

MAJOR IN CHEMISTRY, FORENSIC CHEMISTRY CONCENTRATION

Forensic chemistry is the application of chemical analysis principles to criminal investigation. Students interested in pursuing careers in the laboratory analysis of forensic evidence or criminal investigation, attend law school, or study forensic science in graduate school are recommended to choose this concentration.

Chemistry majors in the forensic track are encouraged to participate in undergraduate research. Ample opportunities exist for undergraduate students to become involved in ground-breaking research in the laboratories of individual faculty members. Students have access to state-of-the-art equipment in faculty laboratories and the Analytical Resources Core facility, including NMR, FTIR, UV/Vis, fluorescence, mass spectrometers, vacuum lines, x-ray diffractometers, and many more. Undergraduate research is strongly encouraged for any student

considering a career in chemistry, and many students complete supervised research for academic credit. Development of skills in all of the aforementioned analytical techniques will enable graduates to pursue a forensic analyst or researcher career.

Learning Objectives

Upon successful completion, students will be able to:

1. Design chemical experiments to comprehensively investigate forensic samples.
2. Apply interdisciplinary knowledge from biology, microbiology, statistics, criminal justice, and anthropology to answer forensic and legal questions.

Requirements Effective Fall 2026

Chemistry majors must achieve a minimum grade of C (2.000) in all the listed courses required for the major in chemistry.

Freshman

		AUCC	Credits
CHEM 120 ¹	Foundations of Modern Chemistry (GT-SC2)	3A	4
CHEM 121 ¹	Foundations of Modern Chemistry Laboratory (GT-SC1)	3A	1
CHEM 192	Introductory Seminar in Chemistry		2
CHEM 241 ²	Foundations of Organic Chemistry		4
CHEM 242 ²	Foundations of Organic Chemistry Laboratory		1
CHEM 263	Foundations of Inorganic Chemistry		4
CHEM 264	Foundations of Inorganic Chemistry Laboratory		1
CO 150	College Composition (GT-CO2)	1A	3
MATH 155 or 160	Calculus for Biological Scientists I (GT-MA1) Calculus for Physical Scientists I (GT-MA1)	1B	4
1C (https://catalog.colostate.edu/general-catalog/all-university-core-curriculum/aucc/#aucc)		1C	3
Arts and Humanities (https://catalog.colostate.edu/general-catalog/all-university-core-curriculum/aucc/#arts-and-humanities)		3B	3
Total Credits			30

Sophomore

CHEM 231	Foundations of Analytical Chemistry		3
CHEM 232	Foundations of Analytical Chemistry Lab		2
CHEM 321 or BC 351	Foundations of Chemical Biology Principles of Biochemistry		4
CHEM 322	Foundations of Chemical Biology Laboratory		1
LIFE 102	Attributes of Living Systems (GT-SC1)	3A	4
PH 121 or 141	General Physics I (GT-SC1) Physics for Scientists and Engineers I (GT-SC1)	3A	5
PH 122 or 142	General Physics II (GT-SC1) Physics for Scientists and Engineers II (GT-SC1)	3A	5
MATH 271 or 161	Applied Mathematics for Chemists I Calculus for Physical Scientists II (GT-MA1)		4
Select one group from the following:			5
Group A			
CS 150B	Culture and Coding: Python	3B	
Elective			

Group B			
CS 152	Python for STEM		
Arts and Humanities (https://catalog.colostate.edu/general-catalog/all-university-core-curriculum/aucc/#arts-and-humanities)		3B	
Total Credits			33
Junior			
CHEM 371	Fundamentals of Physical Chemistry		4
CHEM 372	Fundamentals of Physical Chemistry Lab	4A	1
CHEM 431	Instrumental Analysis	4B	3
MIP 300	General Microbiology		3
SOC 253	Intro to Criminology and Criminal Justice		3
SOC 275/ANTH 275	Introduction to Forensic Anthropology		3
Advanced Writing (https://catalog.colostate.edu/general-catalog/all-university-core-curriculum/aucc/#advanced-writing) ³		2	3
Historical Perspectives (https://catalog.colostate.edu/general-catalog/all-university-core-curriculum/aucc/#historical-perspectives)		3D	3
Social and Behavioral Science (https://catalog.colostate.edu/general-catalog/all-university-core-curriculum/aucc/#social-behavioral-science)		3C	3
Elective			3
Total Credits			29
Senior			
BZ 350	Molecular and General Genetics		4
CHEM 333	Forensic Chemistry	4B	3
CHEM 434	Forensic Chemistry Laboratory		1
STAT 301 or 307	Introduction to Applied Statistical Methods		3
	Introduction to Biostatistics		
CHEM 493 or 499 ⁴	Senior Seminar	4C	2
	Senior Thesis		
In-depth Chemistry Courses (see list below)			6
Electives ⁵			9
Total Credits			28
Program Total Credits:			120

In-depth Chemistry Courses

At least 3 credits must come from laboratory course or lab components of lecture/laboratory courses: CHEM 312, CHEM 433, CHEM 440, CHEM 442, CHEM 456, CHEM 462, CHEM 477, or CHEM 498.

Code	Title	AUCC	Credits
CHEM 311	Introduction to Nanoscale Science		3
CHEM 312	Nanochemistry Laboratory		1
CHEM 315	Foundations of Polymer Chemistry		3
CHEM 320	Chemistry of Addictions		3
CHEM 338	Environmental Chemistry		3
CHEM 355	Foundations of Sustainable Chemistry		3
CHEM 433	Clinical Chemistry		3
CHEM 440	Advanced Organic Chemistry Laboratory	4B	2
CHEM 442	Chemistry of Hemp and Cannabis		3
CHEM 445	Synthetic Organic Chemistry	4B	3

CHEM 448	Medicinal Chemistry		3
CHEM 451	Foundations of Catalytic Chemistry		3
CHEM 456	Foundations of Sustainable Chemistry Lab		1
CHEM 461	Inorganic Chemistry	4B	3
CHEM 462	Inorganic Chemistry Laboratory	4B	2
CHEM 463	Applications of Spin in Chemistry		3
CHEM 465	Chemistry of Sustainable E-Waste Management		4
CHEM 476	Advanced Physical Chemistry	4B	3
CHEM 477	Advanced Physical Chemistry Laboratory	4B	1
CHEM 498	Research		1-3

- ¹ Students who complete General Chemistry in Freshman year (CHEM 111 or CHEM 107, CHEM 112 or CHEM 108, CHEM 113, CHEM 114) do not have to take CHEM 120 and CHEM 121.
- ² Students may complete the organic chemistry requirement by taking CHEM 341, CHEM 343, and CHEM 344. Students who take CHEM 245/CHEM 246 may complete the organic chemistry requirement by taking CHEM 343/CHEM 344. For both sets of these students, CHEM 343/CHEM 344 together count as an in-depth chemistry course.
- ³ CHEM 301 is recommended.
- ⁴ CHEM 499 by department approval. Students fulfilling the AUCC 4C requirement with CHEM 499 must write a thesis and present it to the department.
- ⁵ Select enough elective credits to bring the program total to a minimum of 120 credits, of which at least 42 must be upper-division (300- to 400-level).

Major Completion Map

Distinctive Requirements for Degree Program:

TO PREPARE FOR FIRST SEMESTER: The curriculum for the new American Chemical Society Certified Chemistry major assumes students enter college prepared to take calculus. Entering students who are not prepared to take calculus will need to fulfill pre-calculus requirements in the first semester. CHEM 111 and CHEM 120 require Algebra II as a prerequisite (this prerequisite is met by having Algebra II by test credit, transfer credit, or placement out of MATH 117 and MATH 118 on Math Placement Exam). Earned grades of C (2.000) or better are required in all listed courses for the major in chemistry. Students with credit for CHEM 111, CHEM 112, CHEM 113, CHEM 114 do not need to take CHEM 120, CHEM 121. Students with credit for CHEM 341, CHEM 343, CHEM 344 do not need to take CHEM 241, CHEM 242.

Freshman

Semester 1		Critical	Recommended	AUCC	Credits
CHEM 120	Foundations of Modern Chemistry (GT-SC2)	X		3A	4
CHEM 121	Foundations of Modern Chemistry Laboratory (GT-SC1)	X		3A	1
CHEM 192	Introductory Seminar in Chemistry	X			2
CO 150	College Composition (GT-CO2)	X		1A	3
1C (https://catalog.colostate.edu/general-catalog/all-university-core-curriculum/aucc/#aucc)		X		1C	3
Arts and Humanities (https://catalog.colostate.edu/general-catalog/all-university-core-curriculum/aucc/#arts-and-humanities)			X	3B	3

Total Credits

16

Semester 2		Critical	Recommended	AUCC	Credits
CHEM 241	Foundations of Organic Chemistry	X			4
CHEM 242	Foundations of Organic Chemistry Laboratory	X			1
CHEM 263	Foundations of Inorganic Chemistry	X			4
CHEM 264	Foundations of Inorganic Chemistry Laboratory	X			1
MATH 155 or 160	Calculus for Biological Scientists I (GT-MA1) Calculus for Physical Scientists I (GT-MA1)	X		1B	4

Total Credits

14

Sophomore

Semester 3		Critical	Recommended	AUCC	Credits
CHEM 231	Foundations of Analytical Chemistry	X			3
CHEM 232	Foundations of Analytical Chemistry Lab	X			2

LIFE 102	Attributes of Living Systems (GT-SC1)	X		3A	4
PH 121 or 141	General Physics I (GT-SC1) Physics for Scientists and Engineers I (GT-SC1)	X		3A	5
MATH 271 or 161	Applied Mathematics for Chemists I Calculus for Physical Scientists II (GT-MA1)				4
Total Credits					18
Semester 4		Critical	Recommended	AUCC	Credits
CHEM 321 or BC 351	Foundations of Chemical Biology Principles of Biochemistry	X			4
CHEM 322	Foundations of Chemical Biology Laboratory	X			1
PH 122 or 142	General Physics II (GT-SC1) Physics for Scientists and Engineers II (GT-SC1)	X		3A	5
Select one group from the following:					5
Group A					
CS 150B	Culture and Coding: Python	X		3B	
Elective					
Group B					
CS 152	Python for STEM				
Arts and Humanities (https://catalog.colostate.edu/general-catalog/all-university-core-curriculum/aucc/#arts-and-humanities)				3B	
Total Credits					15
Junior					
Semester 5		Critical	Recommended	AUCC	Credits
CHEM 371	Fundamentals of Physical Chemistry	X			4
CHEM 372	Fundamentals of Physical Chemistry Lab	X		4A	1
SOC 275/ ANTH 275	Introduction to Forensic Anthropology	X			3
Advanced Writing (https://catalog.colostate.edu/general-catalog/all-university-core-curriculum/aucc/#advanced-writing)				2	3
Historical Perspectives (https://catalog.colostate.edu/general-catalog/all-university-core-curriculum/aucc/#historical-perspectives)			X	3D	3
Total Credits					14
Semester 6		Critical	Recommended	AUCC	Credits
CHEM 431	Instrumental Analysis	X		4B	3
MIP 300	General Microbiology	X			3
SOC 253	Intro to Criminology and Criminal Justice	X			3
Social and Behavioral Science (https://catalog.colostate.edu/general-catalog/all-university-core-curriculum/aucc/#social-behavioral-science)			X	3C	3
Elective					3
Total Credits					15
Senior					
Semester 7		Critical	Recommended	AUCC	Credits
BZ 350	Molecular and General Genetics	X			4
CHEM 333	Forensic Chemistry	X		4B	3
CHEM 434	Forensic Chemistry Laboratory	X			1
STAT 301 or 307	Introduction to Applied Statistical Methods Introduction to Biostatistics	X			3
Elective			X		3
Total Credits					14
Semester 8		Critical	Recommended	AUCC	Credits
CHEM 493 or 499	Senior Seminar Senior Thesis	X		4C	2
In-depth Chemistry Courses (see list on Program Requirements tab)		X			6
Elective		X			6

The benchmark courses for the 8th semester are the remaining courses in the entire program of study. X

Total Credits	14
Program Total Credits:	120