Geosciences Undergraduate Handbook

Department of Geosciences

Catalog Year: 2024-2025 *(rev 8 Jan 2025)*

The Department of Geosciences focuses on research and education from the Core to the Clouds, with emphasis on the solid Earth, Earth's Surface, Oceans, Atmosphere, and on organisms that occur in each of these spheres. We study processes that have operated over the past 4.5 billion years, which are operating on the Earth today, and that will be important in shaping our future.

Specific fields of emphasis include biogeochemistry; climate dynamics; gem science, geoarchaeology; geochemistry; geochronology; geology; geomorphology; geophysics; mineral resources; mineralogy; paleoclimate; paleolimnology; palynology; paleontology; petrology; planetary geology; sedimentology; stratigraphy; structural geology; thermochronology; and tectonics.

We encourage interdisciplinary approaches to research in the geosciences and have strong collaborations with researchers in many different fields on campus, across the US, and around the world. Research projects are led by faculty members and commonly involve graduate and undergraduate students.

According to U.S. News and World Report, the Department of Geosciences is currently ranked #10 in the US, with more specific rankings of #4 for Earth Sciences, #5 for Geology, #6 for Geochemistry, and #15 for Geophysics and Seismology. We are ranked #25 globally. The recognition that comes with these rankings will be of great benefit for you as you pursue additional studies and/or a career in Earth Sciences and related fields.

To learn more about the Department of Geosciences, please visit our web page at http://www.geo.arizona.edu. You will find separate sections that describe our people (faculty, graduate students, undergraduate students, staff members), research areas, laboratories, degrees, courses, and latest accomplishments. You will also find information that is specifically relevant for undergraduate students, including descriptions of our degrees, course offerings, career opportunities, undergraduate club, and advisors.

If you would like more information, please contact Dr. Jessica Kapp, advisor for Undergraduate students. You can contact Dr. Kapp at jkapp@arizona.edu, set up an appointment through Trellis, or drop by her office in Gould-Simpson 210A during drop in hours.

DEGREES OFFERED

The Department of Geosciences offers a BS in Geosciences, a BS in Planetary Geoscience, and a BA in Geosciences and Society. The BS in Geosciences has four sub-plans, including Geology, Geophysics, Earth-Ocean-Climate, and Gem Science. The BA in Geosciences and Society offers three sub-plans, including Law, Public Policy, and Science Communication. Courses within our degree tracks provide training in main categories of English, Second Language, Math, Chemistry, Physics, Computer Science, Core courses in Geosciences, and Electives in Geosciences and related fields. Every degree requires at least 120 units.

Each of our degrees is described below.

BS in Geosciences

Geology: The Bachelor of Science in Geosciences with a Geology emphasis provides students with an understanding of fundamental concepts in geosciences including the basic structure of the Earth, major events in the evolution of life on Earth, plate tectonics, formation and importance of Earth materials and natural resources, processes that shape and change our planet, and linkages between humans and our physical environment. Graduates pursue careers in research, energy, mineral resources, academia and more.

Geophysics: Explore a greater understanding of our planet - from its inner core to the depths of the oceans to the outer reaches of space. Students who select the Bachelor of Science in Geosciences with a Geophysics emphasis take an interdisciplinary approach to the study of the planet. A Geosciences degree provides students with an understanding of fundamental concepts in geosciences including the basic structure of the Earth, major events in the evolution of life on Earth, plate tectonics, formation and importance of Earth materials and natural resources, processes that shape and change our planet, and linkages between humans and our physical environment. Students will develop an understanding of Earth's interior and its connection to surface processes, including geodynamics, seismology, tectonics, geomagnetism, and volcanism, and apply quantitative skills to describe and model various Earth systems.

Earth-Ocean-Climate: Explore the history of Earth's climate, global change, ocean science and modern climate dynamics. Students who select the Bachelor of Science in Geosciences with an Earth, Oceans and Climate emphasis are immersed in an interdisciplinary approach to the study of the planet. Students will develop an understanding of Earth's climate - past, present, and future - and the important connections between the solid Earth, oceans, and atmosphere, and how they influence modern climate dynamics. Explore this world-renowned field of study at the University of Arizona and discover the mysteries behind our planet. Graduates pursue careers in environmental geology and scientific research in fields such as oceanography, climate science, surficial processes, paleoclimate, paleoecology and more.

Gem Sciences: Discover new technologies in the evolving global market of gemstone mining, sales, and research. Students who select the Bachelor of Science in Geosciences with a Gem Science emphasis explore a curriculum that is one of its kind in the nation and is designed to meet the demands of a growing segment in the jewelry industry. Learn analytical techniques for prospecting and characterizing gemstones. Join the rising need for expertise in the field and discover the research possibilities in a $23+ billion industry. Explore the evolution of the gem industry and how Geosciences relates to other areas of science and to society in general. Gem Science produces fun and outstanding career growth opportunities.

BS in Planetary Geoscience

The B.S. in Planetary Geoscience will prepare students for science and industry careers in the rapidly expanding field of planetary science and exploration (including Earth and its Moon, the planets, their satellites, and myriad minor bodies in the solar system; as well as exoplanetary systems). The curriculum will build on a foundation of mathematics, physics and chemistry; it will comprise fundamental training in Earth materials, structures, and processes; and it will provide advanced study of the physical and chemical evolution of the Solar System and advanced course options focused on particular planetary bodies and planetary topics. The curriculum will culminate in a capstone research experience and advanced fieldwork in relevant Earth settings. Students will take courses from faculty in two internationally recognized, top-rated departments - Planetary Science and Geosciences - with opportunities for transdisciplinary mentorship and advisement.

BA in Geosciences and Society

This degree focuses on the intersection of humans and Earth, building a strong geoscience foundation while concentrating on one of three social science areas: Science Communication, Law, or Public Policy. These tracks combine an appropriate set of required Geoscience and related science courses with a set of required social science classes. It is for students interested in Geoscience in a broader sense, with less math and science requirements than BS tracks. For those interested in taking the Law or Policy tracks, the required Geoscience classes cover subject matter that is regularly involved in current legal or policy matters, such as climate change and natural resources. The Geoscience focus of the Science Communication track is slightly different, to also include subjects of considerable public interest, such as paleontology, which are less likely to be of concern to policy makers and the law. Curricular requirements in this degree allow for more flexibility in a student’s pursuit of other interests, with plenty of open elective credits to provide the opportunity for double-majoring, minoring, or simply exploring other course work to enhance one’s educational experience, career training, or preparation for graduate studies. The degree is open to all students, with no minimum GPA or other academic restrictions.

Requirements for Geology Sub-plan: 2024-25 Catalog Year

SECOND LANGUAGE REQUIREMENT
(Requirement can be met with proficiency exam):

Semester 1		4
Semester 2	(completion with a grade of C or higher)	4

GENERAL EDUCATION
GE: Introduction Course

UNIV 101	Introduction to General Ed (Waived for new transfer students)	1

GE: Exploring Perspectives (12 units):

Artist		3
Humanist		3
Nat Scientist	Fulfilled with one: Geos 212, 216, 218 or Chem 151	3
Social Scientist		3

GE: Building Connections (9 units):

		3
		3
		3

GE: Portfolio (3 units):

UNIV 301	General Ed Capstone (Waived for new transfer students)	3

ENGLISH (6 units):

ENGL 101	English Composition	3
ENGL 102	English Composition (grade of B or higher to meet MCWA)	3

or

ENGL 109H	English Composition	3

or

ENGL 106	English Composition for ESL Students	3
ENGL 107	English Composition for ESL Students	3
ENGL 108	English Composition for ESL Students (grade of B or higher to meet MCWA)	3

MATHEMATICS (9-12 units):

MATH 122A&B or MATH 125	Calculus I (P: MATH 120R or MATH 112 with >C) (PPL score of >75 for 122A/B; PPL score > 92 for 125)	3-5
MATH 129	Calculus II (P: MATH 122B/125 (with >C)	3

Plus one of the following:

MATH 163	Basic Statistics (P: MATH 112)	3
MATH 223	Vector Calculus (P: MATH 129)	4
MATH 263	Statistics and Biostatistics (P: MATH 112)	3
MATH 313	Intro to Linear Algebra (P: MATH 129)	3

CHEMISTRY (8 units):

CHEM 141	Intro Chemistry I (P: MATH 112 or appropriate math placement)	3
CHEM 143	Intro Laboratory I (CR: CHEM 141)	1
CHEM 142	Intro Chemistry II (P: CHEM 141)	3
CHEM 144	Intro Laboratory II (P: CHEM 143; CR: CHEM 142)	1

or

CHEM 151	General Chemistry I (P: MATH 112 or appropriate math placement)	4
CHEM 152	General Chemistry II (P: CHEM 151)	4

PHYSICS (7-8 units):

PHYS 102	Introductory Physics I (P: MATH 112 or appropriate math placement)	3
PHYS 181	Introductory Laboratory I (CR: PHYS 102)	1
PHYS 103	Introductory Physics II (P: PHYS 102)	3
PHYS 182	Introductory Laboratory II (P: PHYS 181; CR: PHYS 103)	1

or

PHYS 141	Introductory Mechanics (P: MATH 122B or MATH 125; CR: MATH 129)	4
PHYS 142	Introductory Optics and Thermodynamics (P: PHYS 141 and MATH 129 or appropriate math placement)	3

GEOSCIENCES CORE (Complete 5 courses):

GEOS 251	Physical Geology (Fall and Spring)	4
Comp App: GEOS 280 or GEOS 285	Intro to MatLab (P: GEOS Major/Minor) (Fall) or Intro to Python (P: GEOS 251) (Spring)	3
GEOS 300	Earth Surface Processes (P: GEOS 251, Calculus I proficiency recommended) (Spring)	3
GEOS 302	Principles Stratigraphy and Sedimentation (P: GEOS 251, PHYS 102 or 141) (Fall) (Writing Proficiency course; MCWA alt)	4
Capstone: Field Camp	GEOS 414 Geology Field Camp (P: GEOS 251, 302, 304) (Summer) *or* GEOS 405 Accessible Earth (P: ≥30 units of Geos courses with GPA ≥2.75) (Summer) *or* Advisor-approved, in-person, equivalent transfer Field Camp(s)	6

GEOLOGY CORE (Complete all 5 courses):

GEOS 304	Structural Geology (P: GEOS 251, PHYS 102 or 141) (Spring)	4
GEOS 306	Mineralogy (P: GEOS 251, CHEM 151) (Fall)	3
GEOS 308	Paleontology (P: GEOS 251 or GEOS 212 or ECOL 182R/L) (Spring)	3
GEOS 322	Intro to Geophysics (P: GEOS 251; P: MATH 122B or 125) (Spring)	3
GEOS 356	Petrology (P: GEOS 306, MATH 122B or 125) (Spring)	4

ADVISOR APPROVED EMPHASIS COURSES (15 units)

Majority of courses should consist of GEOS 300 or 400 level
Full list of approved classes on advisement report
No more than 3 units of Preceptor (GEOS 397A)
Up to 6-units of a combination of Internship, Preceptorship (3-unit max), and/or Research allowed.
No double-dipping Emphasis credits with Capstone or other GEOS BS requirements.

ELECTIVE COURSES (1-20 unit)

Geology Advisor Approved Emphasis Courses (offerings listed between Fall 24 and Spring 27):

GEOS 195D (Sense of Place):
GEOS 212: Oceanography (can double dip this for EP Nat Sci Gen Ed): offered reg term and online in summer
GEOS 216: Dinosaurs (can double dip this for EP Nat Sci Gen Ed): offered reg term and online in summer
GEOS 218: Natural Disasters (can double dip this for EP Nat Sci Gen Ed): offered online reg term and summer
GEOS 240 (National Parks): Fall 25
GEOS 255 (Historical Geology): Spring 25, Spring 26, Spring 27
GEOS 260 (Gems and Minerals): Fall 24, Fall 25, Fall 26
GEOS 270 (Planetary Geoscience): Spring 25, Spring 26, Spring 27
GEOS 342 (History of Earth's Climate): Fall 24, Fall 25, Fall 26
GEOS 346 (Mineral and Energy Resources): Spring 25, Fall 26
GEOS 397A (Preceptorship): every semester
GEOS 400 (Intro to Geochemistry): Spring 25, Spring 26, Spring 27
GEOS 412A/B (Ocean Sciences): Spring 25, Spring 26, Spring 27
GEOS 415 (Geologic Hazards): Fall 24
GEOS 417 (Sedimentary Basin Analysis): Fall 24, Fall 26
GEOS 419 (Physics of the Earth): Spring 25, Spring 27
GEOS 423 (Regional Structural Geology): Spring 25
GEOS 425 (Regional Tectonics): Fall 24, Fall 26
GEOS 427 (Orogenic Systems):
GEOS 430 (Chemical Evolution of the Earth):
GEOS 432 (Intro to Seismology): Fall 24, Fall 25, Fall 26
GEOS 434A (Exploration Seismology): Fall 24, Fall 25, Fall 26
GEOS 439A (Intro to Dendrochronology):
GEOS 440 (Geodynamics):
GEOS 446 (Economic Mineral Deposits): Fall 24, Fall 25, Fall 26
GEOS 450 (Geomorphology and Landscape Evolution): Fall 24, Fall 26
GEOS 453 (Glacial and Quaternary Geology):
GEOS 456 (Thrust Belts and Synorogenic Sediments): Spring 25
GEOS 460 (Characterization and Identification of Minerals):
GEOS 462 (Petrology of Gems): Spring 25
GEOS 466 (Stable Isotope Geochemistry): Fall 25
GEOS 469 (Seismic Data Processing):
GEOS 470L/R (Volcanology): Spring 26
GEOS 477 (Active Tectonics):
GEOS 478 (Global Change): Fall 24, Fall 25, Fall 26
GEOS 479 (Intro to Climate Dynamics): Spring 25, Spring 26, Spring 27
GEOS 482 (Paleoceanography and Paleoclimatology): Fall 24, Fall 26
GEOS 482B (Petrology and Geochemistry for Resource Geology): Spring 25, Spring 26, Spring 27
GEOS 483 (Modes of Climate Variability): Spring 25, Spring 27
GEOS 484 (Co-evolution of Earth and Biosphere): Fall 26
GEOS 486 (Organic Geochemistry): Fall 24
GEOS 487 (Physical and Dynamical Oceanography): Fall 25, Fall 26
GEOS 489: (Quaternary Geology):

ANTH 304, ANTH 335, ANTH 435, ANTH 439A, ASTR 403, ASTR 442, ATMO 412A, CHEM 325, CHEM 326, CHEM 480A, CHEM 480B, ECOL 335, ECOL 360, ECOL 406L, ECOL 406R, ECOL 412A, ECOL 412B, ENVS 412A, GEN 402, GEN 416, GEN 427, GEN 448, GEOG 430, GEOG 438, GEOG 439A, HWRS 350, HWRS 411, HWRS 431, HWRS 480, MATH 313, MATH 322, MNE 402, MNE 427, MSE 412, PHYS 403, PTYS 403, PTYS 411, PTYS 442, WSM 439A, Approved Transfer Course

Following is a recommended Four-Year Schedule for the Geology Sub-Plan:

YEAR 1	YEAR 2	YEAR 3	YEAR 4
FALL	**FALL**	**FALL**	**FALL**
GEOS 251 (4)	GEOS 306 (3)	GEOS 302 (4)	GEOS 322 (3)
MATH 122A/B (5)	Additional MATH (3)	GEOS Emph (3)	GEOS Emph (3)
ENGL 1st Sem (3)	PHYS 1 (4)	GEOS Comp App (3)	GE Core (6)
CHEM 1 (4)	GE Core (3)	Elective (3)	Elective (3)
TOTAL: 16 units	TOTAL: 13 units	TOTAL: 13 units	TOTAL: 15 units

YEAR 1	YEAR 2	YEAR 3	YEAR 4
SPRING	**SPRING**	**SPRING**	**SPRING**
GEOS Emph (3)	GEOS 300 (3)	GEOS 304 (4)	GEOS Emph (3)
MATH 129 (3)	GEOS 356 (4)	GEOS Emph (3)	GEOS 308 (3)
ENGL 2nd Sem (3)	PHYS 2 (4)	GE Core (3)	GE Core (3)
CHEM 2 (4)	GE Core (3)	Elective (3)	Electives (6)
Intro to GE (1)			GE Portfolio (1)
TOTAL: 14 units	TOTAL: 14 units	TOTAL: 13 units	TOTAL: 16 units

YEAR 1	YEAR 2	YEAR 3	YEAR 4
SUMMER	**SUMMER**	**SUMMER**	**SUMMER**
		Field Camp (6)	

Please note that this schedule assumes first-year placement into MATH 122A/B. If you need to begin the MATH sequence with MATH 100, 112, or 120R, this will delay your enrollment in PHYS and GEOS Core courses.

Requirements for Geophysics Sub-plan: 2024-25 Catalog Year

SECOND LANGUAGE REQUIREMENT
(Requirement can be met with proficiency exam):

Semester 1		4
Semester 2	(completion with a grade of C or higher)	4

GENERAL EDUCATION

GE: Introduction Course

UNIV 101	Introduction to General Ed (Waived for new transfer students)	1

GE: Exploring Perspectives (12 units):

Artist		3
Humanist		3
Natural Scientist	Fulfilled with one: Geos 212, 216, 218 or Chem 151	3
Social Scientist		3

GE: Building Connections (9 units):

		3
		3
		3

GE: Portfolio (3 units):

UNIV 301	General Ed Capstone (Waived for new transfer students)	1

ENGLISH (6 units):

ENGL 101	English Composition	3
ENGL 102	English Composition (grade of B or higher to meet MCWA)	3

or

ENGL 109H	English Composition	3

or

ENGL 106	English Composition for ESL Students	3
ENGL 107	English Composition for ESL Students	3
ENGL 108	English Composition for ESL Students (grade of B or higher to meet MCWA)	3

MATHEMATICS (19 units; fulfills Math Minor requirements):

MATH 122A&B *or* MATH 125	Calculus I (P: MATH 120R or MATH 112 with >C) (PPL score of >75 for 122A/B; PPL score > 92 for 125)	3-5
MATH 129	Calculus II (P: MATH 122B or MATH 125 with grade of C or higher)	3
MATH 223	Vector Calculus (P: MATH 129)	4
MATH 254	Differential Equations (P: MATH 129 or 223)	3
MATH 313	Intro to Linear Algebra (P: MATH 129, 223, 243, 254, CSC 144, or CSC 245)	3
MATH 322	Mathematical Analysis for Engineers (P: MATH 223 and 254)	3

CHEMISTRY (4 units):

CHEM 141	Introductory Chemistry I (P: MATH 112 or appropriate math placement)	3
CHEM 143	Introductory Laboratory I (CR: CHEM 141)	1

or

CHEM 151	Chemical Thinking I (P: MATH 112 or appropriate math placement)	4

PHYSICS (7 units):

PHYS 141	Introductory Mechanics (P: MATH 122B or MATH 125; CR: MATH 129)	4
PHYS 142	Introductory Optics and Thermodynamics (P: PHYS 141 and MATH 129 or appropriate math placement)	3

GEOSCIENCES CORE (Complete 5 courses):

GEOS 251	Physical Geology (Fall and Spring)	4
Comp App: GEOS 280 *or* GEOS 285	MatLab (P: GEOS Major or Minor) (Fall) *or* Intro to Python (P: GEOS 251) (Spring)	3
GEOS 300	Earth Surface Processes (P: GEOS 251, Calculus I proficiency recommended) (Spring)	3
GEOS 302	Principles Stratigraphy and Sedimentation (P: GEOS 251, PHYS 102 or 141) (Fall) (Writing Proficiency course; MCWA alternative)	4
Capstone: Field Camp	GEOS 414 Geology Field Camp (P: GEOS 251, 302, 304) (Summer) *or* GEOS 405 Accessible Earth (P: >30 units of Geos courses with GPA of >2.75) (Summer) *or* Advisor-approved, in-person, equivalent transfer Field Camp(s)	6

GEOPHYSICS CORE (Complete all 7 courses):

GEOS 304	Structural Geology (P: GEOS 251, PHYS 102 or 141) (Spring)	4
GEOS 306	Mineralogy (P: GEOS 251, CHEM 151) (Fall)	3
GEOS 322	Intro to Geophysics (P: GEOS 251; P: MATH 122B or 125) (Spring)	3
GEOS 356	Petrology (P: GEOS 306, MATH 122B/125) (Spring)	4
GEOS 419	Physics of the Earth (P: MATH 254) (Spring odd years)	3
GEOS 432	Intro to Seismology (P: MATH 254) (Fall)	3
GEOS 434A	Intro to Exploration Seismology (P: MATH 129) (Fall)	3

ADVISOR APPROVED EMPHASIS COURSES (9 units

Majority of courses should consist of GEOS 300 or 400 level
Full list of approved classes on advisement report
No more than 3 units of Preceptor (GEOS 397A)
Up to 6-units of a combination of Internship, Preceptorship (3-unit max), and/or Research allowed.
No double-dipping Emphasis credits with Capstone or other GEOS BS requirements.

ELECTIVE COURSES (1-14 units)

Geophysics Advisor Approved Emphasis Courses (offerings listed between Fall 24 and Spring 27):

GEOS 212: Oceanography (can double dip this for EP Nat Sci Gen Ed): offered reg term and online in summer
GEOS 216: Dinosaurs (can double dip this for EP Nat Sci Gen Ed): offered reg term and online in summer
GEOS 218: Natural Disasters (can double dip this for EP Nat Sci Gen Ed): offered online reg term and summer
GEOS 240 (National Parks): Fall 25
GEOS 255 (Historical Geology): Spring 25, Spring 26, Spring 27
GEOS 260 (Gems and Minerals): Fall 24, Fall 25, Fall 26
GEOS 270 (Planetary Geoscience): Spring 25, Spring 26, Spring 27
GEOS 397A (Preceptorship): every semester
GEOS 400 (Intro to Geochemistry): Spring 25, Spring 26, Spring 27
GEOS 417 (Sedimentary Basin Analysis): Fall 24, Fall 26
GEOS 423 (Regional Structural Geology): Spring 25
GEOS 425 (Regional Tectonics): Fall 24, Fall 26
GEOS 427 (Orogenic Systems):
GEOS 440 (Geodynamics):
GEOS 446 (Economic Mineral Deposits): Fall 24, Fall 25, Fall 26
GEOS 462 (Petrology of Gems): Spring 25
GEOS 479 (Intro to Climate Dynamics): Spring 25, Spring 26, Spring 27
GEOS 477 (Active Tectonics):
GEOS 479 (Intro to Climate Dynamics): Spring 25, Spring 26, Spring 27
GEOS 482 (Petrology and Geochemistry for Resource Geology): Spring 25, Spring 26, Spring 27
GEOS 565 (Geophysical Methods in Planetary Analog Field Research): hopefully Summer 25
GEOS 567 (Inverse Problems in Geophysics):
GEOS 568 (Advanced Seismology): Fall 24

ASTR 403, ASTR 442, ENVS 330, GEN 330, GEN 416, GEN 448, GEOG 330, GEOG 403, GEOG 417, GEOG 419, GEOG 420, GIST 330, GIST 417, GIST 420, HWRS 411, HWRS 431, MATH 363, PHYS 403, PTYS 403, PTYS 407, PTYS 411, PTYS 442, PTYS 567, RNR 403, RNR 417, RNR 419, RNR 420, WSM 330, Approved Transfer Course

Following is a recommended Four-Year Schedule for the Geophysics Sub-Plan:

YEAR 1	YEAR 2	YEAR 3	YEAR 4
FALL	**FALL**	**FALL**	**FALL**
GEOS 251 (4)	GEOS 306 (3)	GEOS 302 (4)	GEOS 432 (3)
MATH 122A/B or 125 (3)	PHYS 1 (4)	GEOS 322 (3)	GEOS 434A (3)
ENGL 1st Sem (3)	MATH 223 (4)	MATH 313 (3)	GE Core (3)
GE Core (3)	GE Core (3)	GE Core (3)	Elective (6)
Intro to GE (1)			
TOTAL: 14 units	TOTAL: 14 units	TOTAL: 13 units	TOTAL: 15 units

YEAR 1	YEAR 2	YEAR 3	YEAR 4
SPRING	**SPRING**	**SPRING**	**SPRING**
Geophys Emph (3)	GEOS Comp App (3)	GEOS 300 (3)	GEOS 419 (3)
MATH 129 (3)	GEOS 356 (4)	GEOS 304 (4)	Geophys Emph (3)
CHEM 1 (4)	PHYS 2 (3)	Geophys Emph (3)	GE Portfolio (1)
ENGL 2nd Sem (3)	GE Core (3)	MATH 322 (3)	Elective (6)
GE Core (3)	MATH 254 (3)		
TOTAL: 16 units	TOTAL: 16 units	TOTAL: 13 units	TOTAL: 13 units

YEAR 1	YEAR 2	YEAR 3	YEAR 4
SUMMER	**SUMMER**	**SUMMER**	**SUMMER**
		Field Camp (6)	

Please note that this schedule assumes first-year placement into MATH 122A/B. If you need to begin the MATH sequence with MATH 100, 112, or 120R, this will delay your enrollment in PHYS and GEOS Core courses.

Requirements for Gem Science Sub-plan: 2024-25 Catalog Year

SECOND LANGUAGE REQUIREMENT
(Requirement can be met with proficiency exam):

Semester 1		4
Semester 2	(completion with a grade of C or higher)	4

GENERAL EDUCATION
GE: Introduction Course

UNIV 101	Introduction to General Ed (Waived for new transfer students)	1

GE: Exploring Perspectives (12 units):

Artist		3
Humanist		3
Natural Scientist	Fulfilled with one: Geos 212, 216, 218 or Chem 151	3
Social Scientist		3

GE: Building Connections (9 units):

		3
		3
		3

GE: Portfolio (3 units):

UNIV 301	General Ed Capstone (Waived for new transfer students)	1

ENGLISH (6 units):

ENGL 101	English Composition	3
ENGL 102	English Composition (grade of B or higher to meet MCWA)	3
or		
ENGL 109H	English Composition	3
or		
ENGL 106	English Composition for ESL Students	3
ENGL 107	English Composition for ESL Students	3
ENGL 108	English Composition for ESL Students (grade of B or higher to meet MCWA)	3

MATHEMATICS (19 units; fulfills Math Minor requirements):

MATH 122A&B *or* MATH 125	Calculus I (P: MATH 120R or MATH 112 with >C) (PPL score of >75 for 122A/B; PPL score > 92 for 125)	3-5
MATH 129	Calculus II (P: MATH 122B or MATH 125 with grade of C or higher)	3
MATH 223	Vector Calculus (P: MATH 129)	4

CHEMISTRY (4 units):

CHEM 151	Chemical Thinking I (P: MATH 112 or appropriate math placement)	4
MSE 110	Solid State Chemistry (P: CHEM 151)	4

PHYSICS (7 units):

PHYS 141	Introductory Mechanics (P: MATH 122B or MATH 125; CR: MATH 129)	4
PHYS 142	Introductory Optics and Thermodynamics (P: PHYS 141 and MATH 129 or appropriate math placement)	3

GEOSCIENCES CORE (Complete 5 courses):

GEOS 251	Physical Geology (Fall and Spring)	4
Comp App: GEOS 280 *or* GEOS 285	Intro to MatLab (P: GEOS Major or Minor) (Fall) *or* Intro to Python (P: GEOS 251) (Spring)	3
GEOS 300	Earth Surface Processes (P: GEOS 251, Calculus I proficiency recommended) (Spring)	3
GEOS 302	Principles of Stratigraphy and Sedimentation (P: GEOS 251, PHYS 102/110/141) (Fall) Writing Prof course; satisfies MCWA	4
Capstone Field Camp *&/or* Research or Thesis *&/or* Internship	 GEOS 414: Geology Field Camp (P: GEOS 251, 302, 304) or GEOS 405: Accessible Earth (P: >30 units of Geos courses with GPA of >2.75) (Summer) GEOS 492 Directed Research, GEOS 499 or 499H Independent Study, GEOS 498 Sr. Capstone Thesis, GEOS 498H Honor's Thesis GEOS 393 (1-6-unit exp.) or GEOS 493 (3-unit exp.)	6

GEM SCIENCE CORE (Complete 6 courses):

GEOS 260	Intro to Gems and Minerals (CHEM 151 or CHEM 141/143 or MSE 110 or instructor permission) (Fall)	4
GEOS 306	Mineralogy (P: GEOS 251 and CHEM 151) (Fall)	3
GEOS 356	Petrology (P: GEOS 306, MATH 122B or 125) (Spring)	4
GEOS 400 *or* GEOS 474	Intro to Geochem (P: CHEM 152) (Fall) *or* Geochronology-Thermochronology (P: GEOS 251) (Spring 26)	3
GEOS 462	Petrology of Gems (P: Completion of GEOS 260/306, and completion of or CR in GEOS 356, or instructor permission) (Spring 25)	3
MSE 480	Advanced Characterization Methods (P: advanced standing in ENGR) (Spring)	3

ADVISOR APPROVED EMPHASIS COURSES (13 units)

Majority of courses should consist of GEOS 300 or 400 level
Full list of approved classes on advisement report
No more than 3 units of Preceptor (GEOS 397A)
Up to 6-units of a combination of Internship, Preceptorship (3-unit max), and/or Research allowed.
No double-dipping Emphasis credits with Capstone or other GEOS BS requirements.

ELECTIVE COURSES (1-23 units)

Advisor Approved Emphasis Courses (offerings listed between Fall 24 and Spring 27):

GEOS 212: Oceanography (can double dip this for EP Nat Sci Gen Ed): offered reg term and online in summer
GEOS 216: Dinosaurs (can double dip this for EP Nat Sci Gen Ed): offered reg term and online in summer
GEOS 218: Natural Disasters (can double dip this for EP Nat Sci Gen Ed): offered online reg term and summer
GEOS 240 (National Parks): Fall 25
GEOS 255 (Historical Geology): Spring 25, Spring 26, Spring 27
GEOS 260 (Gems and Minerals): Fall 24, Fall 25, Fall 26
GEOS 270 (Planetary Geoscience): Spring 25, Spring 26, Spring 27
GEOS 304 (Structural Geology): Spring 25, Spring 26, Spring 27
GEOS 346 (Mineral and Energy Resources): Spring 25, Fall 26
GEOS 397A (Preceptorship): every semester
GEOS 400 (Intro to Geochemistry): Spring 25, Spring 26, Spring 27
GEOS 408 (Tectonic Petrology): Spring 25
GEOS 427 (Orogenic Systems):
GEOS 446 (Economic Mineral Deposits): Fall 24, Fall 25, Fall 26
GEOS 462 (Petrology of Gems): Spring 25
GEOS 474 (Geochronology-Thermochronology): Spring 26

ANTH 201, ART 237, CHEM 325, CHEM 326, CHEM 480A, CHEM 480B, MNE 201, OPTI 201R, OPTI 201L, OPTI 202R, OPTI 202L, OPTI 210, OPTI 330, OPTI 340, OPTI 340A, OPTI 404, OPTI 484, OPTI 485, RCSC 114, RCSC 240, RCSC 320, RCSC 360, Approved Transfer Course

Following is a recommended Four-Year Schedule for the Gem Science Sub-Plan:

YEAR 1	YEAR 2	YEAR 3	YEAR 4
FALL	**FALL**	**FALL**	**FALL**
GEOS 251 (4)	GEOS 260 (3)	GEOS 306 (4)	GEOS 302 (4)
MATH 122A/B or 125 (3)	MSE 110 (4)	GemSci Emph (3)	GEOS 400 or 474 (3)
ENGL 1st Sem (3)	MATH 223 (4)	PHYS 2 (3)	GemSci Emph (3)
GE Core (3)	GE Core (3)	GE Core (3)	Elective (6)
Intro to GE (1)	Elective (2)		
TOTAL: 14 units	TOTAL: 16 units	TOTAL: 13 units	TOTAL: 16 units

YEAR 1	YEAR 2	YEAR 3	YEAR 4
SPRING	**SPRING**	**SPRING**	**SPRING**
GemSci Emph (3)	GEOS Comp App (3)	GEOS 356 (4)	GEOS 462 (3)
MATH 129 (3)	GEOS 300 (3)	MSE 480 (3)	GemSci Emph (3)
CHEM 1 (4)	PHYS 1 (4)	GemSci Emph (3)	GE Portfolio (1)
ENGL 2nd Sem (3)	GE Core (3)	GE Core (3)	Elective (6)
GE Core (3)			
TOTAL: 16 units	TOTAL: 13 units	TOTAL: 13 units	TOTAL: 13 units

YEAR 1	YEAR 2	YEAR 3	YEAR 4
SUMMER	**SUMMER**	**SUMMER**	**SUMMER**
		Capstone (6)	

Please note that this schedule assumes first-year placement into MATH 122A/B or 125. If you need to begin the MATH sequence with MATH 100, 112, or 120R, this will delay your enrollment in PHYS and GEOS Core courses.

Requirements for Earth, Oceans, and Climate Sub-plan: 2024-25 Catalog Year

SECOND LANGUAGE REQUIREMENT
(Requirement can be met with proficiency exam):

Semester 1		4
Semester 2	(completion with a grade of C or higher)	4

GENERAL EDUCATION
GE: Introduction Course

UNIV 101	Introduction to General Ed (Waived for new transfer students)	1

GE: Exploring Perspectives (12 units):

Artist		3
Humanist		3
Nat Scientist	Fulfilled with one: Geos 212, 216, 218 or Chem 151	3
Social Scientist		3

GE: Building Connections (9 units):

		3
		3
		3

GE: Portfolio (3 units):

UNIV 301	General Ed Capstone (Waived for new transfer students)	3

ENGLISH (6 units):

ENGL 101	English Composition	3
ENGL 102	English Composition (grade of B or higher to meet MCWA)	3

or

ENGL 109H	English Composition	3

or

ENGL 106	English Composition for ESL Students	3
ENGL 107	English Composition for ESL Students	3
ENGL 108	English Composition for ESL Students (grade of B or higher to meet MCWA)	3

MATHEMATICS (9-12 units):

MATH 122A&B or MATH 125	Calculus I (P: MATH 120R or MATH 112 with >C) (PPL score of >75 for 122A/B; PPL score > 92 for 125)	3-5
MATH 129	Calculus II (P: MATH 122B/125 (with >C)	3

CHEMISTRY (8 units):

CHEM 151	Chemical Thinking I (P: MATH 112 or appropriate math placement)	4
CHEM 152	Chemical Thinking II (P: CHEM 151)	4

PHYSICS (7-8 units):

PHYS 102	Introductory Physics I (P: MATH 112 or appropriate math placement)	3
PHYS 181	Introductory Laboratory I (CR: PHYS 102)	1
PHYS 103	Introductory Physics II (P: PHYS 102)	3
PHYS 182	Introductory Laboratory II (P: PHYS 181; CR: PHYS 103)	1

or

PHYS 141	Introductory Mechanics (P: MATH 122B or MATH 125; CR: MATH 129)	4
PHYS 142	Introductory Optics and Thermo (P: PHYS 141 and MATH 129 or appropriate math placement)	3

GEOSCIENCES CORE (Complete 5 courses):

GEOS 251	Physical Geology (Fall and Spring)	4
Comp App: GEOS 280 *or* GEOS 285	MatLab (P: GEOS Major or Minor) (Fall) *or* intro to Python (P: GEOS 251) (Spring)	3
GEOS 300	Earth Surface Processes (P: GEOS 251, Calculus I proficiency recommended) (Spring)	3
GEOS 302	Principles Stratigraphy and Sedimentation (P: GEOS 251, PHYS 102 or 141) (Fall) (Writing Proficiency course; MCWA alternative)	4
Capstone: Field Camp *&/or* Research or Thesis *&/or* Internship	 Geos 414: Geology Field Camp (P: GEOS 251, 302, 304) or Geos 405: Accessible Earth (P: >30 units of Geos courses with GPA of >2.75) (Summer) GEOS 492 Directed Research, GEOS 499 or 499H Independent Study, GEOS 498 Sr. Capstone Thesis, GEOS 498H Honor's Thesis GEOS 393 (1-6-unit exp.) or GEOS 493 (3-unit exp.)	6

EOC CORE (Complete all 5 courses):

GEOS 308	Paleontology (P: GEOS 251 or GEOS 212 or ECOL 182R/L) (Spring)	3
GEOS 342	The History of Earth's Climate (Fall)	3
GEOS 412A	Ocean Sciences (P: One year of science) (Spring)	3
GEOS 478	Global Change (P: Upper-division standing and introductory course work in biological and physical sciences) (Fall)	3
GEOS 479	Climate Dynamics (P: MATH 122B) (Spring)	3

ADVISOR APPROVED EMPHASIS COURSES (17 units)

Majority of courses should consist of GEOS 300 or 400 level
Full list of approved classes on advisement report
No more than 3 units of Preceptor (GEOS 397A)
Up to 6-units of a combination of Internship, Preceptorship (3-unit max), and/or Research allowed.
No double-dipping Emphasis credits with Capstone or other GEOS BS requirements.

ELECTIVE COURSES (1-23 units)

Earth, Oceans and Climate Advisor Approved Emphasis Courses (offerings listed between Fall 24 and Spring 27):

GEOS 212: Oceanography (can double dip this for EP Nat Sci Gen Ed): offered reg term and online in summer
GEOS 216: Dinosaurs (can double dip this for EP Nat Sci Gen Ed): offered reg term and online in summer
GEOS 218: Natural Disasters (can double dip this for EP Nat Sci Gen Ed): offered online reg term and summer
GEOS 240 (National Parks): Fall 25
GEOS 255 (Historical Geology): Spring 25, Spring 26, Spring 27
GEOS 260 (Gems and Minerals): Fall 24, Fall 25, Fall 26
GEOS 270 (Planetary Geoscience): Spring 25, Spring 26, Spring 27
GEOS 304 (Structural Geology): Spring 25, Spring 26, Spring 27
GEOS 306: (Mineralogy):
GEOS 322: (Intro to Geophysics):
GEOS 346 (Mineral and Energy Resources): Spring 25, Fall 26
GEOS 356: (Petrology):
GEOS 397A (Preceptorship): every semester
GEOS 400 (Intro to Geochemistry): Spring 25, Spring 26, Spring 27
GEOS 408 (Tectonic Petrology): Spring 25
GEOS 415 (Geologic Hazards): Fall 24
GEOS 418: (Metallurgy):
GEOS 419: (Physics of the Earth)
GEOS 423 (Regional Structural Geology): Spring 25
GEOS 430: (Chem Evolution of the Earth):
GEOS 432 (Intro to Seismology): Fall 24, Fall 25, Fall 26
GEOS 434A: (Exploration Seismology)
GEOS 439A (Intro to Dendrochronology):
GEOS 440 (Geodynamics):
GEOS 450 (Geomorphology and Landscape Evolution): Fall 24, Fall 26
GEOS 453 (Glacial and Quaternary Geology):
GEOS 462 (Petrology of Gems): Spring 25
GEOS 466: (Stable Isotope Geochem):
GEOS 469 (Seismic Data Processing):
GEOS 470L/R (Volcanology): Spring 26
GEOS 474 (Geochronology-Thermochronology): Spring 26
GEOS 482 (Paleoceanography and Paleoclimatology): Fall 24, Fall 26
GEOS 483 (Modes of Climate Variability): Spring 25, Spring 27
GEOS 484 (Co-evolution of Earth and Biosphere): Fall 26
GEOS 486 (Organic Geochemistry): Fall 24
GEOS 487 (Physical and Dynamical Oceanography): Fall 25, Fall 26
GEOS 489: (Quaternary Geology):

ANTH 332, ANTH 439A, ASTR 403, ASTR 442, ATMO/ENVS/GEOG/HWRS/RNR 490, ECOL 360, ECOL 404F, ECOL 404R/L, ECOL 410, ECOL/GEOS 412B, ECOL 450, ENVS/GEN/GEOG/GEOS/GIST/WSM 330, ENVS 340, ENVS 410, ENVS 420, ENVS 422, ENVS 483, GEN 416, GEN 448, GEOG 304, GEOG/GEOS/RNR 416A, GEOG/GIST 420, GEOG 430, GEOG 439A, GEOG 447, GEOG 473, GEOG/GIST 483, GEOS/HWRS/PTYS 411, GEOS/RNR 417, HWRS 340, HWRS 350, HWRS 422, HWRS 431, MNE 418, PHYS 403, PLG 483, PLS 410, PTYS 403, PTYS 442, RNR 316, RNR 321, RNR 403, RNR 420, RNR 427, RNR 440, RNR 458, RNR 473, RNR 480, RNR 483, WSM 439A, Approved Transfer Course

Following is a recommended Four-Year Schedule for the EOC Sub-Plan:

YEAR 1	YEAR 2	YEAR 3	YEAR 4
FALL	**FALL**	**FALL**	**FALL**
GEOS 251 (4)	GEOS 342 (3)	GEOS 302 (4)	GEOS 478 (3)
MATH 122A/B or 125 (3)	PHYS 1 (4)	GEOS Comp App (3)	EOC Emph (3)
ENGL 1st Sem (3)	GE Core (3)	GE Core (3)	GE Core (3)
GE Core (3)	CHEM 2 (4)	Elective (3)	Elective (6)
Intro to GE (1)			
TOTAL: 14 units	TOTAL: 14 units	TOTAL: 13 units	TOTAL: 15 units

YEAR 1	YEAR 2	YEAR 3	YEAR 4
SPRING	**SPRING**	**SPRING**	**SPRING**
EOC Emph (3)	GEOS 300 (3)	GEOS 412A (3)	GEOS 479 (3)
MATH 129 (3)	GEOS 308 (3)	EOC Emph (3)	EOC Emph (4)
CHEM 1 (4)	PHYS 2 (4)	EOC Emph (3)	EOC Emph (3)
ENGL 2nd Sem (3)	GE Core (3)	GE Core (3)	Elective (3)
	Elective (3)	Elective (3)	GE Portfolio (1)
TOTAL: 13 units	TOTAL: 16 units	TOTAL: 15 units	TOTAL: 14 units

YEAR 1	YEAR 2	YEAR 3	YEAR 4
SUMMER	**SUMMER**	**SUMMER**	**SUMMER**
		Capstone (6)	

Please note that this schedule assumes first-year placement into MATH 122A/B or 125. If you need to begin the MATH sequence with MATH 100, 112, or 120R, this will delay your enrollment in PHYS and GEOS Core courses.

Requirements for Planetary Geoscience BS degree: 2024-25 Catalog Year

SECOND LANGUAGE REQUIREMENT
(Requirement can be met with proficiency exam):

Semester 1		4
Semester 2	(completion with a grade of C or higher)	4

GENERAL EDUCATION
GE: Introduction Course

UNIV 101	Introduction to General Ed (Waived for new transfer students)	1

GE: Exploring Perspectives (12 units):

Artist		3
Humanist		3
Nat Scientist	Fulfilled with one: Geos 212, 216, 218 or Chem 151	3
Social Scientist		3

GE: Building Connections (9 units):

		3
		3
		3

GE: Portfolio (3 units):

UNIV 301	General Ed Capstone (Waived for new transfer students)	3

ENGLISH (6 units):

ENGL 101	English Composition	3
ENGL 102	English Composition (grade of B or higher to meet MCWA)	3

or

ENGL 109H	English Composition	3

or

ENGL 106	English Composition for ESL Students	3
ENGL 107	English Composition for ESL Students	3
ENGL 108	English Composition for ESL Students (grade of B or higher to meet MCWA)	3

MATHEMATICS (9-12 units):

MATH 122A&B or MATH 125	Calculus I (P: MATH 120R or MATH 112 with >C) (PPL score of >75 for 122A/B; PPL score > 92 for 125)	3-5
MATH 129	Calculus II (P: MATH 122B/125 (with >C)	3
MATH 223	Vector Calc (P: MATH 129)	4
or		
MATH 254	Differential Equations (P: MATH 129 or 223)	3
or		
MATH 263	Statistics and Biostats (P: 108, 112, 113, 116, 119A, 122B, or 125)	3
or		
MATH 313	Linear Algebra (P: MATH 129, 223, 243, 254, CSC 144, or CSC 245)	3

CHEMISTRY (8 units):

CHEM 151	Chemical Thinking I (P: MATH 112 or appropriate math placement)	4

PHYSICS (7-8 units):

PHYS 141	Introductory Mechanics (P: MATH 122B or MATH 125; CR: MATH 129)	4
PHYS 142	Introductory Optics and Thermodynamics (P: PHYS 141 and MATH 129 or appropriate math placement)	3

GEOSCIENCES AND PLANETARY SCIENCE COURSES
(12 or more courses)

GEOS 251	Physical Geology (Fall and Spring)	4
PTYS/GEOS 270	Planetary Geoscience (P: GEOS 251) (Spring)	3
Comp App: GEOS 280 *or* GEOS 285	MatLab (P: GEOS Major or Minor) (Fall) *or* intro to Python (P: GEOS 251) (Spring)	3

plus four of the following:

GEOS 300	Earth Surface Processes (P: GEOS 251; Calculus I proficiency recommended) (Spring)	3
GEOS 302	Principles of Stratigraphy and Sedimentation (P: GEOS 251, PHYS 102/110/141) (Fall) Writing Prof course; satisfies MCWA	4
GEOS 304	Structural Geology (P: GEOS 251, PHYS 102/110/141) (Spring)	3
GEOS 306	Mineralogy (P: GEOS 251 and CHEM 151) (Fall)	3
GEOS 322	Intro to Geophysics (P: 251, MATH 122B or 125) (Spring)	3
GEOS 356	Petrology (P: GEOS 306, MATH 122B or 125) (Spring)	4

plus

PTYS 395B	Topics in Planetary Science (Fall)	3

plus

PTYS 403	Physics of the Solar System (P: PHYS 142) (Spring odd yrs)	3
PTYS 407	Chemistry of the Solar System (P: CHEM 152, MATH 129) (Fall odd yrs)	3
PTYS 411	Geology and Geophysics of the Solar System (Spring even yrs)	3
Capstone	PTYS 498 Capstone research *or* PTYS 498H Honor's Thesis *or* GEOS 414 Geology Field Camp	6

ADVISOR APPROVED EMPHASIS COURSES (9 units)

Majority of courses should consist of GEOS 300 or 400 level
Full list of approved classes on advisement report
No more than 3 units of Preceptor (GEOS 397A)
Up to 6-units of a combination of Internship, Preceptorship (3-unit max), and/or Research allowed.
No double-dipping Emphasis credits with Capstone or other BS requirements.

ELECTIVE COURSES (1-22 units)

ADVISOR-APPROVED EMPHASIS COURSES:

ASTR 418 (Astronomical Instrumentation): Fall even years
ASTR 442 (Mars): Spring odd years
ASTR 450 (Origin of Solar System and other Planetary Systems): Fall odd years
ASTR 475 (Planetary Astrobiology): Spring even years
GEOS 412A (Ocean Sciences): Spring
ATMO 490 (Remote Sensing of Planet Earth): Fall
ECOL 410 (Microbial Biogeochemistry and Global Change): Fall

Following is a recommended Four-Year Schedule for the Planetary Geoscience Degree:

YEAR 1	YEAR 2	YEAR 3	YEAR 4
FALL	**FALL**	**FALL**	**FALL**
MATH 122A/B or 125 (3)	MATH 223 (4)	GEOS 302 (4)	GEOS 407 (3)
ENGL 1st Sem (3)	PHYS 142 (3)	GEOS 322 or 306 (3)	Capstone (3)
GE Core (3)	PTYS 270 (3)	GE Core (3)	PTYS Emph (3)
GE Core (3)	GEOS Comp App (3)	GE Core (3)	Elective (6)
Intro to GE (1)	GE Core (3)	Elective (3)	GE Portfolio (1)
TOTAL: 13 units	TOTAL: 16 units	TOTAL: 16 units	TOTAL: 16 units

YEAR 1	YEAR 2	YEAR 3	YEAR 4
SPRING	**SPRING**	**SPRING**	**SPRING**
MATH 129 (3)	GEOS 300 (3)	PTYS 403 (3)	PTYS 411 (3)
PHYS 141 (4)	GEOS 304 (4)	PTYS Emph (3)	Capstone (3)
GEOS 251 (4)	CHEM 151 (4)	PTYS Emph (3)	Elective (4)
ENGL 2nd Sem (3)	PTYS 395B (3)	GE Core (3)	Elective (3)
		Elective (3)	Elective (3)
TOTAL: 14 units	TOTAL: 14 units	TOTAL: 15 units	TOTAL: 16 units

Please note that this schedule assumes first-year placement into MATH 122A/B or 125. If you need to begin the MATH sequence with MATH 100, 112, or 120R, this will delay your enrollment in PHYS and GEOS Core courses.

Requirements for Geosciences and Society BA degree: 2024-25 Catalog Year

SECOND LANGUAGE REQUIREMENT
(Requirement can be met with proficiency exam):

Semester 1		4
Semester 2	(completion with a grade of C or higher)	4

GENERAL EDUCATION
GE: Introduction Course

UNIV 101	Introduction to General Ed (Waived for new transfer students)	1

GE: Exploring Perspectives (12 units):

Artist		3
Humanist		3
Nat Scientist	Fulfilled with one: Geos 212, 216, 218 or Chem 151	3
Social Scientist		3

GE: Building Connections (9 units):

		3
		3
		3

GE: Portfolio (3 units):

UNIV 301	General Ed Capstone (Waived for new transfer students)	3

ENGLISH (6 units):

ENGL 101	English Composition	3
ENGL 102	English Composition (grade of B or higher to meet MCWA)	3

or

ENGL 109H	English Composition	3

or

ENGL 106	English Composition for ESL Students	3
ENGL 107	English Composition for ESL Students	3
ENGL 108	English Composition for ESL Students (grade of B or higher to meet MCWA)	3

FOUNDATION
Complete one:

MATH 163	Basic Statistics	3
MATH 263	Intro to Statistics and Biostatistics	3

Complete one:

GEOS 280	MATLAB (P: GEOS Major/Minor) (Fall)	3
GEOS 285	Intro to PYTHON (P: GEOS 251) (Spring)	3
MATH 107	Exploring and Understanding Data	3
MATH 108	Modeling Alg & Trig Functions	4
MATH 112	College Algebra Concepts & Apps	3
MATH 113	Elements of Calculus	3
MATH 121A	PreCalc Functions & Models I	3
MATH 121B	PreCalc Functions & Models II	3
MATH 122A	Functions for Calculus	1
MATH 122B	First Semester Calculus	4
MATH 125	Calculus I	3

Complete one:

CHEM 130	Chemistry for Allied & Public Health	3
CHEM 141	General Chemistry Lecture I	3
CHEM 151	Chemical Thinking I	3
CHEM 161	Honors Chemical Thinking I	3
PHYS 102	Introductory Physics	3
PHYS 141	Introductory Mechanics	4
PHYS 161H	Accelerated Introductory Mechanics	4

GEOSCIENCES CORE (12 or more courses)

GEOS 251	Physical Geology (Fall and Spring)	4
GEOS 255 or GEOS 260	Historical Geology (P: GEOS 251) (Spring) Intro to Gems and Minerals (P: CHEM 151 or MSE 110) (Fall)	3
GEOS 300 *or* GEOS 308	Earth Surface Processes (P: GEOS 251) (Spring) *or* Paleontology (GEOS 251 or GEOS 212 or ECOL 182R/L) (Spring)	3 3
GEOS 342 or GEOS 346	History of Earth's Climate (Fall) Mineral and Energy Resources	3
GEOS 412A	Ocean Science (P: 1 yr of Science) (Spring)	3
GEOS 478	Global Change (upper division standing plus intro course in bio or phys science) (Fall)	3
GEOG 330 or GEOG 403 or GEOG 417	Intro to Remote Sensing (Fall) App of Geog Info Systems (Fall & Spring) Geog Info Systems for Nat & Soc Sciences (Fall and Spring)	3 3 3

ELECTIVE TRACK COURSES
Law Track
Complete four:

LAW 303	Intro Studio Phys I (P: MATH 112 or math placement)	4
LAW 407	Introductory Studio Phys II (P: PHYS 110)	4
LAW 411	Agriculture, Environ & Legal Issues (Spring)	3
LAW 445	Applied Environmental Law (Fall)	3
LAW 459	Environmental Law & Policy (Fall and Spring)	3
LAW 460	Public International Environ Law (Spring)	3
LAW 489A	Land-Use Planning Law	3
GEOG 462	Regulatory Science Case Study Project	3
GEOG 480	Environmental Law, Geography and Society	3

Science Communication Track
Complete four:

SCI 401	Science Communication	3
JOUR 305	Full STEM Ahead: Science and the News	3
JOUR 455	Environmental Journalism	3
JOUR 465	Issues in Covering Science and the Environ	3
JOUR 472	Science Journalism	3
ENGL 302	Magazine Article Writing Workshop	3
ENGL 308	Technical Writing	3
ENGL 313	Introduction to Professional & Tech Writing	3
COMM 325	Argumentation	3

Public Policy Track
Complete four:

POL 301	Methods of Political Inquiry	3
POL 373	Political Geography	3
POL 401	Methods of Political Inquiry	3
POL 404	Experimental Political Science	3
POL 409	Causes and Consequences of Public Opinion	3
POL 424A	Politics in the Digital Age	3
LAW 454	Environmental Law and Policy	3

GEOSCIENCES AND SOCIETY ELECTIVES (can double-dip one Geos Gen Ed course for one of elective)

Complete two:

GEOS 300	Earth Surface Processes (P: GEOS 251; Calculus I proficiency recommended) (Spring)	3
GEOS 302	Principles of Stratigraphy and Sedimentation (P: GEOS 251, PHYS 102/110/141) (Fall) Writing Prof course; satisfies MCWA	4
GEOS 304	Structural Geology (P: GEOS 251, PHYS 102/110/141) (Spring)	4
GEOS 306	Mineralogy (P: GEOS 251, CHEM 151) (Fall)	3
GEOS 308	Paleontology (P: GEOS 251 or 212 or ECOL 182R/L) (Spring)	3
GEOS 342	History of Earth's Climate (Fall)	3
GEOS 346	Mineral and Energy Resources	3
GEOS 388	Biosphere 2 Science, From Wonder to Discovery	3
GEOS 403	Physics of the Solar System (P: PHYS 142) (Spring odd yrs)	3
GEOS 411	Geology and Geophys of the Solar System (Spring even yrs)	3
GEOS 412A	Ocean Sciences (P: one year of science)	3
	(Spring)	
GEOS 415	Geologic Hazards (Fall)	2
GEOS 439A	Introduction to Dendrochronology (Fall)	4
GEOS 453	Glacial and Quaternary Geology	3
ANTH 301	Conservation and Community	3
ANTH 307	Ecological Anthropology	3
ANTH 332	Environmental Archaeology	3
ANTH 512A	Geoarchaeology	3
EVS 304	Water, Environment, and Society	3
EVS 468	Water and Sustainability	3
GEOG 330	Introduction to Remote Sensing	3
GEOG 362	Environment and Development	3
GEOG 403	Applications of Geographic Information Systems	3
GEOG 416A	Computer Cartography	3
GEOG 417	Geographic Information Systems for Nat and Soc Sciences	3
GEOG 530	The Climate System	3

Following is a recommended Four-Year Schedule for the Geosciences and Society Degree:

LAW (L), Science Communication (SC), or Public Policy (PP) EMPHASIS

YEAR 1	YEAR 2	YEAR 3	YEAR 4
FALL	**FALL**	**FALL**	**FALL**
GEOS 251 (4)	GEOS 342 or 346 (3)	GEOS 478 (3)	L-SC-PP Emph (3)
MATH 163 or 263 (3)	Additional MATH (3)	L-SC-PP Emph (3)	G&S Elective (3)
ENGL 101 (3)	GE Core (3)	GEOG 330/403/417 (3)	Elective (3)
GE Core (3)	GE Core (3)	GE Core (3)	Elective (3)
Intro to GE (1)	Elective (3)	Elective (3)	Elective (3)
TOTAL: 14 units	TOTAL: 15 units	TOTAL: 15 units	TOTAL: 15 units

YEAR 1	YEAR 2	YEAR 3	YEAR 4
SPRING	**SPRING**	**SPRING**	**SPRING**
CHEM I or PHYS I (3)	GEOS 300 or 308 (3)	G&S Elective (3)	GE Portfolio (1)
GEOS 255 or 260 (4)	GEOS 412A (3)	GE Core (3)	Elective (3)
ENGL 2nd Sem (3)	GE Core (3)	GE Core (3)	Elective (3)
Elective (3)	LAW Emph (3)	LAW Emphasis (3)	Elective (3)
Elective (3)	Elective (3)	Elective (3)	Elective (5)
TOTAL: 16 units	TOTAL: 15 units	TOTAL: 15 units	TOTAL: 15 units

Requirements for Geosciences Minor

The Geosciences minor requires 20 units.

Any additional coursework required to reach 20 units should be Geosciences Electives selected in consultation with your academic advisor. The minor requires a minimum of 9 upper-division units.

The cumulative GPA for the minor must be 2.0 or higher. A minimum GPA presupposes that at least one 3-unit course in the minor is University Credit.

GEOSCIENCES MINOR

COURSE	TITLE	PRE-REQUISITE(S)	SEMESTER TYPICALLY OFFERED	UNITS

Complete one course:

GEOS 251	Physical Geology	None	Fall & Spring	4

Choose minimum of two:

GEOS 255	Historical Geology	GEOS 251	Spring	4
GEOS 260	Intro to Gems & Minerals	CHEM 151 or CHEM 141/143 or MSE 110 or instructor permission	Fall	3
GEOS 280	Programming and Data Analysis in Earth Sciences	GEOS Major or Minor	Fall	3
GEOS 285	Introduction to Python in Geosciences	GEOS 251	Spring	3
GEOS 300	Earth Surface Processes	GEOS 251, Calculus I proficiency recommended	Spring	3
GEOS 302	Stratigraphy and Sedimentation	GEOS 251, PHYS 102 or 141	Fall	4
GEOS 304	Structural Geology	GEOS 251, PHYS 102 or 141	Spring	4
GEOS 306	Mineralogy	GEOS 251, CHEM 151	Fall	3
GEOS 308	Paleontology	GEOS 251 or GEOS 212 or ECOL 182R	Spring	3
GEOS 322	Intro to Geophysics	GEOS 251, MATH 122B or 125	Fall	3
GEOS 342	History of Earth's Climate		Fall	3
GEOS 356	Petrology	GEOS 306, MATH 122B or 125	Spring	4
GEOS 412A	Ocean Science	One year of science	Spring	3

Geosciences Electives* – Complete 20 units (9 units overall, including above, must be upper-division):

*Students can use one class from GEOS 212, 216, 218, 220, 222.

IMPORTANT GEOSCIENCES INFORMATION

GENERAL INFORMATION

Our students are encouraged to engage in any number of professional development programs, such as our GEOS Undergraduate Career Preparation Seminar Series and our Faculty/Student Mentor Program: https://www.geo.arizona.edu/CareerResources

Our students and faculty are working in field areas around the world: https://www.geo.arizona.edu/Research

The Society of Earth Science Students (SESS) is our undergraduate student club!
https://www.geo.arizona.edu/content/sess-club

Review GEOS scholarship opportunities:
https://www.geo.arizona.edu/TigerScholarship and https://www.geo.arizona.edu/content/scholarships

Full lists of courses offered by Geosciences, and policies governing undergraduate careers at U of A can be found in the academic catalogs: http://catalog.arizona.edu/

Four-Year Plan for teaching Geos courses: https://www.geo.arizona.edu/content/geos-4-year-teaching-plan

Review the Office of Scholarships and Financial Aid website regarding loans and scholarships:
https://financialaid.arizona.edu/

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To schedule an advising appointment with a Geosciences Advisor, use Trellis Advise:
https://trellis.arizona.edu/solutions/trellis-advise

ADVISOR RESPONSIBILITIES

Among other things, your GEOS Undergraduate Advisors provide guidance on…

- Courses & programmatic opportunities, such as research and mentorships
- Outlining and achieving your goals
- Best practices for a good academic experience
- Navigating UA Policies, especially when academic problems arise
- Contacting different departments on campus
- Contacting sponsors/writing sponsor letters for academic progress

STUDENT RESPONSIBILITIES

- Tell us about your academic and career interests
- Tell us if things are not going as planned – be honest with us and yourself
- Questions! Ask lots of questions
- Bring ideas about which courses you are interested in taking - review the GEOS Handbookyou're your Advisement Report before coming in
- Take notes during the meeting so you remember information and resources we discuss

STUDENT GUIDELINES FOR INDIVIDUAL AND GROUP WORK

1. Underlying Principle
   Unless specified in the assignment, all work and all words used to describe the results of an assignment must be the student's own. No material, whether paragraphs, sentences or phrases must be copied from another student or any external source. External material that is used, usually for a specific reason, must be accompanied by a citation of the source.

2. Individual Assignments

In some cases, students will be told that no conferring is allowed; if that is the case, students must not discuss their work with others, or show others their work. More often, Geosciences faculty will encourage discussion among students, because this facilitates learning. In such a case, any ideas and concepts may be discussed openly, but the student is still responsible for his/her own work turned in for grading. Identical paragraphs, sentences, phrases, or notations on a map/illustration may not be used by two or more students. The best way to avoid this is for students to discuss the assignment, but then separate from each other in order to produce the work to be turned in for grading, and not share electronic files using e-mail, flash drives or other method.

3. Group Assignments
   Geosciences faculty routinely give two kinds of group assignments. Category 1 is a group assignment where students work in parallel on the same material (for instance a mapping exercise), but then turn in individual work for grading. Discussion is encouraged, but it is essential that each student first perform the written or map work individually, after which ideas may be exchanged and interpretations modified before the work is graded. Copying of another's work is prohibited, and this can be avoided in the same way as for individual assignments. Category 2 is a group assignment where students work explicitly as teams, perhaps with each member performing parts of a complex task (such as a geophysical or analytical experiment), and a combined product will be graded with equal scores for all members of the team. In this case, full discussion of the work, before any write-up takes place, is expected. The instructor will inform students whether a group assignment is Category 1 or 2.

4. Reporting Cheating
   All incidents of cheating or plagiarism, including facilitating of same, will be reported to the Dean of Students' office and the College of Science. As well as the violations in take-home or field assignments detailed above, this will include any violations during quizzes and exams. The University's procedure and forms give students an opportunity to explain to the instructor, and to comment upon (or rebut) any accusations in writing before the forms are turned in. But the forms can be turned in, reporting the cheating incident, even if the student fails to meet with the instructor or does not countersign the paperwork.

5. Expectation of Student Integrity
   Instructors in the Department of Geosciences set a high standard for themselves as educators, and they expect that students, both in general education and majors' classes, will do the same for their own education. Thus, cheating and plagiarism will not be tolerated.

6. UA Code of Academic Integrity
   This document is a statement of what students and faculty should expect within Department of Geosciences, or in general education courses offered by the Department. It does not replace the UA's Code of Academic Integrity, which can be read in full at: https://deanofstudents.arizona.edu/student-rights-responsibilities/academic-integrity

FIELDWORK IN GEOSCIENCE COURSES

Many classes offered by the Department of Geosciences have required field trips that will involve walking and hiking. The field trips require some degree of physical fitness as they can be physically demanding. Students who need short-term or long-term medical accommodations for physical activity required on class field trips, or for field camp, should register with the Disability Resources Center (https://drc.arizona.edu/students/connect-drc), and then work with their instructor on an alternate assignment.

CAPSTONE EXPERIENCES IN GEOSCIENCES

A Capstone experience is required in all of our BS degree programs/tracks. Depending on the degree track, this Capstone will consist of attending a Summer Field Camp or participating in a field experience (not field camp), research project, or internship. The requirements for each degree track are described above, and details of Field Camps and Field Experience/Research/Internship opportunities are described below.

FIELD CAMP

We offer two different field camps, GEOS 405 and 414, and you may also satisfy this requirement by attending a field camp offered by other universities so long as it is a 6-unit experience that involves significant geologic observation and interpretation.

GEOS 414 – Field Camp

GEOS 414 is a 5-week, 6-unit, field mapping class offered each summer. Students will take the geologic

principles they have learned in required lab courses and apply them to making their own geologic maps in the field. Students depart in vans from Tucson, accompanied by faculty and graduate students, and travel from campsite to campsite for the duration of the 5-week period.

GEOS 414 will be the most physically and scientifically challenging course students take in the major and they must be prepared for long days of strenuous physical exercise, variable weather conditions, and rough terrain. Backcountry campgrounds have limited facilities.

Because students at field camp are supervised 24/7 by faculty and safety standards must be met, space in the UA field camp is limited to 20 students each summer. Admission to our field camp is therefore not guaranteed for UA students. All qualified students from the University of Arizona are welcome to apply. However, admission is competitive and based on GPA, a letter of recommendation from a faculty member, and overall strength of the application. The cost for attending the UA field camp for summer 2025 will be approximately $5,376 ($3,006 tuition/fees for 6 units of credit plus $1,970 for food and transportation plus a $400 deposit). Students should monitor the UA Geosciences webpage https:/www.geo.arizona.edu/fieldcamp for deadlines and detailed application procedures. Applications to the UA Geosciences Field Camp will be open in December of 2024.

You can find more information about GEOS 414, and scholarships that may help cover the cost of field camp, from https://www.geo.arizona.edu/fieldcamp

GEOS 405 – Accessible Earth Study Abroad Program (stay tuned for info for 2024-2025)

Field Camps offered by other universities
Field Camps offered by other universities must be provide a 6-unit experience that involves high-level geologic observation and interpretation. Information on other field camps can be found at https://geology.com/field-camp.shtml. Before enrolling in a non-UofA Field Camp, please chat with your Geos advisor to make sure it will satisfy the degree requirement.

PARTICIPATION IN A FIELD EXPERIENCE, RESEARCH PROJECT, OR INTERNSHIP
You may satisfy the Capstone requirement for some degree tracks through participation in a field experience (other than Field Camp), a research project, or an internship, or some combination of these activities. The intent is for these activities to provide you with an individualized, meaningful, hands-on experience outside of the classroom. You may participate in several different opportunities that add up to 6 units. All options must allow for an independent evaluation of your work at the end of the experience (a grade or a written evaluation), and must be approved in advance by a GEOS faculty member and your GEOS advisor. Following are some common formats for a Capstone experience involving a field experience, research project, or internship:

Field Experiences other than GEOS 414 or GEOS 405
Some or all of your Capstone units may be satisfied by participating in a field experience other than GEOS 405 or 414. A UofA example is ECOL 463 (Ecology & Natural History of the Sonoran Desert & Gulf of California), which is a hands-on, field-based exploration of the Sonoran Desert, its Sky Islands, and the Upper Gulf of California. A non-UofA example is "Arizona Field Camp", a 3-unit field-mapping course taught during winter session in western Arizona by the South Dakota School of Mines and Technology. There are many such possibilities -- be resourceful in finding these opportunities, and make sure you discuss your options with your Geos advisor before signing up. Note that most also involve additional fees.

Participation in a research experience or internship on or off campus
Examples include participation in a research project with a faculty member in Geosciences or other departments, or conducting an internship in a company, non-profit organization, or government agency office. The main requirements are that such activities involve Earth Science principles and activities, and require a minimum of 45 hours of work per semester for each unit of credit. You must complete the appropriate enrollment form with instructor signature: the GEOS Independent Study, Research, & Thesis Enrollment form or the UA Internship Work Plan. During the course of the independent activity, the student must update the approving faculty member regularly and provide the information needed to obtain an independent evaluation of the student's work by the end of the activity, such as a final project report, to enable grading.

A specific research activity is to participate in a NSF REU (Research Experience for Undergraduates) program in an Earth System science -- you can find these listed at http://www.nsf.gov/crssprgm/reu/reu_search.cfm. A faculty member will sign off on this as fulfilling the requirement. REU positions include a stipend. You can access REU opportunities in diverse fields, including geosciences, ecology, hydrology, ocean science, and atmospheric

science. You can meet this requirement by enrolling in UA classes such as GEOS 492 (Directed Research), GEOS 498 (Senior Capstone Thesis), or GEOS 498H (Honor's Thesis). You must submit a GEOS Independent Study, Research, & Thesis Enrollment form with instructor signature for administrative enrollment in the appropriate course and units.

SECOND LANGUAGE PROFICIENCY

All students attending the University of Arizona must fulfill their 2nd language proficiency requirement. For international students, this is commonly through the IELTS or TOEFL exam required for admittance to the University. For domestic students, this is commonly fulfilled through classes in a 2nd language. Additional options are listed below.

OPTION 1. For students in a BS program, take 2 semesters of the same 2nd language
(For example: Spanish 101 and Spanish 102)

OPTION 2. Take a Proficiency Exam (fulfills language requirement, does not earn credits)

College of Humanities Exam Options:
- https://advising.humanities.arizona.edu/language-placement-and-proficiency-exams-faqs Tests available: Chinese, French, German, Italian, Japanese, Korean, Latin, Russian and Spanish
- For French and Italian – schedule with the French-Italian Studies Department: https://french.arizona.edu/undergraduate/student-resources/placement-exams-and-credit- exam
- For Chinese, Japanese, or Korean - schedule with the East Asian Department: https://eas.arizona.edu/undergraduate/information-placement-exams

Department of Linguistics Exam Options:
- https://linguistics.arizona.edu/second-language-proficiency-exam
- Commonly tested languages (not a complete list):
  Armenian, Bengali, Gujarati, Hindi, Igbo, Korean, Malay, Navajo, Polish, Romanian, Sinhala, Slovak, Somali, Thai, Twi, Vietnamese

Critical Languages Exam Options:
- Please contact the offering department to request a proficiency exam: http://clp.arizona.edu/
- Language Options (may be additional options):
  Cantonese, Chechen, Czech, Dutch, Finnish, Modern Greek, Hindi, Hungarian, Kazakh, Korean, Kurdish, Norwegian, Polish, Scots-Gaelic, Swahili, Swedish, Tagalog, Thai, Ukrainian, Vietnamese

Arabic Language Proficiency Exam:
- https://menas.arizona.edu/arabic/testing

Portuguese Language Proficiency Exam:
- https://spanish.arizona.edu/undergraduate/student-resources/faqs

OPTION 3. Take a CLEP Exam (Earn course credits)
- https://testing.arizona.edu/test/clep
- Tests available: French, German, Spanish
- For Arabic (up to 10 units) complete the Application for Special Examination (available on Registrars website) and make an appointment with Dr. Shiri (https://menas.arizona.edu/arabic/testing).

OPTION 4. Students who received conditional admission to the University of Arizona through CESL may apply for CESL Endorsement to fulfill the 2nd language proficiency requirement.
- https://cesl.arizona.edu/endorsement

OPTION 5. If you have taken the TOEFL or IELTS and your advisement report says you have NOT fulfilled the Second Language Requirement, please let your advisor know as soon as possible.