

# 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
<b>Preparatory Subject Matter</b>		
<i>Chemistry</i>		
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	
<i>Physics</i>		
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	
<b>Mathematics</b>		
Choose a series:		9-12
MAT 016A & MAT 016B DISC & MAT 016C DISC	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	
<i>Biological Science</i>		5
BIS 002A	Introduction to Biology: Essentials of Life on Earth	
<i>Statistics</i>		
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
<b>Depth Subject Matter</b>		
<i>Chemistry</i>		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
<b>OR</b>	
CHE 128A & CHE 128B & CHE 128C	Organic Chemistry and Organic Chemistry and Organic Chemistry
<b>AND</b>	
CHE 129A & CHE 129B	Organic Chemistry Laboratory and Organic Chemistry Laboratory
<i>Environmental Science &amp; Policy</i>	4
ESP 110	Principles of Environmental Science
<i>Environmental Toxicology</i>	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	Radiogenic Isotope Geochemistry & Cosmochemistry
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) <sup>1</sup>	3
Depth Subject Matter Subtotal	50-65
<b>Total Units</b>	<b>95-116</b>

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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
<b>Preparatory Subject Matter</b>		
<i>Chemistry</i>		
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	
<i>Physics</i>		
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	
<i>Mathematics</i>		
Choose a series:		9-12
MAT 016A & MAT 016B DISC & MAT 016C DISC	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	
<i>Biological Science</i>		5
BIS 002A	Introduction to Biology: Essentials of Life on Earth	
<i>Environmental Toxicology</i>		3
ETX 020	Introduction to Forensic Science	
<i>Statistics</i>		
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	
<i>Chemistry</i>	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
<b>OR</b>	
CHE 128A & CHE 128B & CHE 128C	Organic Chemistry and Organic Chemistry and Organic Chemistry
<b>AND</b>	
CHE 129A & CHE 129B	Organic Chemistry Laboratory and Organic Chemistry Laboratory
<i>Environmental Toxicology</i>	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:	
Choose one:	
ESP 110 or ESP 161	Principles of Environmental Science Environmental Law
Choose one:	
BIS 101 or BIS 101V	Genes & Gene Expression 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) <sup>1</sup>	
Depth Subject Matter Subtotal	51-61
<b>Total Units</b>	<b>99-115</b>

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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.