



Program Approval Form

For approval of new programs and deletions or modifications to an existing program.

Action Requested:

- Create New (SCHEV approval required except for minors)
- Inactivate Existing
- Modify Existing (check ALL that apply)
 - Title (SCHEV approval required except for minors)
 - Concentration (Choose one): Add Delete Modify
 - Degree Requirements
 - Admission Standards/ Application Requirements
 - Other Changes: _____

Type (Check one):

- B.A. B.S. Minor
- Master's
- Ph.D.
- Undergraduate Certificate*
- Graduate Certificate*
- Bachelor's/Accelerated Master's Other:

College/School: Department:
 Submitted by: Ext: Email:

Effective Term: **Please note:** For students to be admitted to a new degree, minor, certificate or concentration, the program must be fully approved, entered into Banner, and published in the University Catalog.

Justification: (attach separate document if necessary)

Program Title: (Required)
Title must identify subject matter. Do not include name of college/school/dept.

Concentration(s):

Admissions Standards / Application Requirements: (Required only if different from those listed in the University Catalog)

Degree Requirements:
Consult University Catalog for models, attach separate document if necessary using track changes for modifications

Courses offered via distance:
(if applicable)

TOTAL CREDITS REQUIRED:

Existing	New/Modified
Chemistry, BS	
	Concentration in Environmental Chemistry
	See attachment
120	120

*For Certificates Only: Indicate whether students are able to pursue on a Full-time basis Part-time basis

Approval Signatures

Department Date College/School Date Required for Minors and Interdisciplinary Programs

If this program may impact another unit or is in collaboration with another unit at Mason, the originating department must circulate this proposal for review by those units and obtain the necessary signatures prior to submission. Failure to do so will delay action on this proposal.

Unit Name	Unit Approval Name	Unit Approver's Signature	Date

For Undergraduate Programs only

For Graduate Programs Only

Program Proposal Submitted to the College of Science Curriculum Committee (COSCC)

The form above is processed by the Office of the University Registrar. This second page is for the COSCC's reference. Please complete the applicable portions of this page to clearly communicate what the form above is requesting.

FOR ALL PROGRAMS (required)

Program Title: Chemistry, B.S.

Concentration in Environmental Chemistry

Date of Departmental Approval: Oct. 13, 2017

FOR MODIFIED PROGRAMS (required if modifying a program)

- **Summary of the Modification:** The Concentration in Analytical and Environmental Chemistry will be deleted and two new concentrations proposed. Environmental Chemistry will now be one of the new concentrations. The new courses to be included for the concentration will focus on environmental chemistry and on environmental courses from other COS departments.
- **Text before Modification (title, degree requirements, etc.):** See next two pages
- **Text after Modification (title, degree requirements, etc.):** See next two pages
- **Reason for the Modification:** The Concentration in Analytical and Environmental Chemistry did not work well as a combination concentration and very few students chose it. When one of the elective courses was deleted, and the concentration needed to be modified, we realized that two new concentrations would be better. Having two new concentrations increases the areas of concentration offered to majors and complements our existing degrees: B.S. (no concentration) and B.S. with Concentration in Biochemistry.

The Environmental Chemistry concentration in Chemistry is designed to introduce and train students in the field of environmental chemistry. Students will take essentially the same chemistry, physics, and math courses as for the Concentration in Biochemistry. However, other required chemistry courses are specifically in the environmental chemistry field. In addition, several core science courses in environmental science from Geology, EVPP, Biology, and GGS have been added to the curriculum as either requirements or electives.

Before modification

B.S.: Concentration in Analytical and Environmental Chemistry American Chemical Society Accredited Degree

Chemistry (CHEM) (52 credits)

General Chemistry lecture and lab	<input type="checkbox"/> 211 (3)	<input type="checkbox"/> 213 (1)	<input type="checkbox"/> 212 (3)	<input type="checkbox"/> 214 (1)
Organic Chemistry lecture and lab	<input type="checkbox"/> 313 (3)	<input type="checkbox"/> 315(2)	<input type="checkbox"/> 314 (3)	<input type="checkbox"/> 318 (2)
Quantitative Chemical Analysis	<input type="checkbox"/> 321 (4)			
Physical Chemistry lecture and lab	<input type="checkbox"/> 331 (3)	<input type="checkbox"/> 336 (2)	<input type="checkbox"/> 332 (3)	<input type="checkbox"/> 337 (2)
Prop. and Bonding of Inorganic Compounds	<input type="checkbox"/> 441 (3)	-or-	Bioinorganic Chemistry	<input type="checkbox"/> 446(3)
General Biochemistry	<input type="checkbox"/> 463 (4)			
Instrumental Methods of Chemical Analysis and Lab	<input type="checkbox"/> 422 (3)	<input type="checkbox"/> 423 (2)		
Inorganic Preparations and Techniques	<input type="checkbox"/> 445 (2)	-or-	Biochemistry Lab	<input type="checkbox"/> 465 (2)
Aquatic Environmental Chemistry	<input type="checkbox"/> 427 (3)	-or-	Chemical Oceanography	<input type="checkbox"/> 458 (3)
Atmospheric Chemistry	<input type="checkbox"/> 438 (3)			

Science Area Electives (minimum 7 credits) from **(7-8 credits)**

Introductory Geology	GEOL 101 (4)	-and-	Introduction to Oceanography	GEOL 309 (3)
-or-				
Introduction to Environmental Science I	EVPP 110(4)	-and-	Introduction to Environmental Science II	EVPP 111 (4)
-or-				
Fundamental Inorganic Chemistry	CHEM 341 (3) and four credits from			
Undergraduate Research	CHEM 355 (1-3)			
Special Projects In Chemistry	CHEM 451/452 (1-3, 1-3)			
Honors Research In Chemistry	CHEM 455/456 (3, 3)			

Mathematics (MATH) (11 credits)

Analytic Geometry and Calculus	<input type="checkbox"/> 113 -or- 123-124 (4)	<input type="checkbox"/> 114 (4)	<input type="checkbox"/> 213 (3)
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Physics (PHYS) (8 credits)

University Physics	<input type="checkbox"/> 160 (3)	<input type="checkbox"/> 260 (3)
University Physics Lab	<input type="checkbox"/> 161 (1)	<input type="checkbox"/> 261 (1)

General Education (approved courses are listed in the University Catalog) **(30 credits)**

Written Communication	<input type="checkbox"/> ENGH 101 (3)	<input type="checkbox"/> ENGH 302 (3)
Oral Communication	<input type="checkbox"/> COMM 100 or 101 (3)	
Western Civilization/World History	<input type="checkbox"/> HIST 100 or 125 (3)	
Information Technology	<input type="checkbox"/> ___ (3)	
Literature	<input type="checkbox"/> ___ (3)	
Fine Arts	<input type="checkbox"/> ___ (3)	
Social and Behavioral Sciences	<input type="checkbox"/> ___ (3)	
Global Understanding	<input type="checkbox"/> ___ (3)	
Synthesis	<input type="checkbox"/> ___ (3)	
Electives	<input type="checkbox"/> ___ (7-8)	

TOTAL CREDITS REQUIRED: 120 Minimum (of which 45 must be upper-division \geq 300 level); overall GPA \geq 2.00; major requirements GPA \geq 2.30; maximum of two courses of CHEM with a "D" grade. All CHEM prerequisite courses require a grade of C or better.

After modification

B.S. in Chemistry: Concentration in Environmental Chemistry

Chemistry (CHEM) (49 credits)

General Chemistry lecture and lab	<input type="checkbox"/> 211 (3)	<input type="checkbox"/> 213 (1)	<input type="checkbox"/> 212 (3)	<input type="checkbox"/> 214 (1)
Organic Chemistry lecture and lab	<input type="checkbox"/> 313 (3)	<input type="checkbox"/> 315(2)	<input type="checkbox"/> 314 (3)	<input type="checkbox"/> 318 (2)
Quantitative Chemical Analysis	<input type="checkbox"/> 321 (4)			
Physical Chemistry lecture and lab	<input type="checkbox"/> 331 (3)	<input type="checkbox"/> 336 (2)	<input type="checkbox"/> 332 (3)	<input type="checkbox"/> 337 (2)
Prop. and Bonding of Inorganic Compounds	<input type="checkbox"/> 441 (3)	-or-	Bioinorganic Chemistry	<input type="checkbox"/> 446(3)
Instrumental Methods of Chemical Analysis and Lab	<input type="checkbox"/> 422 (3)	<input type="checkbox"/> 423 (2)		
Aquatic Environmental Chemistry	<input type="checkbox"/> 427 (3)			
Atmospheric Chemistry	<input type="checkbox"/> 438 (3)			
CHEM Elective (lecture or research course)	<input type="checkbox"/> ___ (3)			

Physics (PHYS) (8 credits)

University Physics lecture and lab	<input type="checkbox"/> PHYS 160 (3)	<input type="checkbox"/> PHYS 161 (1)	<input type="checkbox"/> PHYS 260 (3)	<input type="checkbox"/> PHYS 261 (1)
-or-				
College Physics lecture and lab	<input type="checkbox"/> PHYS 243 (3)	<input type="checkbox"/> PHYS 244 (1)	<input type="checkbox"/> PHYS 245 (3)	<input type="checkbox"/> PHYS 246 (1)

Mathematics (MATH) (11 credits)

Analytic Geometry and Calculus	<input type="checkbox"/> 113 (4)	<input type="checkbox"/> 114 (4)	<input type="checkbox"/> 213 -or- STAT 250 (3)
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Science Core Courses (11 credits)

Introductory Geology	<input type="checkbox"/> GEOL 101 (4)			
Soil Geology	<input type="checkbox"/> GEOL 306 (3)			
Environmental Biology: Molecules and Cells	<input type="checkbox"/> EVPP 210 (4)	-or-	Cell Structure and Function	BIOL 213 (4)

Science Electives (minimum 6-8 credits)

Chemical Oceanography	<input type="checkbox"/> CHEM 458 (3)	-or-	Intro. to Oceanography	BIOL/EVPP/GEOL 309 (3)
Envir. Sci.: Biological Diversity and Ecosystems	<input type="checkbox"/> EVPP 301(4)			
Principles of Environmental Toxicology	<input type="checkbox"/> EVPP 445 (3)			
Environmental Geology	<input type="checkbox"/> GEOL 305 (3)			
Hydrogeology	<input type="checkbox"/> GEOL 313 (3)			
Biology of Microorganisms	<input type="checkbox"/> BIOL 305/306 (4)	-or-	Envir. Microbiology Essentials	EVPP 305/306 (4)
Global Environmental Hazards	<input type="checkbox"/> GGS 302 (3) [Pre-requisite is GGS 121]			

Mason Core (30 credits) (approved courses are listed in the University Catalog)

Written Communication	<input type="checkbox"/> ENGH 101 (3)	-and-	<input type="checkbox"/> ENGH 302 (3)
Oral Communication	<input type="checkbox"/> COMM 100	-or-	COMM 101 (3)
Western Civilization/World History	<input type="checkbox"/> HIST 100	-or-	HIST 125 (3)
Information Technology	<input type="checkbox"/> ___ (3)		
Literature	<input type="checkbox"/> ___ (3)		
Fine Arts	<input type="checkbox"/> ___ (3)		
Social and Behavioral Sciences	<input type="checkbox"/> ___ (3)		
Global Understanding	<input type="checkbox"/> ___ (3)		
Synthesis	<input type="checkbox"/> ___ (3)		

Electives

(3-5)

TOTAL CREDITS REQUIRED: 120 Minimum (of which 45 must be upper-division \geq 300 level); overall GPA \geq 2.00; major requirements GPA \geq 2.30; maximum of two courses of CHEM with a "D" grade. All CHEM prerequisite courses require a grade of C or better.

Banner Code: SC-BS-CHEM

Degree Requirements

Total credits: minimum 120

Students should refer to the [Admissions & Policies](#) tab for specific policies related to this program.

Students majoring in chemistry 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.

Concentration in Analytical and Environmental Chemistry (AEC)

~~Students planning professional careers in an industry involving chemical measurements, careers with a chemistry emphasis in the environmental science, or those seeking graduate study in analytical or environmental chemistry should choose this program. Students who chose this concentration will have a broad knowledge of chemistry and a firm foundation in the environmental sciences covering atmospheric, aquatic, and soil. The major prepares students to work in the public or private sector as environmental chemists as well as to pursue an advanced degree.~~

Chemistry Courses

Code	Title	Credits
CHEM 211	General Chemistry I (Mason Core)	3
CHEM 213	General Chemistry Laboratory I (Mason Core)	1
CHEM 212	General Chemistry II (Mason Core)	3
CHEM 214	General Chemistry Laboratory II (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

Code	Title	Credits
<u>CHEM 332</u>	Physical Chemistry II	3
<u>CHEM 336</u>	Physical Chemistry Lab I	2
<u>CHEM 337</u>	Physical Chemistry Lab II	2
<u>CHEM 422</u>	Instrumental Methods of Chemical Analysis	3
<u>CHEM 423</u>	Instrumental Methods of Chemical Analysis Laboratory	2
<u>CHEM 427</u>	Aquatic Environmental Chemistry	3
<u>CHEM 438</u>	Atmospheric Chemistry	3
<u>CHEM 441</u>	Properties and Bonding of Inorganic Compounds	3
or <u>CHEM 446</u>	Bioinorganic Chemistry	
	<u>CHEM elective (lecture or research courses)</u>	<u>3</u>
Total Credits		<u>52.49</u>

Course List

Fulfills the writing intensive requirement.

Physics Courses

Code	Title	Credits
Mason Core: Natural Science courses:		
<u>PHYS 160</u>	University Physics I (<u>Mason Core</u>)	3

Code	Title	Credits
<u>PHYS 161</u>	University Physics I Laboratory (<u>Mason Core</u>)	1
<u>PHYS 260</u>	University Physics II (<u>Mason Core</u>)	3
<u>PHYS 261</u>	University Physics II Laboratory (<u>Mason Core</u>)	1
	or	
<u>PHYS 243</u>	<u>College Physics I</u>	3
<u>PHYS 245</u>	<u>College Physics II</u>	3
<u>PHYS 244</u>	<u>College Physics I Laboratory</u>	1
<u>PHYS 246</u>	<u>College Physics II Laboratory</u>	1
Total Credits		8

Course List

Mathematics Courses

Code	Title	Credits
<u>MATH 113</u>	Analytic Geometry and Calculus I (<u>Mason Core</u>)	4
<u>MATH 114</u>	Analytic Geometry and Calculus II	4
<u>MATH 213</u>	Analytic Geometry and Calculus III	3
<u>Or STAT 250</u>	<u>Introductory Statistics</u>	3

Code	Title	Credits
Total Credits		11

Course List

Science Core Courses

Code	Title	Credits
<u>GEOL 101</u>	<u>Introductory Geology</u>	<u>4</u>
<u>GEOL 306</u>	<u>Soil Geology</u>	<u>3</u>
<u>EVPP 210</u>	<u>Environmental Biology: Molecules and Cells</u>	<u>4</u>
<u>Or BIOL 213</u>	<u>Cell Structure and Function</u>	<u>4</u>
Total Credits		11

Course List

Supporting Science Electives

Code	Title	Credits
Select one of the following options <u>Choose six-eight credits from the following:</u>		<u>7-8-8</u>
<u>GEOL 101</u> GEOL 305	<u>Introductory Geology I (Mesozoic Core)</u> <u>Environmental Geology</u>	<u>3</u>
<u>GEOL 309</u> GEOL 313	<u>Introduction to Oceanography</u> <u>Hydrogeology</u>	<u>3</u>

Code	Title	Credits
<u>EVPP-440</u> <u>EVPP 301</u>	<u>The Ecosphere: An Introduction to Environmental Science I (Mason Core) Environmental Science: Biological Diversity and Ecosystems</u>	4
<u>EVPP 445</u>	<u>Principles of Environmental Toxicology</u>	3
<u>EVPP-441</u> <u>BIOL 305</u>	<u>Biology of Microorganisms The Ecosphere: An Introduction to Environmental Science II (Mason Core)</u>	3
<u>And BIOL 306</u>	<u>Biology of Microorganisms Lab</u>	1
<u>Or EVPP 305</u>	<u>Environmental Microbiology Essentials</u>	3
<u>And EVPP 306</u>	<u>Environmental Microbiology Essentials Lab</u>	1
<u>CHEM-341</u> <u>IGGS 302</u>	<u>Fundamental Inorganic Chemistry Global Environmental Hazards</u>	
<u>CHEM</u> <u>CHEM-355</u> <u>CHEM 458</u>	<u>Undergraduate Research Chemical Oceanography</u>	3
<u>Or CHEM-454</u> <u>BIOL 309</u> <u>Or EVPP 309</u> <u>Or GEOL 309</u>	<u>Special Projects in Chemistry Introduction to Oceanography</u>	3
<u>CHEM 452</u>	<u>Special Projects in Chemistry</u>	
Total Credits		76-8

Course List

The remaining credits are fulfilled by Mason Core requirements or general electives.

The discipline sequences may be interchanged only with approval by the program coordinator.

