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): $\square$ Add $\quad \square$ Delete $\quad \square$ Modify
Degree Requirements
Admission Standards/ Application Requirements
Other Changes: $\qquad$

Type (Check one):


Ph.D.
Undergraduate Certificate*
Graduate Certificate*
Other:

College/School: Submitted by: $\square$ 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)
Adding "Mason Core and Elective Credits" and "Mason Core" sections in order to have the catalog listing clearly show how the degree equals 120 credits and how the Mason Core requirements can be fulfilled.

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 |  |
|  |  |
| [Mason Core and Electives section not included] | See the bottom portion of the degree listing <br> attached. |
|  |  |
|  |  |

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

| Department | Date | College/School | Date | Provost's Office <br> 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 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, BS

Date of Departmental Approval: 3/11/2015

## FOR INACTIVATED PROGRAMS (required if inactivating a program)

- Reason for Inactivation:


## FOR MODIFIED PROGRAMS (required if modifying a program)

- Summary of the Modification: Adding "Mason Core and Elective Credits" and "Mason Core" sections.
- Text before Modification (title, degree requirements, etc.): Sections weren't included.
- Text after Modification (title, degree requirements, etc.): See attached.
- Reason for the Modification: In order to have the catalog listing clearly show how the degree equals 120 credits and how the Mason Core requirements can be fulfilled.

FOR NEW PROGRAMS (required if creating a new program)

- Reason for the New Program:
- Relationship to Existing Programs:
- Relationship to Existing Courses:
- Semester of Initial Offering:
- Insert Tentative SCHEV Proposal Below


# Acalog ACMS ${ }^{\text {TM }}$ 

## 2015-2016 University Catalog \{working\}

## Chemistry, BS


#### Abstract

Banner Code: SC-BS-CHEM This program of study is offered by the Department of Chemistry and Biochemistry in the College of Science. This program is approved by the American Chemical Society; upon completion, students are certified to the society. Students planning professional careers in chemistry should choose this degree.

In addition to satisfying all requirements for bachelor's degrees including the Mason Core, 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. Through the coursework below, chemistry majors satisfy the Mason Core requirements in 'Natural Science' and 'Quantitative Reasoning'.


CHEM 336 or CHEM 465 will fulfill the writing intensive requirement for students majoring in chemistry.
This undergraduate program offers students the option of applying to the accelerated master's degree program in Chemistry or in Curriculum and Instruction (Secondary Education Chemistry Concentration).

## Degree Requirements

## BS without Concentration

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

## 11 Credits of Math

- MATH 113 - Analytic Geometry and Calculus I Credits: 4 (Mason Core: Quantitative Reasoning course)
- MATH 114 - Analytic Geometry and Calculus II Credits: 4
- MATH 213 - Analytic Geometry and Calculus III Credits: 3


## 1-3 Credits

## Choose from:

- CHEM 355- Undergraduate Research Credits: 1-3
- CHEM 423 - Instrumental Analysis Laboratory Credits: 2
- CHEM 451- Special Projects in Chemistry Credits: 1-3
- CHEM 452 - Special Projects in Chemistry Credits: 1-3
- CHEM 455-Honors Research in Chemistry Credits: 3
- CHEM 456-Honors Research in Chemistry Credits: 3


## 6 Credits of In-depth Electives

Choose from:

- CHEM 422 - Instrumental Analysis Credits: 3
- CHEM 427- Aquatic Environmental Chemistry Credits: 3
- CHEM 438 - Atmospheric Chemistry Credits: 3
- CHEM 446 - Bioinorganic Chemistry Credits: 3
- CHEM 458-Chemical Oceanography Credits: 3
- CHEM464-General Biochemistry II Credits: 3
- CHEM 467- The Chemistry of Enzyme-Catalyzed Reactions Credits: 3
- CHEM 468 - Bioorganic Chemistry Credits: 3


## 44 Credits of Chemistry

- CHEM 211-General Chemistry Credits: 4 (Mason Core: Natural Science course)
- CHEM 212 - General Chemistry Credits: 4 (Mason Core: Natural Science course)
- CHEM 313 - Organic Chemistry Credits: 3
- CHEM 314 - Organic Chemistry II Credits: 3
- CHEM 315- Organic Chemistry Lab I Credits: 2
- CHEM 318 - Organic Chemistry Lab II Credits: 2
- CHEM 321- Elementary Quantitative Analysis Credits: 4
- CHEM 331- Physical Chemistry I Credits: 3
- CHEM 332 - Physical Chemistry II Credits: 3
- CHEM 336 - Physical Chemistry Lab I Credits: 2
- CHEM 337- Physical Chemistry Lab II Credits: 2
- CHEM 441- Properties and Bonding of Inorganic Compounds Credits: 3
- CHEM 445 - Inorganic Preparations and Techniques Credits: 2 or CHEM 465 - Biochemistry Lab Credits: 2
- CHEM 463-General Biochemistry I Credits: 4
- Choose 3 credits of chemistry electives


## 8 Credits of Physics

Mason Core: Natural Science courses:

- PHYS 160 - University Physics I Credits: 3
- PHYS 161- University Physics I Laboratory Credits: 1
- PHYS 260 - University Physics II Credits: 3
- PHYS 261- University Physics II Laboratory Credits: 1


## Without Concentration Total: 70-72 credits

## $\Delta$ 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. This concentration meets the requirements for certification by the American Chemical Society (ACS).

In addition to satisfying the Mason Core and requirements for bachelor's degrees, students majoring in chemistry with a concentration in analytical and environmental 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. Through the coursework below, chemistry majors satisfy the Mason Core requirements in Natural Science’ and ‘Quantitative Reasoning'.

## 52 Credits of Chemistry

- CHEM 211- General Chemistry Credits: 4 (Mason Core: Natural Science course)
- CHEM 212 - General Chemistry Credits: 4 (Mason Core: Natural Science course)
- CHEM 313 - Organic Chemistry Credits: 3
- CHEM 314 - Organic Chemistry II Credits: 3
- CHEM 315- Organic Chemistry Lab I Credits: 2
- CHEM 318 - Organic Chemistry Lab II Credits: 2
- CHEM 321- Elementary Quantitative Analysis Credits: 4
- CHEM 331- Physical Chemistry I Credits: 3
- CHEM 332 - Physical Chemistry II Credits: 3
- CHEM 336 - Physical Chemistry Lab I Credits: 2
- CHEM 337- Physical Chemistry Lab II Credits: 2
- CHEM 422 - Instrumental Analysis Credits: 3
- CHEM 423 - Instrumental Analysis Laboratory Credits: 2
- CHEM 427- Aquatic Environmental Chemistry Credits: 3 or CHEM 458 - Chemical Oceanography Credits: 3
- CHEM 438 - Atmospheric Chemistry Credits: 3
- CHEM 463- General Biochemistry I Credits: 4
- CHEM 441- Properties and Bonding of Inorganic Compounds Credits: 3 or CHEM 446 - Bioinorganic Chemistry Credits: 3
- CHEM 445- Inorganic Preparations and Techniques Credits: 2 or CHEM 465-Biochemistry Lab Credits: 2


## 8 Credits of Physics

## Mason Core: Natural Science courses:

- PHYS 160 - University Physics I Credits: 3
- PHYS 161- University Physics I Laboratory Credits: 1
- PHYS 260 - University Physics II Credits: 3
- PHYS 261- University Physics II Laboratory Credits: 1


## 11 Credits of Math

- MATH 113 - Analytic Geometry and Calculus I Credits: 4 (Mason Core: Quantitative Reasoning course)
- MATH 114 - Analytic Geometry and Calculus II Credits: 4
- MATH 213 - Analytic Geometry and Calculus III Credits: 3


## 7-8 Credits of Supporting Science Electives

## Choose from one of three options:

Option 1:

- GEOL 101- Introductory Geology I Credits: 4 (Mason Core: Natural Science course)
- GEOL 309 - Introduction to Oceanography Credits: 3

Option 2:

- EVPP 110 - The Ecosphere: An Introduction to Environmental Science I Credits: 4 (Mason Core: Natural Science course)
- EVPP 111- The Ecosphere: An Introduction to Environmental Science II Credits: 4 (Mason Core: Natural Science course)

Option 3:

- CHEM 341-Fundamental Inorganic Chemistry Credits: 3
and at least an additional 4 credits chosen from:
- CHEM 355- Undergraduate Research Credits: 1-3
- CHEM 451- Special Projects in Chemistry Credits: 1-3
- CHEM 452 - Special Projects in Chemistry Credits: 1-3

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

## AEC Concentration Total: 78-79 credits

## $\Delta$ Concentration in Biochemistry (BC)

Students planning professional careers in biochemistry, the pharmaceutical industry, medicine, biotechnology, or related fields with a chemistry emphasis should choose this program instead of the Chemistry, BS without a concentration. This concentration provides students with a focus on biochemistry while retaining a strong chemistry foundation. Students are allowed to tailor the concentration to their interests with 9 credits of science electives.

Students must fulfill all requirements for bachelor's degrees including the Mason Core. In addition, students majoring in chemistry with a concentration in biochemistry must complete the following courses with a minimum GPA of 2.30. No more than two courses with a grade of 'D' (1.00) in CHEM coursework may be applied to the major. Through the coursework below, students satisfy the Mason Core requirements in 'Natural Science' and 'Quantitative Reasoning'.

## 39 Credits of Chemistry

- CHEM 211- General Chemistry Credits: 4 (Mason Core: Natural Science course)
- CHEM 212 - General Chemistry Credits: 4 (Mason Core: Natural Science course)
- CHEM 313 - Organic Chemistry Credits: 3
- CHEM 314 - Organic Chemistry II Credits: 3
- CHEM 315- Organic Chemistry Lab I Credits: 2
- CHEM 318 - Organic Chemistry Lab II Credits: 2
- CHEM 321- Elementary Quantitative Analysis Credits: 4
- CHEM 331- Physical Chemistry I Credits: 3
- CHEM 336 - Physical Chemistry Lab I Credits: 2
- CHEM 446 - Bioinorganic Chemistry Credits: 3
- CHEM 463-General Biochemistry I Credits: 4
- CHEM 464-General Biochemistry II Credits: 3
- CHEM 465 - Biochemistry Lab Credits: 2


## 8 Credits of Math

- MATH 113 - Analytic Geometry and Calculus I Credits: 4 (Mason Core: Quantitative Reasoning course)
- MATH 114 - Analytic Geometry and Calculus II Credits: 4


## 8 Credits of Physics

## Choose one Mason Core: Natural Science sequence:

- PHYS 243 - College Physics Credits: 3
- PHYS 244 - College Physics Lab Credits: 1
- PHYS 245-College Physics Credits: 3
- PHYS 246 - College Physics Lab Credits: 1
or
- PHYS 160 - University Physics I Credits: 3
- PHYS 161- University Physics I Laboratory Credits: 1
- PHYS 260 - University Physics II Credits: 3
- PHYS 261- University Physics II Laboratory Credits: 1


## 8 Credits of Biology

- BIOL 213 - Cell Structure and Function Credits: 4 (Mason Core: Natural Science course)
- BIOL 305 - Biology of Microorganisms Credits: 3
- BIOL 306 - Biology of Microorganisms Laboratory Credits: 1


## 9 Credits of Approved Science Electives

- 9 credits of approved science electives chosen from CHEM or BIOL courses numbered 302-499. Other science or math courses may be approved as electives, subject to prior approval of the coordinator.


## BC Concentration Total: 72 credits

## A Concentration in Chemistry Education (CHME)

Those interested in teaching high school chemistry should choose this concentration. This concentration is approved by the American Chemical Society and, upon completion of the degree, leads to state licensure to teach in Virginia.

Students must fulfill all requirements for bachelor's degrees including the Mason Core. In addition, students with a concentration in chemistry education must complete the following:

## 38 Credits of Chemistry

- CHEM 211- General Chemistry Credits: 4 (Mason Core: Natural Science course)
- CHEM 212 - General Chemistry Credits: 4 (Mason Core: Natural Science course)
- CHEM 313 - Organic Chemistry Credits: 3
- CHEM 314 - Organic Chemistry II Credits: 3
- CHEM 315 - Organic Chemistry Lab I Credits: 2
- CHEM 321- Elementary Quantitative Analysis Credits: 4
- CHEM 331- Physical Chemistry I Credits: 3
- CHEM 446 - Bioinorganic Chemistry Credits: 3
- CHEM463-General Biochemistry I Credits: 4
- CHEM 336 - Physical Chemistry Lab I Credits: 2 or CHEM 465 - Biochemistry Lab Credits: 2
- CHEM 470 - Laboratory Instructional Methods for Chemistry Credits: 3
- Choose one 3 credit upper-level chemistry elective


## 11 Credits of Math

- MATH 113 - Analytic Geometry and Calculus I Credits: 4 (Mason Core: Quantitative Reasoning course)
- MATH 114 - Analytic Geometry and Calculus II Credits: 4
- STAT 250 - Introductory Statistics I Credits: 3 (Mason Core: Quantitative Reasoning course)


## 8 Credits of Physics

## Choose one Mason Core: Natural Science sequence:

- PHYS 243-College Physics Credits: 3
- PHYS 244-College Physics Lab Credits: 1
- PHYS 245-College Physics Credits: 3
- PHYS 246 - College Physics Lab Credits: 1
or
- PHYS 160 - University Physics I Credits: 3
- PHYS 161- University Physics I Laboratory Credits: 1
- PHYS 260 - University Physics II Credits: 3
- PHYS 261- University Physics II Laboratory Credits: 1


## 8 Credits of Other General Science

Mason Core: Natural Science courses:

- GEOL 101- Introductory Geology I Credits: 4 and
- BIOL 103 - Introductory Biology I Credits: 4 or BIOL 213 - Cell Structure and Function Credits: 4 (Mason Core: Natural Science course)


## Teacher Licensure Requirement ( 21 credits)

A grade of ' $C$ ' or better is required for all licensure coursework.

- EDCI 473 - Teaching Science in the Secondary School Credits: 3
- EDCI 483 - Advanced Methods of Teaching Science in Secondary School Credits: 3
- EDCI 490 - Student Teaching in Education Credits: 6 (Mason Core: Synthesis course)
- EDRD 419 - Literacy in the Content Areas Credits: 3
- EDUC 372 - Human Development, Learning, and Teaching Credits: 3 (Mason Core: Social and Behavioral Science course)
- EDUC 422 - Foundations of Secondary Education Credits: 3


## Notes:

The coursework above satisfies the Mason Core requirements in 'Natural Science' and 'Quantitative Reasoning'.

During their second year, students should contact the Graduate School of Education in order to attend an information session and to prepare for taking the Praxis Core Academic Skills for Educators Test.

## CHME Concentration Total: 86 credits

## Mason Core and Elective Credits (34-50 credits)

The remaining credits (see below for specific credit counts by concentration) are available to fulfill any remaining Mason Core requirements (outlined below). Once those and all requirements for bachelor's degrees are met, any remaining credits may be completed by elective courses. Students are strongly encouraged to consult with their advisor to ensure that they fulfill all requirements.

- Without concentration: 48-50 credits
- AEC concentration: 41-42 credits
- BC concentration: 48 credits
- CHME concentration: 34 credits


## Mason Core

Please note that some Mason Core requirements may already be fulfilled by the major requirements listed above.
Expand each item below for a link to specific course lists for each category:

## Foundation Requirements (15-19 credits)

- Mason Core UWCU - Written Communication Credits: 6
- Mason Core UOC - Oral Communication Credits: 3
- Mason Core UQR - Quantitative Reasoning Credits: 3
- Mason Core UITC - Information Technology Credits: 3-7


## Core Requirements (22 credits)

- Mason Core UFA - Arts Credits: 3
- Mason Core UGU - Global Understanding Credits: 3
- Mason Core ULIT - Literature Credits: 3
- Mason Core UNSL - Natural Science Credits: 7
- Mason Core USBS - Social and Behavioral Sciences Credits: 3
- Mason Core UWC - Western Civilization/Western History Credits: 3


## Synthesis/Capstone Requirement (minimum 3 credits)

- Mason Core USYN - Synthesis/ Capstone Credits: minimum 3


## Degree Total: Minimum 120 credits

 Pa Paf



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