APPLIED CHEMISTRY, BACHELOR OF SCIENCE

College of Letters & Science

Chemistry studies the composition of matter, its structure, and the means by which it is converted from one form to another.

The Program

The Department of Chemistry offers two Bachelor of Science degree emphases under the heading of Applied Chemistry: Environmental Chemistry and Forensic Chemistry. The B.S. emphasis in Applied Chemistry falls outside of the classical chemistry degree and instead draws on significant course material from areas relevant to their particular fields. The Environmental Chemistry program provides students with tools to understand the processes governing chemical transformations in soil, air, and water, analyze key substances in the environment, and make meaningful predictions about the fates of these chemicals. The Forensic Chemistry program involves the identification and quantification of scientific evidence both in the natural environment and in urban settings, including substances sometimes available in only trace amounts.

Career Alternatives

Environmental chemistry graduates with the bachelor's degree will be able to pursue advanced degrees in areas such as atmospheric chemistry, geochemistry, toxicology, and environmental science. They will also have access to a range of scientific careers including regulatory agencies, environmental consulting firms, and industries concerned with the environmental impacts and fates of their products. Forensic chemistry graduates will be able to pursue careers in private forensic labs as well as law enforcement and regulatory agencies at many levels, including police and sheriff's departments, district attorney crime labs, and laboratories of federal agencies including the FBI, DEA, FDA, and many others.

Major Advisor

To contact a major advisor in the Department of Chemistry, see Academic Advising (https://chemistry.ucdavis.edu/undergraduate/academic-advising/).

Honors & Honors Program

The student must take CHE 194HA, CHE 194HB, & CHE 194HC, and complete a capstone research project (typically a written honors thesis). For more information, see Undergraduate Research (https://chemistry.ucdavis.edu/undergraduate/undergraduate-research/) on the department's website.

Graduate Study

The Department of Chemistry offers programs of study and research leading to M.S. and Ph.D. degrees in Chemistry. Detailed information regarding graduate study may be obtained by contacting the Graduate Advisor, Department of Chemistry. See also Graduate Studies (http://gradstudies.ucdavis.edu/).

The major requirements below are in addition to meeting University Degree Requirements (https://catalog.ucdavis.edu/undergraduate-education/university-degree-requirements/) & College Degree Requirements (https://catalog.ucdavis.edu/undergraduate-education/college-degree-requirements/); unless otherwise noted. Respective of the Emphasis, the minimum number of units required for the Applied Chemistry Bachelor of Science are 95 & 99.

Environmental Chemistry Emphasis

Code	Title	Units
Preparatory Subject Matter		
Chemistry		
Choose a series:		15
CHE 002A & CHE 002B & CHE 002C	General Chemistry and General Chemistry and General Chemistry	
CHE 004A & CHE 004B & CHE 004C	General Chemistry for the Physical Sciences & Engineering and General Chemistry for the Physical Sciences & Engineering and General Chemistry for the Physical Sciences & Engineering	
Physics		
Choose a series:		12-15
PHY 007A & PHY 007B & PHY 007C	General Physics and General Physics and General Physics	
PHY 009A & PHY 009B & PHY 009C	Classical Physics and Classical Physics and Classical Physics	
Mathematics		
Choose a series:		9-12
MAT 016A & MAT 016B DISCO & MAT 016C DISCO	and and (Discontinued for spring 2025) **	
MAT 017A & MAT 017B & MAT 017C	Calculus for Biology & Medicine and Calculus for Biology & Medicine and Calculus for Biology & Medicine	
MAT 019A & MAT 019B & MAT 019C	Calculus for Data-Driven Applications and Calculus for Data-Driven Applications and Calculus for Data-Driven Applications	
MAT 021A & MAT 021B & MAT 021C	Calculus and Calculus and Calculus	
Biological Science		*5*
BIS 002A	Introduction to Biology: Essentials of Life on Earth	
Statistics		
Choose one:		4
STA 013 or STA 013Y	Elementary Statistics Elementary Statistics	
STA 032	Gateway to Statistical Data Science	
STA 100	Applied Statistics for Biological Sciences	
Preparatory Subject Matter Subtotal		45-51
Depth Subject Matter		
Chemistry		*32-39*
CHE 100	Environmental Water Chemistry	
CHE 105	Analytical & Physical Chemical Methods	
CHE 115	Instrumental Analysis	
CHE 124A	Inorganic Chemistry: Fundamentals	

Choose a series:		
CHE 107A & CHE 107B	Physical Chemistry for the Life Sciences and Physical Chemistry for the Life Sciences	
CHE 110A & CHE 110B & CHE 110C	Physical Chemistry: Introduction to Quantum Mechanics and Physical Chemistry: Properties of Atoms & Molecules and Physical Chemistry: Thermodynamics, Equilibria & Kinetics	
Choose 118 series or 128 series, & CHE 129A & CHE 129B:		
CHE 118A & CHE 118B & CHE 118C	Organic Chemistry for Health & Life Sciences and Organic Chemistry for Health & Life Sciences and Organic Chemistry for Health & Life Sciences	
OR		
CHE 128A & CHE 128B & CHE 128C	Organic Chemistry and Organic Chemistry and Organic Chemistry	
AND		
CHE 129A & CHE 129B	Organic Chemistry Laboratory and Organic Chemistry Laboratory	
Environmental Science & Policy		*4*
ESP 110	Principles of Environmental Science	
Environmental Toxicology		*4*
ETX 101	Principles of Environmental Toxicology	
Choose three:		7-15
ATM 160	Introduction to Atmospheric Chemistry	
ESM 120	Global Environmental Interactions	
ESP 151	Limnology	
ETX 102A	Environmental Fate of Toxicants	
ETX 102B	Quantitative Analysis of Environmental Toxicants	
ETX 120	Perspectives in Aquatic Toxicology	
ETX 131	Environmental Toxicology of Air Pollutants	
ETX 135	Health Risk Assessment of Toxicants	
ETX 146	Exposure & Dose Assessment	
ETX 180	Chemistry & Toxicology of Metals	
FPS 161	Structure & Properties of Fibers	
FPS 161L	Textile Chemical Analysis Laboratory	
GEL 146 or EPS 146	Radiogenic Isotope Geochemistry & Cosmochemistry (Discontinued for fall 2026) **	
GEL 148	Stable Isotopes & Geochemical Tracers	
GEL/ESP 150A	Physical & Chemical Oceanography	
HYD 134	Aqueous Geochemistry	
SSC 102	Environmental Soil Chemistry	
SSC 111	Soil Microbiology	
At least three additional upper division units in Chemistry (CHE) [1]		3
Depth Subject Matter Subtotal		50-65
Total Units		**95-116**

[1]

CHE 199 strongly encouraged. In order to enroll in CHE 199, students must first secure an undergraduate research position with a chemistry faculty member.

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Course(s) discontinued; see your advisor for course options.

Forensic Chemistry Emphasis

Code	Title	Units
Preparatory Subject Matter		
Chemistry		
Choose a series:		15
CHE 002A & CHE 002B & CHE 002C	General Chemistry and General Chemistry and General Chemistry	
CHE 004A & CHE 004B & CHE 004C	General Chemistry for the Physical Sciences & Engineering and General Chemistry for the Physical Sciences & Engineering and General Chemistry for the Physical Sciences & Engineering	
Physics		
Choose a series:		12-15
PHY 007A & PHY 007B & PHY 007C	General Physics and General Physics and General Physics	
PHY 009A & PHY 009B & PHY 009C	Classical Physics and Classical Physics and Classical Physics	
Mathematics		
Choose a series:		9-12
MAT 016A & MAT 016B DISCO & MAT 016C DISCO	and and (Discontinued for spring 2025) **	
MAT 017A & MAT 017B & MAT 017C	Calculus for Biology & Medicine and Calculus for Biology & Medicine and Calculus for Biology & Medicine	
MAT 019A & MAT 019B & MAT 019C	Calculus for Data-Driven Applications and Calculus for Data-Driven Applications and Calculus for Data-Driven Applications	
MAT 021A & MAT 021B & MAT 021C	Calculus and Calculus and Calculus	
Biological Science		*5*
BIS 002A	Introduction to Biology: Essentials of Life on Earth	
Environmental Toxicology		*3*
ETX 020	Introduction to Forensic Science	
Statistics		
Choose one:		4
STA 013 or STA 013Y	Elementary Statistics Elementary Statistics	
STA 032	Gateway to Statistical Data Science	
STA 100	Applied Statistics for Biological Sciences	
Preparatory Subject Matter Subtotal		48-54

Depth Subject Matter		
Chemistry		*29-36*
CHE 104	Forensic Applications of Analytical Chemistry	
CHE 105	Analytical & Physical Chemical Methods	
CHE 115	Instrumental Analysis	
Choose a series:		
CHE 107A & CHE 107B	Physical Chemistry for the Life Sciences and Physical Chemistry for the Life Sciences	
CHE 110A & CHE 110B & CHE 110C	Physical Chemistry: Introduction to Quantum Mechanics and Physical Chemistry: Properties of Atoms & Molecules and Physical Chemistry: Thermodynamics, Equilibria & Kinetics	
Choose 118 series or 128 series, & CHE 129A & CHE 129B:		
CHE 118A & CHE 118B & CHE 118C	Organic Chemistry for Health & Life Sciences and Organic Chemistry for Health & Life Sciences and Organic Chemistry for Health & Life Sciences	
OR		
CHE 128A & CHE 128B & CHE 128C	Organic Chemistry and Organic Chemistry and Organic Chemistry	
AND		
CHE 129A & CHE 129B	Organic Chemistry Laboratory and Organic Chemistry Laboratory	
Environmental Toxicology		*13*
ETX 101	Principles of Environmental Toxicology	
ETX 102A	Environmental Fate of Toxicants	
ETX 102B	Quantitative Analysis of Environmental Toxicants	
Choose one from each of the following lists:		6-9
Choose one:		
ESP 110	Principles of Environmental Science	
or ESP 161	Environmental Law	
Choose one:		
BIS 101	Genes & Gene Expression	
or BIS 101V	Genes & Gene Expression	
ETX 103A	Biological Effects of Toxicants	
ETX 103B	Biological Effects of Toxicants: Experimental Approaches	
ETX 111	Introduction to Mass Spectrometry	
ETX 135	Health Risk Assessment of Toxicants	
ETX 138	Legal Aspects of Environmental Toxicology	
STA 108	Applied Statistical Methods: Regression Analysis	
STA 130A	Mathematical Statistics: Brief Course	
At least three additional upper division units in Chemistry (CHE) [1]		3
Depth Subject Matter Subtotal		51-61
Total Units		**99-115**

1

CHE 199 strongly encouraged. In order to enroll in CHE 199, students must first secure an undergraduate research position with a chemistry faculty member.

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Course(s) discontinued; see your advisor for course options.