

BIOTECHNOLOGY

Post-Graduate Certificate Program

UC SANTA CRUZ SILICON VALLEY CAMPUS
UCSC Silicon Valley
Extension

in partnership with  Higher Education

The Bay Area is a leader in the global biopharmaceutical industry, with local companies and research institutions setting the pace in the discovery and development of biopharmaceuticals. UCSC's Biotechnology Certificate provides a solid understanding of the scientific disciplines that underlie the industry's activities, a foundation in the principles that guide drug discovery and development, an appreciation of cutting-edge bioscience research and technology, and a broader awareness of today's biopharmaceutical industry.

Who Should Attend?

UCSC Extension's Biotechnology certificate program is designed for chemists, biologists and other scientists who want to enhance their knowledge of the principles and applications of biotechnology. It also benefits individuals from other disciplines who need a solid scientific foundation in order to enter or work more effectively in the biopharmaceutical field.

Curriculum

Certificate & OPT | 3 Quarters | 29 Units

Drug Discovery, Introduction | 3 Units

This introductory course provides a framework for understanding the process of drug discovery, from target selection and validation to lead optimization and preclinical studies. Although the fundamental principles of drug discovery are well established, the tools, technologies and methods used in the discovery and development of safe and effective drugs are constantly evolving. Personalized medicine and novel diagnostics involving biomarkers, pharmacogenetics and pharmacogenomics in clinical practice are changing the landscape of drug discovery. The instructor will address fundamental and translational principles and cutting-edge approaches along with strategies for integrating current scientific approaches into the drug discovery process.

Biochemistry, Introduction | 3 Units

This course covers biochemistry concepts central to the biotechnology industry with an emphasis on the enzymatic and metabolic processes of living systems at the molecular level. Topics include the structure and function of biomolecules including proteins, carbohydrates, lipids and nucleic acids; enzymes and enzyme

kinetics; and metabolism, including energy production and storage. The course is beneficial for scientists and non-scientists interested in the critical biochemistry processes underlying core technologies in the pharmaceutical, medical devices, diagnostics, biotechnology and biofuel industries.

Drug Development Process | 2 Units

The development of new drugs is a highly complex, lengthy and expensive process. In this course, you examine this process---from discovery to market and beyond---and see what makes the biopharmaceutical industry unique. Infused with real-world examples, lectures will address drug discovery; preclinical characterization of new drug entities; the phases and purposes of both pharmacological and clinical development; regulatory filings, compliance and oversight; FDA jurisdiction; and strategic issues in drug development. The course provides an important foundation in drug development for professionals from all disciplines who are currently working in or are considering a move to the biopharmaceutical industry.

Next Generation DNA Sequencing: Methods and Applications | 3 Units

Next Generation DNA Sequencing (NGS) has transformed our understanding of genomics. The ability to sequence a human genome at an incredibly low cost has vastly expanded the potential applications of genomics in cancer diagnostics, pathogen identification, forensic human identification and genetic disease diagnosis. For researchers, NGS is a powerful tool that allows you to address questions that were impossible to pursue just a few years ago. This course, taught by a leading expert in the field, begins with the basics of this revolutionary process and then delves into specific applications of NGS in research and clinical settings. You will develop the knowledge needed to perform analyses from sample prep to generating the final data. The course begins with an introduction to genomics. It then reviews the primary methods used for highly parallel sequencing technologies. The course covers standard workflows from sample prep to final data analysis. This is the only course available in the Bay Area that builds comprehensive knowledge in next generation DNA sequencing.



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Curriculum Continued

Experimental Methods in Molecular Biology | 3 Units

The 50 plus years since the structure of DNA was solved have been punctuated by spectacular advances both in our understanding of biological processes and in the very methods developed to achieve this understanding. This lecture-based course provides a theoretical overview of the key molecular biology techniques used in basic life science research and by the biotechnology and biopharmaceutical industry for the discovery of novel therapeutics.

Cellular Biology | 3 Units

Recent advances in stem cell biology and cancer research illustrate the importance of understanding complex biological processes at the cellular level. This course covers the essential concepts of cellular biology, including the functions of cellular macromolecules, subcellular organization, nuclear control of cellular activity, cell signaling and cancer. You'll also learn the experimental approaches used to explore cellular activities.

Immunology, Principles | 3 Units

Immunology involves a complex network of interacting molecules and cells that function to recognize and respond to foreign agents. It also has wide-ranging implications for the pharmaceutical, healthcare and biotechnology industries. This course provides the fundamental principles of immunology, along with recent developments and their implications for drug discovery and development, as well as disease treatment.

Human Physiology in Health and Disease | 3 Units

This course introduces the fundamental principles of human physiology in health and disease, and provides insight into emerging and established therapies used to treat a range of disease processes. Designed for individuals who lack formal medical training, the course introduces the hierarchical organization of the body, from cells to coordinated organ systems, and continues with a discussion of the key integrative/homeostatic control mechanisms. With these topics as a foundation, the instructor progresses through the functions of major systems, including renal, cardiovascular, respiratory, neuromuscular, digestive, endocrine and reproductive.

Good Manufacturing Practices | 3 Units

Professional Credit: CA BRN/LVN Credit-Provider #CEP13114. Familiarity with the Good Manufacturing Practices (GMP) regulations is necessary for employees engaged in the manufacture, regulation, quality assurance, and control of drugs and biologics. Through lectures, discussions, and case studies, you'll gain an understanding of the FDA GMP and Good Laboratory Practice (GLP) regulations. While primarily aimed at the manufacturing, quality control, and quality assurance worker, the course is also useful for regulatory affairs and clinical research professionals, as well as anyone who wants to understand which regulatory controls apply to the manufacture of drugs and biopharmaceuticals for human use.

Regulation of Drugs and Biologics | 3 Units

Complex regulations govern the development, manufacture, and commercialization of biomedical products. This course will help you understand the regulatory requirements, both U.S. and international, for patented and generic pharmaceuticals, over-the-counter drugs, and biological products. Through lectures, case studies, and hands-on exercises, you'll gain knowledge and insight into the regulatory agencies and their roles and responsibilities, regulatory applications and pathways, post-marketing requirements, the impact of regulatory differences between U.S. and other countries, and how regulatory approval processes affect corporate strategy.

Internships (unpaid) | 3 Units Minimum 90 Hours Per Quarter

Enrolling in a certificate program allows you to participate in multiple unpaid internships at local companies in your field of study. Internships are available across a variety of sectors, generally at mid-sized companies, such as Agylytyx, Crowdera Inc, Innowest, and YMedia Labs. Good internships are much sought after and highly competitive. To stand the best chance of securing your preferred placement, our Internship Coordinators are on hand with expert support and guidance.

Courses in the certificate programs are subject to change based on schedule availability and/or student aptitude. Equivalent course substitutions will be made to accommodate.