

Chemistry, B.S.

Degrees Offered

- Bachelor of Science

Nature of the Program

The Bennett Department of Chemistry offers the **bachelor of science with a major in chemistry**. This program is configured to meet the needs of all students who have an interest in the broad field of chemistry and includes three focus areas that are related to students' career goals.

The three focus areas are (i) Chemistry & Health, (ii) Chemistry & the Environment, and (iii) Certified Chemist. The focus area of **Chemistry & Health** prepares students for careers in health-related sciences and entry into health professional schools such as dentistry, pharmacy, medicine, and biomedical research. The **Chemistry & the Environment** focus area prepares students for careers in environmental testing and analysis and for further schooling in environmental or toxicological chemistry. Areas such as secondary school teaching; chemical laboratory technical work; law; or business may be pursued with a proper choice of electives. The **Certified Chemist** focus area is approved by the American Chemical Society (ACS). This focus area is for students who desire to qualify for professional positions in industrial and governmental laboratories as well as those who plan to do graduate work in chemistry or allied areas in preparation for research careers in industry or academia.

A chemistry degree is **versatile** and **marketable**. A myriad of career options such as forensics, counterfeit specialist, environmental chemistry, occupational health and safety, industrial engineering, patent and intellectual property law, pharmaceutical research or sales, cosmetics, food science/flavorist, and fuel science are open to chemistry majors. In addition, chemistry is one of the most important topics for pre-med students and the acceptance rate of chemistry majors to health professional schools is very high.

Regardless of focus area, the bachelor of science in chemistry is similar during the first two years. Students should complete the calculus 1 requirement as soon as possible to facilitate their choice of focus area and/or as a prerequisite for both the physics and physical chemistry courses. The three focus areas differ primarily in the upper-level chemistry elective requirements. The Certified Chemist program requires more upper-level chemistry courses than the other two focus areas. However, students can easily shift between the three focus areas or transfer into the chemistry major from another major.

The Department of Chemistry is located in Clark Hall, a state-of-the-art teaching facility for chemistry. Clark Hall offers many new instruments, numerous safety features, excellent ventilation and ample hoods, and complete accessibility for the physically handicapped. The department also has modern research facilities in the adjacent Chemistry Research Laboratory (CRL) building where interested undergraduates may participate in research projects.

Chemistry Scholarships

In addition to financial aid offered by the University, the department maintains **several scholarships specifically for chemistry majors**. The Ann Shelbaer Ammons Memorial Scholarship, Mountaineer Chemistry Scholarship, John A. Moore Trust Scholarships, the Charles L. Lazzell Scholarship, the Carpenter Family Scholarship, the Robert L. and Patricia Miller Stultz Chemistry Scholarship, the Herbert and Hannah Seigel Chemistry Scholarship, the Willard W. Hodge Scholarship, the Morrissey-Ropp Chemistry Scholarships, the William R. and Phylis T. Moore Organic Chemistry Scholarship, the Joseph T. Green Memorial Scholarship, and the Bud and Patty Blizzard Scholarships are awarded to students in the B.S. program with records of outstanding achievement and demonstrated financial need. Several of these scholarships are restricted to West Virginia residents. Scholarship recipients are expected to remain as chemistry majors and to maintain a 3.0 average in their degree programs in order to be eligible for continued support.

Minors

All students have the possibility of earning one or more minors; follow the link for a list of all available minors and their requirements (<http://catalog.wvu.edu/undergraduate/minors/>). Please note that students may not earn a minor in their major field.

FACULTY

CHAIR

- Brian Popp - Ph.D. (University of Wisconsin-Madison)

ASSOCIATE CHAIR OF GRADUATE STUDIES

- Fabien Goulay - Ph.D. (Université of Rennes, France)

ASSOCIATE CHAIR OF UNDERGRADUATE STUDIES

- Michelle Richards-Babb - Ph.D. (Lehigh University)

PROFESSORS

- Gregory Dudley - Ph.D. (Massachusetts Institute of Technology)
Regular Graduate Faculty; Eberly Family Distinguished Professor; Chemical Synthesis, Organic Reaction Methodology, Medicinal Chemistry
- Terry Gullion - Ph.D. (College of William & Mary)
Regular Graduate Faculty; Physical Chemistry, Solid State NMR, Biological Materials, Polymers
- Lisa Holland - Ph.D. (University of North Carolina-Chapel Hill)
Regular Graduate Faculty; Micro-separations, High Throughput Drug Screening
- Fred L. King - Ph.D. (University of Virginia)
Analytical Chemistry, Mass Spectrometry, Trace Elements, Gas-phase Chemistry
- Joshua Osbourn - Ph.D. (University of Pittsburgh)
Teaching Faculty; Organic Chemistry
- Brian Popp - Ph.D. (University of Wisconsin-Madison)
Regular Graduate Faculty; Organic and Organometallic Chemistry, Catalysis
- Betsy Ratcliff - Ph.D. (University of Binghamton-SUNY)
Teaching Faculty; Chemical Education, Physical Chemistry
- Michelle Richards-Babb - Ph.D. (Lehigh University)
Regular Graduate Faculty; Chemical Education
- Stephen Valentine - Ph.D. (Indiana University)
Regular Graduate Faculty; Eberly Professor of Chemistry; Mass Spectrometric Analysis of Biomolecules

ASSOCIATE PROFESSORS

- Erin Battin - Ph.D. (Clemson University)
Teaching Faculty; Bioinorganic Chemistry
- Fabien Goulay - Ph.D. (Université de Rennes)
Regular Graduate Faculty; Physical Chemistry, Laser Spectroscopy
- Carolyn Kitchens - Ph.D. (University of Pittsburgh)
Teaching Faculty; Biochemistry
- Peng Li - Ph.D. (Texas Technical University)
Regular Graduate Faculty; Bioanalytical Chemistry
- Mark Tinsley - Ph.D. (Leeds University, England)
Regular Graduate Faculty; Teaching Faculty; Physical Chemistry, Nonlinear Dynamics
- Mingming Xu - Ph.D. (Ohio University)
Teaching Faculty; Analytical Chemistry

ASSISTANT PROFESSORS

- Hacer Karatas Bristow - Ph.D. (University of Michigan)
Regular Graduate Faculty; Chemical Biology, Bioorganic and Medicinal Chemistry
- Brian Dolinar - Ph.D. (University of Wisconsin-Madison)
Regular Graduate Faculty; Inorganic Chemistry
- David Mersing - Ph.D. (West Virginia University)
Teaching Faculty; Physical Chemistry
- Brian Nichols - Ph.D. (West Virginia University)
Teaching Faculty; Organic Chemistry
- Oluwaboti (Tobi) Odeleye - Ph.D. (South Dakota State University)
Regular Graduate Faculty; Chemical Education
- Trina Perrone - Ph.D. (West Virginia University)
Teaching Faculty; Organic Chemistry
- Mark Schraf - M.S. (West Virginia University)
Teaching Faculty; Analytical Chemistry

PROFESSORS EMERITI

- Harry Finklea - Ph.D. (California Institute of Technology)
- Charles Jaffe - Ph.D. (University of Colorado)
- Jeffrey Petersen - Ph.D. (University of Wisconsin-Madison)
- Kenneth Showalter - Ph.D. (University of Colorado)
- Ronald Smart - Ph.D. (University of Michigan)

- Bjorn Soderberg - Ph.D. (Royal Institute of Technology, Sweden)
- Kung Wang - Ph.D. (Purdue University)

Admissions for 2026-2027

- First Time Freshmen are admitted directly to the major. For the timely completion of the degree, it is recommended that students have a minimum MATH ACT of 22, a MATH SAT of 540, or an ALEKS score of 45.
- Students transferring from another WVU major or from another institution with fewer than 24 credits and at least a 2.0 overall GPA are admitted directly to the major. For the timely completion of the degree, it is recommended that students have a minimum MATH ACT of 22, a MATH SAT of 540, or an ALEKS score of 45.
- Students transferring from another WVU major or from another institution with 24 credits or more and at least a 2.0 overall GPA must meet the following requirement prior to being admitted to the major: completion of CHEM 115 (<http://catalog.wvu.edu/search/?P=CHEM%20115>), CHEM 115L (<http://catalog.wvu.edu/search/?P=CHEM%20115L>), CHEM 116 (<http://catalog.wvu.edu/search/?P=CHEM%20116>), and CHEM 116L (<http://catalog.wvu.edu/search/?P=CHEM%20116L>) with a grade of C-.

Major Code: 1439

Click here to view the Suggested Plan of Study (http://catalog.wvu.edu/undergraduate/eberlycollegeofartsandsciences/bennettdepartmentofchemistry/chemistry_bs/#SPOS)

Degree Requirements

Students must complete WVU General Education Foundations requirements, College B.S. requirements, major requirements, and electives to total a minimum of 120 hours. For complete details on these requirements, visit the B.S. Degrees tab on the Eberly College of Arts and Sciences (p. 6) page.

Departmental Requirements for the B.S. in Chemistry

- **Calculation of GPA in the major:** A grade of C- is required in all courses applied to major requirements, including the STEM Foundations. If a course is repeated, all attempts will be included in the calculation of the GPA, unless the course is eligible for a D/F repeat.
- **Writing Requirement:** Chemistry Bachelor of Science fulfill the Writing and Communication Skills requirement by completing ENGL 101 and ENGL 102 (or ENGL 103), CHEM 402, and WRIT 305.
- **Capstone Requirement:** The university requires the successful completion of a Capstone course, which for the B.S. Chemistry degree involves CHEM 402.

Curriculum Requirements

Code	Title	Hours
University Requirements		33
Eberly Edge Requirements		18
Chemistry Major Requirements		69
Total Hours		120

University Requirements

Code	Title	Hours
General Education Foundations (GEF) 1, 2, 3, 4, 5, 6, 7, and 8 (31-37 Credits)		
Outstanding GEF Requirements 1, 4, 5, and 6 or 7		15
CHEM 191	First-Year Seminar	1
General Electives		17
Total Hours		33

Eberly Edge Program Requirements

Code	Title	Hours
EDG 1: Data and Society		3
EDG 2 : Effective and Civil Communication		3
EDG 3: Ethics and Civil Responsibility		3
EDG 4: Global and Regional Perspectives (GEF 6 or 7)		3
EDG 5: Practicing Arts & Sciences (ARSC 380)		3

EDG 6: High Impact Experience	3
Total Hours	18

Chemistry Major Requirements

Code	Title	Hours
STEM FOUNDATIONS *		23
MATH 155	Calculus 1	
MATH 156 or STAT 211	Calculus 2 Elementary Statistical Inference	
PHYS 101 & 101L & PHYS 102 & PHYS 102L or PHYS 111 & 111L & PHYS 112 & PHYS 112L	Introductory Physics 1 and Introductory Physics 1 Laboratory and Introductory Physics 2 and Introductory Physics 2 Laboratory General Physics 1 and General Physics 1 Laboratory and General Physics 2 and General Physics 2 Laboratory	
Select one pair of courses:		
BIOL 115 & 115L & BIOL 117 & BIOL 117L	Principles of Biology and Principles of Biology Laboratory and Introductory Physiology and Introductory Physiology Laboratory	
SUST 101 & 101L & SUST 201 & SUST 201L	Sustainable Earth and Sustainable Earth Laboratory and Earth System Science and Earth System Science Laboratory	
SUST 101 & 101L & SUST 207 & SUST 207L	Sustainable Earth and Sustainable Earth Laboratory and Climate System Science and Climate System Science Laboratory	
CORE COURSES		23
CHEM 115 & 115L	Fundamentals of Chemistry 1 and Fundamentals of Chemistry 1 Laboratory	
CHEM 116 & 116L	Fundamentals of Chemistry 2 and Fundamentals of Chemistry 2 Laboratory	
CHEM 215 & 215L	Introductory Analytical Chemistry and Introductory Analytical Chemistry Laboratory	
CHEM 233 & 233L	Organic Chemistry 1 and Organic Chemistry 1 Laboratory	
CHEM 234 & 234L	Organic Chemistry 2 and Organic Chemistry 2 Laboratory	
CHEM 322	Inorganic Chemistry 1	
FOCUS AREAS		11
Select a minimum of 11 credits from the suggested areas below		
Chemistry & Health		
CHEM 335 & 335L	Methods of Structure Determination and Methods of Structure Determination Laboratory	
CHEM 336	Fundamental Concepts in Early Drug Discovery	
CHEM 422L	Inorganic Synthesis Laboratory	
AGBI 410	Introductory Biochemistry	
Chemistry & the Environment		
CHEM 310 & 310L	Instrumental Analysis and Instrumental Analysis Laboratory	
CHEM 312	Environmental Chemistry	

CHEM 341 & 341L	Physical Chemistry: Brief Course and Physical Chemistry: Brief Course Laboratory	
ACS Certified Chemist		
CHEM 341 & 341L	Physical Chemistry: Brief Course and Physical Chemistry: Brief Course Laboratory	
CHEM 422L	Inorganic Synthesis Laboratory	
AGBI 410	Introductory Biochemistry	
Select two classes from the group below:		
CHEM 310	Instrumental Analysis	
CHEM 348	Physical Chemistry 2	
CHEM 422	Inorganic Chemistry 2	
Select one course from the group below:		
CHEM 310L	Instrumental Analysis Laboratory	
CHEM 348L	Physical Chemistry 2 Laboratory	
UPPER-DIVISION ELECTIVES **		9
Select a minimum of nine credits from the following list		
Any upper-division CHEM course that is not used to fulfill another requirement		
CHEM 497	Research	
MATH 343	Introduction to Linear Algebra	
CAPSTONE EXPERIENCE		3
CHEM 402	Chemistry Capstone: Chemical Literature	
Total Hours		69

FOOTNOTES

*

STEM foundation courses are common to most STEM majors and excluded from the calculation of the percentage of upper-division courses

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Only three hours of CHEM 497 may be counted toward the 9-credit upper-division Chemistry requirement. With approval of a chemistry advisor, up to 3 credits may come from a non-chemistry course.

It is recommended for students planning to pursue a graduate degree to complete MATH 251 and MATH 261 as a part of their undergraduate course work.

Suggested Plan of Study

First Year

Fall	Hours	Spring	Hours
CHEM 191		1 ENGL 101 (GEF 1)	3
GEF 4		3 CHEM 116 & 116L (GEF 8)*	4
GEF 6 or 7		3 MATH 156 or STAT 211 (GEF 8)	3
CHEM 115 & 115L (GEF 2)*		4 EDG 1: Data and Society	3
MATH 155 (GEF 3)		4 General Elective	2
	15		15

Second Year

Fall	Hours	Spring	Hours
CHEM 215 & 215L		4 ENGL 102 (GEF 1)	3
CHEM 233 & 233L		4 CHEM 234 & 234L	4
EDG 2: Effective and Civil Communication		3 EDG 3: Ethics and Civil Responsibility	3
PHYS 101 & 101L (GEF 8)		4 PHYS 102 & 102L	4

		General Elective	1
		15	15
Third Year			
Fall	Hours	Spring	Hours
Focus Area Course 1		3 CHEM 322	3
Focus Area Course 2		4 Focus Area Course 3	4
EDG 4: Global and Regional Perspectives (GEF 6 or 7)		3 EDG 5 : Practicing Arts & Sciences (ARSC 380)	3
General Elective		3 GEF 5	3
General Elective		2 General Elective	2
		15	15
Fourth Year			
Fall	Hours	Spring	Hours
Chemistry Elective 1		3 CHEM 402	3
Chemistry Elective 2		3 Chemistry Elective 3	3
Stem Science Pairing 1		4 EDG 6: High Impact Experience	3
General Elective		3 Stem Science Pairing 2	4
General Elective		2 General Elective	2
		15	15

Total credit hours: 120

Degree Progress

- By the end of their second semester (excluding summer) in the major, at a minimum, students must have completed MATH 126 with a minimum grade of C-.
- By the end of the second semester in the major or two semesters after completing CHEM 110, completion of CHEM 115, CHEM 115L, CHEM 116 and CHEM 116L with C- or better in each.
- By the end of the second year in the major or two semesters after completing CHEM 116 and CHEM 116L, completion of CHEM 234 and CHEM 234L with C- or better and a 2.0 in the major.
- All majors must meet with a Chemistry adviser each semester.

Students who do not meet their benchmark expectations may be removed from the major.

Major Learning Outcomes

CHEMISTRY

1. Students will demonstrate competency at a foundational level in a minimum of four of the five traditional sub-disciplines of chemistry (listed below) and in-depth knowledge in at least three of the five sub-disciplines. Further, students will recognize that higher order interactions of macromolecular, supramolecular, mesoscale, and nanoscale systems are distinct from those of small molecules.

- Analytical chemistry
- Biochemistry
- Inorganic chemistry
- Organic chemistry
- Physical chemistry

2. Students will be able to define problems clearly, develop testable hypotheses, design and execute experiments, analyze data using appropriate statistical methods, identify and account for fundamental uncertainties in experimental measurements, and draw appropriate conclusions.

3. Students will demonstrate safe and effective lab techniques spanning at least three of the five traditional sub-disciplines of chemistry.

4. Students will be able to interact effectively and productively with a diverse group of peers to solve scientific problems.

5. Students will demonstrate effective written and oral communication skills including interpretation/presentation of results, navigating the scientific literature, and properly citing the works of others.