Community Colleges of San Diego County

Cuyamaca College

Biology 126, Introduction to Biotechnology is a three - unit course that provides an introduction to biotechnology for non-biology majors. Topics include fundamentals of molecular biology and of scientific research, product development and manufacturing, as well as the social, legal and ethical implications of biotechnology. This course is designed for those who might be interested in working in the industry in a non-scientific capacity, or who are currently working in the industry and want to expand their overall understanding. There are no prerequisites for this course.

More information is available at: www.cuyamaca.net

General (619) 660-4000
Admissions (619) 660-4275
Math and Sciences (619) 660-4452
Biotechnology Director (619) 660-4345

Grossmont College

Biology 220 & 221 - Principles of Molecular and Cellular Biology & Laboratory represents a total of four-semester units. The LECTURE class (Biology 220) surveys the general principles of biology at an advanced level. Emphasis is placed on the following topics: cellular processes including energy metabolism, membrane transport and cell division; molecular genetics including recombinant DNA; communication between cells; and the theories of cellular evolution. In the LABORATORY class (Biology 221), students conduct laboratory experiments on biomolecules, membrane transport, enzyme kinetics, cellular respiration, photosynthesis and advanced exercises in Biotechnology. These advanced exercises include basic biotechnology instrumentation, bioinformatics (analysis of data and use of web-based tools such as BLAST), bacterial transformation, bacterial gene cloning, and DNA restriction analysis using gel-electrophoresis (including DNA fingerprinting).

Biology 220 & 221 form half of the core curriculum for Biology Major transfer students. Both courses have a pre-requisite of one semester of college-level General Chemistry or the equivalent. Biology 221 can be taken as a separate course with permission of the instructor prior to registration

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Chem 231 & 232 - Organic Chemistry for biology, chemistry and premedical and biotechnology majors is a two-semester sequence similar to the sophomore organic sequence at four-year institutions. Grossmont College is one of the few community colleges that offers not only first-semester organic but the second semester as well. Chem 231 is a five - unit course including three hours of lecture and six hours of lab. The prerequisite for this course is two semesters of general chemistry. The second semester course (Chem 232) is also five units, three hours of lecture and six hours of lab. Students are given hands-on training with a full array of sophisticated laboratory instrumentation, such as FTIR, AA and UV spectrometry, high-performance liquid chromatography, gas chromatography, and NMR spectrophotometry.

Community Colleges of San Diego County

Forensic Technology Program - Grossmont College has one of the oldest forensic technology programs in the U.S., having started in 1964. The program is designed to help prepare students for a career in crime scene processing and or fingerprint analysis and comparison. Students should be aware there are many components to the forensic profession, and this program is only the first step. The various fields include not only forensic technology, which is the technology involved in processing a crime scene, but many other fields of study that are more closely related to the hard sciences. The term, "criminalistics." is the science and profession dealing with the recognition, collection, identification, individualization, and interpretation of physical evidence, and the application of the natural sciences to law-science matters. As a result, students interested in a career in "criminalistics" are more likely to major in either Chemistry or Biology.

The Chemistry Department offers a Forensic Chemistry course (**Chemistry 113**). In this one-semester lab course, students use lab equipment to study physical evidence (hair, fibers, paint and fingerprints) and are taught how organic and general chemistry principles are introduced in the context of practical application.

Students who complete the Forensic Technology Program may qualify for certain entry-level positions in state labs and are well-prepared for transfer into four-year forensic programs.

General information is available at: www.grossmont.edu
Grossmont College Admissions (619) 644-7186

Course descriptions can be found in our online catalog at:
http://www.grossmont.edu/admissions/catalog.asp

For information on Bio 220 & 221 course content and pre-requisites, please contact:
Professor Craig Milgrim at craig.milgrim@gcccd.edu or (619) 644-7337

For information on the Chemistry program and Chem 231&232 including course content and pre-requisites, please contact Professor Tom Olmstead at tom.olmstead@gcccd.edu or (619) 644-7483

For information on the Forensics program, please contact:
Professor Rick Michelson at rick.michelson@gcccd.edu or (619) 644-7321

MiraCosta College

The Certificate of Achievement - Biotechnology Lab Assistant is a 13-20 unit program designed to prepare entry level workers in support positions, including media preparation.

The Certificate of Competence - Biotechnology Research and Development Technician is a 40-41 unit program designed to give students a deeper understanding of the science to work in R&D support positions, quality assurance/control and manufacturing. Course work includes basic solution and media preparation, basic bacteriology and sterile

technique, assay and spectrophotometry, as well as gel electrophoresis. Prerequisites include English, math, chemistry, biology and basic computer information systems.

The Certificate of Competence - Biotechnology Manufacturing Operator is 27-28 unit program that provides the background knowledge needed to do biotechnology manufacturing. Specialized course work includes: Solution and Media Prep, Bacteriology, Sterile Technique, Assays / Spectrophotometry, Tissue Culture, Business and Regulatory Practices in Biotechnology and a capstone experience in Bioprocessing. Prerequisite courses include intermediate algebra, English, preparatory chemistry, human biology (or Introduction to Biotechnology), and Computer Information Systems.

More information is available at: www.miracosta.edu/biotech

To learn more about MiraCosta's biotechnology manufacturing courses please visit: www.miracosta.edu/biomfg/

General (760) 757-2121 Math and Sciences (760) 795-6812
Admissions (760) 795-6620 Biotechnology Coordinator (760) 757-2121, ext. 6496

San Diego Mesa College

The ***Chemistry Technician Certificate*** at San Diego Mesa College offers education in the basic skills as well as the theoretical knowledge necessary to be a successful chemical technician. To complete the program, students must take one year of general chemistry (six hrs/wk of lab), organic chemistry (six hrs/wk of lab), and either a semester of analytical chemistry (six hrs/wk of lab) or biochemistry and biochemical techniques (three hrs/wk of lab).

General Chemistry (Chem. 200, 200L, 201, 201L) provides basic general chemistry with six hrs/week of lab.

Organic Chemistry (Chem 231, 231L, 233, 233L) provides theory and skills in organic molecule synthesis, purification and characterization, all of which are important for a job in the biotechnology industry.

Inside the Pharmaceutical Industry (Chem 255), is a course taught primarily by industry representatives. It looks at the process of drug discovery and development and provides an overview of how the industry works.

Analytical Chemistry (Chem 251) covers advanced analytical techniques including atomic absorption spectroscopy, UV-VIS and IR spectroscopy, HPLC and wet chemical techniques. In addition, many of the instruments are computer-interfaced and, therefore, teach use of computers in data acquisition and management.

Introduction to Biochemistry (Chem 160) and Techniques in Biochemistry (Chem 161) provide an understanding of basic concepts and techniques needed by chemists in the

biotechnology industry in the field of protein, lipid, carbohydrate and nucleic acid chemistry.

The ***Associate in Science Degree in Animal Health Technology*** is offered at San Diego Mesa College. This program prepares students for the Registered Veterinary Technician Exam. On becoming a Registered Veterinary Technician (RVT) the graduate may find employment in the private or specialty veterinary facility, biomedical/biotechnology research institutions, animal related industries, regulatory agencies, and zoological parks or aquariums. Eligibility for enrollment into the Animal Health Technology program is determined by a special admission procedure and interested students should call the Special Programs Admission Clerk in the Admissions Office.

General college information is available at: www.mesa.sdccd.edu
General (619) 388-2600
Admissions (619) 388-2500
Math and Sciences (619) 388-2795

For information on the Chemistry Technician Certificate please visit:
http://www.mesa.sdccd.edu/chemistry/index.html
Contact: Rob Fremland: (619) 388-2422 rfremlan@sdccd.net

For more information on the Animal Health Technology Degree please visit:
http://www.sdmesa.edu/animal_health/index.html
Animal Health Technology Admissions (619) 388-2684
Contact: Peggy Fischer: (619) 388- 2832 or email: pfischer@sdccd.edu

San Diego Miramar College

San Diego Miramar College offers several pathways designed to teach students the basic biology, chemistry and lab skills needed for an entry-level position in the biotechnology industry.

Introduction to Biotechnology Class – A general education class designed to introduce students to key concepts and techniques in the industry.

Associate in Science Degree in Applied Biology – Students complete 60 units, which includes transfer science and general education course work. About half of the degree units are from classes that specifically address biotechnology skills and necessary biology and chemistry concepts.

Certificate of Achievement in Applied Biology – This is a 27-31 unit program with coursework that includes biology, chemistry and computer science, including two specific biotechnology courses. No general education coursework is required.

Certificate of Completion in Biotechnology – Students can take two specific biotechnology courses (Biology 132 and 133) for a total of eight units to receive a special

certificate, assuming they have met the prerequisite biology and chemistry courses within prior degree programs or through industry experience. Biology 132 (Applied Biotechnology I) covers introductory biology and chemistry skills. Biology 133 (Applied Biotechnology II) introduces advanced lab techniques and is taught by industry instructors.

More information is available at: www.miramarcollege.net
Admissions (858) 536-7844
Math and Sciences (619) 388-7844
Biotechnology Program Director: Sandra Slivka, Ph.D.
(619) 388-7490 or email: sslivka@sdccd.net

Southwestern College

Southwestern College offers a multi-track program in Biotechnology. The ***Biotechnology Certificate*** is a 31-unit program that provides an introduction to a variety of biotechnology disciplines and techniques. Students take 13 units total of General Chemistry, Principles of Biology (lecture and lab), Introduction to Research I and DNA Science I. The following semester, students take 14 units total of Microbiology, Cell Biology, Introduction to Research II, and DNA Science II. Intermediate algebra is a program prerequisite (four units). To earn an ***Associate in Science Degree***, additional General Education and Graduation Requirements must be completed. Students interested in ***transferring*** to a four-year academic institution substitute higher level courses required for their major.

Southwestern College also offers a ***Chemical Technician Certificate*** and an ***Associate in Science Degree in Chemical Technology***. Both programs are composed of a comprehensive collection of instructional and laboratory experiences directed toward readying graduates for entry-level positions in a wide variety of chemistry-based industries such as pharmaceutical, biotechnology, paints and coatings, and electronic materials. The program curriculum is structured to equip students with many of the technical skills and competencies identified by the American Chemical Society as essential in the preparation of well-trained Chemical Technicians.

Paid Research Internships and Teaching Assistant opportunities are available through a project funded by the National Science Foundation (NSF). ***The Biotechnology Education and Training Sequence Investment (BETSI) Project*** provides outreach and partnerships between Southwestern College and the Sweetwater Union High School District, four-year academic institutions, and the local Biotechnology Industry.

More information is available at: www.sccd.edu/~biotechnology & www.sccd.edu/~betsi
General (619) 421-6700
Admissions (619) 482-6550
School of Mathematics, Science and Engineering (619) 482-6406

Biotechnology Program Director and BETSI Project PI: Nouna Bakhiet, Ph.D.

(619) 421-6700, ext. 5476 or email: nbakhiet@sccd.edu

BETSI Project CoPI and High School Outreach Coordinator: Jonathan Atwater, Ph.D.
(619) 421-6700, ext. 5707 or email: jatwater@sccd.edu

Chemical Technology Program Director: David R. Brown, Ph.D.
(619) 421-6700, ext. 5664 or email: dbrown@swc.c.ca.us