B.S. in Biochemistry
Department of Chemistry & Biochemistry

Full-time Faculty
Alfred-Dirk Bacher, Lecturer
Jesse Bergkamp, Assistant Professor
Drew Brandon, Lecturer
Miriam Buschhaus, Lecturer
Sarah Forester, Assistant Professor
Andreas Gebauer, Professor
Dennis Harvey, Lecturer
Samuel Hudson, Associate Professor
Roy LaFever, Professor
Karlo Lopez, Associate Professor & Vice Chair
Hanoz Santoke, Lecturer
Marina Shapiro, Lecturer
Danielle Solano, Associate Professor & Chair

What is Biochemistry?
Biochemistry is a continuously advancing field, vitally important to modern life sciences such as agriculture, biology, microbiology, medicine, pharmacy, and veterinary science. This field studies life in all biological systems, i.e., human, animal, plant, microorganisms, and viruses at the molecular level. Biochemical understanding has served as the basis for major developments in health sciences related research, and significantly contributed to the formation of the biotechnology industry.

Career Opportunities in Biochemistry
Graduates with a B.S. degree in Biochemistry can choose from a great variety of careers. The solid foundation in all physical sciences provides great flexibility both in type and location of employment. Many graduates move on to graduate school in biochemistry or biochemistry related fields as well as professional schools. Career options include:

• Medicine
• Dentistry
• Veterinary Medicine
• Pharmacology
• Chiropractic Medicine
• Physical Therapy
• Clinical Research
Requirements for all Biochemistry Majors

1) Lower Division Chemistry Courses:
   - CHEM 1000 Foundations of Chemistry (3)
   - CHEM 1001 Foundations of Chemistry Laboratory (2)
   - CHEM 1100 Foundations of Analytical Chemistry (2)
   - CHEM 1600 Foundations of Physical Chemistry (2)
   - CHEM 2200 Foundations of Inorganic Chemistry (2)
   - CHEM 2300 Foundations of Organic Chemistry (2)
   - CHEM 2400 Foundations of Biochemistry (2)
   - CHEM 2940 Research Methods in Biochemistry (2)

2) Upper Division Chemistry Courses:
   - CHEM 3300 Organic Chemistry I (3)
   - CHEM 3301 Organic Chemistry Laboratory I (2)
   - CHEM 3400 Biochemistry I (2)
   - CHEM 3401 Biochemistry Laboratory I (2)
   - CHEM 3650 Biophysical Chemistry (4)
   - CHEM 3940 Seminar in Biochemical Literature (2)
   - CHEM 4400 Biochemistry II (2)
   - CHEM 4948 Senior Seminar in Biochemistry (3)

3) Physics Courses:
   - PHYS 2110 College Physics I (4)
   - PHYS 2120 College Physics II (4)
   or
   - PHYS 2210 Calculus-Based Physics I (4)
   - PHYS 2220 Calculus-Based Physics II (4)

4) Mathematics Courses:
   - MATH 2010 Calculus for the Biological and Chemical Sciences I (4)
   - MATH 2020 Calculus for the Biological and Chemical Sciences II (4)
   or
   - MATH 2310 Calculus I for Engineers (4)
   - MATH 2320 Calculus II for Engineers (4)
   or
   - MATH 2510 Calculus I (4)
   - MATH 2520 Calculus II (4)

5) Biology Courses:
   - BIOL 2010 Introductory Biology – Cells (4)
   One of:
   - BIOL 2110 Introductory Biology – Animals (4)
   - BIOL 2120 Introductory Biology – Plants (4)

Additional Courses Required for the B.S. in Biochemistry

6) Upper Division Chemistry Courses:
   - CHEM 3310 Organic Chemistry II (2)
   - CHEM 3311 Organic Chemistry Laboratory II (2)
   - CHEM 4401 Biochemistry Laboratory II (2)

7) Six additional units of upper division elective coursework in Chemistry or Biology
   *See additional sheet for pre-approved upper division coursework.

Additional Courses Required for the B.S. in Biochemistry with a Concentration in Food Science

6) Lower Division Chemistry Courses:
   - CHEM 2500 Foundations of Food Science (1)

7) Upper Division Chemistry Courses:
   - CHEM 4500 Food Chemistry (3)
   - CHEM 4510 Advanced Nutrition and Metabolism (2)
   - CHEM 4850 Food Industrial Practicum (1)
   One of:
   - CHEM 3100 Quantitative Analytical Chemistry (4)
   - CHEM 3500 Food Analysis (4)

8) Biology Courses:
   - BIOL 3420 Food Microbiology (4)

Minor in Chemistry

A minimum of 16 units in Chemistry coursework.

8 units must be upper division courses taken at CSUB. Only courses satisfying Chemistry or Biochemistry major requirements are acceptable.

Important Note: A grade of "C" in chemistry, cognate, and all other major courses is the minimal grade acceptable for progression into subsequent chemistry courses and for graduation. Credit, no-credit courses are not acceptable for the major or minor.
Approved Upper Division Electives for the B.S. in Biochemistry

Approved Upper Division Elective Coursework in Biology

BIOL 3010 General Genetics (3)  
BIOL 3020 General Physiology (3)  
BIOL 3220 Human Pathophysiology (4)  
BIOL 3410 General Microbiology (4)  
BIOL 3420 Food Microbiology (4)  
BIOL 3530 Immunology (3)  
BIOL 3540 Hematology (3)  
BIOL 3550 Human Physiology (4)  
BIOL 4100 Evolution (3)  
BIOL 4200 Medical Microbiology (4)  
BIOL 4440 Molecular Genetics (4)  
BIOL 4450 Bioinformatics (4)  
BIOL 4460 Evolutionary Genetics (4)

Approved Upper Division Elective Coursework in Chemistry

CHEM 3100 Quantitative Analytical Chemistry (4)  
CHEM 3500 Food Analysis (4)  
CHEM 3610 Physical Chemistry II (3)  
CHEM 4010 Symmetry and Group Theory (2)  
CHEM 4020 Computational Chemistry (2)  
CHEM 4100 Chemical Separations (1)  
CHEM 4101 Chemical Separations Laboratory (1)  
CHEM 4110 Spectroscopy (1)  
CHEM 4120 Nuclear Magnetic Resonance (1)  
CHEM 4121 Spectroscopy Laboratory (1)  
CHEM 4200 Inorganic Chemistry (3)  
CHEM 4210 Bioinorganic Chemistry (2)  
CHEM 4410 Protein Chemistry (2)  
CHEM 4420 Plant Biochemistry (2)  
CHEM 4500 Food Chemistry (3)  
CHEM 4510 Advanced Nutrition and Metabolism (2)  
CHEM 4700 Special Topics in Chemistry (1 - 3)  
CHEM 4800 Honors Research (1-3)  
CHEM 4830 Instruction in Chemistry (1)

Note: This is not an extensive list. Other coursework may qualify at the discretion of the advisor.

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