School of Natural Sciences and Mathematics

Geosciences (B.A., B.S.)

Attaining greater understanding of past and present Earth processes is the fundamental goal of geosciences. To achieve this goal the geoscientist studies the minerals, rocks, fluids, and fossils of the Earth and investigates the physical, chemical, and biological processes occurring on and in the Earth.

Professional opportunities in geology exist in the environmental, energy, and mineral resources industries and in government agencies concerned with these fields. In addition, many occupations concerned with law, management, economics, and the environment utilize a background in geosciences.

Specific degree plans will be formulated by the undergraduate advisor in Geosciences. Changing circumstances may require changes to the degree plans.

The Geosciences B.A. degree plan must be taken in conjunction with the UTeach program. UTeach Dallas Option degree plans are streamlined to allow students to complete both a rigorous Bachelor of Science or Bachelor of Arts degree and all course work for middle or high school teacher certification in four years. Teaching Option degrees require deep content knowledge combined with courses grounded in the latest research on math and science education. While most graduates go on to classroom teaching, UTeach alums are also prepared to enter graduate school and to work in discipline related industry.

Faculty

Professors: Carlos L. V. Aiken, John F. Ferguson, John Geissman, John William I. Manton, George A. McMechan, John S. Oldow, Robert J. Stern

Associate Professors: Alexander Braun, Thomas H. Brikowski, Georgia Fotopoulos

Professor Emeritus: David E. Dunn, Richard M. Mitterer, Emile A. Pessagno, Dean C. Presnall, Robert H. Rutford

Associate Professor Emeritus: James L. Carter

Senior Lecturers: William R. Griffin, Ignacio Pujana
Bachelor of Arts in Geosciences with UTeach Option

Degree Requirements (120 hours)

I. Core Curriculum Requirements: 42 hours

**Communication (6 hours)**
- 3 hours Communication (**RHET 1302**)
- 3 hours Communication Elective (**NATS 4390**/4399)

**Social and Behavioral Sciences (15 hours)**
- 6 hours Government (**GOVT 2301** and **GOVT 2302**)
- 6 hours American History
- 3 hours Social and Behavioral Sciences Elective

**Humanities and Fine Arts (6 hours)**
- 3 hours Fine Arts (**ARTS 1301**)
- 3 hours Humanities (**HUMA 1301**)

**Mathematics and Quantitative Reasoning (6-8 hours)**
- **MATH 1325** and **STAT 3332**
  or **MATH 2413** and **MATH 2414**

**Science (9 hours)**
- 8 hours Chemistry
- 1 hour Geosciences Laboratory (**GEOS 1103** Physical Geology Laboratory)

II. Major Requirements: 55-57 hours beyond Core Curriculum

**Major Core Courses (33 hours beyond Core Curriculum)**
- **GEOS 1104** History of Earth and Life Laboratory
- **GEOS 1103** Physical Geology Laboratory

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<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
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<tbody>
<tr>
<td>GEOS 1303</td>
<td>Physical Geology</td>
</tr>
<tr>
<td>GEOS 1304</td>
<td>History of Earth and Life</td>
</tr>
<tr>
<td>GEOS 2306</td>
<td>Geodesy and Geospatial Analysis</td>
</tr>
<tr>
<td>GEOS 2409</td>
<td>Rocks and Minerals</td>
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<tr>
<td>GEOS 3421</td>
<td>Stratigraphy and Sedimentology</td>
</tr>
<tr>
<td>GEOS 3434</td>
<td>Paleobiology</td>
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<tr>
<td>GEOS 3470</td>
<td>Structural Geology</td>
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<tr>
<td>GEOS 4320</td>
<td>Physics and Chemistry of the Solid Earth</td>
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<tr>
<td>GEOS 4430</td>
<td>Hydrogeology and Geochemistry</td>
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**Composite Science Requirements (22-24 hours beyond Core Curriculum)**

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<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
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<tbody>
<tr>
<td>CHEM 1311</td>
<td>General Chemistry I</td>
</tr>
<tr>
<td>CHEM 1111</td>
<td>General Chemistry I Laboratory</td>
</tr>
<tr>
<td>CHEM 1312</td>
<td>General Chemistry II</td>
</tr>
<tr>
<td>CHEM 1112</td>
<td>General Chemistry II Laboratory</td>
</tr>
<tr>
<td>BIOL 2311</td>
<td>Introduction to Modern Biology I</td>
</tr>
<tr>
<td>BIOL 2111</td>
<td>Introduction to Modern Biology Workshop I</td>
</tr>
<tr>
<td>BIOL 2312</td>
<td>Introduction to Modern Biology II</td>
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<tr>
<td>BIOL 2112</td>
<td>Introduction to Modern Biology Workshop II</td>
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2 approved Upper-level Biology electives (choose from BIOL 3324, **BIOL 3350**, **BIOL 3351**, BIOL 3445 and **BIOL 3456**)

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<tr>
<th>Course Code</th>
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<tbody>
<tr>
<td>PHYS 1301</td>
<td>College Physics I</td>
</tr>
<tr>
<td>PHYS 2125</td>
<td>Physics Laboratory I</td>
</tr>
<tr>
<td>PHYS 1302</td>
<td>College Physics II</td>
</tr>
<tr>
<td>PHYS 2126</td>
<td>Physics Laboratory II</td>
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**OR**

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<tr>
<th>Course Code</th>
<th>Course Title</th>
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<tbody>
<tr>
<td>PHYS 2325</td>
<td>Mechanics</td>
</tr>
<tr>
<td>PHYS 2125</td>
<td>Physics Laboratory I</td>
</tr>
<tr>
<td>PHYS 2326</td>
<td>Electromagnetism and Waves</td>
</tr>
<tr>
<td>PHYS 2126</td>
<td>Physics Laboratory II</td>
</tr>
</tbody>
</table>
III. UTeach Requirements: 21 hours beyond Core Curriculum

- **NATS 1141** UTeach Step 1
- **NATS 1143** UTeach Step 2
- **NATS 3341** Knowing and Learning in Mathematics and Science
- **NATS 3343** Classroom Interactions
- **HIST 3328** History and Philosophy of Science and Medicine
- **NATS 4390** Research Methods
  - or NATS 4399 Honors Research Methods
- **NATS 4341** Project-based Instruction
- **NATS 4694** UTeach Student Teaching, 8-12 Science and Mathematics
  - or **NATS 4696** UTeach Student Teaching, 4-8 Science and Mathematics
- **NATS 4141** UTeach Student Teaching Seminar

IV. Free Electives

Students are required to take additional free electives (upper-level if necessary) if needed to reach 120 total degree hours or 51 upper-level credit hours.

**Bachelor of Science in Geosciences**

*Degree Requirements (120 hours)*

I. Core Curriculum Requirements: 42 hours

- **Communication (6 hours)**
  - 3 hours Communication (**RHET 1302**)
  - 3 hours Communication Elective (**GEOS 4390, GEOS 4399** or **NATS 4310**)

- **Social and Behavioral Sciences (15 hours)**
  - 6 hours Government (**GOVT 2301** and **GOVT 2302**)
  - 6 hours American History
  - 3 hours Social and Behavioral Science Elective

- **Humanities and Fine Arts (6 hours)**
3 hours Fine Arts (ARTS 1301)
3 hours Humanities (HUMA 1301)

Mathematics and Quantitative Reasoning (6 hours; 2 hours extra may be counted as free electives)
Calculus (MATH 2417 and MATH 2419)

Science (9 hours)
8 hours Chemistry (CHEM 1311, CHEM 1111, CHEM 1312, CHEM 1112)
1 hour Geoscience (GEOS 1103 Physical Geology Laboratory)\(^4\)

II. Major Requirements: 58-61 hours

Major Preparatory Courses (20 hours beyond Core Curriculum)
Pre-requisite courses to be completed before enrolling in upper-division GEOS courses.

- GEOS 1103 Physical Geology Laboratory\(^4,5\)
- PHYS 2325 Mechanics
- PHYS 2125 Physics Laboratory I
- PHYS 2326 Electromagnetism and Waves
- PHYS 2126 Physics Laboratory II
- GEOS 1104 History of Earth and Life Laboratory\(^5\)
- GEOS 1303 Physical Geology\(^5\)
- GEOS 1304 History of Earth and Life\(^5\)
- GEOS 2409 Rocks and Minerals\(^5\)

Major Core Courses (38-44 hours)

- GEOS 2306 Geodesy and Geospatial Analysis
- GEOS 3300 Field Geology I (Summer Field Camp I)
- GEOS 3421 Stratigraphy and Sedimentology
- GEOS 3470 Structural Geology
- GEOS 4300 Field Geology II (Summer Field Camp II)
- GEOS 4320 The Physics and Chemistry of the Solid Earth

Geology Option (18-19 hours)
GEOS 3434 Paleobiology
GEOS 3464 Igneous and Metamorphic Petrography
GEOS 4322 The Earth System
GEOS 4430 Hydrogeology and Aqueous Geochemistry

A mathematics course selected from:

GEOS 5306 Data Analysis for Geoscientists (with permission)
MATH 2418 Linear Algebra
MATH 2451 Multivariable Calculus with Applications
PHYS 3330 Numerical Methods in Physics and Computational Techniques

OR

Geophysics Option (24 hours)

MATH 2420 Differential Equations with Applications
MATH 2451 Multivariable Calculus with Applications
PHYS 3330 Numerical Methods in Physics and Computational Techniques
MATH 4362 Partial Differential Equations
PHYS 3411 Theoretical Physics
PHYS 3312 Classical Mechanics
PHYS 3416 Electricity and Magnetism

III. Elective Requirements: 14-19 hours

Advanced Electives (6 hours)

All students are required to take at least six hours of advanced electives outside their major field of study. These must be either upper-division classes or lower-division classes that have prerequisites.

Free Electives (8-13 hours)

Both lower- and upper-division courses may count as electives, but students must complete at least 51 hours of upper-division credit to qualify for graduation. Students are strongly encouraged to take GEOS graduate courses as free electives.

Fast Track Baccalaureate/Master’s Degrees

The Fast-Track program allows students with strong academic records to take selected graduate
courses that may be applied toward the baccalaureate degree and be used to satisfy requirements for the master's degree. Interested students who intend to pursue a master's degree in Geosciences may apply for a Fast Track baccalaureate/master's plan of study via the Geosciences graduate advisor. The planned coursework must be coordinated with the Geosciences undergraduate advisor; the Geosciences graduate advisor should also be notified. A maximum of 15 credit hours may be applied under this program.

Geosciences Minor

Students not majoring in Geosciences are encouraged to choose Geosciences as a minor.

Lower-division courses (8 hours):

- **GEOS 1103** Physical Geology Laboratory
- **GEOS 1104** History of Earth and Life Laboratory
- **GEOS 1303** Physical Geology
- **GEOS 1304** History of Earth and Life

Upper-division courses (12 hours)

To be selected in consultation with Geosciences Undergraduate advisor

1. Must be completed in conjunction with the UTeach program.

2. Curriculum Requirements can be fulfilled by other approved courses from accredited institutions of higher education. The courses listed in parentheses are recommended as the most efficient way to satisfy both Core Curriculum and Major Requirements at UT Dallas.

3. A Major requirement that also fulfills a Core Curriculum requirement.

4. A Major requirement that also fulfills a Core Curriculum requirement. If hours are counted in the Core Curriculum, students must complete additional coursework to meet the minimum requirements for graduation. Course selection assistance is available from the undergraduate advisor.

5. A prerequisite course to be completed before enrolling in upper-division GEOS core courses (GEOS 3421, GEOS 3434, GEOS 3464, GEOS 3470, GEOS 4320, GEOS 4322, GEOS 4430 and GEOS 4606).

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