Biology

Biology is the science of life and living organisms, including their structure, function, growth, origin, evolution, and distribution. Students take biology courses to prepare for a biology major, to fulfill general education requirements, and to meet prerequisites for related courses. A bachelor's degree in biology can lead to careers in areas such as health sciences, biotechnology, research, environmental sustainability, marine science, and education.

Academic and Career Pathway

Math and Sciences

Contact Information

Chair: Suzie Bailey
Dean: Michael Fino
https://www.miracosta.edu/academics/degree-and-certificate-programs/math-and-sciences/biology/index.html

Department: Biological Sciences
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Full-Time Faculty

Suzie Bailey
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Associate Degrees

Associate in Science Degree

Biology for Transfer

Students completing this associate degree will have completed lower-division major preparation requirements for a biology degree, an emphasis or option within a biology degree, or a degree considered similar to biology at a participating California State University (CSU) campus.

Following transfer to a participating CSU campus, students will be required to complete no more than 60 units to obtain a bachelor's degree; however, some CSU campuses may require additional lower-division major preparation. This degree may not be appropriate preparation for students transferring to a CSU campus not accepting this degree or to a university or college that is not part of the CSU system. Students should consult with a MiraCosta counselor for further information regarding the most efficient pathway to transfer as a biology major and to determine which CSU campuses are participating in this program.

Graduation Requirements

- Complete a minimum of 60 CSU-transferable semester units.
- Complete all courses required in the major with a "C" or "P" or better.
- Complete the CSU-GE (Plan B) or IGETC (Plan C)* general education pattern.**
- Obtain a minimum CSU-transferable GPA of 2.0.
- Complete a minimum of 12 units in residence at MiraCosta College.

* Students completing IGETC may be awarded the degree, but they must complete a course from Area IC: Oral Communication to meet CSU admission requirements.

** Students must use the CSU-GE Breadth or IGETC general education pattern for STEM majors to complete the degree in 60 units. This allows for the completion of 6 units of non-STEM general education coursework after transfer. Please see a counselor for further details.

Program Student Learning Outcomes

Upon successful completion of the program, students are able to do the following:

- Apply their understanding of the interconnections and interactions of molecular, cellular, and organismal levels of biological organization to the evaluation of biological phenomena.
- Demonstrate their understanding of the relationship between molecular, cellular, and organism-level structure and the relevant cellular, organismal, and ecological contexts in which they arose through adaptation.
- Apply the process of science and appropriate quantitative skills to the analysis, interpretation and evaluation of biological phenomena at various levels of biological organization.

Course Requirements

Required courses:		
BIO 202	Foundations of Biology: Evolution, Biodiversity, and Organismal Biology	4
BIO 204	Foundations of Biology: Biochemistry, Cell Biology, Genetics, and Molecular Biology	4
or BIO 204H	Foundations of Biology: Biochemistry, Cell Biology, Genetics, and Molecular Biology (Honors)	
List A:		
CHEM 150	General Chemistry I: For Science Majors	5
or CHEM 150H	General Chemistry I: For Science Majors (Honors)	
CHEM 151	General Chemistry II: For Science Majors	5
or CHEM 151H	General Chemistry II: For Science Majors (Honors)	
MATH 150	Calculus and Analytic Geometry I	5
or MATH 150H	Calculus and Analytic Geometry I (Honors)	
Choose one sequence below:		8
PHYS 111 & PHYS 112	Introductory Physics I and Introductory Physics II	
PHYS 151 & PHYS 152	Principles of Physics I and Principles of Physics II	
or PHYS 151H	Principles of Physics I (Honors)	
or PHYS 152H	Principles of Physics II (Honors)	
Total Units		**31**

Biology

NOTE: Students are strongly advised to select courses that meet lower-division major preparation requirements at their transfer university and to complete the History, Constitution, and American Ideals requirement prior to transfer.

Courses

BIO 102: Introductory Biology: Ecology and Environmental Biology
Units: 4
Prerequisites: None
Acceptable for Credit: CSU, UC
Lecture 3 hours, laboratory 3 hours.
Course Typically Offered: Fall, Spring

This general education life science course is intended for non-science track students. Using an interdisciplinary approach, students explore ecology and address current environmental issues, while seeking sustainable solutions. Course activities may include lectures, group discussions, lab observations and experimentation, simulation exercises, field work, case studies, and research projects.

BIO 103: Introductory Biology: Animal Diversity
Units: 3
Prerequisites: None
Enrollment Limitation: Not open to students with prior credit in BIO 202.
Acceptable for Credit: CSU, UC
Lecture 3 hours.
Course Typically Offered: Fall, Spring

This course introduces non-science track students to animal diversity and incorporates biological concepts such as evolution, ecology, behavior, physiology, and development. Course activities may include lectures, assessments, class discussions, research projects, reflection and/or application assignments, and observational activities.

BIO 104: Introductory Biology: Botany (Plant Life)
Units: 4
Prerequisites: None
Acceptable for Credit: CSU, UC
Lecture 3 hours, laboratory 3 hours.
Course Typically Offered: Spring

This introductory course examines plant anatomy, physiology, and classification. It provides a broad perspective of biological concepts and principles and covers both unicellular and multicellular systems. Topics include structure and function of life, metabolism and manipulation of energy, cell division, genetics, taxonomy, and the evolution and adaptation of living organisms. Field trips may be required.

BIO 105: Introductory Biology: Biotechnology in Society
Units: 3
Prerequisites: None
Acceptable for Credit: CSU, UC
Lecture 3 hours.
Course Typically Offered: Fall, Spring, and Summer

This introductory course relates basic biology to the emerging field of biotechnology. Topics include fundamental chemical processes common to all cells, biomolecular chemistry, cellular and molecular biology, classical and molecular genetics, and the molecular basis of immunology and cancer. The course highlights current advances in biotechnology, such as cloning, recombinant DNA technology, and gene therapy as well as the applications, social consequences, and ethical implications of biology and biotechnology in medicine and agriculture.
UC CREDIT LIMITATION: Credit for BIO 103, BIO 105, BIO 110, or BIO 111.

BIO 107: Introductory Biology: Marine Biology
Units: 4
Prerequisites: None
Acceptable for Credit: CSU, UC
Lecture 3 hours, laboratory 3 hours.
Course Typically Offered: Fall, Spring

This general education life science course introduces basic biological concepts in the context of learning about life in the ocean. The course emphasizes organismal diversity, how animals have adapted to the physical environment and anthropogenic impacts on the ocean including fisheries sustainability. The laboratory portion of the course combines classroom investigation with field exploration and emphasizes the scientific method, current research in the field of marine biology and the development of field sampling techniques. Students attend local field trips.

BIO 108: Introductory Biology: Ocean Ecology and Sustainability
Units: 3
Prerequisites: None
Acceptable for Credit: CSU, UC
Lecture 3 hours.
Course Typically Offered: Fall, Spring

This introductory life science course examines the ocean from an ecological perspective with an emphasis on environmental sustainability. Topics include patterns in the marine realm, interactions between organisms and their environment, the flow of energy through food webs, the structure of marine communities and issues related to environmental sustainability and human impacts on ocean ecosystems. Students discuss climate change, reducing our carbon footprint, the impacts of plastics and other pollution, and exploitation of marine resources. This class prepares students for moving forward toward a more sustainable future.

BIO 108L: Introductory Biology: Ocean Ecology and Sustainability Lab
Units: 1
Prerequisites: BIO 107 or BIO 108.
Enrollment Limitation: Concurrent enrollment in BIO 107 or BIO 108 if prerequisite not met.
Acceptable for Credit: CSU, UC
Laboratory 3 hours.
Course Typically Offered: Fall, Spring

This general education life science lab course offers students an experimental approach to examining current topics in the field of ocean ecology with a strong emphasis on sustainability. The course introduces students to current laboratory and field-based research methods, allowing them to develop skills in experimental design and then practice their skills by engaging in instructor-led independent research. This course supports the content of BIO 108 and includes local field trips.

BIO 110: Introductory Biology: Preparation for Pre-Health Professions (Lecture/Lab)
Units: 4
Prerequisites: None
Enrollment Limitation: Not open to students with prior credit in BIO 111 and BIO 111L.
Acceptable for Credit: CSU, UC
Lecture 3 hours, laboratory 3 hours.
Course Typically Offered: Fall, Spring, and Summer

This entry-level course provides a broad perspective of biological concepts and principles with an emphasis on human health. Topics include the process of scientific inquiry, the biochemistry of biomolecules, metabolism and manipulation of energy by plants and animals, cell division, classical and molecular genetics, development, and the evolution and adaptation of living organisms. The laboratory component of this course provides direct participation in experiments, demonstrations, and discussions related to fundamental concepts in biology. This course is designed for pre-health profession students. UC CREDIT LIMITATION: Credit for BIO 103, BIO 105, BIO 110, or BIO 111.

BIO 111: Introductory Biology: Preparation for Pre-Health Professions (Lecture)
Units: 3
Prerequisites: None
Advisory: BIO 111L
Enrollment Limitation: Not open to students with prior credit in BIO 110.
Acceptable for Credit: CSU, UC
Lecture 3 hours.
Course Typically Offered: Fall, Spring, and Summer

This entry-level course provides a broad perspective of biological concepts and principles with an emphasis on human health. Topics include the process of scientific inquiry, the biochemistry of biomolecules, metabolism and manipulation of energy by plants and animals, cell division, classical and molecular genetics, development, and the evolution and adaptation of living organisms. This course is designed for pre-health profession students. UC CREDIT LIMITATION: Credit for BIO 103, BIO 105, BIO 110, or BIO 111.

BIO 111L: Introductory Biology: Preparation for Pre-Health Professions (Lab)
Units: 1
Prerequisites: BIO 111
Enrollment Limitation: Concurrent enrollment in BIO 111 if prerequisite not met. Not open to students with prior credit in BIO 110.
Acceptable for Credit: CSU, UC
Laboratory 3 hours.
Course Typically Offered: Fall, Spring

This laboratory accompaniment to BIO 111 provides direct participation in experiments, demonstrations, and discussions related to fundamental concepts in biology. This course further develops the students understanding of topics introduced in the lecture.

BIO 202: Foundations of Biology: Evolution, Biodiversity, and Organismal Biology
Units: 4
Prerequisites: Knowledge, skills, and abilities at the intermediate algebra level as determined by the math placement process.
Advisory: Any college-level biology course with an organismal or population focus (e.g., BIO102, BIO103, BIO104, BIO107, BIO108, BIO110, BIO204, BIO210, BIO220, or BIO230)
Acceptable for Credit: CSU, UC
Lecture 3 hours, laboratory 3 hours.
Course Typically Offered: Fall, Spring

This course surveys the organismal/meta-organismal half of biological disciplines. Topics include the taxonomy and physiology of prokaryotes and basal eukaryotes; the taxonomy, developmental biology, and physiology of plants and animals; and single-species population dynamics and interspecies interactions in communities. The laboratory emphasizes evolutionary process and mechanism, phylogeny reconstruction, comparative anatomy/physiology/survey of plants and animals, and life history evolution.The laboratory portion also includes local field trips or online alternatives. C-ID BIOL 135S (with BIO 204/BIO 204H) and BIOL-140.

BIO 204: Foundations of Biology: Biochemistry, Cell Biology, Genetics, and Molecular Biology
Units: 4
Prerequisites: CHEM 150 or CHEM 150H.
Enrollment Limitation: Not open to students with prior credit in BIO 204H.
Acceptable for Credit: CSU, UC
Lecture 3 hours, laboratory 3 hours.
Course Typically Offered: Fall, Spring

This course surveys the molecular half of biological disciplines. Topics include biological molecules, metabolic biochemistry, cell biology, molecular biology, and genetics. The laboratory emphasizes modern methods in cell and molecular biology, classical genetics, and experimental design. UC CREDIT LIMITATION: Credit for BIO 204 or BIO 204H. C-ID BIOL-135S (with BIO 202) and BIOL-190.

BIO 204H: Foundations of Biology: Biochemistry, Cell Biology, Genetics, and Molecular Biology (Honors)
Units: 4
Prerequisites: CHEM 150 or CHEM 150H.
Enrollment Limitation: Not open to students with prior credit in BIO 204.
Acceptable for Credit: CSU, UC
Lecture 3 hours, laboratory 3 hours.
Course Typically Offered: Fall, Spring

This course surveys the molecular half of biological disciplines. Topics include biological molecules, metabolic biochemistry, cell biology, molecular biology, and genetics. The laboratory emphasizes modern methods in cell and molecular biology, classical genetics, and experimental design. This honors course offers students the opportunity to complete, document, and discuss independent scientific research. UC CREDIT LIMITATION: Credit for BIO 204 or BIO 204H. C-ID BIOL-135S (with BIO 202) and BIOL-190.

BIO 210: Human Anatomy
Units: 4
Prerequisites: BIO 110, BIO 111, or a minimum 3-unit course in biology that presents principles of cellular life in its curriculum.
Enrollment Limitation: Not open to students with prior credit in BIO 210H.
Acceptable for Credit: CSU, UC
Lecture 2 hours, laboratory 6 hours.
Course Typically Offered: Fall, Spring, and Summer

This course follows a systemic approach by combining microscopic studies of tissues (histology) and organs along with gross/visual anatomical studies of the human body. Students learn mammalian and human anatomy by working with preserved mammalian specimens and human cadavers. Because the course presents applied clinical situations, it is recommended for students majoring in the health sciences: massage therapy, kinesiology, physical therapy, nursing, and physician assistant. UC CREDIT LIMITATION: Credit for BIO 210 or BIO 210H. C-ID BIOL-110B.

BIO 210H: Human Anatomy (Honors)
Units: 4
Prerequisites: BIO 110, BIO 111, or a minimum 3-unit course in biology that presents principles of cellular life in its curriculum.
Enrollment Limitation: Not open to students with prior credit in BIO 210.
Acceptable for Credit: CSU
Lecture 2 hours, laboratory 6 hours.
Course Typically Offered: Fall or Spring

This course offers students an enriched opportunity to understand normal human anatomy and to explore select pathologies (abnormal anatomy). It targets students looking for a more challenging academic experience that will include some human dissection and advanced reading of published scientific material. This enhanced course blends the systemic approach to the study of human anatomy with select regional dissections. It combines microscopic studies of tissues (histology) and organs with gross/visual anatomical studies of the human body. UC CREDIT LIMITATION: Credit for BIO 210 or BIO 210H. C-ID BIOL-110B.

BIO 220: Human Physiology
Units: 4
Prerequisites: BIO 110, BIO 111, BIO 204, BIO 204H, BIO 210, or BIO 210H.
Advisory: CHEM 115, CHEM 112, or CHEM 115H.
Acceptable for Credit: CSU, UC
Lecture 3 hours, laboratory 3 hours.
Course Typically Offered: Fall, Spring, and Summer

This course presents the interrelationships of the various organ systems, based upon the molecular and cellular activities of the organs that comprise those systems. It emphasizes the integration of body systems for maintaining homeostasis through regulated metabolism and coordinated flow of information. This course is designed for students majoring in pre-medicine, pre-nursing, allied health fields, and physical education. C-ID BIOL-120B.

BIO 230: Introduction to Microbiology
Units: 5
Prerequisites: BIO 220, CHEM 115, CHEM 115H, CHEM 112, CHEM 140, CHEM 150, or CHEM 150H.
Acceptable for Credit: CSU, UC
Lecture 3 hours, laboratory 6 hours.
Course Typically Offered: Fall, Spring, and Summer

This course introduces the fundamental concepts of microbiology and the use of the scientific method applied to the study of bacteria and other microorganisms. Topics include the history, morphology, genetics, and physiology of microbes. The laboratory emphasizes methods for isolating, culturing, identifying, enumerating and controlling bacteria.

BIO 290: Human Dissection Laboratory
Units: 1
Prerequisites: BIO 210 or BIO 210H.
Acceptable for Credit: CSU
Laboratory 3 hours.
Course Typically Offered: Summer

This supervised study of human dissection techniques includes a review of dissection procedures as well as practical experience with human cadavers. The course follows a regional approach to human anatomy and covers all major muscle groups, organs, nerves, and blood vessels of the body. It is intended for students who are interested in normal anatomy of the human body, pathology, and the pursuit of careers in the medical field.

BIO 292: Internship Studies
Units: 0.5-14
Prerequisites: None
Corequisite: Complete 54 hours of work per unit, paid or unpaid.
Enrollment Limitation: Instructor, dept chair, and Career Center approval. Fourteen unit maximum in any combination of work experience education and/or internship studies per semester.
Acceptable for Credit: CSU
Course Typically Offered: To be arranged

This course provides students the opportunity to apply the theories and techniques of their discipline in an internship position in a professional setting under the instruction of a faculty-mentor and site supervisor. It introduces students to aspects of the roles and responsibilities of professionals employed in the field of study. Topics include goal-setting, employability skills development, and examination of the world of work as it relates to the student's career plans. Students must develop new learning objectives and/or work/intern at a new site upon each enrollment.

BIO 296: Topics in Biology
Units: 1-4
Prerequisites: None
Acceptable for Credit: CSU
Lecture 1 hour.
Lecture 2 hours.
Lecture 3 hours.
Lecture 4 hours.
Course Typically Offered: To be arranged

This course gives students an opportunity to study topics in Biology that are not included in regular course offerings. Each Topics course is announced, described, and given its own title and 296 number designation in the class schedule.

BIO 299: Occupational Work Experience Education
Units: 0.5-14
Prerequisites: None
Corequisite: Complete 54 hours of work per unit, paid or unpaid.
Enrollment Limitation: Career Center approval. Fourteen unit maximum in any combination of work experience education and/or internship studies per semester.
Acceptable for Credit: CSU
Course Typically Offered: Fall, Spring, and Summer

This course is intended for students who are employed in a job directly related to their major or career area of interest. It allows such students the opportunity to apply the theories and skills of their discipline to their position and to undertake new responsibilities and learn new skills at work. Topics include goal-setting, employability skills development, and examination of the world of work as it relates to the student's career plans. Students must develop new learning objectives and/or work/intern at a new site upon each enrollment.

BIO 340: Molecular Mechanisms of Disease
Units: 3
Prerequisites: BIO 105, BIO 110, BIO 111, BIO 204, or BIO 204H, and CHEM 150 or CHEM 150H.
Enrollment Limitation: Only open to students enrolled in the bachelor's degree program in biomanufacturing at MiraCosta College.
Lecture 3 hours.
Course Typically Offered: Fall

This course focuses on the molecular basis of human disease. Topics include genetic, metabolic, signaling, developmental, and infectious diseases as well as the biological mechanisms of immunity, cancer, and aging. This course develops students' understanding of the biological basis of human disease that will allow them to evaluate technological advances in therapeutics and diagnostics. This course is open only to students enrolled in the biomanufacturing bachelor's degree program.