

# GEOSCIENCES, BS

Many students are already familiar with Geosciences through what is commonly called "earth science" in high school. Geosciences covers our Planet Earth - its soil, minerals, climate change, magnetic fields, earthquakes, water, plants, fossils, volcanoes and more.

The Bachelor of Science (BS) degree in Geosciences is designed to prepare students to become professional Earth scientists in a wide range of disciplines, as well as to enter graduate programs for further advanced training. The BS curriculum includes more allied science requirements than the BA and is designed for students who plan professional employment or advanced study in the geosciences. Graduates seek employment with environmental and water resource management; energy and mineral industries; and government agencies.

Geosciences majors at UWM can organize their electives around a particular area of interest if they wish:

- Hard Rock - the study of structural geology, mineralogy, petrology, volcanology and tectonics
- Hydrogeology - the study of water resources
- Paleontology - the study of evolutionary patterns in history
- Sedimentary Geology - the study of rocks, fossils, and landforms in the context of the biological and chemical make-up

Geosciences touches on all aspects of the other natural sciences including chemistry, biology, mathematics and physics, so the ideal student for Geosciences loves all types of science and is curious about how they interrelate. Most Geosciences students also love the outdoors and traveling off of the beaten path.

Required outdoor field work prepares students for jobs with environmental and water resource management; energy and mineral industries; and government agencies.

UWM students often participate in research abroad in places as diverse as Iceland, Turkey, South America, Ireland, and New Zealand. Others gain hands-on experience in the dirt of Montana, the hills of South Dakota or the swamps of Florida.

## Course of Study – Bachelor of Science Degree

Complete 120 credits including 90 credits in the College of Letters & Science and with 36 of the 90 credits in L&S upper-level (numbered above 300) courses and 30 of those 36 credits in designated Advanced Natural Science courses (<https://uwm.edu/letters-science/advising/degree-requirements/advanced-natural-science-approved-courses-list/>). The College requires that students must complete in residence at UWM at least 15 credits in upper-division (numbered 300 or above) courses in their major. Students are also required to complete University-wide General Education Requirements and the specific L&S requirements listed below.

To complete a major, students must satisfy all the requirements of the major as stated in this catalog. Students who declare their majors within five years of entering the UW System as a degree candidate may satisfy the requirements outlined in any catalog issued since the time they entered. Credits used to satisfy the major also may be used to satisfy other degree requirements.

## University General Education Requirements (GER)

| Code   | Title   | Credits |
|--|---|---------|
| <b>Oral and Written Communication</b>  |   |         |
| <i>Part A</i>  |   |         |
| Achieve a grade of C or better in the following course:  |   |         |
| ENGLISH 102  | College Writing and Research (or equivalent)            |         |
| <i>Part B</i>  |   |         |
| Course designated as OWC-B; may be completed through a major-specific course requirement   |   |         |
| <b>Quantitative Literacy</b>   |   |         |
| <i>Part A</i>  |   |         |
| Earn at least 3 credits with a grade of C or higher in one of the following courses or an equivalent course, or achieve a placement code of at least 30 on the mathematics placement test (or other appropriate test, as determined by the Mathematical Sciences Department) |   |         |
| MATH 102   | Mathematical Literacy for College Students II           |         |
| MATH 103   | Contemporary Applications of Mathematics                |         |
| MATH 105   | Introduction to College Algebra                         |         |
| MATH 108   | Algebraic Literacy II                                   |         |
| MATH 111   | Introduction to Logic - Critical Reasoning <sup>1</sup> |         |
| or PHILOS 111  | Introduction to Logic - Critical Reasoning              |         |
| MATH 116   | College Algebra   |         |
| Or equivalent course   |   |         |
| <i>Part B</i>  |   |         |
| Course designated as QL-B; may be completed through a major-specific course requirement  |   |         |
| <b>Arts</b>  |   |         |
| Select 3 credits   |   | 3       |
| <b>Humanities</b>  |   |         |
| Select 6 credits   |   | 6       |
| <b>Social Sciences</b>   |   |         |
| Select 6 credits   |   | 6       |
| <b>Natural Sciences</b>  |   |         |
| Select 6 credits (At least two courses including one lab)  |   | 6       |
| <b>UWM Foreign Language Requirement</b>  |   |         |
| Complete Foreign Language Requirement through:   |   |         |
| Two years (high school) of a single foreign language   |   |         |
| Two semesters (college) of a single foreign language   |   |         |
| Or equivalent  |   |         |
| <b>UWM Cultural Diversity Requirement</b>  |   |         |
| One course from the Arts, Humanities, or Social Sciences must also satisfy UWM's Cultural Diversity requirement  |   |         |

<sup>1</sup> Math 111 and Philosophy 111 are jointly offered and count as repeats of one another. Students cannot receive credit for both courses.

## College of Letters & Science Requirements

### I. English Composition Requirement

Students must satisfy the English Composition Requirement with one of the following options:

- 1) Completing ENGLISH 102 with a grade of C or higher; or
- 2) placing beyond English 102 on the English Placement Test (EPT) (or other assessment as determined by the English Department); or
- 3) transferring a course of at least 2.5 equivalent credits from another institution that is equivalent to English 102, or a UWM higher-level expository writing course, with a grade of C or higher.

**Note:** This requirement is the same as the University General Education Requirement for Oral and Written Communication Part A. The College of Letters & Science does not have a specific requirement for a writing course beyond English 102, but students must complete the university-wide requirement for Oral and Written Communication Part B listed above.

### II. Mathematics and Formal Reasoning

To satisfy the Mathematics and Formal Reasoning Requirement, Bachelors of Sciences degree students must satisfy the following two requirements:

1. Complete one of the following courses or an equivalent course:

| Code     | Title                                      | Credits |
|----------|--|---------|
| MATH 211 | Survey in Calculus and Analytic Geometry I | 4       |
| MATH 213 | Calculus with Life Sciences Applications   | 4       |
| MATH 221 | Honors Calculus I                          | 5       |
| MATH 231 | Calculus and Analytic Geometry I           | 4       |

2. Complete one course (at least 3 credits) at the 200 level or above chosen from courses in Mathematics, PHILOS 211, or Letters and Science statistics courses:

| Code  | Title  | Credits |
|---|--|---------|
| Complete one of the following:                          |  |         |
| 3 or more credits in any 200-level or above Math course |  |         |
| AFRIC 220   | Introduction to Statistics in African and African Diaspora Studies |         |
| ANTHRO 568  | Introduction to Anthropological Statistics                         |         |
| BIO SCI 465   | Biostatistics  |         |
| ECON 210  | Economic Statistics  |         |
| GEOG 247  | Quantitative Analysis in Geography                                 |         |
| HIST 595  | The Quantitative Analysis of Historical Data                       |         |
| MTHSTAT 215   | Elementary Statistical Analysis                                    |         |
| PHILOS 211  | Elementary Logic   |         |
| POL SCI 390   | Political Data Analysis  |         |
| POL SCI 392   | Survey Research  |         |
| PSYCH 210   | Psychological Statistics   |         |
| SOCIOL 261  | Introduction to Statistical Thinking in Sociology                  |         |

**Note:** This requirement is NOT the same as the University General Education Requirement for Quantitative Literacy Part B. To complete the BS, students must take one of the L&S approved courses. **Not all of the courses listed here will satisfy the QL-B requirement.**

### III. Foreign Language Requirement

Two courses (minimum of 6 credits) in a language (including American Sign Language) other than English at the 100 level or above are required.

Placement testing may be used to satisfy all or part of this requirement. Language courses (including American Sign Language) other than English taken in high school may be used to satisfy all or part of this requirement. One year of high school language equates to one semester of college work.

Completion of the L&S Language Requirement also satisfies the university-wide Foreign Language GER, but not vice versa.

### IV. International Requirement

See Approved Courses for the L&S International Requirement (<https://catalog.uwm.edu/letters-science/approved-courses-international-requirement/>) for course options.

| Code  | Title | Credits |
|---|-------|---------|
| Completed in one of the following ways:   |       | 9       |
| Complete 3 courses (min. 9 cr) in a single foreign language (not including literature-in-translation or American Sign Language) at the 3rd semester level and above |       |         |
| Complete 3 non-language courses (min. 9 credits) with an international content chosen from at least 2 curricular areas.   |       |         |
| Complete 9 credits in combination of the two options above.   |       |         |

### V. Breadth Requirement

Along with completing the University General Education Requirements of 3 credits in the Arts (A); 6 credits in the Humanities (HU), Social Sciences (SS), and Natural Sciences (NS/NS+); and a course with the Cultural Diversity (CD/+) designation, L&S students must complete the Breadth requirement.

| Code   | Title | Credits |
|--|-------|---------|
| <b>Arts</b>  |       |         |
| Select 3 credits   |       | 3       |
| <b>Humanities</b>  |       |         |
| Complete 12 credits of L&S courses with Humanities Breadth designation; no more than 6 credits from a single subject area. *                                 |       | 12      |
| <b>Social Sciences</b>   |       |         |
| Complete 12 credits of L&S Courses with Social Science Breadth designation; no more than 6 credits from a single curricular area. *                          |       | 12      |
| <b>Natural Sciences</b>  |       |         |
| Complete 12 credits of L&S Courses with Natural Sciences Breadth designation, including laboratory or field courses from three different curricular areas. * |       | 12      |
| <b>Cultural Diversity</b>  |       |         |
| Complete 3 credits in a course with Cultural Diversity (CD) designation. **  |       | 3       |

\* Students should check their course selections carefully with the list of approved L&S Breadth Courses (<https://catalog.uwm.edu/letters-science/breadth-requirement-course-list/>). Students are advised to

select at least 6 credits worth of courses in each of the Humanities, Social Science, and Natural Sciences areas that can satisfy both the campus-wide General Education Requirements and the L&S Breadth requirement.

\*\* Students are advised to select a course that satisfies the Cultural Diversity requirement as well as a Humanities or Social Science breadth/GER requirement.

## VI. The Major

The College requires that students attain at least a 2.0 GPA in all credits in the major attempted at UWM. In addition, students must attain a 2.0 GPA on all major credits attempted, including any transfer work. Individual departments or programs may require higher GPAs for graduation. Some departmental majors require courses from other departments. Contact your major department for information on whether those credits will count as part of the major GPA. The College requires that students must complete in residence at UWM at least 15 credits in upper-division (numbered 300 or above) courses in their major.

### Research Requirement

Within their majors, students must complete a research experience approved by the L&S faculty. A list of courses satisfying the research requirement in each major can be found here (<https://catalog.uwm.edu/letters-science/approved-courses-research-requirement/>).

## VII. The Minor

The College requires that students attain at least a 2.0 GPA in all credits in the minor attempted at UWM. In addition, students must attain a 2.0 GPA on all minor credits attempted, including any transfer work. Individual departments or programs may require higher GPAs for graduation.

## Major Requirements

All students who major in Geosciences must complete at least 15 credits in Geosciences courses at the advanced level (numbered 300 or above) in residence at UWM as part of the 36 advanced-level credits required for the L&S degree. The College requires that students attain at least a 2.0 GPA on all credits in the major attempted at UWM. In addition, students must attain a 2.0 GPA on all major credits attempted, including any transfer work.

| Code   | Title   | Credits |
|--|---|---------|
| <b>Required</b>                              |   |         |
| GEO SCI 100                                  | Introduction to the Earth                                   | 3       |
| GEO SCI 102                                  | Principles of Historical Geology                            | 3       |
| GEO SCI 301                                  | Principles of Mineralogy                                    | 4       |
| GEO SCI 302                                  | Elementary Petrology  | 4       |
| GEO SCI 316                                  | Introduction to Geophysics                                  | 4       |
| GEO SCI 414                                  | Structural Geology (satisfies L&S research requirement)     | 4       |
| GEO SCI 455                                  | Field Geology (normally taken over the summer) <sup>1</sup> | 4-8     |
| GEO SCI 511                                  | Stratigraphy and Sedimentation                              | 4       |
| <b>Electives</b>                             |   |         |
| Select two (6 – 8 credits) of the following: |   | 6-8     |
| GEO SCI 400                                  | Water Quality   |         |
| GEO SCI 401                                  | General Soil Science  |         |
| GEO SCI 409                                  | Process Geomorphology                                       |         |
| GEO SCI 443                                  | Glacial and Pleistocene Geology                             |         |

|             |   |
|-------------|---|
| GEO SCI 463 | Physical Hydrogeology                           |
| GEO SCI 464 | Chemical Hydrogeology                           |
| GEO SCI 515 | Physical Sedimentology                          |
| GEO SCI 525 | Terroir: Geology in a Glass                     |
| GEO SCI 563 | Field Methods in Hydrogeology                   |
| CES 651     | Principles of Stream Management and Restoration |

Select 10-12 additional credits from Geosciences Department courses at the 300 level or above, for a total of 18 elective credits. 10-12

### Other Requirements

#### Mathematics

|          |                                  |   |
|----------|----------------------------------|---|
| MATH 231 | Calculus and Analytic Geometry I | 4 |
|----------|----------------------------------|---|

Students are encouraged to take the following:

|          |   |  |
|----------|---|--|
| MATH 232 | Calculus and Analytic Geometry II         |  |
| MATH 233 | Calculus and Analytic Geometry III        |  |
| MATH 234 | Linear Algebra and Differential Equations |  |

#### Chemistry

|          |                   |   |
|----------|-------------------|---|
| CHEM 102 | General Chemistry | 5 |
|----------|-------------------|---|

Students are encouraged to take the following course as well as courses in organic and inorganic chemistry:

|          |  |  |
|----------|--|--|
| CHEM 104 | General Chemistry and Qualitative Analysis |  |
|----------|--|--|

#### Physics

Select one of the following options: 5

##### Option 1:

|                           |  |  |
|---------------------------|--|--|
| PHYSICS 120 & PHYSICS 121 | General Physics I (Non-Calculus Treatment) and General Physics Laboratory I (Non-Calculus Treatment) |  |
|---------------------------|--|--|

##### Option 2:

|                           |   |  |
|---------------------------|---|--|
| PHYSICS 209 & PHYSICS 214 | Physics I (Calculus Treatment) and Lab Physics I (Calculus Treatment) |  |
|---------------------------|---|--|

Students are encouraged to take:

|                           |  |  |
|---------------------------|--|--|
| PHYSICS 122 & PHYSICS 123 | General Physics II (Non-Calculus Treatment) and General Physics Laboratory II (Non-Calculus Treatment) |  |
|---------------------------|--|--|

#### OR

|                           |   |  |
|---------------------------|---|--|
| PHYSICS 210 & PHYSICS 215 | Physics II (Calculus Treatment) and Lab Physics II (Calculus Treatment) |  |
|---------------------------|---|--|

**Total Credits** 60-68

<sup>1</sup> GEO SCI 455 is required but not offered at UWM. Students must enroll in a field course at another university to satisfy the requirement.

Students are advised strongly to increase their scholastic breadth by selecting courses from among several subdisciplines of the geosciences, in consultation with Geosciences Department faculty.

Students who are interested in general geology are encouraged to include courses from among the following:

| Code  | Title   | Credits |
|---|---|---------|
| GEO SCI 409   | Process Geomorphology                                 | 4       |
| GEO SCI 420   | Methods in Paleomagnetism and Environmental Magnetism | 3       |
| GEO SCI 515   | Physical Sedimentology                                | 4       |
| GEO SCI 520   | Introduction to Paleontology                          | 4       |
| GEO SCI 545   | X-Ray Analytical Methods                              | 3       |
| GEO SCI 614   | Advanced Structural Geology                           | 3       |
| GEO SCI 635   | Volcanology   | 3       |
| GEO SCI 638   | Advanced Igneous Petrology                            | 3       |
| Students are encouraged to consider topics offered under the following: |   |         |
| GEO SCI 696   | Topics in the Geological Sciences:                    | 1-3     |
| GEO SCI 697   | Seminar in the Geological Sciences:                   | 1-3     |

Students who are interested in environmental geology or hydrogeology are encouraged to include courses from among the following:

| Code        | Title                           | Credits |
|-------------|---------------------------------|---------|
| GEO SCI 400 | Water Quality                   | 4       |
| GEO SCI 409 | Process Geomorphology           | 4       |
| GEO SCI 443 | Glacial and Pleistocene Geology | 4       |
| GEO SCI 463 | Physical Hydrogeology           | 4       |
| GEO SCI 464 | Chemical Hydrogeology           | 4       |
| GEO SCI 545 | X-Ray Analytical Methods        | 3       |
| GEO SCI 562 | Environmental Surface Hydrology | 3       |
| GEO SCI 563 | Field Methods in Hydrogeology   | 4       |

## Letters & Science Advising

During your time at UWM, you may have multiple members of your success team, including advisors, peer mentors, and success coaches. Letters and Science students typically work with at least two different types of advisors as they pursue their degrees: professional College Advisors and Faculty Advisors. L&S College Advisors advise across your entire degree program while departmental Faculty Advisors focus on the major.

**College Advisors** are located in Holton Hall and serve as your primary advisor. They are your point person for your questions about navigating college and completing your degree. College Advisors will:

- assist you in defining your academic and life goals;
- help you create an educational plan that is consistent with those goals;
- assist you in understanding curriculum, major and degree requirements for graduation, as well as university policies and procedures;
- provide you with information about campus and community resources and refer you to those resources as appropriate; and
- monitor your progress toward graduation and completion of requirements.

**Faculty Advisors** mentor students in the major and assist them in maximizing their development in the program. You will begin working with a Faculty Advisor when you declare your major. Faculty Advisors are an important partner and will:

- help you understand major requirements and course offerings in the department;
- explain opportunities for internships and undergraduate research and guide you in obtaining those experiences; and
- serve as an excellent resource as you consider potential graduate programs and career paths in your field.

Students are encouraged to meet with both their College Advisor and Faculty Advisor at least once each semester. Appointments are available in-person, by phone or by video.

Currently enrolled students should use the Navigate website (<https://uwm.guide.eab.com/>) to make an appointment with your assigned advisor or call (414) 229-4654 if you do not currently have an assigned Letters & Science advisor. Prospective students who haven't enrolled in classes yet should call (414) 229-7711 or email [let-sci@uwm.edu](mailto:let-sci@uwm.edu).

## College of Letters and Science Dean's Honor List

GPA of 3.750 or above, earned on a full-time student's GPA on 12 or more graded credits in a given semester.

## Honors College Degree and Honors College Degree with Distinction

Granted to graduating seniors who complete Honors College requirements, as listed in the Honors College (<https://catalog.uwm.edu/honors-college/>) section of this site.

## Commencement Honors

Students with a cumulative GPA of 3.500 or above, based on a minimum of 40 graded UWM credits earned prior to the final semester, will receive all-university commencement honors and be awarded the traditional gold cord at the December or May Honors Convocation. Please note that for honors calculation, the GPA is **not** rounded and is truncated at the third decimal (e.g., 3.499).

## Final Honors

Earned on a minimum of 60 graded UWM credits: Cum Laude - 3.500 or above; Magna Cum Laude - 3.650 or above; Summa Cum Laude - 3.800 or above.