

# CHEMISTRY, MS

**Banner Code:** SC-MS-CHEM

## Academic Advising

Email: [cbgrad@gmu.edu](mailto:cbgrad@gmu.edu)

Website: [science.gmu.edu/academics/departments-units/chemistry-biochemistry/graduate-programs](http://science.gmu.edu/academics/departments-units/chemistry-biochemistry/graduate-programs)

This master's degree provides advanced training for recent college graduates, professionals in teaching, and technical workers in research organizations who have an interest in chemistry or biochemistry. With a Thesis Option Master's in Chemistry, the serious student will perform original research and write an MS thesis under the direction of a faculty member. This option is for students planning to continue with a PhD, or to work in industry, academia, or a national laboratory. The Non Thesis Option is often used by those going on to a professional degree or to teach chemistry at the secondary school level.

## Admissions & Policies

### Admissions

University-wide admissions policies can be found in the Graduate Admissions Policies (<https://catalog.gmu.edu/admissions/graduate-policies/>) section of this catalog. International students and students having earned international degrees should also refer to Admission of International Students (<https://catalog.gmu.edu/admissions/international-students/>) for additional requirements.

### Eligibility

To be considered for admission to degree status, students must have a bachelor's degree in chemistry, biochemistry, or a related field from an institution of higher education accredited by a Mason-recognized U.S. institutional accrediting agency or international equivalent.

Applicants with a bachelor's degree in other fields of study who have at least three years of chemistry or biochemistry coursework may be accepted into the program. In some cases, students may be accepted provisionally and will be required to successfully complete the selected remedial courses, some of which may not be applicable toward the master's requirements.

### Application Requirements

To apply for this program, prospective students should submit the George Mason University Admissions Application (<https://www2.gmu.edu/admissions-aid/apply-now/>) and its required supplemental documentation, and letters of recommendation.

GRE scores are not required for admission into this program.

### Policies

For policies governing all graduate programs, see AP.6 Graduate Policies (<http://catalog.gmu.edu/policies/academic/graduate-policies/>).

CHEM 500 Selected Topics in Modern Chemistry may not be applied toward the MS degree.

CHEM courses numbered 502 through 510 may be applied toward the degree only with prior written approval of the department.

### Transferring Previous Graduate Credit into this Program

Previously earned and relevant graduate credits may be eligible for transfer into this program; details can be found in the Credit by Exam or Transfer (<https://catalog.gmu.edu/policies/academic/graduate-policies/>) section of this catalog.

## Requirements

### Degree Requirements

Total credits: 30

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

### Core Courses

Code	Title	Credits
Select three of the following core courses. Courses must be selected from three different core areas shown below: <sup>1</sup>		
<b>Analytical:</b>		
CHEM 624	Principles of Chemical Separation	
<b>Biochemistry:</b>		
CHEM 660	Protein Biochemistry	
CHEM 662	Modern Methods of Drug Discovery	
<b>Environmental:</b>		
CHEM 651	Environmental Chemistry of Organic Substances	
<b>Inorganic:</b>		
CHEM 641	Solid State Chemistry	
CHEM 646	Bioinorganic Chemistry	
<b>Organic:</b>		
CHEM 613	Modern Polymer Chemistry	
CHEM 614	Physical Organic Chemistry	
Total Credits		9

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These listed courses may also be taken as electives beyond the stated credit requirement for each option.

### MS without Concentration

General chemistry students who do not wish to pursue a concentration complete the core courses above, the following requirements, and choose either the Thesis Option or the Non Thesis Option:

Code	Title	Credits
<b>Additional Core Course</b>		<b>3</b>
CHEM 633	Chemical Thermodynamics and Kinetics	
<b>Chemistry Electives</b>		<b>9</b>
Select 3 credits of CHEM designated courses ( <a href="http://catalog.gmu.edu/courses/chem/">http://catalog.gmu.edu/courses/chem/</a> )		
Select 6 credits of courses in chemistry or related fields, approved by the graduate committee prior to registration		

<b>Seminar</b>	<b>3</b>
CHEM 790 Graduate Seminar	
<b>Thesis or Non Thesis</b>	<b>6</b>
Select the Thesis Option or the Non Thesis Option	
Total Credits	21

### Thesis Option

The Thesis Option is designed for students planning to pursue a doctoral degree or a career involving research in the chemical, biochemical, environmental, or pharmaceutical industries.

Students must choose a research laboratory advisor during their first semester in the program and begin working on their thesis project no later than the second semester. The thesis is based on research that must be preapproved by the thesis or advisory committee, which is appointed prior to the first semester of registration in CHEM 799 Master's Thesis. Students must complete CHEM 799 Master's Thesis and present a seminar, followed by an oral defense.

Code	Title	Credits
<b>Thesis Option</b>		
CHEM 799	Master's Thesis	6
Total Credits		6

### Non Thesis Option

The Non Thesis Option is designed for those seeking to go on to professional school, teach chemistry in secondary schools, or pursue other careers in which advanced work in chemistry is necessary or advantageous.

Students selecting this option are not required to complete a laboratory-based thesis. Instead, they must complete a research project or gain teaching experience in undergraduate chemistry labs, as described below.

Any combination of CHEM 670 Teaching Practicum and CHEM 796 Master Directed Reading and Research may be used to fulfill this requirement. However, CHEM 796 Master Directed Reading and Research may only be used to fulfill this requirement with prior written approval of the department and must be used to complete a laboratory or library-based research project, or must otherwise enhance the student's teaching skills.

Code	Title	Credits
<b>Non Thesis Option</b>		
Select 3 credits of the following:		3
CHEM 670	Teaching Practicum	
CHEM 796	Master Directed Reading and Research	
Additional Chemistry Electives		3
Select 3 credits of CHEM designated courses ( <a href="http://catalog.gmu.edu/courses/chem/">http://catalog.gmu.edu/courses/chem/</a> )		
Total Credits		6

### MS with Concentration in Biochemistry (BC)

Students who wish to pursue an optional concentration in biochemistry complete the core courses above, the following requirements, and choose either Thesis Option or the Non Thesis Option:

Code	Title	Credits
<b>Additional Core Course</b>		
CHEM 633	Chemical Thermodynamics and Kinetics	3
<b>Chemistry Electives</b>		
Select 3 credits of CHEM designated courses ( <a href="http://catalog.gmu.edu/courses/chem/">http://catalog.gmu.edu/courses/chem/</a> )		
<b>Seminar</b>		
CHEM 790	Graduate Seminar	3
<b>Thesis or Non Thesis</b>		
Select the Thesis Option or the Non Thesis Option		
Total Credits		21

### Thesis Option

The Thesis Option is designed for students planning to pursue a doctoral degree or a career involving research in the chemical, biochemical, environmental, or pharmaceutical industries.

Students must choose a research laboratory advisor during their first semester in the program and begin working on their thesis project no later than the second semester. The thesis is based on research that must be preapproved by the thesis or advisory committee, which is appointed prior to the first semester of registration in CHEM 799 Master's Thesis. Students must complete CHEM 799 Master's Thesis and present a seminar, followed by an oral defense.

Code	Title	Credits
<b>Biochemistry Electives</b>		
Select 6 credits of electives in biochemistry or related fields with approval from the department		
<b>Thesis</b>		
CHEM 799	Master's Thesis	6
Total Credits		12

### Non Thesis Option

The Non Thesis Option is designed for those seeking to go on to professional school, teach chemistry in secondary schools, or pursue other careers in which advanced work in chemistry is necessary or advantageous.

Students selecting this option are not required to complete a laboratory-based thesis. Instead, they must complete a research project or gain teaching experience in undergraduate chemistry labs, as described below.

Any combination of CHEM 670 Teaching Practicum and CHEM 796 Master Directed Reading and Research may be used to fulfill this requirement. However, CHEM 796 Master Directed Reading and Research may only be used to fulfill this requirement with prior written approval of the department and must be used to complete a laboratory or library-based research project, or must otherwise enhance the student's teaching skills.

Code	Title	Credits
<b>Non Thesis Option</b>		
Select 3 credits of the following:		3
CHEM 670	Teaching Practicum	
CHEM 796	Master Directed Reading and Research <sup>1</sup>	
Biochemistry Electives		9

Electives in biochemistry or related fields with approval from department

Total Credits 12

## Accelerated Master's

### Chemistry, BS/Chemistry, Accelerated MS Overview

This bachelor's/accelerated master's degree program allows academically strong undergraduates with a commitment to advance their education to obtain both the Chemistry, BS (<http://catalog.gmu.edu/colleges-schools/science/chemistry-biochemistry/chemistry-bs/>) and the Chemistry, MS degrees within an accelerated timeframe. Upon completion of this 138 credit accelerated program, students will be exceptionally well prepared for entry into their careers or into a doctoral program in the field or in a related discipline.

Students are eligible to apply for this accelerated program once they have earned at least 60 undergraduate credits. They will be able to enroll in up to 18 credits of graduate coursework after successfully completing 75 undergraduate credits. This flexibility makes it possible for students to complete a bachelor's and a master's in five years.

For more detailed information, see AP.6.7 Bachelor's/Accelerated Master's Degrees (<http://catalog.gmu.edu/policies/academic/graduate-policies/#ap-6-7>). For policies governing all graduate degrees, see AP.6 Graduate Policies (<http://catalog.gmu.edu/policies/academic/graduate-policies/>). For more information on undergraduates enrolling in graduate courses, see AP.1.4.4 Graduate Course Enrollment by Undergraduates (<https://catalog.gmu.edu/policies/academic/registration-attendance/#text>).

### Application Requirements

Applicants to all graduate programs at George Mason University must meet the admission standards and application requirements for graduate study as specified in the Graduate Admission Policies (<http://catalog.gmu.edu/admissions/graduate-policies/>) section of this catalog.

Important application information and processes for this accelerated master's program can be found here (<https://www2.gmu.edu/admissions-aid/how-apply/accelerated-masters/>).

Students should seek out the graduate program's advisor who will aid in choosing the appropriate graduate courses and help prepare the student for graduate studies.

Successful applicants will have earned 60 undergraduate credits and have an overall GPA of at least 3.00. Additionally, they will have completed 36 credits of CHEM courses with a GPA of at least 3.00.

### Accelerated Option Requirements

After the completion of 75 undergraduate credits, students may complete 3 to 12 credits of graduate coursework that can apply to both the undergraduate and graduate degrees.

In addition to applying to graduate from the undergraduate program, students in the accelerated program must submit a bachelor's/accelerated master's transition form (available from the Office of the University Registrar (<https://registrar.gmu.edu/forms/>)) to the College of Science's Office of Academic and Student Affairs (<https://cos.gmu.edu/about/contact-us/>) by the last day to add classes of their final

undergraduate semester. Students should enroll for courses in the master's program in the fall or spring semester immediately following conferral of the bachelor's degree, but should contact an advisor if they would like to defer up to one semester.

Students must maintain an overall GPA of 3.00 or higher in all graduate coursework and should consult with their faculty advisor to coordinate their academic goals.

### Reserve Graduate Credit

Accelerated master's students may also take up to 6 graduate credits as reserve graduate credits. These credits do not apply to the undergraduate degree, but will reduce the master's degree by up to 6 credits. With 12 graduate credits counted toward the undergraduate and graduate degrees plus the maximum 6 reserve graduate credits, the credits necessary for the graduate degree can be reduced by up to 18.

### Graduate Course Suggestions

The following list of suggested courses is provided for general reference. To ensure an efficient route to graduation and post-graduation readiness, students are strongly encouraged to meet with an advisor before registering for graduate-level courses.

Code	Title	Credits
CHEM 633	Chemical Thermodynamics and Kinetics <sup>1</sup>	
<b>For Students Interested in the Environmental Sciences</b>		
CHEM 627	Aquatic Environmental Chemistry	
CHEM 651	Environmental Chemistry of Organic Substances	
<b>For Students Interested in Biochemistry</b>		
CHEM 567	The Chemistry of Enzyme-Catalyzed Reactions	
CHEM 660	Protein Biochemistry	
<b>For Students Interested in Organic Chemistry</b>		
CHEM 568	Bioorganic Chemistry	
CHEM 613	Modern Polymer Chemistry	
CHEM 614	Physical Organic Chemistry	
<b>For Students Interested in Inorganic Chemistry</b>		
CHEM 641	Solid State Chemistry	
CHEM 646	Bioinorganic Chemistry	
<b>For Students Interested in Analytical Chemistry</b>		
CHEM 624	Principles of Chemical Separation	
CHEM 625	Electroanalytical Chemistry	
<b>For Students Interested in Materials Science</b>		
CHEM 680	Fundamentals of Nanoscience and Nanomaterials	

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This course covers the advanced concepts necessary to understand the mechanism and kinetics of chemical reactions.