

Interested in This Major?

Current Students: Visit us in the Chemistry Building, Room 144, call us at 414-229-4411, or email chem-info@uwm.edu

Not a UWM Student yet? Call our Admissions Counselor at 414-229-7711 or email let-sci@uwm.edu

web: uwm.edu/chemistry



What is Chemistry?

Our world is made up of an enormous variety of both naturally-occurring and man-made elements and compounds. From our galaxy to the earth's inner crust to the ecosystem of the rain forest to our own bodies, everything is made from elementary parts. There are new substances evolving from old substances with and without our help each day. Chemistry is a science that attempts to organize and explain, in a systematic and logical manner, knowledge about the existence, purpose and interaction of these substances. Chemists are involved in the development of synthetic fibers, paints, adhesives, electronic components, lubricants and thousands of other products. Chemists also devise ways to save energy and reduce pollution.

Why Study Chemistry?

Understanding the principles and concepts of chemistry helps us function rationally and effectively within our physical surroundings. Chemistry has been called the central science because of its relationship to all other sciences. An understanding of chemistry is essential for biologists, physicists, geologists, biophysicists, and many healthcare professionals.

As the study of elementary substances, a chemistry major forms the foundation of many different careers. Only some of these jobs are traditional "chemist" jobs located in a lab with solutions, glassware and instruments. Chemistry majors also find job opportunities in medical labs, crime labs, sales, teaching, manufacturing, research and development, environmental sustainability, and government. The chemical industry continues to

be strong. A chemistry major is also excellent preparation for further studies in medicine or other advanced healthcare roles, law, molecular biology, toxicology, pharmacology, many areas of engineering, environmental science and more.

UWM's Programs

UWM students can choose from two different tracks to tailor a program to their career goals. The **standard chemistry major** is all-purpose and provides appropriate preparation for entry-level jobs or graduate school.

The **chemistry major with a biochemical option** substitutes some chemistry classes with biochemistry and biology classes. Students planning on going to graduate school in biochemistry, molecular biology or medicine may prefer this option.

Preparatory Courses

Ideally, high school students should take four years of math and science, including chemistry and physics. Students without high school chemistry or whose background in science is weak may need to take Chem 100 first before starting the courses required for the major.

Undergraduates can participate in hands-on research! Valuable experience for your resumé! Recent student projects include:



- Plant-derived "green solvents" as the basis for new, environmentally-friendly solvent extraction processes for the removal of toxic dyestuffs from wastewater
- Determining Lead Speciation and Mobility in Soil from an American Civil War Battlefield by Potentiometric Stripping Analysis
- Characterization of the GABA_A Receptor Subunits in a Murine Model of Asthma

Chemistry Major Requirements

In total a student completes between 41 and 45 credits in chemistry as part of the major.

Course #	Course Title
Chem 102, 104	General Chemistry sequence
Chem 343/344/345	Organic chemistry sequence
Chem 221	Elementary Quantitative Analysis
Chem 311	Intro Inorganic Chemistry
Chem 524	Instrumental Analysis
Chem 561/562/563	Physical Chemistry I & II and lab
An advanced chemistry lab (Chem 603 is the required choice for students on the biochemical track, and those students must take 6 additional credits in biochemistry and 8 credits of biology (Bio Sci 150 and 325)	
Chem 501 or	Intro to Biochemistry (students on the biochemical track must take this option)
Chem 511	Inorganic Chemistry
Senior research course or thesis course	

Chemistry students must also take these related math and physics classes:

Course #	Course Title
Math through the third semester of calculus	
Math 234 (recommended, but not required)	Linear Algebra and Differential Equations
A two-semester calculus-based physics sequence with labs	

Chemistry Minor

A chemistry minor complements other natural science majors. The minor consists of 20 credits in chemistry with at least 9 credits at the 300-level or above. These credits must include general chemistry, at least one laboratory course besides general chemistry, and at least one course from three of the following areas: analytical chemistry, biochemistry, inorganic chemistry, organic chemistry or physical chemistry.

Chemistry Clubs

The *Student Affiliates of the American Chemical Society (SAACS)* is the undergraduate chemistry club. The group regularly studies together, visits local chemical industries, attends meetings of the Milwaukee section of the ACS, participates in National Chemistry Week, and fundraises for support

to attend the national ACS conference.

Scholarships

Students are encouraged to explore all options for campus, private or college-level scholarships by contacting the Office of Financial Aid and the College of Letters and Science.

The department offers some of its own scholarships and awards for outstanding majors and also runs some poster competitions with prizes.

Faculty Research Areas

- instrumentation design
- drug discovery and medicinal chemistry
- environmental chemistry
- laser spectroscopy of proteins
- nanoparticle trapping
- enzymology
- iron metabolism
- DNA & RNA metabolism
- multidrug resistance issues
- pre-steady state kinetics
- trafficking, toxicity, and drugs
- natural product biosynthesis and secondary metabolism
- statistical thermodynamics
- quantum mechanics
- photodynamic chemistry
- molecular recognition
- nucleic acid
- molecular-surface interactions
- smart materials
- chemistry education and teaching formats

Chemists can be entrepreneurs! One faculty member partnered with a local business to design an instrument that will reduce the time, money, and environmental impact of treating industrial wastewater.



Another holds multiple patents for chemical compounds to treat schizophrenia and addiction.

A group of faculty hold a patent for the development of a GABAA agonist to control airway hyperresponsiveness and inflammation in asthma.

Last Updated 11/18



This sample four-year plan shows just one possible pathway to earning a degree with this major in four years. This plan **does not** replace the advice of your advisor, and students are cautioned to meet regularly with their advisor to create a personalized plan that matches their particular circumstances. This plan also follows the degree requirements for students who began their college education in Fall of 2013 or later. If you started college prior to Fall of 2013, your degree requirements may be different.

Degree Requirements for a Bachelor of Science with a Chemistry major (brief summary):

(Chemistry is also available as a Bachelor of Arts degree with a different set of requirements than listed below.)

1. English Proficiency and UWM Oral and Written Communication (OWC) GER - English 102 (fulfills Part A) and one OWC-Part B course.
2. Math Proficiency and UWM Quantitative Literacy (QL) GER, and Formal Reasoning - two courses are required for the Bachelor of Science. All BS students will take math through at least the first semester of calculus. They will also take one additional 200-level Math course, or Philosophy 212, or a Letters and Science statistics course. (A student may end up taking more than 2 classes, though, depending on placement test scores.)
3. Foreign Language – 2 semesters of a single Foreign Language (may be satisfied through 2 years of a single Foreign Language in high school)
4. L&S Humanities – 12 credits
5. L&S Social Sciences – 12 credits
6. L&S Natural Science – 12 credits including a laboratory course in three distinct natural science areas
7. L&S International – 9 credits usually accomplished in conjunction with Humanities and/or Social Science courses
8. UWM Arts GER – 3 credits
9. UWM Cultural Diversity GER – 3 credits usually accomplished in conjunction with a Humanities or Social Science course
10. 120 credits including 90 credits in L&S and with 36 of the 90 credits in L&S upper-level (numbered 300 and above) courses and 30 of those 36 credits in designated upper-level Natural Science
11. Complete the Chemistry major requirements in either the Chemistry option or the Biochemical option
 - Standard Chemistry option:
 - » All of Math 231, 232, 233 or both Math 221 and 222
 - » All of Physics 209, 210, 214, and 215
 - » All of Chem 102, 104, 221, 311, 343, 344, 345, 524, 561, 562, 563
 - » Chem 501 or 511
 - » Chem 582 or 584
 - » One of Chem 691, 692, or 697
 - Biochemical option
 - » All of Math 231, 232, 233 or Both Math 221 and 222
 - » All of Physics 209, 210, 214, and 215
 - » BioSci 150 and 325
 - » All of Chem 102, 104, 221, 311, 343, 344, 345, 501, 524, 561, 562, 563, 603
 - » Two of Chem 601, 602, 604, 614
 - » One of Chem 691, 692, or 697

Sample Four Year Plans:

There are hundreds of courses that satisfy various requirements and courses can count towards more than one requirement. For example, Chemistry 102 counts as a natural science with lab and counts towards the requirements for the major. (This sample assumes no high school Foreign Language was taken and that the student placed into calculus and college-level English.)

Chemistry Major

	Semester 1	Semester 2
Year 1	Math 231	Math 232
	Chemistry 102	Chemistry 104
	English 101	English 102 (OWC-A)
	1st semester Foreign Language	2nd semester Foreign Language
Year 2	Math 233	Arts GER
	Physics 209 and 214	Physics 210 and 215
	L&S Social Science/ International	Chem 344/345
	Chem 343	L&S Social Science/ International
Year 3	Chem 311	Chem 561
	Chem 501 or 511	OWC-B course
	Natural Science (not chemistry or physics) with lab	Chem 221
	L&S Humanities/Cultural Diversity	L&S Humanities
	L&S Social Science	L&S Upper-level elective
Year 4	Chem 524	L&S Humanities
	Chem 562	Chem 691 or 692
	Chem 563	L&S Social Science
	Chem 582	L&S Upper-level natural science if needed
	L&S Humanities/International	Elective

Chemistry Major with Biochemical option

	Semester 1	Semester 2
Year 1	Math 231	Math 232
	Chemistry 102	Chemistry 104
	English 101	English 102 (OWC-A)
	1st semester Foreign Language	2nd semester Foreign Language
Year 2	Math 233	Arts GER
	Bio Sci 150	Physics 209 and 214
	L&S Social Science/ International	Chem 344/345
	Chem 343	L&S Social Science/ International
Year 3	Chem 311	Chem 561
	Chem 501	L&S Social Science
	Physics 210 and 215	Bio Sci 325
	L&S Humanities/Cultural Diversity	L&S Humanities
	OWC-B course	Chem 221
Year 4	Chem 524	Chem 603
	Chem 562/563	L&S Upper-level elective
	Chem 601	Chem 691 or 692
	L&S Social Science	Chem 602 or 604
	L&S Humanities/International	L&S Humanities

Chemistry Course List as shown in samples:

(for full list, see UWM Course Catalog)

Chemistry 102: General Chemistry

Chemistry 104: General Chemistry and Qualitative Analysis

Chemistry 221: Elementary Quantitative Analysis

Chemistry 311: Introduction to Inorganic Chemistry

Chemistry 343: Introductory Organic Chemistry Laboratory

Chemistry 344: Organic Chemistry

Chemistry 345: Organic Chemistry Laboratory

Chemistry 501: Introduction to Biochemistry.

Chemistry 511: Inorganic Chemistry

Chemistry 524: Instrumental Analysis

Chemistry 560: Biophysical Chemistry

Chemistry 561: Physical Chemistry I

Chemistry 562: Physical Chemistry II

Chemistry 563: Physical Chemistry Laboratory

Chemistry 582: Advanced Chemistry Lab I

Chemistry 584: Advanced Chemistry Lab II

Chemistry 601: Biochemistry: Protein Structure and Function

Chemistry 602: Biochemistry: Cellular Processes

Chemistry 603: Introduction to Biochemistry Laboratory

Chemistry 604: Biochemistry: Metabolism

Chemistry 614: Bio-Inorganic Chemistry

Chemistry 691: Senior Research

Chemistry 692: Senior Thesis

Chemistry 697: Senior Seminar