

CHEMISTRY, BA

Banner Code: SC-BA-CHEM

Academic Advising

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This program, when coordinated with the necessary courses in education, meets requirements for teacher licensure. It also meets requirements for entrance to medical and other professional schools.

Teacher Licensure

Students who wish to become teachers and plan to seek teacher licensure should consider the following options:

- Chemistry, BA or BS/Curriculum and Instruction, Accelerated MEd (Secondary Education Chemistry concentration)
- Secondary Education - Chemistry (6-12) Undergraduate Certificate (<https://catalog.gmu.edu/colleges-schools/education-human-development/school-education/secondary-education-chemistry-6-12-undergraduate-certificate/>)

Interested students should attend an information session early in their studies. For more information, visit the School of Education's website (<http://gse.gmu.edu/>).

Admissions & Policies

Admissions

University-wide admissions policies can be found in the Undergraduate Admissions Policies (<https://catalog.gmu.edu/admissions/undergraduate-policies/>) section of this catalog.

To apply for this program, please complete the George Mason University Admissions Application (<https://www2.gmu.edu/admissions-aid/apply-now/>).

Policies

Students must fulfill all Requirements for Bachelor's Degrees (<https://catalog.gmu.edu/policies/academic/undergraduate-policies/#ap-5-3-2>), including the Mason Core (<https://catalog.gmu.edu/mason-core/>). As outlined in the Requirements section, students in this bachelor's program must also complete the additional College Requirements for the BA Degree.

CHEM 336 Physical Chemistry Lab I (Mason Core) (<https://catalog.gmu.edu/mason-core/>) or CHEM 465 Biochemistry Lab (Mason Core) (<https://catalog.gmu.edu/mason-core/>) will fulfill the writing intensive requirement.

For policies governing all undergraduate programs, see AP.5 Undergraduate Policies (<https://catalog.gmu.edu/policies/academic/undergraduate-policies/>).

Termination from the Major

To ensure the academic integrity of the Chemistry and Biochemistry undergraduate major program, students are expected to maintain a satisfactory level of academic performance.

No chemistry, math, or science course that is required for the major may be attempted more than three times. Students who do not successfully complete such a course with a grade of C or better by the third attempt may be terminated from the major.

Students who have been terminated from the chemistry major may not register for a chemistry course without the permission of the Department of Chemistry and Biochemistry.

A student may not declare a major in chemistry if the student has previously met the termination criteria for the major at any time, regardless of what the student's major was at the time the courses were taken.

Requirements

Degree Requirements

Total credits: minimum 120

Students should refer to the Admissions & Policies tab for specific policies related to this program.

Students must complete the chemistry program requirements with a minimum GPA of 2.30 and present no more than two courses with a grade of 'D' (1.00) in CHEM coursework at graduation.

BA without Concentration

Students who do not select the optional concentration complete the curriculum requirements listed below.

Chemistry Courses

Code	Title	Credits
CHEM 211	General Chemistry I (Mason Core) (https://catalog.gmu.edu/mason-core/)	3
CHEM 213	General Chemistry Laboratory I (Mason Core) (https://catalog.gmu.edu/mason-core/)	1
CHEM 212	General Chemistry II (Mason Core) (https://catalog.gmu.edu/mason-core/)	3
CHEM 214	General Chemistry Laboratory II (Mason Core) (https://catalog.gmu.edu/mason-core/)	1
CHEM 313	Organic Chemistry I	3
CHEM 314	Organic Chemistry II	3
CHEM 315	Organic Chemistry Lab I	2
CHEM 318	Organic Chemistry Lab II	2
CHEM 321	Quantitative Chemical Analysis	4
CHEM 331	Physical Chemistry I	3
CHEM 332	Physical Chemistry II	3
CHEM 336	Physical Chemistry Lab I (Mason Core) (https://catalog.gmu.edu/mason-core/) ¹	2

CHEM 337	Physical Chemistry Lab II	2
Select 5 credits of electives in chemistry		5
Total Credits		37

¹ Fulfills the writing intensive requirement.

Mathematics Courses

Code	Title	Credits
MATH 113	Analytic Geometry and Calculus I (Mason Core) (https://catalog.gmu.edu/mason-core/)	4
MATH 114	Analytic Geometry and Calculus II	4
MATH 213	Analytic Geometry and Calculus III	3
Total Credits		11

Physics Courses

Code	Title	Credits
Select one sequence:		
PHYS 243 & PHYS 244 & PHYS 245 & PHYS 246	College Physics I (Mason Core) (https://catalog.gmu.edu/mason-core/) and College Physics I Lab (Mason Core) (https://catalog.gmu.edu/mason-core/) and College Physics II (Mason Core) (https://catalog.gmu.edu/mason-core/) and College Physics II Lab (Mason Core) (https://catalog.gmu.edu/mason-core/)	8
PHYS 160 & PHYS 161 & PHYS 260 & PHYS 261	University Physics I (Mason Core) (https://catalog.gmu.edu/mason-core/) and University Physics I Laboratory (Mason Core) (https://catalog.gmu.edu/mason-core/) and University Physics II (Mason Core) (https://catalog.gmu.edu/mason-core/) and University Physics II Laboratory (Mason Core) (https://catalog.gmu.edu/mason-core/)	8
Total Credits		8

Concentration in Biochemistry (BC)

The concentration in biochemistry is designed for students interested in studying chemistry at its interface with the biological sciences. Those interested in health science careers can obtain an excellent science background through this concentration.

Students majoring in chemistry with a concentration in biochemistry will complete the coursework below:

Chemistry Courses

Code	Title	Credits
CHEM 211	General Chemistry I (Mason Core) (https://catalog.gmu.edu/mason-core/)	3
CHEM 213	General Chemistry Laboratory I (Mason Core) (https://catalog.gmu.edu/mason-core/)	1
CHEM 212	General Chemistry II (Mason Core) (https://catalog.gmu.edu/mason-core/)	3

CHEM 214	General Chemistry Laboratory II (Mason Core) (https://catalog.gmu.edu/mason-core/)	1
CHEM 313	Organic Chemistry I	3
CHEM 314	Organic Chemistry II	3
CHEM 315	Organic Chemistry Lab I	2
CHEM 318	Organic Chemistry Lab II	2
CHEM 321	Quantitative Chemical Analysis	4
CHEM 331	Physical Chemistry I	3
CHEM 336	Physical Chemistry Lab I (Mason Core) (https://catalog.gmu.edu/mason-core/) ¹	2
CHEM 446	Bioinorganic Chemistry	3
CHEM 463	General Biochemistry I	4
CHEM 464	General Biochemistry II	3
CHEM 465	Biochemistry Lab (Mason Core) (https://catalog.gmu.edu/mason-core/) ¹	2
Total Credits		39

¹ Fulfills the writing intensive requirement.

Mathematics and Statistics Courses

Code	Title	Credits
MATH 113	Analytic Geometry and Calculus I (Mason Core) (https://catalog.gmu.edu/mason-core/)	4
MATH 114	Analytic Geometry and Calculus II	4
STAT 250	Introductory Statistics I (Mason Core) (https://catalog.gmu.edu/mason-core/)	3
Total Credits		11

Physics Courses

Code	Title	Credits
PHYS 243	College Physics I (Mason Core) (https://catalog.gmu.edu/mason-core/)	3
PHYS 244	College Physics I Lab (Mason Core) (https://catalog.gmu.edu/mason-core/)	1
PHYS 245	College Physics II (Mason Core) (https://catalog.gmu.edu/mason-core/)	3
PHYS 246	College Physics II Lab (Mason Core) (https://catalog.gmu.edu/mason-core/)	1
Total Credits		8

Biology Courses

Code	Title	Credits
BIOL 213	Cell Structure and Function	4
Total Credits		4

Mason Core and Elective Credits

In order to meet a minimum of 120 credits, this degree requires additional credits (specific credit counts by concentration are shown below), which may be applied toward any remaining Mason Core (<https://catalog.gmu.edu/mason-core/>) requirements (outlined below), Requirements for Bachelor's Degrees (<https://catalog.gmu.edu/policies/academic/undergraduate-policies/#ap-5-3-2>), College Requirements for the BA Degree (outlined below), and elective courses. Students are

strongly encouraged to consult with their advisors to ensure that they fulfill all requirements.

- Without concentration: 64 credits
- BC concentration: 58 credits

Mason Core

Some Mason Core (<https://catalog.gmu.edu/mason-core/>) requirements may already be fulfilled by the major requirements listed above. Students are strongly encouraged to consult their advisors to ensure they fulfill all remaining Mason Core (<https://catalog.gmu.edu/mason-core/>) requirements.

Students who have completed the following credentials are eligible for a waiver of the Foundation and Exploration (lower level) requirement categories. The Integration category (upper level) is not waived under this policy. See Admissions (<https://catalog.gmu.edu/admissions/undergraduate-policies/#transfertext>) for more information.

- VCCS Uniform Certificate of General Studies
- VCCS or Richard Bland Associate of Science (A.S.), Associate of Arts (A.A.), Associate of Arts and Sciences (A.A.&S.), or Associate of Fine Arts (A.F.A.)

Code	Title	Credits
Foundation Requirements		
	Written Communication (lower-level) (https://catalog.gmu.edu/mason-core/#written)	3
	Oral Communication (https://catalog.gmu.edu/mason-core/#oral)	3
	Quantitative Reasoning (https://catalog.gmu.edu/mason-core/#quantitative)	3
	Information Technology and Computing (https://catalog.gmu.edu/mason-core/#information-technology)	3
Exploration Requirements		
	Arts (https://catalog.gmu.edu/mason-core/#arts)	3
	Global Contexts (https://catalog.gmu.edu/mason-core/#global-contexts)	3
	Global History (https://catalog.gmu.edu/mason-core/#global-history)	3
	Literature (https://catalog.gmu.edu/mason-core/#literature)	3
	Natural Science (https://catalog.gmu.edu/mason-core/#natural-science)	7
	Social and Behavioral Sciences (https://catalog.gmu.edu/mason-core/#social-behavioral-science)	3
	Just Societies (optional) (https://catalog.gmu.edu/mason-core/#justsocieties) ¹	
Integration Requirements		
	Written Communication (upper-level) (https://catalog.gmu.edu/mason-core/#written)	3
	Writing Intensive (https://catalog.gmu.edu/mason-core/#wi) ²	3
	Mason Apex (https://catalog.gmu.edu/mason-core/#apex) ³	3
Total Credits		40

¹ In addition to covering content related to the designated category, Exploration level courses marked with a Just Societies "flag" are specifically designed to help students learn how to interact effectively with others from all walks of life, including those with backgrounds

and beliefs that differ from their own. Students who wish to increase their knowledge and skills in this area may choose to enroll in a Just Societies-flagged course. Students interested in this approach to completing their Mason Core Exploration Requirements should work closely with their advisor to identify the appropriate Just Societies-flagged courses.

² Most programs include the writing-intensive course designated for the major as part of the major requirements; this course is therefore not counted towards the total required for Mason Core.

³ Minimum 3 credits required.

College Requirements for the BA Degree

In addition to the program requirements and the Mason Core (<https://catalog.gmu.edu/mason-core/>) requirements, students pursuing a BA degree must complete the coursework below. Except where expressly prohibited, a course used to fulfill this college-level requirement may also be used simultaneously to satisfy other requirements such as Mason Core (<https://catalog.gmu.edu/mason-core/>) requirements, other college-level requirements, or requirements for the major. In some cases, the requirements listed below may be superseded by requirements of the degree program and the Mason Core (<https://catalog.gmu.edu/mason-core/>).

Foundational Breadth

Choose two courses from approved Mason Core: Arts (<https://catalog.gmu.edu/mason-core/#arts>), Mason Core: Literature (<https://catalog.gmu.edu/mason-core/#literature>), Mason Core: Global Contexts (<https://catalog.gmu.edu/mason-core/#global-contexts>), and Mason Core: Social and Behavioral Sciences (<https://catalog.gmu.edu/mason-core/#social-behavioral-science>) courses in addition to those required by the Mason Core (<https://catalog.gmu.edu/mason-core/>). The two courses used to fulfill the college-level requirements must each be from different Mason Core categories. Additionally, they must be from different disciplines than the courses used to fulfill the University Mason Core requirements.

Natural Science

Choose one credit in addition to the Mason Core: Natural Science (<https://catalog.gmu.edu/mason-core/#natural-science>) requirement for a total of 8 credits¹. This combined college-level and university requirement must be fulfilled by completing two of any approved Mason Core: Natural Science (<https://catalog.gmu.edu/mason-core/#natural-science>) courses that include a laboratory experience².

Code	Title	Credits
	Select an additional Mason Core Natural Science course	1

¹ For Geography, BA majors, this extra credit is not required.

² BIOL 124 Human Anatomy and Physiology I and BIOL 125 Human Anatomy and Physiology II may not be used to fulfill this requirement.

Foreign Language

Code	Title	Credits
	Intermediate-level proficiency in one foreign language is required and may be fulfilled via one of the options below. ¹	

1. Completing a course in a foreign language numbered 202 (or its equivalent), or higher level courses taught in the language.

2. Achieving a satisfactory score on an approved proficiency test.

3. Completing a three course sequence in American Sign Language:

EDSE 115 American Sign Language (ASL) I

EDSE 116 American Sign Language (ASL) II

EDSE 219 American Sign Language (ASL) III

4. Conferral of a baccalaureate degree.²

¹ Students who are already proficient in a second language may be eligible for a waiver of this requirement. Additional information on waivers can be found with the college's Office of Academic and Student Affairs (<http://cosundergrad.gmu.edu/>).

² This option is only available to students in the Biology, BA with a concentration in Biological Health who have already conferred a baccalaureate degree.

Honors

Honors in the Major

Chemistry majors who have completed prerequisites for CHEM 455 Honors Research in Chemistry and CHEM 456 Honors Research in Chemistry and have maintained an overall GPA of at least 3.00 in mathematics and science courses are eligible to enter the departmental honors program. To graduate with honors in chemistry, a student is required to maintain a minimum GPA of 3.00 in mathematics and science courses and successfully complete the two semesters of CHEM 455 Honors Research in Chemistry and CHEM 456 Honors Research in Chemistry with a minimum GPA of 3.50.

In order to apply for Chemistry Honors, please complete the application (<https://cos.gmu.edu/chemistry/wp-content/uploads/sites/7/2015/08/form-honors-program-application-2016.pdf>) and submit it to the undergraduate coordinator.

Accelerated Master's

Chemistry, BA or BS/Secondary Education, Accelerated MEd (Secondary Education - Science Concentration)

Overview

Highly-qualified undergraduates may be admitted to the bachelor's/accelerated master's option and obtain a BA or BS in Chemistry (<https://catalog.gmu.edu/colleges-schools/science/chemistry-biochemistry/chemistry-bs/>) (degree without concentration) and an MEd in Secondary Education (Secondary Education - Science concentration) (<https://catalog.gmu.edu/colleges-schools/education-human-development/school-education/secondary-education-med/>) in an accelerated time-frame after satisfactory completion of a minimum of 143 credits.

See AP.6.7 Bachelor's/Accelerated Master's Degree (<https://catalog.gmu.edu/policies/academic/graduate-policies/#ap-6-7>) for policies related to this program.

This accelerated option is offered jointly by the Department of Chemistry and Biochemistry (<https://catalog.gmu.edu/colleges-schools/science/chemistry-biochemistry/>) and the School of Education (<https://>

catalog.gmu.edu/colleges-schools/education-human-development/school-education/).

Students in an accelerated degree program must fulfill all university requirements for the master's degree. For policies governing all graduate degrees, see AP.6 Graduate Policies (<https://catalog.gmu.edu/policies/academic/graduate-policies/#text>).

BAM Pathway Admission Requirements

Applicants to all graduate programs at George Mason University must meet the admission standards and application requirements for graduate study as specified in Graduate Admissions Policies (<https://catalog.gmu.edu/admissions/graduate-policies/>) and Bachelor's/Accelerated Master's Degree (<https://catalog.gmu.edu/policies/academic/graduate-policies/#ap-6-7>) policies. For information specific to this accelerated master's program, see Application Requirements and Deadlines (<https://cehd.gmu.edu/bachelors-accelerated-masters-program/>).

Students will be considered for admission into the BAM Pathway after completion of a minimum of 60 credits, and additional unit-specific criteria.

Students who are accepted into the BAM Pathway will be allowed to register for graduate level courses after successful completion of a minimum of 75 undergraduate credits and course-specific pre-requisites.

Accelerated Master's Admission Requirements

Students already admitted in the BAM Pathway will be admitted to the MEd program, if they have met the following criteria, as verified on the Bachelor's/Accelerated Master's Transition form:

- 3.0 overall GPA
- Completion of specific undergraduate coursework
- Successfully meeting Mason's requirements for undergraduate degree conferral (graduation) and completing the application for graduation.

Accelerated Pathway Requirements

To maintain the integrity and quality of both the undergraduate and graduate degree programs, undergraduate students interested in taking graduate courses must choose from the following which can be taken as Advanced Standing or Reserve Graduate credit (<https://catalog.gmu.edu/policies/academic/graduate-policies/#text>) (to be determined by the student and their advisor):

Code	Title	Credits
EDRD 619	Literacy Across the Disciplines	3
EDUC 545	Teaching Science and Engineering Practices	3
SEED 522	Foundations of Secondary Education	3
SEED 540	Human Development and Learning: Secondary Education	3
SEED 573	Teaching Science in the Secondary School	3
SEED 673	Advanced Methods of Teaching Science in the Secondary School	3

One of the following:

SEED 507	Assessing Learning and Teaching in the Secondary Classroom
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SEED 508	Creating Advocacy with Adolescent Learners
SEED 509	Perspectives on Extraordinary Teaching
SEED 510	Secondary Education in International Contexts

For more detailed information on coursework and timeline requirements, see AP.6.7 Bachelor's/Accelerated Master's Degree (<https://catalog.gmu.edu/policies/academic/graduate-policies/#ap-6-7>) policies.