Biotech Career Pathways: Your Journey at UC Davis!

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The UCD Biotech Program works to bring all members of the life science community together to promote biotechnology education and workforce development.

- ADP Graduate Program
- DEB Graduate Program
- NIH & NSF Training Grants
- Short Technical Courses
- BioTech SYSTEM K-14 Outreach

Industry
Academia
Community Groups
Government
UC Davis is a Global Leader in Life Science Education, Research & Public Service
Take Advantage of the 1st Class Research Training Available at UC Davis!

► Research Experiences at UCD

- Undergraduate Research Center
- Internship & Career Center
- Take the initiative! Search the campus website for an interesting lab and email the professor to ask about research project possibilities

While at UCD, build the skill sets needed to:

- Work effectively as the member of a team
- Precisely handle lab equipment and gather data
- Carefully analyze and solve problems, based on known facts or data
- Clearly communicate the results of your work (written and verbal)
Agricultural Biotechnology

- Enhanced pest and disease resistance
- Decrease use of chemicals on farmland
- Enhanced vitamins, micronutrients, etc.
- Increased stress tolerance: drought, salinity, cold, etc.
- “Pharming” to make vaccines and therapeutics.
- Use of cellulosic biomass for biofuels
Useful proteins or biomolecules may be produced on an industrial scale by making transgenic cells (bacteria, fungi, CHO cells, plant or algal cell cultures), followed by large scale fermentation and biomolecule collection...aka “Biomanufacturing”

Molecules produced via biomanufacturing include:

- **Pharmaceuticals** for the treatment of many diseases and disorders (Genentech, Novartis, Amgen, many others...visit [www.baybio.org](http://www.baybio.org) for a list of the local biotech pharma companies)

- **Enzymes** for the production of cheese, bread, detergents, textiles, plastics, etc... (Novozymes)

- **Antibodies** used in vaccines, medical diagnostics, molecular biology research, biosensors, etc...
Biotech Scientists Use Interdisciplinary Skills
(molecular biology, chemical engineering, computer science, etc..) to Address Many Types of Questions

**Biofuels & Bioenergy**
- Can we design transgenic plants and microorganisms to produce inexpensive, renewable sources of fuel and energy?

**Bioremediation**
- Can we use transgenic plants and microorganisms to efficiently remove toxins from soil and water?

**Stem Cells & Tissue Engineering**
- Can we use embryonic stem cells or reprogrammed adult stem cells to regenerate all tissues of the human body?
- Can we develop imaging systems to track stem cells in the human body?
- Can we program stem cells to stop dividing once tissue is repaired?

**Genomics, Proteomics & Bioinformatics**
- Can we identify DNA sequence variations in the Human Genome that correlate to specific diseases and other traits?
- Can we use the genome sequences of pathogenic microorganisms and viruses to help us design more effective drug treatments and vaccines?
UC Davis Biotech-Related Undergraduate Training Programs

- **BS in Biological Sciences (CBS)**
  - Biochemistry & Molecular Biology; Biological Sciences; Cell Biology; Evolution, Ecology & Biodiversity; Exercise Biology; Genetics; Microbiology; Molecular and Cellular Biology; Neurobiology, Physiology, and Behavior; Plant Biology; Undeclared Life Sciences
  - [http://admissions.ucdavis.edu/academics/major_view.cfm?major=bbis](http://admissions.ucdavis.edu/academics/major_view.cfm?major=bbis)

- **BS in Biotechnology (CA&ES)**
  - Concentrations in Plant Biotech, Animal Biotech and Bioinformatics
  - Advisor Theresa Costa ([tacosta@ucdavis.edu](mailto:tacosta@ucdavis.edu)), Plant Sciences Dept
  - [http://admissions.ucdavis.edu/academics/major_view.cfm?major=abit](http://admissions.ucdavis.edu/academics/major_view.cfm?major=abit)

- **Intercollegiate Minor in Quantitative Biology & Bioinformatics**
  - Advisor Carole Hom ([clhom@ucdavis.edu](mailto:clhom@ucdavis.edu)), CBS
UC Davis Biotech-Related Graduate Training Programs

- **MS/PhD in a life science or related engineering discipline**
  - various majors across the Colleges of Biological Science, Ag & Environmental Science, Letters & Science, the Med School and Vet-Med School

- **Designated Emphasis in Biotechnology (DEB)**
  - ~170 PhD students
  - 27 related graduate groups or departments
  - Emphasis on cross-disciplinary training and applications of biotech in industry

Interdisciplinary Collaboration is a Hallmark of UC Davis Teaching & Research
The purpose of the DEB is to provide graduate students an opportunity to explore biotechnology through seminars, courses and examine the relationship of academia to industry through internships. Participating graduate programs currently include 27 programs:

- Agricultural and Environmental Chemistry
- Animal Science
- Applied Science
- Biochemistry and Molecular Biology
- Biological Systems Engineering (formerly Biological & Agricultural Engineering)
- Biomedical Engineering
- Biophysics
- Cell & Developmental Biology
- Chemical Engineering
- Chemistry
- Civil and Environmental Engineering
- Comparative Pathology
- Electrical & Computer Engineering
- Entomology
- Genetics
- Immunology
- Materials Science and Engineering
- Mechanical and Aeronautical Engineering
- Food Science
- Microbiology
- Molecular, Cellular and Integrative Physiology
- Nutritional Biology (formerly Nutrition)
- Pharmacology & Toxicology
- Plant Biology
- Plant Pathology
- Soils & Biogeochemistry
- Statistics

~170 students are in the DEB as of Nov 2008
Team Building at Picnic Day 2008

DNA Extractions!!!

Dave, Tim, Dr. Judy & Ambrose

Vu Trinh explains the DNA extraction expt

Kseniya Zakharyevich and a young scientist

DEB students have FUN WITH SCIENCE & CONNECT WITH PEOPLE

Laura Ho helps a visitor make cheese with a GM enzyme
Education & Training for a Career in the Life Science Industry

High School Diploma

- Community College Certificate: ~2yrs
- Community College AS Degree: ~2yrs

Bachelor’s of Science (BS) Degree: ~4-5yrs

- Master’s of Science (MS) Degree: ~2-3yrs
- Doctoral Degree (PhD): ~5-7yrs

Laboratory Technician: ~$35-40,000/yr

Research Scientist: ~$50-70,000/yr

Laboratory Director: ~$65-100,000+/yr

Biotech Company CEO: ~$100,000+/yr

More years of experience
Education & Training for a Career in Life Science Academia

High School Diploma

- Community College Certificate: 1-2yrs

- Community College AS Degree: ~2yrs

Bachelor’s of Science (BS) Degree: ~4-5yrs

- Master’s of Science (MS) Degree: ~2-3yrs

- Doctoral Degree (PhD): ~5-7yrs

Laboratory Technician: ~$35-45,000/yr

K-12 Credential: ~1-2yrs

K-12 Teacher: ~$45-70,000/yr

Research Scientist: ~$50-70,000/yr

- Adjunct Faculty (temporary): ~$40-50,000+/yr

- Community College Prof/Admin: ~$50-100,000+/yr

University Professor/Administrator: ~$50-100,000+/yr

Postdoctoral Researcher (temporary): ~$40-50,000+/yr

K-12 Teacher: ~$45-70,000/yr

Research Scientist: ~$50-70,000/yr

Adjunct Faculty (temporary): ~$40-50,000+/yr

- Community College Prof/Admin: ~$50-100,000+/yr

University Professor/Administrator: ~$50-100,000+/yr

Postdoctoral Researcher (temporary): ~$40-50,000+/yr
Regional Careers in Biotech Industry

N. California is the birthplace of biotech!
~100 Life Sciences companies exist along the I-80 Corridor

Over 100,000 Jobs!

Nationwide, the median income of those in the life sciences is ~$66,480.
Some of the Life Science Companies in the Region

- AFFYMETRIX
- BIO-RAD
- MONSANTO BIOTECHNOLOGY
- NOVARTIS
- AGRA QUEST
- VENTRIA BIOSCIENCE
- Seminis
- GLYCOMETRIX
- VITALEA
- Novozymes
- Pioneer
- IDEXX LABORATORIES
- MIltenyi Biotec
- Arcadia Biosciences
- Pediatric Bioscience
- Davis Sequencing
- MetaMorphix, Inc.
- Antibodies Incorporated
- VOLCANO
- thermogenesis®
- GPSG
- TETHYS BIOSCIENCE
- Genentech
Thriving Biotech-Related Life Science Job Markets

- Research
- Administration
- Teaching
- Sales & Marketing
- Patent Law
- Government
- Regulatory Affairs
- Technical Writing
- Health Care
Finding Biotech Career Information Online

► BioTech SYSTEM
  - http://biotechsystem.ucdavis.edu/biotech_training.cfm
  - Regional consortium supporting biotech education in Solano, Yolo and Sacramento counties and outlying areas of N. California

► Bio-Link
  - http://www.bio-link.org/
  - Informational website on regional biotech programs and industry, teacher professional development, curriculum, “Equipment Depot”, etc...
  - NSF-funded Center based at San Francisco City College, Director Elaine Johnson

► Biotech Work Portal
  - http://www.biotechwork.org/
  - A comprehensive website with links to information on biotech careers, educational programs, job postings, labor market data, etc...
  - Sponsored by the San Diego Workforce Partnership and BioSpace

► BiotechEmployment.com
  - http://www.biotechemployment.com/
  - An eJobstores.com database providing annual data on job postings and salaries in the biotech industry
Online Resources for Career Planning

► CareerOneStop
  ▪ http://www.careeronestop.org/
  ▪ A career information website sponsored by the US Dept of Labor

► Career Voyages
  ▪ http://www.careervoyages.gov/
  ▪ Career information website hosted by the US Department of Education and the US Department of Labor

► California Employment Development Department
  ▪ http://www.edd.ca.gov/
  ▪ Includes data on California biotech jobs and industry growth