

College of Science
Department of Geosciences
Bachelor of Science in Geosciences (BS)
Geochemistry (GCHE) Option
For students entering under UG Catalog 2023-2024

I. PATHWAYS TO GENERAL EDUCATION REQUIREMENTS (45 credits*)		
Pathways requirements and approved courses are available online: http://www.cle.prov.vt.edu/guides/index.html		
Concept 1: Discourse (9 credits)		
(Foundation: 6 credits)	<u>ENGL 1105 (3)</u>	<u>ENGL 1106 (3)</u>
(Advanced: 3 credits)	Completed by major/option requirements	
Concept 2: Critical Thinking in the Humanities (6 credits)	_____ (3)	_____ (3)
(Select from approved Pathways courses)		
Concept 3: Reasoning in the Social Sciences (6 credits)	_____ (3)	_____ (3)
(Select from approved Pathways courses)		
Concept 4: Reasoning in the Natural Sciences (6 credits)	Completed by major/option requirements	
Concept 5: Quantitative and Computational Thinking (9 credits)		
(Foundation: 6 credits)	Completed by major/option requirements	
(Advanced: 3 credits)	Completed by major/option requirements	
Concept 6: Critique and Practice in Design and the Arts (6 credits)	_____ (3 Arts)	_____ (3 Design)
(Select from approved Pathways courses)		
Concept 7: Critical Analysis of Identity & Equity in the US (3 credits)	_____ (3)	
(Select from approved Pathways courses, can double count with another concept)		

** If requirements completed as outlined, 18 credit hours of Pathways will be satisfied by major/option requirements*

II. GEOS Degree Core (20 credits)		Sem†	
GEOS 2004 Geoscience Career and Professional Development	_____ (3)	S	
GEOS 2024 Earth's Dynamic Systems	_____ (6)	F	
GEOS 2444 Geoscience Field Observations. <i>Pre: (1004, 1104) or 2024 or 2104</i>	_____ (2)	S	
GEOS 3204 Sedimentology-Stratigraphy. <i>Pre: (1004 or 2024 or 2104)</i>	_____ (3)	F	
GEOS 3404 Elements of Structural Geology. <i>Pre: (1004 or 2024 or 2104)</i>	_____ (3)	F	
GEOS 3504 (MSE 3104) Mineralogy. <i>Pre: CHEM 1035</i>	_____ (3)	F	
III. GEOS Major Requirements (16 credits)*		Sem†	Meets Pathways:
GEOS 4024* Senior Seminar. <i>Pre: (2004, 2024, 2444, 3204, 3404, 3504)</i>	_____ (3)	S	1 advanced
GEOG 2084 Principles of Geographic Information Systems	_____ (3)		
CHEM 1035* General Chemistry Co: <i>(MATH 1025 or MATH 1225)</i>	_____ (3)		4
CHEM 1045* General Chemistry Laboratory Co: <i>(1035)</i>	_____ (1)		4
STAT 3005* Statistical Methods. <i>Pre: (MATH 1205 or MATH 1225)</i>	_____ (3)		5 advanced
OR STAT 3615* Biological Statistics. <i>Pre: MATH 1205 or MATH 1525 or MATH 1225 or MATH 1025 or MATH 1524 or ISC 1105</i>			
Choose 1 course from:			
GEOS 3024 Computational Methods in the Geosciences <i>Pre: MATH 1225 or MATH 1025</i>			
CS 1044 Introduction to Programming in C	_____ (3)		
CS 1064 Intro to Programming in Python			

* Credits may double-count for Major Requirements and Pathways (Section I)

IV. GCHE Option Requirements (42 credits)*		Sem†	Meets Pathways:
MATH 1225* Calculus of a Single Variable	_____ (4)		5 foundation
MATH 1226* Calculus of a Single Variable. <i>Pre: 1225</i>	_____ (4)		5 foundation
MATH 2204 Introduction to Multivariable Calculus. <i>Pre: 1226</i>	_____ (3)		
PHYS 2305* Foundations of Physics. <i>Pre: (MATH 1205 or MATH 1205H or MATH 1225) or (MATH 1206 or MATH 1206H or MATH 1226)</i>	_____ (4)		4
PHYS 2306* Foundations of Physics. <i>Pre: (MATH 1206 or MATH 1206H or MATH 1226), PHYS 2305</i>	_____ (4)		4
CHEM 1036* General Chemistry. <i>Pre: (1035 or 1055 or 1055H)</i>	_____ (3)		4
CHEM 1046* General Chemistry Laboratory. <i>Co: 1036</i>	_____ (1)		4
CHEM 2114 Analytical Chemistry. <i>Pre: 1036 or 1056 or 1056H. Co: 2124.</i>	_____ (3)	S	
CHEM 2124 Analytical Chemistry Laboratory Techniques and Practice. <i>Pre: 1046 or 1066. Co: 2114</i>	_____ (1)	S	
CHEM 2424 Descriptive Inorganic Chemistry (spring only). <i>Pre: (1036 or 1056)</i>	_____ (3)		
OR CHEM 2514 Survey of Organic Chemistry. <i>Pre: (1035 or 1055 or 1055H), (1036 or 1056 or 1056H), (1045 or 1065), (1046 or 1066)</i>			
GEOS 3704 Igneous & Metamorphic Rocks. <i>Pre: (1004, 1104) or 2024</i>	_____ (3)	S	
GEOS 4634 Environmental Geochemistry. <i>Pre: MATH 1225, CHEM 1035</i>	_____ (3)	F	
Choose 6 credits from:			
GEOS 4994 Undergraduate Research	_____ ()		
GEOS 4964 Field Study	_____ ()		

* Credits may double-count for Option Requirements and Pathways (Section I)

V. GCHE Option Electives (minimum of 11 credits)

Sem†

Choose from within the themes or from different themes, listed below.

Environmental Theme

GEOS 3014 Environmental Geosciences (3)	S
GEOS 3304 (CSES 3304) (GEOG 3304) Geomorphology (3) <i>Pre: (GEOG 1104 or GEOS 1004 or GEOS 2104 or GEOS 2024)</i>	S
GEOS 3614 (CSES 3314) (ENSC 3114) Soils (3) <i>Pre: CHEM 1036</i>	F
GEOS 3624 (CSES 3124)(ENSC3124) Soils Laboratory (1) <i>Co: 3614</i>	F
GEOS 4804 Groundwater Hydrology (3) <i>Pre: MATH 1226 or 2024, PHYS 2205 or 2305</i>	F,S

Energy, Mining and Materials Theme

GEOS 4624 Mineral Deposits (3) <i>Pre: 1004 or 2104 or 2024</i>	S
GEOS 4824 Engineering Geology (3) <i>Pre: (1004 or 2024 or 2104), (PHYS 2305 or PHYS 2205), (CHEM 1035 or CHEM 1015), (MATH 1225 or MATH 1025)</i>	S
MINE 2114 Energy and Raw Materials: Geopolitics and Sustainable Development (3)	
MINE 2504 Introduction to Mining Engineering (3)	
MSE 2034 Elements of Materials Engineering (3) <i>Pre: CHEM 1035. Co: PHYS 2305</i>	
NANO 1015 Intro to Nanoscience (3)	
NANO 1016 Intro to Nanoscience (3) <i>Pre: NANO 1015</i>	

Chemistry Theme

CHEM 2535 Organic Chemistry (3) <i>Pre: 1036 or 1056 or 1056H or ISC 1106 or ISC 1106H</i>	
CHEM 2536 Organic Chemistry (3) <i>Pre: 2535 or (2565 or 2565H)</i>	
CHEM 2545 Organic Chemistry Laboratory (1) <i>Pre: 1046 or 1066 or ISC 1116. Co: 2535, 2565</i>	
CHEM 2546 Organic Chemistry Laboratory (1) <i>Pre: 2545. Co : 2536</i>	
CHEM 4615 Physical Chemistry for Life Sciences (3) <i>Pre: (1036 or 1056 or 1056H), (MATH 1026 or MATH 1226), (PHYS 2206 or PHYS 2306)</i>	
CHEM 4616 Physical Chemistry for Life Sciences (3) <i>Pre: (1036 or 1056 or 1056H), (MATH 1026 or MATH 1226), (PHYS 2206 or PHYS 2306)</i>	

VI. FREE ELECTIVES

Complete remaining credit hours needed to satisfy degree 120 credit hour requirement

_____ ()	_____ ()
_____ ()	_____ ()

NOTES:

† Semester of course offering only noted for GEOS courses. Semester offered is subject to change. Please consult the timetable or your advisor for current information.

Prerequisites

Prerequisites are listed on the checksheet. There are no hidden prerequisites, although some of the courses listed are prerequisites for other courses. Even when listed, prerequisites are subject to change. Please consult University Course Catalog for current information.

Acceptable substitutions

GEOS 1004, 1104, 1014 for GEOS 2024

GEOS 2104, 1014 for GEOS 2024

GEOS 4974 for GEOS 4994

CHEM 1055 or CHEM 1055H for CHEM 1035 and CHEM 1056 or CHEM 1056H for CHEM 1036

CHEM 1065 for CHEM 1045 and CHEM 1066 for CHEM 1046

COMM 1015 for ENGL 1105 and COMM 1016 for ENGL 1106

CS 1344 for CS 1044

MATH 2204H for MATH 2204

Foreign language requirement

Students who did not successfully complete at least two years of a single foreign, classical, or sign language during high school must successfully complete six semester hours of a single foreign, classical, or sign language at the college level. Courses taken to meet this requirement do not count toward the hours required for graduation. Please consult the Undergraduate Catalog for details.

Satisfactory progress toward degree (Policy 91)

1. By 45 hours attempted at Virginia Tech, students must have completed the following courses:

GEOS 2004, 2024 (or 1004, 1104, 1014 or 2104, 1014), 2444, 3504

MATH 1225

CHEM 1035, 1045

2. By 60 hours attempted at Virginia Tech, students must have completed the following course:

PHYS 2305

3. Students must achieve an overall GPA of 2.0 and an in-major GPA of 2.5 upon attempting 15 GEOS credit hours (including transfer credit, courses completed with a grade of "W", advanced placement or IB credit)

Graduation requirements

Graduation requires completion of a minimum of 120 credit hours with a GPA of 2.0 or greater for all hours attempted. In addition, students must have an in-major GPA of 2.5 or greater. The in-major GPA is calculated from all GEOS courses.