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.

**Biology & Biotechnology**

**Degree:** A.S. - Biotechnology  
**Certificate:** Biotechnology

**Area:** Science and Engineering  
**Dean:** TBD  
**Phone:** (916) 484-8107  
**Counseling:** (916) 484-8572

### Biotechnology

**Requirements for Degree**  
41-42 units

<table>
<thead>
<tr>
<th>Core Requirements</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>BIOL 310 or 400</td>
<td>4-5</td>
</tr>
<tr>
<td>BIOL 440</td>
<td>4</td>
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<tr>
<td>CHEM 305 or 400</td>
<td>5</td>
</tr>
<tr>
<td>CHEM 306 or 401</td>
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<td>CISC 300</td>
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<tr>
<td>ENGR 301, 302, or 342</td>
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<td>STAT 301</td>
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<table>
<thead>
<tr>
<th>Concentration Requirements</th>
<th>Units</th>
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<tbody>
<tr>
<td>BIOT 300</td>
<td>4</td>
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<tr>
<td>BIOT 307</td>
<td>2</td>
</tr>
<tr>
<td>BIOT 315</td>
<td>5</td>
</tr>
<tr>
<td>and 2 units from the following:</td>
<td>2</td>
</tr>
<tr>
<td>BIOL 498</td>
<td></td>
</tr>
<tr>
<td>or 2 units from the following:</td>
<td></td>
</tr>
<tr>
<td>BIOT 305 (1 unit) and BIOL 498 (1 unit)</td>
<td></td>
</tr>
<tr>
<td>BIOT 310 (1 unit) and BIOL 498 (1 unit)</td>
<td></td>
</tr>
</tbody>
</table>

**Recommended Electives**  
CISA 305, 315, 320; CISC 305; PHIL 310; PHYS 350, 360; SPEECH 301

**General Education Graduation Requirements:** In addition to completing the degree requirements, students must also complete the general education graduation requirements for an AA/AS degree. See ARC graduation requirements.

**Requirements for Certificate**  
32-33 units

<table>
<thead>
<tr>
<th>Courses Required</th>
<th>Units</th>
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</thead>
<tbody>
<tr>
<td>BIOL 310 or 400</td>
<td>4-5</td>
</tr>
<tr>
<td>BIOL 440</td>
<td>4</td>
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<td>BIOT 300</td>
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<td>BIOT 315</td>
<td>5</td>
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<td>CHEM 305 or 400</td>
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<td>CISC 300</td>
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<td>ENGR 300</td>
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<tr>
<td>MATH 120</td>
<td>5</td>
</tr>
<tr>
<td>and one course selected from the following:</td>
<td></td>
</tr>
<tr>
<td>BIOT 305, 307, 310, 498</td>
<td></td>
</tr>
</tbody>
</table>

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

**Prerequisite:** None  
**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 microscopic work, simple physiology experiments and demonstrations, and using models and simple dissections to learn anatomy. AA/AS area 3A

**BIOL 115 Basic Anatomy and Physiology**  
3 Units

**Prerequisite:** None  
**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 assistants, medical secretaries, medical transcriptionists, and hazardous materials technicians. 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  
**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. AA/AS area 3A

**BIOL 117 Basic Anatomy and Physiology Lab**  
1 Unit

**Prerequisite:** None  
**Corequisite:** BIOL 115.  
**Hours:** 54 hours LAB

This introductory laboratory course in basic human anatomy and physiology is designed to complement the lecture course BIOL 115. This course is designed for medical assistants, medical secretaries, medical transcriptionists, and hazardous materials technicians. This course is not acceptable in registered nursing and respiratory care programs.
<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Units</th>
<th>Prerequisite</th>
<th>Corequisite</th>
<th>Course Transferable to UC/CSU</th>
<th>Hours:</th>
<th>Notes</th>
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<tbody>
<tr>
<td>BIOL 118</td>
<td>Basic Anatomy and Physiology Laboratory</td>
<td>1 Unit</td>
<td>None</td>
<td>None</td>
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<tr>
<td>BIOL 130</td>
<td>Microbiology for Funeral Services</td>
<td>3 Units</td>
<td>CHEM 130</td>
<td>None</td>
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<tr>
<td>BIOL 300</td>
<td>The Foundations of Biology</td>
<td>3 Units</td>
<td>None</td>
<td>BIOL 310</td>
<td>None</td>
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<tr>
<td>BIOL 303</td>
<td>Survey of Biology</td>
<td>4 Units</td>
<td>None</td>
<td>BIOL 310</td>
<td>None</td>
<td>54 LEC</td>
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<tr>
<td>BIOL 305</td>
<td>Natural History</td>
<td>4 Units</td>
<td>None</td>
<td>BIOL 310</td>
<td>None</td>
<td>54 LEC</td>
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<tr>
<td>BIOL 310</td>
<td>General Biology</td>
<td>4 Units</td>
<td>None</td>
<td>BIOL 310</td>
<td>None</td>
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<tr>
<td>BIOL 320</td>
<td>Field Botany</td>
<td>3 Units</td>
<td>None</td>
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<td>U/C/CSU</td>
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<tr>
<td>BIOL 322</td>
<td>Ethnobotany</td>
<td>3 Units</td>
<td>None</td>
<td>None</td>
<td>U/C/CSU</td>
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<tr>
<td>BIOL 330</td>
<td>Natural History of Insects</td>
<td>3 Units</td>
<td>None</td>
<td>BIOL 310</td>
<td>None</td>
<td>54 LEC</td>
<td></td>
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<tr>
<td>BIOL 332</td>
<td>Introduction to Ornithology</td>
<td>2 Units</td>
<td>None</td>
<td>BIOL 310</td>
<td>None</td>
<td>18 LEC</td>
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<tr>
<td>BIOL 342</td>
<td>The New Plagues: New and Ancient Infectious Diseases Threatening World Health</td>
<td>3 Units</td>
<td>None</td>
<td>BIOL 310</td>
<td>None</td>
<td>54 LEC</td>
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<tr>
<td>BIOL 350</td>
<td>Environmental Biology</td>
<td>3 Units</td>
<td>None</td>
<td>BIOL 310</td>
<td>None</td>
<td>54 LEC</td>
<td></td>
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</tbody>
</table>
river, desert, tropical, marine and polar systems are covered with a specific focus on California landscapes and global biodiversity hotspots. This course provides the scientific background to analyze major global and regional environmental problems and to discuss the scientific techniques used to solve them. Field trips are required. AA/AS area 3A

**BIOL 352 Conservation Biology** 3 Units
**Formerly:** BIOL 18
**Prerequisite:** None
**Course Transferable to UC/CSU**
**Hours:** 54 hours LEC; 108 hours LAB
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:** 3-24 hours LEC; 18-144 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 5B.

**BIOL 390 Natural History Field Study** .5-4 Units
**Formerly:** BIOL 24
**Prerequisite:** None
**Course Transferable to 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. The topics covered are anatomical terminology, chemistry, cells, histology, articulations, and the integumentary, skeletal, muscular and nervous systems. Both BIOL 390 and 410 must be taken to study all of the major body systems. AA/AS area 3A; CSU area B2; IGETC area 5B.

**BIOL 400 Principles of Biology** 5 Units
**Formerly:** BIOL 1A
**Prerequisite:** Any transfer level chemistry course 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) (BIOL SEQ A Sum of CAN BIOL 2, 4, and 6) AA/AS area 3A; CSU area B2; IGETC area 5B.

**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) (BIOL SEQ A Sum of CAN BIOL 400, 420 and 410) IGETC area 5B; CSU area B2;

**BIOL 420 Principles of Zoology** 5 Units
**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. Topics covered include a survey of the animal kingdom, embryology, evolution, genetics, systematics, and comparative anatomy and physiology. One or two field trips per semester are required. (CAN BIOL 4) (BIOL SEQ A Sum of CAN BIOL 400, 420 and 410) IGETC area 5B; CSU area B2;

**BIOL 430 Anatomy and Physiology** 5 Units
**Prerequisite:** CHEM 305, 309, or 400 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. 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 430 and 431). BIOL 430 and 431 are required. (CAN BIOL 6) (BIOL SEQ B Sum of CAN BIOL 430 and 431) AA/AS area 3A.

**BIOL 440 General Microbiology** 4 Units
**Prerequisite:** CHEM 305, 310, 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. It 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 5B.

**BIOL 442 General Bacteriology** 5 Units
**Prerequisite:** CHEM 305, 310, or 400 with a grade of "C" or better.
**Course Transferable to UC/CSU**
**Hours:** 54 hours LEC; 108 hours LAB
This course introduces microorganisms and their effects on human health. It 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 5B.

**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.
<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>BIOL 468</td>
<td>Mammals of Africa</td>
<td>2</td>
</tr>
<tr>
<td>BIOL 480</td>
<td>Biology/Chemistry Honors Seminar</td>
<td>1</td>
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<tr>
<td>BIOL 482</td>
<td>Honors Introduction to Marine Environment</td>
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</tr>
<tr>
<td>BIOL 490</td>
<td>Science Skills and Applications</td>
<td>.5</td>
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<tr>
<td>BIOT 300</td>
<td>Introduction to Biotechnology</td>
<td>4</td>
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<tr>
<td>BIOT 305</td>
<td>Introduction to Bioinformatics</td>
<td>1</td>
</tr>
<tr>
<td>BIOT 306</td>
<td>Computer Applications in Bioinformatics</td>
<td>3</td>
</tr>
<tr>
<td>BIOT 307</td>
<td>Biotechnology and Society</td>
<td>2</td>
</tr>
<tr>
<td>BIOT 310</td>
<td>Polymerase Chain Reaction (PCR) Methods</td>
<td>1</td>
</tr>
<tr>
<td>BIOT 315</td>
<td>Methods in Biotechnology</td>
<td>5</td>
</tr>
<tr>
<td>BIOT 498</td>
<td>Work Experience in Biotechnology</td>
<td>1-2</td>
</tr>
</tbody>
</table>

**Biology & Biotechnology**

- **Mammals of Africa**  
  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.

- **Biology/Chemistry Honors Seminar**  
  Formerly: BIOL 9H  
  Prerequisite: CHEM 400 with a grade of "C" or better; BIOL 400 with a grade of "C" or better; ENGRW 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.

- **Honors Introduction to Marine Environment**  
  Formerly: BIOL 15H  
  Prerequisite: Cumulative GPA of 3.0 or above; ENGRW 300 or 480 with a grade of "C" or better  
  Course Transferable to UC/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 3A; CSU area B2; IGETC area 5B.

- **Science Skills and Applications**  
  Prerequisite: None  
  Corequisite: Current enrollment in a science 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. Registration is open through the twelfth week of the semester. This course may be taken four times. Credit/No Credit only.

- **Introduction to Biotechnology**  
  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.

- **Introduction to Bioinformatics**  
  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.

- **Computer Applications in Bioinformatics**  
  Prerequisite: BIOT 305 with a grade of “C” or better  
  Course Transferable to 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.

- **Biotechnology and Society**  
  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.

- **Polymerase Chain Reaction (PCR) Methods**  
  Formerly: BIOL 38  
  Prerequisite: BIOL 400 with a grade of “C” or better  
  Course Transferable to CSU  
  Hours: 14 hours LEC; 14 hours LAB  
  This course provides training in techniques involving the polymerase chain reactions (PCR). Topics include PCR protocols, troubleshooting, and applications to medicine, forensics, and agriculture.

- **Methods in Biotechnology**  
  Prerequisite: BIOL 300 with a grade of “C” or better  
  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.

- **Work Experience in Biotechnology**  
  Prerequisite: BIOL 300 with a grade of “C” or better  
  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.