i> One of the following: Chem. 1B, 2B, or 4 or Bio. 201. This course applies an integrated systems approach to the study of function in the human body. The 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, and organ levels of function. (Biology 12+12L: CAN BIOL 12; Bio. 11+12+12L: CAN BIOL SEQ B) NR</p> <p><i>Lecture hours:</i> 3</p>
<p>BIO 6 3 units</p> <p>CELLULAR BIOLOGY</p> <p><i>Recom:</i> Concurrent enrollment in Bio. 6L and Chem. 1A or Bio. 201. Biology 6 is an introduction to the structure and function of living systems at the cellular level. The course examines cell and organelle structure and function of both prokaryotic and eukaryotic cells; the biochemistry of energy metabolism; membrane function; gene structure; genetic transmission; gene expression and regulation; major classes of biological macromolecules; cell differentiation; intracellular communication; and regulation of cell growth, replication, and differentiation. (BIOL 6+6L: CAN BIOL 2; Bio. 6+6L+5+2: CAN BIOL SEQ A) NR</p> <p><i>Lecture hours:</i> 3</p>	<p>BIO 8 3 units</p> <p>MOLECULAR BIOLOGY AND BIOCHEMISTRY</p> <p><i>Prereq:</i> Bio. 7 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. NR</p> <p><i>Lecture hours:</i> 3</p>	<p>BIO 12L 1 unit</p> <p>HUMAN PHYSIOLOGY LABORATORY</p> <p><i>Prereq:</i> Prior completion of or concurrent enrollment in Bio. 12. This course is the laboratory complement to Biology 12. It emphasizes experimental design, data collection and analysis, and evaluation and interpretation of experimental results. (Biology 12+12L: CAN BIOL 12; Bio. 11+12+12L: CAN BIOL SEQ B) NR</p> <p><i>Lab hours:</i> 3</p>
		<p>BIO 13 2 units</p> <p>LAB RESEARCH</p> <p><i>Prereq:</i> Bio. 1, 2, 3, 4, 5, 6, 7, 8, 11, 12, or 15 and Chem. 1A/1B or 2A/2B. 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. R-E-3</p> <p><i>Lecture hours:</i> 1 <i>Lab hours:</i> 3</p>

<p>BIO 15 5 units GENERAL MICROBIOLOGY <i>Recom: Bio. 201 and 11.</i> This course is an examination of the fundamental biological concepts as they apply to viruses, bacteria, fungi, and protozoans. Emphasis is placed on the prokaryotic cell. 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. (CAN BIOL 14) NR <i>Lecture hours: 3 Lab hours: 6</i></p>	<p>BIO 43 3 units ANIMAL BEHAVIOR (ETHOLOGY) This course offers an integrated analysis of the biological, ecological, and evolutionary bases of animal behavior (ethology). Historical and evolutionary contexts are emphasized through a detailed consideration of the psychobiological, ecological, ontological, and sociobiological determinants of animal behavior. Field trips may be required to fulfill the objectives of this course. NR <i>Lecture hours: 3</i></p>	<p>BIO 100D 1 unit PRINCIPLES OF BIOLOGY DISCUSSION <i>Coreq: Bio. 1.</i> This course is designed for students seeking additional assistance with the Biology 1 course material and for students returning to the classroom environment after a period of years. The course uses examples, demonstrations, and lectures/discussions as a means of establishing a basic working understanding of biological principles beyond that provided in Biology 1. In addition, the course provides insight into basic study skills, including notetaking, textbook comprehension, and test taking. NR <i>Lecture hours: 1</i></p>
<p>BIO 19 3 units MARINE BIOLOGY <i>Recom: Bio. 1 or 3.</i> 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, community structure of the habitat, and adaptations of the constituent organisms. Emphasis is on California marine life. Field trips may be required. NR <i>Lecture hours: 3</i></p>	<p>BIO 44 3 units BIOLOGY OF HUMAN SEXUALITY 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) psychosexual and physiological development from birth through adulthood. Field trips may be required to fulfill the objectives of this course. NR <i>Lecture hours: 3</i></p>	<p>BIO 112D 1 unit HUMAN PHYSIOLOGY—DISCUSSION <i>Coreq: Bio. 12.</i> This discussion course affords students enrolled in human physiology the opportunity to discuss, analyze, and exchange ideas concerning human function. Discussions focus on negative feedback control systems and other essay topics covered in Biology 12. NR <i>Lecture hours: 1</i></p>
<p>BIO 24 3 units APPLIED ECOLOGY: SOLUTIONS TO URBAN PROBLEMS <i>Recom: Bio. 1 or Env. 1.</i> In this course, students learn to apply ecological principles to problems associated with urban expansion and related environmental issues. To make their study practical and relevant, students will work together on a hypothetical environmental impact at a site on campus. They will follow a step-by-step process, analyzing the proposed impact, preparing appropriate mitigation (i.e., corrective measures), and then implementing the mitigation. In order to address the problem, students will be required to become familiar with environmental laws and regulations and evaluate available environmental documents on the basis of techniques used and conclusions drawn. NR <i>Lecture hours: 3</i></p>	<p>BIO 89 1-3 units SPECIAL TOPICS IN BIOLOGY This course offers students the opportunity to engage a particular biological issue or problem not routinely offered within the standing biology curriculum. Topics are developed by the biology faculty and often focus on some significant topic or issue within the scope of contemporary scientific inquiry. Biology 89 differs in content every time it is offered and thus may be repeated. Granting of UC credit for courses of this kind is contingent upon a review of the course outline by a UC campus. R-E <i>Lecture hours: 1-3</i></p>	<p>BIO 201 2 units BIOCHEMISTRY FOR HEALTH SCIENCES Biology 201 addresses the elements of cellular chemistry which are essential for a thorough understanding of the structure and functions of cells from the molecular perspective. The primary focus is on the structure and function of carbohydrates, lipids, proteins, and nucleic acids; cell membranes and processes of membrane transport; intracellular chemistry, including metabolic pathways and enzymatic reactions; and the control of intracellular and membrane activities through the expression of DNA. The course is for students who have no background in the sciences and intend to complete the pre-nursing course of study. NR <i>Lecture hours: 2</i></p>
	<p>BIO 99 3 units SEMINAR IN BIOLOGY This course is a lower-division seminar given over to the study of a specific topic, issue, or problem within the biological sciences which is not part of the regular college curriculum. Students will conduct research, lead and participate in discussion, and analyze and critique points of view which bear on the selected topic. Biology 99 differs in content every time it is offered and thus may be repeated. Granting of UC credit for courses of this kind is contingent upon a review of the course outline by a UC campus. R-E <i>Lecture hours: 3</i></p>	<p>BIO 289 0.5-5 units SPECIAL TOPICS IN BIOLOGY The Special Topics course is a grouping of short seminars designed to provide students with the latest concepts in the field of biology. The course content is thematic in nature, and each seminar topic within the course differs from other offerings in the same course. R-E <i>Lecture hours: 0.5-5 Lab hours: 0.5-5</i></p>

NATURAL HISTORY AND FIELD STUDIES

BIO 30 3 units

INTRODUCTION TO NATURAL HISTORY

This non-major lecture course emphasizes the natural history of vascular plants and vertebrate animals. Discussions of vascular plants focus on classification, reproductive strategies, community associations, plant habitats, and plant adaptations. Topics which emphasize vertebrate animals include classification, behavioral strategies such as territoriality and mating systems, feeding strategies, migration, and physiologic adaptations for survival. The course is presented from ecological and evolutionary perspectives. NR
Lecture hours: 3

BIO 101 1 unit

FIELD BIOLOGY: COASTAL ECOSYSTEMS

Recom: Prior completion of or concurrent enrollment in a college-level science course. This field course introduces students to coastal 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
Lecture hours: 0.5 Lab hours: 1

BIO 102 1 unit

FIELD BIOLOGY: ISLAND ECOSYSTEMS

Recom: Prior completion of or concurrent enrollment in a college-level science course. This field course introduces students to island 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
Lecture hours: 0.5 Lab hours: 1

BIO 103 1 unit

FIELD BIOLOGY: MOUNTAIN ECOSYSTEMS

Recom: 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
Lecture hours: 0.5 Lab hours: 1

BIO 104 1 unit

FIELD BIOLOGY: DESERT ECOSYSTEMS

Recom: 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
Lecture hours: 0.5 Lab hours: 1

BIO 110 1 or 2 units

FIELD BIOLOGY: NATIONAL PARKS AND MONUMENTS

Recom: Prior completion of or concurrent enrollment in a college-level science course. This field course introduces students to a variety of ecosystems in selected national parks and monuments. Direct observations and experiments in the field are complemented by 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
Lab hours: 3 or 6

BIO 120 1 unit

FIELD BIOLOGY: NATURAL HISTORY OF THE SIERRA NEVADA

This field course presents the principal facets of montane ecology, focusing on the biology and natural history of selected communities within the Sierra Nevada. The course provides introductory background information and is suitable for biology majors and non-majors. R-E-3
Lab hours: 3

ENVIRONMENTAL STUDIES COURSES

ENV 1 3 units

INTRODUCTION TO ENVIRONMENTAL STUDIES

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
Lecture hours: 3

ENV 89 0.5-5 units

SPECIAL TOPICS IN ENVIRONMENTAL STUDIES

The Special Topics course is a grouping of short seminars designed to provide students with the latest concepts in the field of environmental studies. The course content is thematic in nature, and each seminar topic within the course differs from other offerings in the same course. Granting of UC credit for courses of this kind is contingent upon a review of the course outline by a UC campus. R-E
Lecture hours: 0.5-5 Lab hours: 0.5-5

ENV 189 0.5-5 units

SPECIAL TOPICS IN ENVIRONMENTAL STUDIES

The Special Topics course is a grouping of short seminars designed to provide students with the latest concepts in the field of environmental studies. The course content is thematic in nature, and each seminar topic within the course differs from other offerings in the same course. R-E
Lecture hours: 0.5-5 Lab hours: 0.5-5

ENV 289 0.5-5 units

SPECIAL TOPICS IN ENVIRONMENTAL STUDIES

The Special Topics course is a grouping of short seminars designed to provide students with the latest concepts in the field of environmental studies. The course content is thematic in nature, and each seminar topic within the course differs from other offerings in the same course. R-E
Lecture hours: 0.5-5 Lab hours: 0.5-5