

Biology

Degree: A.S. - General Science
Certificate: Biotechnology

Area: Science and Engineering
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American River College's biology program offers courses that satisfy general requirements in natural sciences, and prepares students for transfer opportunities to four-year programs.

General Science

Requirements for Degree Major

18 units of transfer level course work in science in addition to other graduation requirements
Two laboratory courses must be included, one in a physical science and one in a biological. Courses may be selected from anatomy, astronomy, bacteriology, biology, botany, chemistry, geology, physical anthropology, physical geography, physical science, physiology, physics and zoology. See ARC graduation requirements.

Biotechnology Certificate

Requirements for Certificate: 30-32 units

| Courses Required | Units |
|-------------------------------------|-------|
| BIOL 310 or 400 | 4-5 |
| BIOL 440 | 4 |
| BIOT 300 | 4 |
| BIOT 315 | 5 |
| Chemistry 305 or 400 | 5 |
| CISC 300 | 1 |
| ENGWR 300 | 3 |
| Math 120 | 3 |
| <i>Choose one of the following:</i> | |
| BIOT 305 | 1 |
| BIOT 307 | 2 |
| BIOT 310 | 1 |
| BIOT 498 | 1-2 |

BIOL 102 Introduction to Concepts of Human Anatomy and Physiology 4 Units

Prerequisite: None
Course Not Transferable UC or CSU
Hours: 54 hours LEC; 54 hours LAB

This course examines body systems from an anatomical and physiological point of view. It meets the minimum requirements for licensed vocational nursing, paramedic, gerontology, and funeral services programs. The basic anatomy and physiology of all the body systems will be

covered with an emphasis on developing vocabulary in each area. Activities will include microscope work, simple physiology experiments and demonstrations, and using models and simple dissections to learn anatomy.

BIOL 115 Basic Anatomy and Physiology 3 Units

Formerly: BIOL 50
Prerequisite: None
Course Not Transferable UC or CSU
Hours: 54 hours LEC

This course provides instruction involving basic human anatomy and physiology of the skin, skeletal, muscular, nervous, circulatory and lymphatic systems. It is designed for medical assisting majors, medical secretaries and other health-related technologies. Together BIOL 115 and 116 compose a complete study of the basic anatomy and physiology of the human body. AA/AS area 3A.

BIOL 116 Basic Anatomy and Physiology 3 Units

Formerly: BIOL 51
Prerequisite: None
Course Not Transferable UC or CSU
Hours: 54 hours LEC

This course provides instruction involving basic human anatomy and physiology. This course is designed for medical assisting majors, medical secretaries, and other health-related technologies. It covers body organization, basic chemistry, cells, and tissues. In addition, BIOL 116 covers respiratory, digestive, urinary, endocrine, and reproductive systems. Either BIOL 115 or 116 may be taken first, however, both courses are necessary for a complete study of human anatomy and physiology.

BIOL 117 Basic Anatomy and Physiology Lab 1 Unit

Formerly: BIOL 50L
Prerequisite: None
Corequisite: BIOL 115.
Course Not Transferable UC or CSU
Hours: 54 hours LAB

This course is an optional introductory laboratory course in basic human anatomy and physiology designed to complement the lecture course, BIOL 115. It is designed for medical assisting, medical records, and hazardous materials technician majors, and other health-related technologies. This course is not acceptable in most nursing and respiratory care programs.

BIOL 118 Basic Anatomy and Physiology Laboratory 1 Unit

Formerly: BIOL 51L
Prerequisite: None
Corequisite: BIOL 116.
Course Not Transferable UC or CSU
Hours: 54 hours LAB

This course is an optional introductory laboratory course in basic human anatomy and physiology designed to complement the lecture course BIOL 116. It is designed for medical assisting, medical records, and hazardous materials technician majors, and other health-related technologies. It is not acceptable in most nursing and respiratory care programs.

BIOL 130 Microbiology for Funeral Services 3 Units

Prerequisite: CHEM 130.

Course Not Transferable UC or CSU

Hours: 54 hours LEC

This course will include a survey of the basic principles of microbiology. It relates these principles to Funeral Service Education especially as they pertain to sanitization, disinfection, community health and embalming practice.

BIOL 300 The Foundations of Biology 3 Units

Formerly: BIOL 12

Prerequisite: None

Course Transferable to UC/CSU

Hours: 54 hours LEC

This non-majors course covers basic biological principles and how they relate to humans. Concepts included are introduction and philosophy of science, cell chemistry, structure, and physiology; genetics (transmission and molecular); biotechnology; human body systems; evolution; reproduction and development; ecology; and human impacts on the environment. Field trips may be required. AA/AS area 3A; CSU area B2; IGETC area 5

BIOL 303 Survey of Biology 4 Units

Formerly: BIOL 5

Prerequisite: None

Course Transferable to UC/CSU

Hours: 54 hours LEC; 54 hours LAB

This course covers biological principles with special emphasis on the major groups of organisms and the structure and function of their organ systems. Ecology, genetics, and evolution will be included. Plant and animal dissection may be an integral part of the laboratory sessions. Field trips required. Appropriate for Liberal Studies, Elementary Education, Environmental Studies, Recreation and other majors requiring BIOL 303. Not appropriate for science majors and those having completed ARC's Biology 310, without counselor's approval. AA/AS area 3A; CSU area B2.

BIOL 305 Natural History 4 Units

Formerly: BIOL 10

Prerequisite: None

Course Transferable to UC/CSU

Hours: 54 hours LEC; 54 hours LAB

This course covers basic ecological and biological principles in order to understand the origin and diversity of living organisms. Topics range from landscape formation and habitats to the adaptations organisms have evolved to live in their environment. Although this is a broad survey course, emphasis will be placed on the animal kingdom and on local environments. A variety of field trips opportunities allow students to study the diversity of life around them. Dissection is not part of this course. Designed as non-majors, introductory course and for those who enjoy the outdoors. AA/AS area 3A; CSU area B2; IGETC area 5.

BIOL 310 General Biology 4 Units

Formerly: BIOL 16

Prerequisite: None

Course Transferable to UC/CSU

Hours: 54 hours LEC; 54 hours LAB

This non-majors laboratory course covers basic biological principles and how they relate to humans. Concepts included are cell chemistry, structure, and physiology; genetics (transmission and molecular); biotechnology; human body systems; evolution; reproduction and development; ecology; and human impacts on the environment. Field trips may be required. No dissection is required. AA/AS area 3A; CSU area B2; IGETC area 5

BIOL 320 Field Botany 3 Units

Formerly: BIOL 21

Prerequisite: None

Course Not Transferable UC or CSU

Hours: 36 hours LEC; 54 hours LAB

This course covers identification, sight recognition and ecological relationships of native vascular plants of California. Plant keys and principles of taxonomy are stressed to develop proficiency in identification of plant species. This course covers some of society's historical uses of native plants. Frequent field trips and a plant collection are required.

BIOL 322 Ethnobotany 3 Units

Formerly: BIOL 23

Prerequisite: None

Course Transferable to CSU

Hours: 36 hours LEC; 54 hours LAB

The focus of this introductory course is the multicultural use of plants. Emphasis is on the identification and use of plants from several cultures including the American Indians, Europeans, South Americans, and Chinese. Topics include the use of plants for food, medicine, basketry, technology, shelter, and music. Site recognition and plant use will be emphasized. An analysis of ethnicity and ethnocentrism is included. AA/AS area 3F.

BIOL 330 Natural History of Insects 3 Units

Formerly: BIOL 8

Prerequisite: None

Course Transferable to UC/CSU

Hours: 54 hours LEC

This course provides an introduction to the science of Entomology. Approximately 75% of all known species of animals are insects, therefore, they often have a profound effect on human civilization. This class details their great variety, structures and function, habitats, and their significance to plants and animals, including humans. Opportunities for field investigations will be provided.

BIOL 332 Introduction to Ornithology 2 Units

Formerly: BIOL 20

Prerequisite: None

Course Transferable to CSU

Hours: 18 hours LEC; 54 hours LAB

This course covers the structure, physiology, ecology, behavior, reproduction and classification of birds. Field trips are required during class time to study bird identification, behavior and ecology.

BIOL 342 The New Plagues: New and Ancient Infectious Diseases Threatening World Health 3 Units

Formerly: BIOL 31

Prerequisite: None

Course Transferable to UC/CSU

Hours: 54 hours LEC

This course will explore the biology, epidemiology and pathology of selected pathogens such as prions, viruses, bacteria protozoa, and helminthes threatening public health on a global scale. The course explores the influence of human behavior and activities on the emergence of new infectious agents and the emergence of ancient plagues.

BIOL 350 Environmental Conservation 3 Units

Formerly: BIOL 14

Prerequisite: None

Course Transferable to UC/CSU

Hours: 54 hours LEC

A survey course covering the management of soil, water, forest, mineral and energy resources as well as wildlife management and conservation. Case studies involving both national and local problems will enhance the study of human-environment interactions. Field trips and a semester project may be required.

BIOL 352 Conservation Biology 3 Units

Formerly: BIOL 18

Prerequisite: None

Course Transferable to UC/CSU

Hours: 54 hours LEC

This introductory course covers biological and ecological principles involved in understanding and analyzing environmental problems and exploring scientifically sound conservation techniques. Major topics include the nature of science, population dynamics and distributions, evolution and species extinctions, biodiversity, ecosystem functions, and the interdependence between humans and our environment. This course places emphasis on the scientific processes and methodology. Statewide and local environments will be highlighted. Field trips and a semester project may be required. AA/AS area 3A; CSU area B2; IGETC area 5B.

BIOL 370 Introduction to Marine Environment 4 Units

Formerly: BIOL 15

Prerequisite: None

Course Transferable to UC/CSU

Hours: 54 hours LEC; 54 hours LAB

This course is an introduction to oceanography and marine biology. It includes the study of seawater, marine geology, marine algae, marine vertebrate and invertebrate animals, and the ecology of various marine zones. Field trips focusing on the Central California coast are required. AA/AS area 3A; CSU area B2; IGETC area 5.

BIOL 390 Natural History Field Study .5-4 Units

Formerly: BIOL 24

Prerequisite: None

Course Transferable to CSU

Hours: 3-24 hours LEC; 18-144 hours LAB

This course covers the ecology and natural history of specific areas (mountains, deserts, tide pools, etc.). Course content will vary according to field destination but may include topics in botany, zoology, marine biology, conservation, and natural history. Field study methodology and tools may also be covered. Students will be responsible for providing their own lodging or camping equipment and meals when needed. Field trips required. This course may be taken up to four times for a maximum of eight units.

BIOL 400 Principles of Biology 5 Units

Formerly: BIOL 1A

Prerequisite: Any transfer level chemistry course with a grade of "C" or better.

Advisory: ENGRD 116, and ENGRW 102 or 103; or ESLL 130 and ESLR 320 with a grade of "C" or better.

Course Transferable to UC/CSU

Hours: 54 hours LEC; 108 hours LAB

This is an introductory course covering biological concepts important to a general understanding and background for biology majors and pre-professional students. The emphasis is on the basic principles common to all forms of life and the philosophy of science. These include cell structure and function, cell physiology, reproduction, Mendelian and molecular genetics, evolution and ecology. (CAN BIOL 2) AA/AS area 3A; CSU area B2; IGETC area 5. (BIOL SEQ A Sum of CAN BIOL 2, 4, and 6)

BIOL 410 Principles of Botany 5 Units

Formerly: BIOL 2

Prerequisite: BIOL 400 with a grade of "C" or better.

Course Transferable to UC/CSU

Hours: 54 hours LEC; 108 hours LAB

This course covers the general principles of botany for science majors. The emphasis is on anatomy, morphology, life cycles, embryology and physiology of plants and on a plant kingdom survey. All laboratory work includes instructor-directed lecture-discussion consisting of an introduction and analysis of the data and ideas covered. One field trip is required. (CAN BIOL 6) IGETC area 5 (BIOL SEQ A Sum of CAN Biol 2, 4, and 6)

BIOL 420 Principles of Zoology 5 Units

Formerly: BIOL 3

Prerequisite: BIOL 400 with a grade of "C" or better.

Course Transferable to UC/CSU

Hours: 54 hours LEC; 108 hours LAB

This course covers general principles of zoology. The course is designed to give students a broad understanding of the development, individual characteristics, and relationships of the various phyla. Topics covered include: a survey of the animal kingdom, embryology, evolution, systematics, and comparative anatomy and physiology. One or two field trips per semester are required. (CAN BIOL 4) IGETC area 5. (BIOL SEQ A Sum of CAN Biol 2, 4, and 6)

BIOL 430 Anatomy and Physiology 5 Units

Formerly: BIOL 25

Prerequisite: CHEM 305 or 400 with a grade of "C" or better.

Course Transferable to UC/CSU

Hours: 54 hours LEC; 108 hours LAB

This course provides instruction on the principles of human anatomy and physiology emphasizing the integration of structure and function. The topics covered are anatomical terminology, chemistry, cells, histology, articulations and the integumentary, skeletal, muscular and nervous systems. Both BIOL 430 and 431 must be taken to study all of the major body systems. AA/AS area 3A. (BIOL SEQ B Sum of CAN BIOL 10 and BIOL 12)

BIOL 431 Anatomy and Physiology 5 Units

Formerly: BIOL 26

Prerequisite: BIOL 430 with a grade of "C" or better.

Course Transferable to UC/CSU

Hours: 54 hours LEC; 108 hours LAB

This course covers the principles of human anatomy and physiology emphasizing the integration of structure and function. It includes the following systems: cardiovascular, lymphatic, respiratory, digestive, urinary, endocrine and reproductive. Both BIOL 430 and 431 must be taken to study all of the major body systems. AA/AS area 3A. (BIOL SEQ B Sum of CAN BIOL 10 and BIOL 12)

BIOL 440 General Microbiology 4 Units

Formerly: BIOL 6

Prerequisite: CHEM 305 or 400 with a grade of "C" or better.

Course Transferable to UC/CSU

Hours: 54 hours LEC; 72 hours LAB

This course introduces microorganisms and their effects on human health. The course examines the structure, physiology, metabolism, and genetics of microorganisms. Laboratory work includes aseptic technique, morphological and biochemical properties of microorganisms, and medically relevant issues regarding microorganisms. (CAN BIOL 14) CSU area B2; IGETC area 5.

BIOL 442 General Bacteriology 5 Units

Formerly: BIOL 4

Prerequisite: CHEM 305 or 400 with a grade of "C" or better.

Course Transferable to UC/CSU

Hours: 54 hours LEC; 108 hours LAB

This course provides a survey of bacteria and viruses, examining bacterial structure, physiology, metabolism, and genetics and viral structure and replications. Laboratory work introduces methods for culturing and characterizing microorganisms and explores the properties of microorganisms in various habitats. CSU area B2; IGETC area 5.

BIOL 460 Biology of Cancer 3 Units

Formerly: BIOL 27

Prerequisite: None

Course Transferable to UC/CSU

Hours: 54 hours LEC

This course is a biological introduction to cancer which covers topics such as the pathology of cancer, the types of cancer, causes of cancer due to natural or environmental causes, methods of identifying cancer, cancer treatment and the psychological and social impact of cancer on its victims, their families, and society.

BIOL 468 Mammals of Africa 2 Units

Formerly: BIOL 38

Prerequisite: None

Course Transferable to CSU

Hours: 36 hours LEC

This course covers the evolutionary adaptation of African mammals to their environment. Topics include some of the unique types of biological traits that mammals have to survive in the Serengeti ecosystem. The physiology, behavior and physiques of various mammalian groups such as primates, antelopes, elephants, and large cats will be covered. Conservation issues of the Serengeti ecosystem will be an integral part of this course.

BIOL 480 Biology/Chemistry Honors Seminar 1 Unit

Formerly: BIOL 9H

Prerequisite: CHEM 400 with a grade of "C" or better; BIOL 400 with a grade of "C" or better; ENGWR 300 or 480 with a grade of "C" or better; 3.0 cumulative GPA.

Course Transferable to CSU

Hours: 18 hours LEC

This honors section will provide a seminar approach for advanced students of general chemistry and biology to discuss and analyze in-depth recent scientific articles in terms of the chemical and biological principles introduced in these curricula. Not open to students who have taken CHEM 482. May be taken twice.

BIOL 482 Honors Introduction to Marine Environment 4 Units

Formerly: BIOL 15H

Prerequisite: Cumulative GPA of 3.0 or above; ENGWR 300 or 480 with a grade of "C" or better.

Course Transferable to CSU

Hours: 54 hours LEC; 54 hours LAB

This course presents an honors level introduction to marine biology. Using a seminar style, selected topics in marine zoology, botany and ecology will be explored. In addition to the topics presented in BIOL 370, this honors course will include additional studies in cell biology, experimental design, the developmental planning of marine conservation, journal critiques, and applied research based on independent or collaborative field experiments. Field trips focusing on inter-tidal organisms of the Central California Coast are required. AA/AS area A

BIOL 490 Science Skills and Applications .5 Units

Formerly: BIOL 39

Prerequisite: None

Corequisite: Current enrollment in a Biology course.

Course Transferable to CSU

Hours: 27 hours LAB

This course offers individualized instructional modules designed to acquire or improve reading skills in the various science classes. A partial list of skills may include the following: textbook comprehension, principle of learning and retention, note taking, annotating, discipline-based vocabulary, paraphrasing, reading graphics, test taking, and problem solving. Credit/No Credit. Registration is open through the twelfth week of the semester. May be taken four times for a maximum of two units.

Biotechnology**BIOL 300 Introduction to Biotechnology 4 Units**

Formerly: BIOL 40

Prerequisite: BIOL 310 or 400, CHEM 305 with a grade of "C" or better.

Course Transferable to UC/CSU

Hours: 54 hours LEC; 54 hours LAB

This course provides the necessary biochemistry, genetics and molecular biology principles that constitute the foundation for training in the field of

biotechnology. Topics covered will include recombinant DNA technology; DNA production, characterization and analysis; PCR methodologies. Emphasis in lab and theory skills.

BIOT 305 Introduction to Bioinformatics 1 Unit

Formerly: BIOL 41

Prerequisite: BIOL 310 or 400 with a grade of "C" or better.

Advisory: BIOT 300 and CISC 305.

Course Transferable to CSU

Hours: 14 hours LEC; 14 hours LAB

This course includes topics on biology databases, search and retrieval programs, structure/function analysis of biological molecules, DNA sequence alignment and analysis, and applications of these technologies.

BIOT 306 Computer Applications in Bioinformatics 3 Units

Prerequisite: BIOT 305 with a grade of "C" or better.

Course Not Transferable UC or CSU

Hours: 36 hours LEC; 54 hours LAB

This course introduces computation concepts and methods used in bioinformatics. It addresses issues in genomics and proteomics, such as sequence alignment, gene recognition and regulation, and protein modeling. The course examines software and programming tools used to access and manipulate biological database information, especially nucleic acid and protein data.

BIOT 307 Biotechnology and Society 2 Units

Formerly: BIOL 44

Prerequisite: None

Course Transferable to UC/CSU

Hours: 36 hours LEC

This course focuses on the emerging impact of biotechnology on society. Basic concepts in biotechnology are introduced in a non-technical manner to explore advances in medicine, agriculture, and other fields. Public perception and ethical issues in biotechnology are also emphasized.

BIOT 310 Polymerase Chain Reaction (PCR) Methods 1 Unit

Formerly: BIOL 42

Prerequisite: BIOT 300.

Course Transferable to CSU

Hours: 14 hours LEC; 14 hours LAB

This course provides training in techniques involving the polymerase chain reaction (PCR). Topics include PCR protocols, troubleshooting, and applications to medicine, forensics, and agriculture.

BIOT 315 Methods in Biotechnology 5 Units

Formerly: BIOL 43

Prerequisite: BIOT 300.

Course Transferable to CSU

Hours: 54 hours LEC; 108 hours LAB

This course provides specialized laboratory skills and theory in biotechnology. Topics include aseptic technique, preparation of media and solutions, methods in bacteria and plant tissue culture, isolation and analysis of nucleic acids and proteins, good laboratory practice and quality control.

BIOT 498 Work Experience in Biotechnology 1-2 Units

Formerly: BIOL 48

Prerequisite: BIOT 300.

Course Transferable to CSU

Hours: 9 hours LEC; 60-150 hours LAB

This course provides directed work experience in the biotechnology industry with the purpose of applying classroom instruction to the biotechnology workplace. Class enrollment is dependent upon availability of paid or volunteer work experience in a biotechnology-related environment,