



# Undergraduate Degree Programs in Geology and Environmental Science

<http://www.clas.wayne.edu/geology>

Wayne State University

Volume 7, Issue 1

Fall 2011

## Department of Geology

The Department of Geology at Wayne State University is located in a urban environmental setting that lies amongst the glaciated landscape of the southern Great Lakes region. The department has five full-time faculty and four part-time instructors. Faculty include: Drs. [Mark Baskaran](#) (Isotope Geochemistry), [Jeff Howard](#) (Sedimentology), [Larry Lemke](#) (Hydrogeology), [Ed van Hees](#) (Economic Geology), and [Sarah Brownlee](#) (Structural Geology). The Geology Department is housed in the historic and newly renovated Old Main Building (of Wayne University), and owns an extensive teaching collection of rocks, minerals and fossils.

[The Department of Geology](#) offers B. A., B. S., and M. S. degrees in Geology, along with an interdisciplinary B. S. degree in Environmental Science. The Geology program consists of a traditional core curriculum with electives that are primarily in the realm of Environmental Science. Candidates for the B. A. and B. S. degrees in Geology must complete 120 credits of course work including satisfaction of the College Group Requirements and the University General Education Requirements, in addition to Geology major requirements outlined on p. 2. Most upper level courses involve both a laboratory and a field component. Students are required to satisfactorily complete a Writing Intensive Course,

and to complete 6 credits of Geology Field Camp. The Department has an active Geology Club, and a yearly spring field trip to exciting locations such as the Grand Canyon or Yellowstone and the Tetons. In addition to aid available through WSU (<http://www.financialaid.wayne.edu>), financial assistance is available through summer internships in field geology, and as student assistants in the Physical Geology laboratory.

The [Environmental Science Program](#) offers an interdisciplinary approach to the subject by combining courses from the Departments of Biological Sciences and Geology. The curriculum consists of core and environmental Geology courses that examine the characteristics and management of geological resources, geological hazards and environmental pollution. The curriculum includes courses from Biological Sciences that involve the study of macro- and microbiota, and ecological analysis of environmental systems. Candidates for the B. S. degrees in Environmental Science must complete 120 credits of course work including satisfaction of the College Group Requirements and the University General Education Requirements, in addition to Environmental Science major requirements outlined on p. 3.

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## Geology and Environmental Science Careers

[Geologists](#), also known as geoscientists or Earth scientists, study the composition, processes and history of the Earth. They study rocks, minerals and fossils, and geologic processes as varied as earthquakes, tsunamis and volcanic eruptions. Geological information is generally required in order to help society make wise decisions regarding use and management of resources. Work at remote field sites is common, hence geologists are generally physically fit and naturally accustomed to being outdoors. A B.S. in Geology is adequate for most entry-level

jobs; better jobs with good advancement potential usually require at least an M.S. degree. Graduates with a master's degree in geoscience can expect [excellent](#) job opportunities. A Ph.D. degree is required for most research positions in colleges and universities, and in most government work.

According to the U. S. Bureau of Labor Statistics, [employment of geoscientists](#) is expected to grow faster than the average of all occupations through 2018. The need to replace geologists who retire will result in many additional job openings over the next decade. Growth will be driven by the

need for organizations to comply with an increasing number of environmental laws and regulations, particularly those regarding groundwater contamination, clean air and flood control. Increased global exploration and development of oil, gas and mineral resources often give geologists the opportunity to work overseas. Qualifications needed for such opportunities include the ability to speak a foreign

language and a willingness to work abroad. The petroleum and mining industries have traditionally hired many geologists, but such opportunities

vary with changing economic conditions. [Employment of environmental scientists](#) are favorable.

Employment of environmental scientists and specialists is expected to increase by 28 percent between 2008 and 2018, much faster than the average for all occupations. Job growth should be strongest in private-sector consulting firms. 2010 starting salaries for geoscientists with B.S. degrees averaged \$45K; starting salaries for B.S. in Environmental Science averaged just over \$40K. Starting salaries for M.S. and Ph.D. ranged from \$65K to \$95K for geologists.

	2010	
	Starting Salary	Average salary
Environmental Scientist	\$40,000 (B.S.)	\$61,700
Geologist	\$45,000 (B.S.)	\$82,500

### Special points of interest:

- Always register early to be sure you get the classes you want before they fill up
- Always attend the first day of class to ensure sufficient enrollment for the course to run
- Declare your major as soon as possible
- Complete Writing Intensive course early
- Watch for seminars and Geology Club meetings!

# Undergraduate Program in Geology

## **Bachelor of Science in Geology (42 credits total required)**

### ***Required Courses***

GEL 1010 - Geology: The Science of the Earth (4 credits)  
 GEL 1020 - Geological History of the Earth (4 credits)  
 GEL 2130 - Mineralogy (4 credits)  
 GEL 3160 - Igneous and Metamorphic Petrology (4 credits)  
 GEL 3300 - Structural Geology (4 credits)  
 GEL 3400 - Sedimentation and Stratigraphy (4 credits)  
 GEL 5993 - Writing Intensive Course (0 credits)  
 GEL 3650 - Field Geology\* (6 credits)  
 Total 30 credits  
 \*must use an approved field course at another university to complete

### ***Faculty***

staff  
 Zawiskie  
 van Hees  
 van Hees  
 Brownlee  
 Howard  
 Howard  
 staff

### ***Frequency***

each semester  
 fall and winter  
 yearly  
 yearly  
 yearly  
 yearly  
 fall and winter  
 yearly

### ***Electives***

GEL 3100 - Environmental Systems Analysis (4 credits)  
 GEL 4200 - Geomorphology (4 credits)  
 GEL 5000 - Geological Site Assessment (4 credits)  
 GEL 5120 - Environmental Geochemistry (4 credits)  
 GEL 5150 - Soils and Soil Pollution (4 credits)  
 GEL 5450 - Hydrogeology (4 credits)  
 GEL 5510 - Contaminant Fate and Transport (4 credits)  
 GEL 6400 - Nuclear Geology (4 credits)  
 GEL 6500 - Economic Geology (4 credits)

Lemke  
 Howard  
 Lemke  
 Baskaran  
 Howard  
 Lemke  
 Baskaran  
 Baskaran  
 van Hees/Lemke

yearly  
 alternate years  
 alternate years  
 alternate years  
 yearly  
 alternate years  
 yearly  
 alternate years  
 alternate years

### ***Cognate Requirements***

A year of mathematics (MAT 1800 and MAT 2010, or equivalent)  
 A year of physics (PHY 2130 and 2140; or 2170 and 2180, or equivalent)  
 A semester of Chemistry (CHM 1220 and 1230, or equivalent)  
 A semester of Biology (BIO 1500, or equivalent) is strongly recommended

## **Bachelor of Arts in Geology (34 credits total required)**

### ***Required Courses***

GEL 1010 - Geology: The Science of the Earth (4 credits)  
 GEL 1020 - Geological History of the Earth (4 credits)  
 GEL 2130 - Mineralogy (4 credits)  
 GEL 3160 - Igneous and Metamorphic Petrology (4 credits)  
 GEL 3300 - Structural Geology (4 credits)  
 GEL 3400 - Sedimentation and Stratigraphy (4 credits)  
 GEL 5993 - Writing Intensive Course (0 credits)  
 GEL 3650 - Field Geology\* (2 credits)  
 Total 26 credits  
 \*must use an approved field course at another university to complete

### ***Faculty***

staff  
 staff  
 van Hees  
 van Hees  
 Brownlee  
 Howard  
 Howard  
 staff

### ***Frequency***

each semester  
 fall and winter  
 yearly  
 yearly  
 yearly  
 yearly  
 fall and winter  
 yearly

### ***Electives***

Same as above

### ***Cognate Requirements***

One semester in any two fields of Biology, Chemistry, or Physics  
 Mathematics 1800, or equivalent  
 Fulfillment foreign Language Group Requirement

## **Minor in Geology (20 credits total required)**

The Department offers a minor in geology for undergraduate students. The minor consists of twenty credits in geology (usually consisting of five courses). Although desirable courses for a student's minor program should be determined in consultation with Geology Department staff members, the following restrictions and recommendations should be noted:

- The minor must include Geology 1010 and 1020.
- Geology 1000 and 1050 may only be applied for credit to a minor with the permission of the student's adviser in consultation with the Chairperson of the Department.
- At least four credits in the minor must be completed in courses at the 3000-level or higher.
- All minor programs must be approved by the Department Chairperson.

Anyone wishing to complete a minor in geology should contact one of the Department faculty members, or the Chairperson, as soon as possible, so that an appropriate program can be formulated.



# Undergraduate Program in Environmental Science

## Bachelor of Science in Environmental Science (36 credits total required)

<b>Required Courses</b>	<b>Faculty</b>	<b>Frequency</b>
GEL 1010 - Geology: The Science of the Earth (4 credits)	staff	yearly
GEL 2130 - Mineralogy (4 credits)	van Hees	yearly
GEL 3100 - Environmental Systems Analysis (4 credits)	Lemke	yearly
GEL 5150 - Soils and Soil Pollution (4 credits)	Howard	yearly
GEL 5510 - Contaminant Fate and Transport (4 credits)	Baskaran	yearly
BIO 1500 - Basic Life Diversity (4 credits)	staff	each semester
BIO 1510 - Basic Life Mechanisms (4 credits)	staff	each semester
BIO 4130 - Ecology (4 credits)	Kashian	yearly
{ BIO 5100 - Aquatic Ecology(4 credits)	Kashian	alternate years
Or		
{ BIO 5440- Terrestrial Ecology(4 credits)	Kashian	alternate years
3 Science or Engineering electives including at least one from geology or biology (9-12 credits)		
Total 45-48 credits		

### **Cognate Requirements**

A year of mathematics (MAT 1800 and MAT 2010, or equivalent)

A year of physics (PHY 2130 and 2140; or 2170 and 2180, or equivalent)

A year of Chemistry (CHM 1220 and 1230, CHM 1240 and 1250, or equivalent)

### **For further information:**

## Declaring a Major/ Minor in Geology

### **You may declare a major in Geology if:**

You have completed at least one full semester at WSU

You have a GPA of at least 2.0

You have completed GEL 1010 or equivalent

**STEP 1** — Call the University Advising Center at 313-577-2680 (<http://www.advising.wayne.edu>) to make an appointment to see an advisor about declaring your major. You will also receive a degree audit, and a Declaration of Major form.

**STEP 2** — Make an appointment with Dr. Mark Baskaran (313-577-3262; [baskaran@wayne.edu](mailto:baskaran@wayne.edu)) in the Department of Geology (0224 Old Main) to declare your major. Bring your paperwork from the University Advising Center.

**STEP 3** — File the completed Declaration of Major form in the College of Liberal Arts and Sciences Student Services Office in 2155 Old Main.

### **You may declare a minor in Geology if:**

You have completed 20 credits in Geology at WSU (at least four credits must be from a 3000-level or higher course)

You have a GPA of at least 2.0

**STEP 1** — Obtain a program approval form from the University Advising Center at 313-577-2680 (<http://www.advising.wayne.edu>).

**STEP 2** — Make an appointment with an undergraduate advisor in the department of your major. Bring your paperwork from the University Advising Center and obtain a signature for approval.



College of Liberal Arts and Sciences.

Department of Geology  
0224 Old Main Building  
Wayne State University  
Detroit, Michigan 48202

Phone: 313-577-2506  
Fax: 313-577-0517

<http://www.clas.wayne.edu/geology>



## Getting Started

If you are unsure about a career in Geology or Environmental Science, we encourage you to explore the subject with GEL 1010\*. This course provides a good overview, while fulfilling the University's General Education Requirement for a physical science with a laboratory. The course includes a field trip to a world-class fossil locality in Ontario, Canada.

## Miscellaneous News

The **Earth and Environmental Science Seminar Series** features occasional presentations from local and visiting scholars. See the geology website for seminar schedule and details.: <http://www.clas.wayne.edu/Geology/>

The **Geology and Environmental Science Club** is an active student-led group that organizes social and academic activities with Earth and Environmental Science themes. For more information visit the club website: <http://wsugeologyclub.spaces.live.com/> or email [wsugeology@hotmail.com](mailto:wsugeology@hotmail.com)

An annual **Departmental Field Trip** open to all geology and environmental science students explores the geology and ecology of interesting locations. See the departmental website or contact Dr. Lemke ([Idlemke@wayne.edu](mailto:Idlemke@wayne.edu)) or Dr. van Hees ([midas@wayne.edu](mailto:midas@wayne.edu)) for details.



## Other Related Web Sites:

\*GEL 1010 course (<http://www.clas.wayne.edu/unit-inner.asp?WebPageID=144>)

Geological Society of America (<http://www.geosociety.org>)

U. S. Dept. of Labor (Bureau of Labor Statistics) Occupational Outlook Handbook

Environmental Science: (<http://www.bls.gov/oco/ocos311.htm>)

Geology and Hydrology: (<http://www.bls.gov/oco/ocos312.htm>)

## Writing Intensive Course—GEL 5993

Required of all Geology majors. The objective of the Writing Intensive course is to evaluate a student's ability to communicate effectively in writing within their specialized or professional field of study. Early in the course, each student must write a short three or four page paper, whose topic will be mutually agreed upon between the supervising professor and the student. This paper will be reviewed and critiqued by the supervisor (Dr. Howard) and one other Geology professor. After completion of the initial paper, one of the following additional assignments will then be given:

- 1) If the student's writing ability is deemed to be reasonably good, then one additional paper will be assigned. Upon completion, the same two professors will again render a critique, meet with the student to discuss the results, and the student will then be expected to rewrite the paper making corrections and changes as recommended.
- 2) If the student's writing ability is deemed strongly inadequate, then two or at most three additional short papers will be assigned. The same two professors will critique each paper until the requirements are fulfilled. In each case, the results of the critiques will be discussed with the student, and he/she will make the appropriate corrections recommended.

In each of the above cases, the grade of Pass or No Pass will be assigned based on the student's effort toward completion of the assignments. If the student completes the assignments and has made a serious effort to understand and complete the assignments, then a Pass grade will be given. Deadlines for submission of first draft or initial paper are March 1<sup>st</sup> (Winter 2012) and October 15<sup>th</sup> (Fall 2011).