



Biological Sciences

Anatomy

Biology

Physiology

Students expecting to transfer to an upper division institution with a major in Biology must comply with the requirements as shown in the catalog under Graduation Requirements and should consult the catalog of the college or university of their choice for required and/or recommended courses. Counselors/ advisors will assist the student in planning for an Associate Degree.

ASSOCIATE IN SCIENCE DEGREE PROGRAM

Biology

Biology is the study and application of principles of ecology, evolution, genetics, anatomy and physiology as it relates to humans and other organisms. Laboratory and field trip activities emphasize the integrated and interdependent nature of living systems. Course work trains students to use observation and investigation to identify questions and pursue answers.

Graduates with biology degrees may pursue jobs in a variety of fields including; biochemistry, biotechnology, botany, ecology, entomology, genetics, health, immunology, medicine, molecular biology, oceanography, pharmacy, teaching, wildlife management, zoology and related clinical fields. Biology majors may choose to specialize in research based on a particular organism or an aspect of biology related to those listed above.

Candidates for an AS in Biology may select the emphasis that facilitates their interests most closely. The two areas of emphasis are General Biology and Human Biology.

Courses required for the General Biology emphasis include biology and chemistry courses necessary for transfer to 4 year institutions as a biology major, however numerous other courses as well as specialized requirements are necessary for specific institutions. Please refer to the Suggested Program information and check with a counselor concerning requirements for specific transfer institutions. Please note that some courses have prerequisites that should be taken in the appropriate order.

Courses required for the Human Biology emphasis include biology and chemistry courses necessary for transfer to allied health programs such as nursing, radiology and physician's assistant. Please refer to the Suggested Program information and check with a counselor concerning requirements for specific transfer institutions. Please note that some courses have prerequisites that should be taken in the appropriate order.

Required Courses: 18 units

Select 12 units from the following courses (emphasis in General Biology)

Course Number	Title	Units
BIOL B3a	General Biology I	5.0
BIOL B3b	General Biology II	5.0

BIOL B16	General Microbiology	5.0
BIOL B7	Environment	3.0

OR

Select 12 units from the following courses (emphasis in Human Biology)

Course Number	Title	Units
BIOL B14	Anatomy	4.0
BIOL B15	Physiology	5.0
BIOL B16	General Microbiology	5.0
BIOL B3a	General Biology I	5.0

AND

Select 6 units from the following:

Course Number	Title	Units
CHEM B15 or CHEM B2a	Principles of Inorganic Chemistry Introductory General Chemistry (5.0)	4.0
CHEM B16	Principles of Organic Chemistry & Biochemistry	3.0
CHEM B1a	General Chemistry	5.0
CHEM B1b	General Chemistry and Chemical Analysis	5.0
CHEM B8	Elementary Organic Chemistry	3.0
CHEM B9	Organic Chemistry Laboratory	3.0

Note: Students transferring to a 4 year institution for a B.S. in Biology generally take the CHEM B1a, B1b sequence. They should consult the university of their choice as to whether CHEM B8 and B9 should also be taken before transfer.

Note: Students transferring for a B.S. in Nursing should take either the CHEM B15 & CHEM B16 sequence or the CHEM 2a and CHEM B16 sequence. Consult the University of choice as to which sequence meets transfer needs.

Suggested Program

This suggested program meets all Intersegmental General Education Transfer Curriculum (IGETC) requirements. This program is a series of courses that community college students can use to satisfy lower-division general-education requirements at any California State University (CSU) or University of California (UC) campus. It will permit a student to transfer to a campus of the CSU or the UC system without the need, after transfer, to take additional lower-division general-education courses to satisfy campus general-education requirements. The program also meets or exceeds the minimum entrance requirements for most medical schools and other health professional programs. **This program assumes you are academically prepared for university-level courses. Students requiring additional preparation in mathematics, reading or English will require at least one additional semester and should consult a counselor for advice.**

First Semester

Course Number	Title	Units
BIOL B3a	General Biology I	5.0
CHEM B1a	General Chemistry	5.0

ENGL B1a	Expository Composition	4.0
	Art or Humanities Elective	3.0

Second Semester

Course Number	Title	Units
BIOL B3b	General Biology II	5.0
CHEM B1b	General Chemistry and Chemical Analysis	5.0
ENGL B2 or	Advanced Composition and Critical Thinking	5.0
PHIL B9	Critical Thinking and Composition	3.0

Third Semester

Course Number	Title	Units
MATH B6a	Analytic Geometry and Calculus I	4.0
PHYS B2a	General Physics-Mechanics and Heat	4.0
SPCH B1	Speech Communication	3.0
	Art or Humanities elective	3.0
	Social or Behavioral Science elective	3.0

Fourth Semester

Course Number	Title	Units
MATH B6b	Analytic Geometry and Calculus II	4.0
PHYS B2b	General Physics-Sound, Light, Electricity, Magnetism, Modern Physics	4.0
	Art or Humanities elective	3.0
	Social or Behavioral Science elective	3.0

Note: Some UC campuses now require calculus-based physics for biology majors. If you are planning to transfer to a UC campus, contact their admissions office for advice. If you are planning to transfer to a CSU campus, consider satisfying the art or humanities requirement by taking two courses from the following list: FREN B2, B3, B4; GERM B2, B3, B4; or SPAN B2ab, B3, B4. These courses simultaneously satisfy the CSU language other than English and the arts and humanities requirements.

Primary Care Associate (Physician's Assistant)

Stanford University Medical Center administers a program to train individuals who function in association with physicians in the maintenance and delivery of primary health care to medically underserved communities.

Upon completion of the prerequisite pre-clinical program at Bakersfield College or other accredited institutions, students admitted to the program have 15 months of clinical experience coordinated through Stanford University Medical Center. Students participate in didactic course work full-time for the first quarter (3 months) at Stanford Medical Center in Palo Alto, California. Then they complete an equivalent of five days of didactic instruction each month (12 months) thereafter. All clinical experience occurs in an office practice preceptorship. Contact Counseling Department for further information.

Prerequisites:

Minimum requirements for application and admission include:

1. United States citizen or permanent visa.

2. High School Diploma or equivalent.
3. A minimum of 18 months direct patient care experience.
4. Satisfactory completion of the following academic prerequisites or their equivalents.

General Education courses are required for the P.C.A. Program. It is recommended that an AA or AS degree at BC be completed prior to applying to the program.

The student must have a preceptor site established in order to complete the clinical experiences necessary for the program. Some assistance may be available in locating a preceptor.

Upon successful completion of the P.C.A. program. The graduate will sit for a certifying examination administered by the National Commission on Certification of Physician's Assistants. Passing this examination allows the Physician's Assistant to perform direct patient services under the supervision of primary care physicians certified by the California Board of Medical Quality Assurance.

Pre-Clinical Program Requirements

A minimum grade of "C" must be attained in each of these courses. Only work from a regionally accredited college can be accepted.

Algebra - Elementary. One year of high school math or MATH B1/B200a at Bakersfield College.

Anatomy (BIOL B14) and Physiology (BIOL B15) at Bakersfield College or equivalent. Must be at least 10-12 quarter units or 7-8 semester units.

Chemistry - Introductory. One year of high school chemistry or CHEM B15 and B16 at Bakersfield College or equivalent.

Cultural Anthropology or Sociology: ANTH B2, SOCI B1 at Bakersfield College, or another acceptable course.

English Composition - Freshman level: ENGL B1, ENBL B1a at Bakersfield College, or other acceptable course.

General Psychology - PSYC B1a at Bakersfield College or other acceptable course.

Microbiology with laboratory; BIOL B16 at Bakersfield College, or other acceptable course.

*American History and Institutions. HIST B17a and HIST B17b at Bakersfield College.

*Computer Literacy - Two semester units. Must include experience at a terminal (COMS B2 or COMS B12) at Bakersfield College, or other acceptable course.

*Ethnic Studies - A course that reflects the experience of an American ethnic group.

*Humanities - One course from List A and one course from List B. (A) Literature, Philosophy (not Logic), or Western Civilization. (B) Art Appreciation, Music Appreciation, or Theatre Arts Appreciation.

*Physical Education - Four quarter courses or three semester courses.

*Speech - Public Speaking or interpersonal communication: SPCH B1 or SPCH B2 at Bakersfield College, or other acceptable course.

*These courses are required if candidate does not possess an A.A., A.S. or higher academic degree.

COURSE DESCRIPTIONS

The following abbreviations are commonly used in the course descriptions: lect lecture; lab laboratory; demo demonstration; Repeat repeatability (see policy on course repetition); CCS Course Classification System. Hours given in parentheses are total hours for the course. Hours lecture, lab, etc., are hours required per week usually. Offered: F=course is offered fall semester; S=course is offered spring semester; SS=course is offered summer session. If there is no designation, the course is offered irregularly. Check with the department for information. Many classes are offered occasionally during the summer. Check the summer class schedule for additional course listings. Prerequisites are expressed as minimum requirements. (CSU) indicates transferable to California State Universities; (UC) indicates transferable to University of California.

BIOLOGY

Credit limitations may apply. For specific information see a counselor or the transfer institution.

BIOL B3a General Biology I (5 units)

Introductory course for students majoring in biological sciences and related subjects. Science of life, survey of living organisms introduction to ecology and evolutionary biology, Mendelian genetics. **Prerequisite:** Reading Level 5 or 6. **Hours:** (162) 3 lect, 6 lab. Field trips required. **Offered:** F, S. **CCS:** Liberal Arts & Sciences. **Transferable:** UC, CSU and private colleges.

BIOL B3b General Biology II (5 units)

Principles of cell biology, molecular biology, metabolism, biochemistry, molecular genetics, and physiology. **Prerequisites:** CHEM B1a and BIOL B3a. **Hours:** (162) 3 lect, 6 lab.

Field trips required. **Offered:** F, S. **CCS:** Liberal Arts & Sciences. **Transferable:** UC, CSU and private colleges.

BIOL B7 Environment (3 units)

Introduction to environmental science. The process which will sustain humans on this planet. Topics included: the relevance of ecology to human affairs; historical aspects of ecological principles; population ecology; and ecology and the human future. **Prerequisite:** Reading Level 5 or 6. **Hours:** (54) 3 lect. **Offered:** F, S. **CCS:** Liberal Arts & Sciences. **Transferable:** UC, CSU and private colleges.

BIOL B10 Plant Biology (4 units)

An introductory course covering the fundamental principles of plant biology with emphasis on structure, function, reproduction, and development of seed plants. The principles will be related to the practices of applied plant biology in agriculture, forestry, horticulture, and plant biotechnology; to ecology; and to civilization. **Prerequisite:** Reading Level 5 or 6. **Hours:** (108) 3 lect, 3 lab. **CCS:** Liberal Arts & Sciences. **Transferable:** UC, CSU and private colleges.

BIOL B11 Concepts of Biology (4 units)

A non-majors introductory course which applies biological concepts to issues of everyday life. Concepts considered include scientific method; ecosystems and energy flow; organization, structure, function, behavior and evolution of organisms; inheritance; disease; ethics. **Prerequisite:** Reading Level 5 or 6. **Hours:** (108) 3 lect, 3 demo/disc/lab per week, plus at least one field trip. **Offered:** F, S. **CCS:** Liberal Arts & Sciences. **Transferable:** UC, CSU and private colleges.

BIOL B14 Human Anatomy (4 units)

The essential features of human anatomy with special emphasis upon the needs of students majoring in biology, nursing, physical education and the medical sciences. Includes the microscopic and gross anatomy of all systems: skeletal, muscular, circulatory, respiratory, digestive, excretory, nervous, endocrine, reproductive and integumentary. **Prerequisite:** Reading Level 5 or 6. Satisfactory completion of a high school biology course with a laboratory or one semester of college biology. **Hours:** (144) 2 lect and 6 lab. **Offered:** F, S. **CCS:** Liberal Arts and Sciences. **Transferable:** UC, CSU and private colleges. (CAN BIOL 10)

BIOL B15 Human Physiology (5 units)

Introductory course in human physiology. Physiology of cells, tissues, circulation, respiration, digestion excretion, controls and reproduction. **Prerequisite:** BIOL B14, and one of the following chemistry courses: CHEM B15 or CHEM B2a or CHEM B1a. **Hours:** (162) 3 lect, 6 lab. **Offered:** F, S. **CCS:** Liberal Arts and Sciences. **Transferable:** UC, CSU and private colleges.

BIOL B16 General Microbiology (5 units)

Introduction to the study of microorganisms. Topics include: survey of microorganisms history, physical and chemical agents, bacterial genetics, bacterial metabolism, bacterial diseases by transmission, fungal and protozoal infections, viral diseases, immunology, public health and epidemiology, nosocomial infections, biogenetic engineering, applications to food, water and sewage treatment. **Prerequisite:** CHEM B16 or CHEM B8 and CHEM B9. **Hours:** (162) 3 lect, 6 lab. Field trips required. **Offered:** F, S. **CCS:** Liberal Arts and Sciences. **Transferable:** UC, CSU and private colleges. (CAN BIOL 14).

BIOL B18 Essentials of Human Anatomy and Physiology (4 units)

A first course in integrated life science for students in health science programs. Principal emphasis is on the structure and function of human organ systems. Also includes cell structure and function, human development and human heredity. **Prerequisite:** Reading Level 5 or 6. **Hours:** (108) 3 lect, 3 lab. Offered: F, S. **CCS:** Liberal Arts and Sciences. **Transferable:** CSU and private colleges.

BIOL B20 Human Biology (4 units)

An introductory biology course designed specifically for non-science majors, covering basic chemical principles of life, cell and tissue structure and function, human anatomy and physiology, health aspects, and genetics. Topics include evolution, population growth and environmental impact on humans. **Prerequisite:** Reading Level 5 or 6. **Hours:** (108) 3 lect, 3 lab. Field trips required. **Offered:** F, S. **CCS:** Liberal Arts and Sciences. **Transferable:** UC, CSU and private colleges.

BIOL B30 Introduction to Biotechnology (4 units)

An introductory biotechnology course covering basic terminology, techniques, history and future of biotechnology industries. An overview of important biological molecules, the cell, genetic and bioengineering mechanisms, gene expression and manipulations, basic laboratory skills, safety, and industrial techniques. **Prerequisite:** CHEM B1a or B2a or B15 and BIOL B10 or B11 or B20 or B3a with a grade of "C" or better. **Hours:** (108) 3 lect, 3 lab. Field trips required. **Offered:** S. **CCS:** Occupational Education. **Transferable:** CSU and private colleges.

BIOL B31 Applied Biotechnology (5 units)

An intermediate course in Biotechnology; topics include aseptic technique, media production, bacterial culture, nucleic acid isolation and manipulation, DNA cloning, and tissue culturing. Laboratory activities involve GLP's and safety, quality control, use of molecular biology techniques and equipment. **Prerequisite:** BIOL B30 and CHEM B16, or B8 and B9. **Hours:** (162) 3 let, 6 lab. Field trips required. **Offered:** F. **CCS:** Occupational Education. **Transferable:** CSU and private colleges.

BIOL B51 Biotechnology Careers (0.5 unit)

Introduces the student to biotechnology skills, products, and career opportunities. Field trips and guest speakers are an integral part of the program. Hours: (9) 1 lect for 9 weeks. Field trips required. **Offered:** F, S. **CCS:** Occupational Education. **Not Transferable:** Associate Degree only.

BIOL B52 Advanced Biotechnology (4 units)

An advanced course in Biotechnology. Topics will stress biotechnician training and independent lab skills. Lecture topics will include transformation, restriction analysis of DNA, immunological applications. Lab will emphasize practice and mastery of current techniques including teamwork, design of an original project, assembly of necessary components, collection of data, evaluation and defense of findings. **Prerequisites:** BIOL B31 and CHEM B16 or CHEM B8 and B9 with a grade of "C" or better. Hours: (144) 2 lect, 6 lab. **Offered:** S. **CCS:** Occupational Education. **Not Transferable:** Associate Degree only.

BIOL B53 General Biology (3 units)

Outlines the main facts and principles of biology; experience in the use of scientific method. Recommended (and may be required) as preparation for other college biological sciences whenever the previous school record indicates insufficient preparation for such studies. Recommended: Reading Level 4. **Hours:** (72) 2 lect, 1 lab, 1 disc. Field trips required. **Offered:** F, S. **CCS:** Precollegiate - discipline specific. **Not Transferable:** Not degree applicable. **Note:** Not open for credit to students who have already completed BIOL B3a, BIOL B11, PHYL B1 or high school biology with a grade of "B."

BIOL B248ab Cooperative Work Experience Education (1-8 units. Limit 16 units)

See WEXP B248ab description.

BIOL B249ab Cooperative Work Experience Education (1-4 units. Limit 16 units)

See WEXP B249ab description.