

BIOLOGICAL SCIENCES

School of Life Sciences and Technologies

Dean: Lianna Zhao, MD

Academic Chair, Biological Sciences, Environmental Studies:

Jefferey Kaufmann, PhD

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COURSES

The School of Life Sciences at Irvine Valley College offers a wide range of courses in the biological sciences as well as courses 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 level and for some graduate-level programs. They are also intended for students who plan to 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 both Biology 93 and Biology 94 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. As the job market in the biological sciences and related fields changes, the faculty recommends that students also seek guidance as they select their electives.

PROGRAM STUDENT LEARNING OUTCOMES

Biology

Upon completion of the biology program, students will be able to

- Communicate scientific processes and ideas effectively in written and oral forms.
- Demonstrate understanding of the mechanisms driving evolution, the role of evolution as the central unifying concept of biology and describe similarities and differences of the major taxonomic groups.
- Effectively apply current technology and scientific methodologies for problem solving.
- Identify and explain relationships between form and function of biological structures at the molecular cellular, organismal, and ecosystem levels.
- Locate and evaluate various types of scientific information including primary research articles, mass media sources and world wide web.
- Recognize and apply basic ethical principles to biological practices and understand the role of scientists and biological science in society.
- Demonstrate understanding of how organisms interact with one another and with their environment, and explain interactions at the population and community levels.
- Demonstrate understanding of the fundamental biological processes of metabolism, homeostasis, growth, reproduction, development, genetics and whole organism physiology.
- Apply the metric system using standard laboratory equipment to systematically collect, organize, interpret, and assess data in graphs, tables or figures then integrate the acquired knowledge to make informed judgments and conclusions.

POTENTIAL CAREERS

An AA degree in biology will prepare students for entry into certificate or technical training programs in:

- Nursing
- Biotechnology
- Dental Assisting/Hygiene
- Emergency Medical Technology
- Paramedic Training
- Laboratory Research
- Physical Therapy Assisting

An AA degree in biology will also allow students to continue their education at a four-year institution, where earning a BA degree in biological sciences can prepare them for careers in:

- Public Health
- Nutrition
- Biotechnology
- Laboratory and Field Research
- Pharmaceutical Sales
- Land Management
- Environmental Studies
- Entry into professional schools that provide training in medicine, dentistry, pharmacy, optometry, physician's assistant, and veterinary medicine

Associate in Arts Degree Biology

Complete the following courses:		Units
BIO 93	Integrated Biology: From DNA to Organisms	4
BIO 94	From Organisms to Ecosystems	4
BIO 97	Genetics and Evolutionary Biology	3
BIO 99	Molecular Biology and Biochemistry	3
Select 6-10 units from the following courses to complete a total of 20-24 units:		
BIO 11	Human Anatomy	4
BIO 12	Human Physiology	4
BIO 13	Lab Research	2
BIO 15	General Microbiology	5
BIO 19	Marine Biology	4
OR		
BIO 19H	Marine Biology Honors	4
BIO 30	California Wildlife and Wild Places	3
BIO 44	Biology of Human Sexuality	3
BIO 55	Introduction to Ecology: Theory and Application	3
CHEM 1A	General Chemistry I	5
AND		
CHEM 1B	General Chemistry II	5
CHEM 12A	Organic Chemistry	5
AND		
CHEM 12B	Organic Chemistry	5
TOTAL UNITS REQUIRED:		20-24

To earn the associate degree: See page 28 for associate degree graduation requirements.

To transfer: Courses required for the associate degree major at IVC may not be the same as those required for the major at a four-year school. If you plan to transfer, consult a counselor to identify the courses needed for the major at your transfer school and to develop a plan that will best meet your goals.

See an IVC counselor for course substitution if a course is not available.

Certificate of Achievement Biotechnology - Lab Assistant

Biotechnology is the use of microorganisms or biological substances, such as enzymes, to solve problems; develop or make useful products; or preform specific manufacturing processes. The Biotechnology Laboratory Assistant Certificate of achievement is designed for students who wish to obtain the skills required to gain entry level employment in the biotechnology industry. Upon completion of the Biotechnology Laboratory Assistant Certificate program students will be eligible to obtain entry level employment as laboratory assistants in biotechnology industries such as pharmaceutical labs or research and development laboratories. There are no prerequisites or enrollment limitations for the program. Upon successful completion of the program students will have acquired the following knowledge and skills: Apply the scientific method and appropriate experimental design •Maintain an industry standard laboratory notebook. Use and complete correct Standard Operating Procedures (SOPs), Good Manufacturing Procedures (GMPs) and other required documentation common in a biotechnology laboratory. Demonstrate ability to accurately and safely preform standard lab techniques such as pipetting, metrology, aseptic technique. Maintain a safe, clean contamination-free and clutter-free environment. Communicate information in an appropriate way. Perform calculations relating to work function. Select and use appropriate computer tools.

Complete the following courses:		Units
BIOT 70	Introduction to Biotechnology	3
BIOT 70L	Introductory Biotechnology Laboratory	1
BIOT 273	Biotechnology A: Basic Lab Skills	4
CHEM 3	Fundamental Chemistry	4
TOTAL UNITS REQUIRED:		12

To earn the certificate of achievement: See page 26 for certificate information and requirements.

See an IVC counselor for course substitution if a course is not available.

CERTIFICATES OF PROFICIENCY

**Certificate of Proficiency
Biotechnology Biomanufacturing
Technician**

This certificate provides the skills and knowledge needed for positions such as biomanufacturing operators, media preparation assistants, purification assistants or manufacturing technicians in the field of biomanufacturing. The emphasis is on preparation and collection of samples, proper use of lab equipment in contamination-free environments, and standard operating procedures in the biomanufacturing industry.

Complete the following courses:		Units
BIOT 70	Introduction to Biotechnology	3
BIOT 70L	Introductory Biotechnology Laboratory	1
BIOT 273	Biotechnology A: Basic Lab Skills	4
BIOT 274	Biotechnology B: Proteins	4
BIOT 276	Quality and Regulatory Compliance in Bioscience	2
TOTAL UNITS REQUIRED:		14

To earn the certificate of proficiency: See page 26 for certificate information and requirements.

CHEMISTRY

School of Physical Sciences and Technologies

Dean: Lianna Zhao, MD

Academic Chair: John Davison, PhD

Faculty: Arthur Ambrose, PhD; Dale Carranza, EdD;

John Davison, PhD; Keith Donovan, PhD; Sean Pheasant, PhD;

Kiana Tabibzadeh, PhD

COURSES

The chemistry curriculum is designed to foster an understanding of the fundamental principles of chemistry in a variety of applications—medicine, health-care products, energy, food production, body metabolism, structural materials, microelectronics, and the environment. Students learn how chemical knowledge is derived, theorized, and applied in solving problems in everyday life. They perform experiments in a modern chemistry laboratory with state-of-the-art equipment under the guidance of experienced faculty. In addition, students have an opportunity to enhance their understanding of chemical concepts and improve their laboratory skills through a series of computer-aided lessons and exercises. The chemistry curriculum is designed to meet the needs of students who wish to pursue a major in (1) chemistry, biology, marine science, geology, physics, medicine, engineering, or technology; (2) paramedical or allied health science, including nursing, dental hygiene, physical therapy, or nutrition; or (3) liberal arts.

PROGRAM STUDENT LEARNING OUTCOMES

Upon completion of the chemistry program, students will be able to

- Apply chemical concepts to identify or predict chemical behavior.
- Apply mathematics and statistics principles to solve chemical problems.
- Identify chemical composition and communicate both chemical properties and principles.

POTENTIAL CAREERS

Examples of careers in chemistry include the following:

- Medicine
- Chemist
- Pharmacist
- Agrochemist
- Biotechnologist
- Ceramics Industry
- Engineer
- Environmental Law
- Forensic Scientist
- Geochemist
- Government Policy
- Metallurgist
- Oceanographer
- Patent Law
- Plastics Industry
- Software Designer
- Space Exploration
- Teaching
- Technical Writer