Department of Geological Sciences

UNDERGRADUATE STUDENT HANDBOOK

http://www.ohio.edu/geology

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1.0 INTRODUCTION

1.1 GEOLOGY AT OHIO UNIVERSITY

The Department encourages all interested students to consider pursuing an undergraduate degree in Geological Sciences at Ohio University. The University is unique among major state universities by virtue of its location in Appalachia, a region whose principal economic base is geology-related (coal production, oil and gas, sand and gravel, refractory clays, and ground water resources). Thus, students and faculty involved in the geological sciences at Ohio University have an ideal environment in which to study a number of different aspects of geology and regional issues and problems.

Another advantage of undergraduate study in the geological sciences at Ohio University is the opportunity to work closely with faculty members and graduate students. Many departments at other universities are too large to allow for close contact and exchange of ideas among undergraduates, graduate students, and faculty members. However, the small classes and laboratories taught by the department's 11 faculty members, with the assistance of select graduate students, guarantee personal attention and the opportunity for advanced studies at the undergraduate level. This close contact is promoted further by assigning each incoming student a faculty advisor who works with the student to plan each quarter's course schedule, and who is available to provide valuable academic and career counseling.

1.2 NATURE OF THE GEOLOGICAL SCIENCES

Geology is the study of the Earth -- its composition, processes, and history. An understanding of the nature of Earth materials and of geologic processes operating both on the Earth's surface and in the interior provides valuable clues to reconstructing the historical record of the Earth. This understanding allows geologists to locate and develop valuable natural resources and to deal with a variety of geologic processes, which affect our everyday lives. Geology is, therefore, a very practical science.

As the science of geology has matured, we have learned to use geologic products and geologic knowledge in many ways. For instance, the expertise of geologists has contributed to more efficient methods of exploration, production, and conservation of nonrenewable resources. These rapidly dwindling, irreplaceable Earth materials include such fossil fuels as coal, oil, and natural gas; water for human consumption and irrigation; metallic minerals such as iron, copper, and gold; and nonmetallic minerals used to produce building materials, fertilizers, and other chemically-manufactured products.

Geologists are also concerned with solving the many problems of our physical environment. To meet the challenges introduced by various natural occurrences, geologists are involved in the prediction and control of such geologic hazards as floods, landslides, earthquakes, volcanic eruptions, and global climate change. Geologists are also working to find solutions to a variety of geologic problems created by the increasing incidence of environmental pollution and the need for proper disposal of hazardous waste materials. And since geologic factors need to be considered to ensure safe design, geologists are also involved in large-scale construction and engineering projects.

Finally, the study of geology provides fertile ground for the development of new and original ideas. One of the most revolutionary discoveries in the history of science is the concept of plate tectonics,

or the concept that the Earth's crust is broken into a number of huge blocks or plates that slowly move laterally, splitting continents apart to form new ocean basins between, and in other locations, colliding to build mountain ranges. New geologic information and interpretation of existing data continue to add insight to the understanding and application of this concept to topics ranging from how the continents have evolved, to the distribution of earthquakes and volcanic eruptions, to the origin and distribution of a variety of mineral deposits. More recently, great strides have been made in the understanding of the interactions between land, oceans, and the atmosphere. With this new understanding, geoscientists are rapidly gaining insight on how the Earth's climate system works.

These represent just a few of the many challenging areas of study in the geological sciences. However, new methods and applications that call for skills in mathematics, chemistry, physics, and computer science, in addition to geology, are constantly being discovered.

2.0 DEGREE PROGRAMS IN GEOLOGY

The Department of Geological Sciences offers three separate undergraduate degree programs: B.S. in Geological Sciences, B.S. in Environmental Geology, and B.A. in Geological Sciences.

The B.S. programs in Geological Sciences and the B.S. in Environmental Geology are professionally oriented degrees, which prepare students for careers or for advanced study in geology. The B.S. in Geological Sciences degree provides students with broad training across the geological sciences while providing the opportunity for specialization through upper division elective courses. The B.S. in Environmental Geology is a pre-professional program in environmental geology is designed to provide students with broad training in preparation for a career in conservation, natural resource management, land-use planning, or environmental quality control.

The B.A. in Geological Sciences is designed for students interested in applying a general understanding of the geological sciences to fields such as education, library science, technical writing, or other areas where a general knowledge of Earth sciences is desired.

The department also offers a minor in Geological Sciences and an honors program for eligible majors as detailed below.

Four major components comprise the undergraduate degree programs:

1. A series of required core courses which provide a fundamental background in major sub-fields of geology. The core courses develop an understanding of geologic concepts and geologic information in each sub-field (for example, minerals or surface processes). Laboratory work and/or field studies are conducted as integral parts of each course. One-day field trips in Ohio and weekend field trips to areas in the Appalachian Mountains are conducted in conjunction with several of the courses.

2. Two field courses are required in the B.S. programs and are normally scheduled in the senior year.

3. A series of required courses in the supporting sciences. All undergraduate geology programs require a background in mathematics, chemistry, and physics or biology-the exact nature of the requirement depending on the program.

4. Selection from a group of advanced geology courses which specialize in certain areas of geology and which are selected by the student to develop particular career plans or to provide a basis for graduate study.

The course requirements during the first year of study are very similar for both B.S. programs, an arrangement that allows students to explore the various emphases of each before deciding on a specific degree program. Specific course requirements for each of the degree programs can be found in the Ohio University Undergraduate Catalog and are listed below.

**Note: Undergraduate Catalog is updated annually and is always the authoritative source of information on current degree requirements.

2.1 BACHELOR OF SCIENCE IN GEOLOGICAL SCIENCES (BS3321)

Departmental Requirements

Course Number	Course Title	Credit Hours	Quarter Offered
101	Introduction to Geology	5	All
or			
202 + one of 120, 130, 135, 170, 208, 211, 215, 221, or 231			
205 (PSY221/MATH 250)	Statistics	4	Winter (alt)
255	Historical Geology	4	Winter, Summer (most)
315	Mineralogy	5	Fall
320	Petrology	4	Winter
330	Geomorphology	5	Spring
341	Paleontology	4	Fall
350	Stratigraphy & Sedimentology	4	Spring
360	Structural Geology	5	Fall
420	Petrography	5	Spring
446	Earth Systems Evolution*	4	Winter
466	Geodynamics	4	Spring
475A	Field Geology I*	4	Fall
475B	Field Geology II	5	Winter intersession

Geological Sciences Electives

Three additional courses at the 400 level	12 or more
OR Two additional 400 level courses AND a senior thesis	

Extra-Departmental Requirements

MATH	263A & B or	8
	266A & B or	8
	163A & B	7
PHYS or BIOS	251, 252, 253 or	15
(Physics recommended unless	251, 202 or	10
specializing in paleontology)	201, 202 or	10
	BIOS 170, 171, 172	13
CHEM	151, 152, 153 or	15
	121, 122, 123 or	12
	a combination	13-14

College Requirements

Humanities	18
Social Sciences	18
Language	0-30

University Requirements

Tier I additional	English Comp	
	Jr.Comp	8
Tier III	*Both Geol 466 and 475A are Tier III equivalent courses	

Suggested schedule of courses for students pursuing a BS in Geological Sciences

***Note that it is important to begin the chemistry sequence as soon as possible since it forms the pre-requisite for the core geology course sequence beginning with Geol 315 (Mineralogy)

For students entering the major in fall of year 1

	FALL	WINTER	SPRING
Year 1	Geol 101	Geol 255	Chem 123/153
	Chem 121/151	Chem 122/152	Eng 151
	Math 163A/263A	Math 163B/263B	Tier II
	Tier II	Tier II	Geol 205/PSY 221/MATH 250
Year 2	Geol 315	Geol 320	Geol 330
	Geol 341	Tier II	Geol 350
	Phys 251/201	Phys 252/202	Phys 253
	Tier II	Tier II	Tier II
Year 3	Geol 360	Geol 4XX-A	Geol 420
	Tier II or Jr Comp	Jr Comp or Tier II	Geol 4XX-B
	**Lang 111	**Lang 112	**Lang 113
Year 4	Geol 475A	Geol 475B*	Geol 466
	Geol 4XX-C	Geol 446	Tier II
	Tier II	Tier II	Tier II

For students entering the major in fall of year 2

	FALL	WINTER	SPRING
Year 1	Tier II/**Lang 111	Tier II/**Lang 112	Tier II/**Lang 113
	Engl 151	Tier II	Tier II
	Tier II	Tier II	Tier II
	Tier II	Tier II	Tier II
Year 2	Geol 101	Geol 255	Geol 330
	Math 163A/263A	Math 163A/263B	Geol 205/PSY 221/MATH 250
	Chem 121/151	Chem 122/152	Chem 123/153
	Tier II/Lang 111	Tier II/Lang 112	Tier II/ Lang 113
Year 3	Geol 315	Geol 320	Geol 350
	Geol 341	Junior Comp	Geol 4XX-A
	Phys 251/201	Phys 252/202	Phys 253/Tier II
	Tier II/Lang 111	Tier II/Lang 112	Tier II/ Lang 113
Year 4	Geol 360	Geol 475B*	Geol 420
	Geol 475A	Geol 446	Geol 466
	Geol 4XX-B	Geol 4XX-C	Tier II

*Winter Intersession course
**See college language requirements. This is a typical minimum

2.2 BACHELOR OF SCIENCE IN ENVIRONMENTAL GEOLOGY (BS3323)

Departmental Requirements

Course Number	Course Title	Credit Hours	Quarter Offered
101	Introduction to Geology	5	All
or			
202 + one of 120, 130, 135, 170, 208, 211, 215, 221, or 231			
205 (PSY 221/MATH 250)	Statistics	4	Winter (alt)
231	Water & Pollution	4	Fall, Spring, Summer
255	Historical Geology	4	Winter, Summer (most)
315	Mineralogy	5	Fall
320	Petrology	4	Winter
330	Geomorphology	5	Spring
350	Stratigraphy & Sedimentology	4	Spring
360	Structural Geology	5	Fall
427	Water Geochemistry	4	Fall
429	Contaminant Geochemistry	4	Winter
475A	Field Geology I (Fills Tier III)	4	Fall
475B	Field Geology II	5	Winter intersession
480	Hydrogeology	4	Fall

Choose three courses from the list below

405	Modeling and comp. Methods	4	Winter (alt)
428	Physical Geochemistry	4	Winter (alt)
432	Soils	4	Fall (alt)
439	Fluvial Geomorphology	4	Fall (alt)
453	Limnology	4	Fall (alt)
471	Advanced Environmental Geol	4	Winter
481	Flow modeling	4	Winter
482	Contaminant Transport	4	Spring
485	Geophysics	4	Fall
476	Subsurface Methods	4	Winter
Geog 478* (requires prerequisite)	Principles of GIS	5	Fall, Winter

Extra-Departmental Requirements

MATH	263A & B or	8
	266A & B	8
	163A & B	7
PHYS	251, 252, 253 or	15
	251, 202 or	10
	201, 202 or	10
	BIOS 170, 171, 172	13
CHEM	151, 152, 153 or	15
	121, 122, 123	12

College Requirements

Humanities	18
Social Sciences	18
Language	0-30

University Requirements

Tier I additional	Freshman English/Jr Comp	8
Tier III	Geol 475A is a Tier III equivalent course	

Suggested schedule of courses for students pursuing a BS in Environmental Geology

***Note that it is important to begin the chemistry sequence as soon as possible since it forms the pre-requisite for the core geology course sequence beginning with Geol 315 (Mineralogy)

For students entering the major in fall of year 1

	FALL	WINTER	SPRING
Year 1	Geol 101	Geol 255	Geol 231
	Chem 121/151	Chem 122/152	Chem 123/153
	Math 163A/263A	Math 163B/263B	Eng 151
	Tier II	Tier II	Geol 205/PSY 221/MATH 250
Year 2	Geol 315	Geol 320	Geol 330
	Geol 427	Tier II	Geol 350
	Phys 251/201	Phys 252/202	Phys 253
	Tier II	Tier II	Tier II
Year 3	Geol 360	Geol 429	Geol 4XX-A
	Geol 480	Jr Comp	Tier II
	**Lang 111	**Lang 112	**Lang 113
Year 4	Geol 475A	Geol 475B*	Geol 4XX-C
	Tier II	Geol 4XX-B	Tier II
	Tier II	Tier II	Tier II

For students entering the major in fall of year 2

	FALL	WINTER	SPRING
Year 1	Tier II/**Lang 111	Tier II/**Lang 112	Tier II/**Lang 113
	Engl 151	Tier II	Tier II
	Tier II	Tier II	Tier II
	Tier II	Tier II	Tier II
Year 2	Geol 101	Geol 255	Geol 330
	Math 163A/263A	Math 163B/263B	Geol 231
	Chem 121/151	Chem 122/152	Chem 123/153
	Tier II/Lang 111	Tier II/Lang 112	Geol 205/PSY 221/MATH 250
Year 3	Geol 315	Geol 320	Geol 350
	Geol 427	Junior Comp	Geol 4XX-A
	Phys 251/201	Phys 252/202	Phys 253/Tier II
	Tier II/Lang 111	Tier II/Lang 112	Tier II/ Lang 113
Year 4	Geol 360	Geol 475B*	Geol 4XX-C
	Geol 475A	Geol 429	Tier II
	Geol 480	Geol 4XX-B	Tier II

*Winter Intersession course
**See college language requirements. This is a typical minimum

2.3 BACHELOR OF ARTS IN GEOLOGICAL SCIENCES (BA3321)

Departmental Requirements

*Geological Sciences coursework must total at least 52 hours

Course Number	Course Title	Credit Hours	Quarter Offered
101	Introduction to Geology	5	All
or			
202 + one of 120, 130, 135, 170, 208, 211, 215, 221, or 231			
205 (or PSY 221 or MATH 250)	Statistics	4	Winter (alt)
255	Historical Geology	4	Winter, Summer (most)
330	Geomorphology	5	Spring
341	Paleontology	4	Fall
350	Stratigraphy & Sedimentology	4	Spring
360	Structural Geology	5	Fall
either			
315	Mineralogy	5	Fall
and			
320	Petrology	4	Winter
or			
211	Oceanography	4	Fall, Spring
and			
312	Earth Materials	5	Fall
either			
446	Earth Systems Evolution*	4	Winter
or			
466	Geodynamics	4	Spring

Geological Sciences Electives

At least 2 additional courses at the 400 level	8 or more

Extra-Departmental Requirements

MATH 115	Pre Calculus	5
PHYS 201	Intro to Physics	5
CHEM 121, 122	Principles of Chemistry	8

College of Arts and Sciences Requirements

Humanities	18
Social Sciences	18
Language	0-30

University Requirements

Tier I additional	English Comp Jr.Comp	8
Tier III	Can fill with Geol 446 or 475A	

* Note - only Geol 446 is a TIER III equivalent class at this time

****Students in this major should follow a modified version of the BS in Geological Sciences schedule**

2.4 MINOR IN GEOLOGICAL SCIENCES (OR3321)

The minor program is intended to provide a flexible option for students who desire a more in-depth knowledge of geology in concert with another major. Majors from any major in the university, science or non-science, are welcome to pursue a minor in the department.

Required Courses

Course Number	Course Title	Credit Hours	Quarter Offered
101	Introduction to Geology	5	All
255	Historical Geology	4	Winter, Summer (most)
A minimum of 3 courses at the 300-400 level		12-15	
		21-24	

Any additional course in Geological Sciences to achieve a minimum of 25 total hours

Compete at least 8 hours of the 300-400 level coursework with a grade of "C" or better

2.5 SENIOR THESES

For BS in Geological Sciences majors, students may complete a senior thesis in place of one of the three 400-level elective courses. A senior thesis comprises an independent research project in which the student collects data, evaluates hypotheses, and constructs interpretations which are then written up as a scientific document and defended.

High achieving students may wish to apply for departmental honors and pursue an honors thesis as outlined in the next section. It is important to note that all students who can identify a willing advisor and suitable project may complete a senior thesis regardless of whether their GPA qualifies them for the honors program. Only students who qualify and apply for departmental honors will have this honorific noted on their diploma and transcripts.

To begin a senior thesis, the student must select a research area of interest and then discuss with the intended faculty advisor the feasibility of a research project. The research project can be proposed by either the student or faculty member as long as both agree about the purpose, methodology, and expected results of the thesis.

A student is expected to spend the bulk of three quarters conducting their senior thesis. Therefore, if you are considering undertaking a senior thesis, it is important to contact potential advisors in the spring of your junior year. Grants are available from the Ohio University Provost's Research Fund (http://www.honors.ohio.edu/research_op.htm#a1) and the North Central Section of the Geological Society of America (http://www.geosociety.org/sectdiv/Northc/students.htm), among other sources, to support undergraduate research. Review the guidelines for annual deadlines to apply for funding.

The responsibilities of the advisor include: working collaboratively with the student in the preparation of the research proposal, advising the student in the developing of the thesis or project proposal; advising the student regarding coursework needed to prepare the thesis or project; reviewing the thesis results with the student and to discuss the implications of the results, reading and critiquing the written component of the thesis; and helping the student with a forum in which to share the results of the thesis or project.

The student, in consultation with the advisor, must select two additional departmental faculty members to serve on the thesis committee. The committee member responsibilities include the review and approval of the thesis proposal and the final thesis and participation in the oral thesis defense.

Once a thesis topic has been selected by the student, a thesis proposal must be written and presented to the thesis committee. The thesis proposal is a referenced paper, typically approximately ten pages in length, that describes the background for the project, rationale for and significance of the research, hypotheses to be tested, methods to be used, and expected results. The thesis proposal should be written early in the research process and at least one quarter prior to the anticipated final thesis defense. Once the thesis proposal has been approved, the student may register for GEOL 495 (Senior Thesis). Registration for GEOL 495 requires permission (pink slip) from the department chair. Students may register for up to 5 hours per quarter for a maximum of 15 hours. A PR grade is given until the thesis is successfully defended. At that time, a CR grade will be submitted.

The next step in the thesis process involves the acquisition, compilation, and synthesis of information that comprises the research project, the end-product of which is a written thesis. Writing of the thesis should be undertaken in close collaboration with the faculty advisor. The final thesis should be written in scientific language and clearly document the background, hypotheses, methods, results, and interpretations of the research in a logical, well-referenced manuscript. The completed thesis should be an original work that fully addresses the problem outlined in the thesis proposal. While not as comprehensive a work as a Master's thesis, the Senior thesis should represent substantially more effort and content than a senior independent study project.

Once the thesis is approved by the advisor, the thesis is presented to the thesis committee and a final defense is scheduled. The thesis defense includes a 20 to 25 minute public presentation (open to departmental faculty and students) by the student about their research followed by a closed session in which the student fields questions from the thesis committee. Following approval of the oral defense, the student makes any corrections to the written document required by the committee and submits the completed thesis to the department.

2.6 DEPARTMENTAL HONORS PROGRAM

Geology majors with exceptional academic records, interested in having a down to Earth experience, and who are engaged in a senior thesis research project during their senior year are eligible for graduation with Departmental Honors.

Eligibility

- Students must have an overall GPA of 3.1 or higher and major GPA of 3.3 or higher in order to be eligible for the program.
- Prior to completing the application for admission into the departmental honors program students must identity a full-time faculty member whose expertise is relevant to the proposed research project who has agreed to serve as the advisor. The student and faculty member must discuss and agree on a mutually acceptable research topic for the thesis, and the faculty member must review and sign the application form.
- Students must be in residence at the Athens campus for at least 2 quarters during their senior year to complete and write their thesis research.

Senior Thesis

The primary requirement for the awarding of Departmental Honors is the completion of senior honors thesis research project. Departmental thesis guidelines are outlined on pages 11 and 12 of this handbook.

Application

Interested students must apply for admission to the Departmental Honors Program. The process involves filling out an application form by the fourth week of the quarter immediately prior to the quarter in which the student wishes to begin the Honors Program. A copy of the application form is on pages 14-15 of this handbook or can be requested from the Honors Program Coordinator.

Thesis/Project Submission

College guidelines describe the type of work acceptable for the thesis or project. These guidelines can be accessed at http://www.cas.ohiou.edu/facultystaff/guidelines/Dept_honors.pdf. These may include specific information about the deadlines, specific style requirements, and general format. The thesis submission form is completed after the thesis is approved by the student's faculty committee. This form requires signatures from the advisor, departmental honors coordinator, and the Dean of Arts and Sciences.

Criteria for the Awarding of Departmental Honors

The following list summarizes the requirements for the Departmental Honors Program. Departmental honors will be awarded if students accepted for admission into the program meet the following criteria:

- Continue to maintain a 3.1 GPA overall and 3.3 in Geological Sciences.
- Complete and defend a senior thesis that demonstrates excellence in the student ability for geological research and writing.
- The senior thesis must be completed, approved by the thesis committee, and submitted to the College of Arts and Sciences by the last day of classes for the quarter (see quarterly deadlines on College of Arts and Sciences website). Student defenses may occur in Fall, Winter, or Spring Quarters. Summer defenses are not normally allowed without special permission.

Who to Contact

The Undergraduate Chair serves as the Coordinator of Departmental Honors.

Department of Geological Sciences Honors Program Application

Name:

Current Overall G.P.A:

Current Geology G.P.A.:

Supervising Faculty Member:

1. Describe the nature and scope of your proposed project.

2. What classes or other experiences have provided you with the background knowledge needed to successfully complete this project?

3. Describe the availability of data to test your hypotheses. What are your field, lab, or museum plans, if any, to acquire this data?

4. What is your current timetable for researching, writing, and revising your project?

Please read the following and sign below as an indication that you understand and accept the criteria established for the awarding of Departmental Honors in Geology.

Criteria for the Awarding of Departmental Honors:
Departmental Honors will be awarded if students accepted for admission in the program meet the following criteria:

- Continue to maintain a 3.1 GPA overall and 3.3 in Geological Sciences.
- Complete and defend a senior thesis that demonstrates excellence in the student's ability for geological research and writing.
- The senior thesis must be completed, approved by the thesis committee, and submitted to the College of Arts and Sciences by the last day of classes for the quarter (see quarterly deadlines on College of Arts and Sciences website). Student defenses may occur in Fall, Winter, or Spring Quarters. Summer defenses are not normally allowed without special permission.

Student Signature _____

The undersigned have reviewed and assented to the proposal outlined on this application form.

Supervising Faculty Member _____

Coordinator of Departmental Honors _____

3.0 FIELD EXPERIENCES

Geology is a hands-on field, and it is often said that the best geologists are those that have seen the most rocks. As a department, we are strongly committed to providing real-world field experiences to our students. Many major courses, therefore, encompass field components. These range from excursions during scheduled laboratories to the local rocks and water systems, day trips to fossiliferous outcrops or mines in Ohio and nearby states, and weekend trips to examine structural features in the Appalachian Mountains. Two longer field excursions, the departmental field course to Death Valley and the carbonate field course to San Salvador in the Bahamas, provide opportunities for more in-depth study of geologic systems.

Field trips provide exceptional learning opportunities, contribute to strong student cohorts, and often produce lasting memories. When in the field, always be aware of the potential dangers to yourself and others, such as loose rocks or steep slopes. Utilize appropriate caution, be aware of your surroundings, and practice safe field conduct.

A field geology course is required for both of the BS degree programs. This requirement can be filled with either the departmental field course (Geol 475A and Geol 475B) or an equivalent summer field course taken through another university.

Our department currently offers a two-phase field camp component that most of our majors choose to be involved in. Our field camps consist of two classes. The first, GEOL 475A, is taught each fall quarter at Ohio University with field trips to and projects in southeastern Ohio and West Virginia. GEOL 475A is taken alongside your other courses during your senior year. GEOL 475B is our two-week field course taught in Death Valley/southern California region during the lengthy winter intersession of your senior year.

During your junior year, field camp instructors will call a special meeting to provide all undergraduates with application and information regarding field camp at Ohio University and information regarding external field camps. If you have any questions about your upcoming field camp experience, please contact Keith Milam at milamk@ohio.edu or speak with your departmental advisor.

Students should be aware that attendance at field camps outside Ohio University may involve substantial expense for tuition, fees, and travel. Financial aid through Ohio University cannot be applied to external field camps since this university is unaffiliated with other programs. Equivalent courses should be at least 9 quarter or 6 semester hours and include approximately 6 weeks of field work emphasizing geologic mapping. A list of field geology courses offered by other universities can be found at http://geology.com/field-camp.shtml. Be aware that this is a general list of field courses and that not all of these courses are considered equivalent to the departmental field course. Field courses typically require completion of structural geology (Geol 360) and are usually taken the summer before or after a student's senior year. *If you are interested in enrolling in a field course from another university, you must meet with your departmental advisor to determine whether your proposed course is considered to be equivalent before applying.*

Opportunities for financial aid through professional societies or other institutions may be available. The National Association of Geoscience Teachers offers scholarships for field courses which may be applied to any field course (http://www.nagt.org/nagt/programs/field_scholarships.html).

4.0 UNDERGRADUATE ADVISING

Each student majoring in Geological Sciences or Environmental Geology is assigned a specific faculty member as their academic advisor. This faculty member will provide advice on course selection and career options. Students must meet with their academic advisor once per quarter to pick up a physical copy of the DARS (Degree Audit Report) including the RAC (Registration Access Code) in order to enroll for the next quarter. Students may print copies of their DARS themselves at any time form the registrar's webpage, but these lack the RAC information.

If desired, students may request a switch in academic advisors. For example, if a student is conducting research with a particular faculty member and would prefer them to serve as their academic advisor. Requests should be directed to the Undergraduate Chair.

4.1 STUDENT RESPONSIBILITY

The student is responsible for knowing and observing the regulations in the Undergraduate Catalog at http://www.catalogs.ohio.edu/. The responsibility for verification of information and completion of degree requirements rests with the student.

The student will construct a degree completion plan, using the worksheet on the following page, that lists each of the courses a student will take during the remainder of his or her tenure at Ohio University and present it to their academic advisor for review. The student should consult with their advisor whenever the degree completion plan needs to be emended. Continued communication with the academic advisor is particularly important for students experiencing the transition from quarters to semesters.

4.2 ADVISOR RESPONSIBILITY

The advisor shares the responsibility for developing an advising partnership with the undergraduate student. The advisor will review, revise, and approve the degree completion plan. This collaborative effort with the student provides a clear framework for timely degree completion.

4.3 GRADUATION CHECK AND APPLICATION FOR GRADUATION

Conferral of the degree is not automatic at Ohio University. Students must apply for graduation during the quarter in which they plan to complete their degree at http://www.ohio.edu/registrar/gradapp.cfm. Deadlines for applying to graduate are typically within the first four weeks of the quarter. Deadlines are listed on the registrar's website.

The college of Arts and Sciences recommend that students schedule a graduation check during their junior year and then a final graduation check their senior year. A graduation check is a one-on-one meeting with an advisor in the Office of Undergraduate Student Affairs. Students and advisors will carefully review the DARS and each requirement that is unmet will be noted. Students and advisors will discuss how and when these requirements will be completed. A graduation check will allow students to see if they are on track for timely graduation and help them take necessary steps to ensure degree completion. Students may schedule a graduation check by calling the office at 740-593-2845.

4.4 Degree Completion Plan for _____

	Fall	Winter	Spring	Summer
20__ to 20__				
20__ to 20__				
20__ to 20__				
20__ to 20__				
20__ to 20__				

5.0 FACILITIES AND SERVICES

5.1 STUDENT MAILBOXES AND EMAIL

Each geology major is provided with a mailbox in the department office (Clippinger 316). Students should check their mailbox regularly for departmental notices, returned assignments, etc. Similarly, students should check their university email regularly. Departmental announcements, internships and job announcements, and scholarship opportunities are distributed to students in this way.

5.2 COMPUTER LAB

The Department of Geological Sciences maintains a computer lab in Clippinger 218 with computers that boot with both Macintosh and Windows interfaces. Access is available to geology majors and students enrolled in geology courses above the Tier II level during a particular quarter. Computer access is limited to course-work or research related items. Computers and printers are NOT available for personal use. Personal use of computing resources may result in loss of access to the computer lab.

Computer software includes Microsoft Word, Excel, and Powerpoint, ArcGIS, Adobe Illustrator, Adobe Photoshop, and specialty geology software for use in specific courses. Both interfaces are password protected. Ask your course instructor or the department IT specialist, Tim Grubb (grubbt1@ohio.edu, 315 Clippinger) for access.

The computer lab is a resource specifically for geology students, and it must be maintained by geology students. Please clear away all scrap and waste paper to the recycling bins. When printer paper or ink becomes low, see Cheri Sheets in Clippinger 316 for refills. Food and drink are not allowed in the computer lab. The computer lab is closed to other students when classes have reserved the room.

Be aware that paper and ink are finite resources. Once the annual supply is exhausted, ink and paper can not be replaced. Therefore, be conscientious with your use of supplies. Conserve resources by printing 4 of more powerpoint slides to a page and only printing one copy of documents. Be aware that a slight delay exists between sending the print command and the document printing. Please wait for the document to print before sending a second print command.

5.3 BUILDING ACCESS

Certain courses and research projects require access to geology classrooms or facilities after hours or on weekends. If the professor teaching a course expects after hours work, they will request that keys be made available to their class. Keys can be picked up in the department office and must be returned at the end of the quarter. Failure to return keys will result in a charge to the student's university account.

6.0 FINANCIAL ASSISTANCE

6.1 SCHOLARSHIPS AND AWARDS

The department awards a number of scholarships and awards based on academic excellence.

Stocker Scholarship
Awarded annually to an outstanding incoming freshman majoring in Geological Sciences or Environmental Geology.

Ewers Scholarship
Awarded annually to an outstanding sophomore or junior majoring in Geological Sciences or Environmental Geology.

Elizabeth Llewelyn Robe Memorial Scholarship
Awarded in alternate years to an outstanding student majoring in Geological Sciences or Environmental Geology (academic rank is open).

Maurice and Betty Warner Scholarship
Awarded annually to one or two outstanding students majoring in Geological Sciences or Environmental Geology (academic rank is open).

Distinguished Professor Scholarship
Awarded annually to one outstanding student majoring in Geological Sciences or Environmental Geology (academic rank is open).

Outstanding Graduating Senior
Awarded annually to the most outstanding geology major in the graduating class.

W.A. Tarr Award
Awarded annually by the Sigma Gamma Epsilon Chapter to an outstanding student leader.

6.2 UNDERGRADUATE EMPLOYMENT

Students interested in employment within the department should discuss options with faculty members. Annually, several PACE (Program to Aid Career Exploration) positions are available in the department. Students should apply to these positions in April for the following academic year at http://www-sfa.chubb.ohiou.edu/employment/emp_pace.html. The department office typically employs a work-study student. Furthermore, faculty members with research grants often hire student assistants. Ask around the department to find out what is available.

Summer internships are available through a variety of sources. One large internship program is GeoCorps™ America. GeoCorps America is a program of the Geological Society of America, in partnership with the U.S. Forest Service, the Bureau of Land Management, and the National Park Service. The program offers paid short-term geoscience positions in some of the most beautiful natural areas in the world. Discreet project areas include geology, hydrology, paleontology, mapping and GIS, minerals, soils, glaciology, geo-hazards, karst, and education. Applications to this program are due in January for summer positions and in April for late fall and winter positions. More information is available at http://www.geosociety.org/geocorps/index.htm.

For students interested in the energy industry, the AAPG-SEG Student Expo (http://studentexpo.info/) is an excellent place to pursue internship and career opportunities.

7.0 Professional Development

The Department of Geological Sciences provides a number of ways to engage in geology outside of the classroom setting.

7.1 Geology Club

Geology Club is an undergraduate organization that provides social activities that may (or may not) involve geology such as social events, trips to rock and mineral shows, hiking, caving, and camping. The list of activities changes each quarter. Stop by a pizza-filled meeting to learn more about this club which is open to both geology majors and anyone interested in geology in general. Watch for postings in the hallways about meeting times or ask the Geology Club officers for more information.

7.2 Sigma Gamma Epsilon (SGE)

Sigma Gamma Epsilon is the Earth sciences honors society. Any person in any branch of the Earth Sciences who has completed at least 15 quarter hours in Earth Science courses and has maintained a minimum GPA of 3.0 in all Earth Science courses together with an overall GPA of 2.67 in all college courses is qualified for membership. SGE members engage in academic service related activities such as resume and poster presentation workshops and offers free tutoring to some introductory courses. Watch for postings in the hallways about meeting times or ask the SGE officers for more information.

7.3 Departmental Colloquium Series

The department hosts a seminar series during the quarter on Friday afternoons. Geoscientists from Ohio University and other universities in the region present 40 to 50 minute lectures highlighting their recent research endeavors. The colloquium series provides a great way to see science in action including hypothesis testing, data collection, results, and interpretations and learn about new and cutting edge research in geology.

7.4 Student Research

Geology majors are encouraged to engage in independent research with any member of the department faculty. To become involved in a research project, contact a faculty member that works in an area of geology you are interested in (see list in Appendix I) and inquire about opportunities in their lab. Student research may, but does not necessarily need to, lead to a senior thesis.

7.5 Participation in Professional Societies and Meetings

Undergraduate students in geology are encouraged to participate in professional meetings. Regional Geological Society of America (GSA) meetings are excellent venues for presentation of results of undergraduate research, and our students often present at these meetings. Attending meetings such as the Annual GSA meeting provides students the chance to view a wide array of research presentations on topics similar to and different than those studied in the classroom. This can be a great way to narrow down fields of interest for graduate school and make contacts with potential graduate school advisors.

Students should also consider joining professional organizations such as the Geological Society of America (GSA), American Geophysical Union (AGU), Society for Sedimentary Geology (SEPM), and the Ohio Geological Society. Journals, newsletters, and meeting-registration discounts come with membership, and most such professional organizations offer reasonably priced student memberships. The Ohio Geological Society offers free student membership.

8.0 Employment and Graduate School Opportunities

8.1 Employment in the Geological Sciences

Our society's continuing demand for and management of natural resources assure the future need for well-qualified graduates in the geological sciences. The increasing need for solutions to problems created by pollution, geologic hazards, and other environmental factors has become a global problem. Further career opportunities are available through a variety of different sources.

Most employment in geoscience is offered by the private sector, particularly those industries involved in the exploration and production of energy and mineral resources. In fact, the petroleum industry is currently experiencing a period of growth and is actively seeking geologists for entry-level positions. Private environmental consulting firms also employ large numbers of geologists needed to evaluate present and future problems involving ground water supplies.

Geologists are also employed by federal and state governmental agencies who are concerned with issues such as the development of ground water and the solutions to a wide variety of environmental and engineering problems. Some of the agencies include the U.S. Geological Survey, the Bureau of Land Management, the Division of Water Resources, the Environmental Protection Agency, and the Department of Energy.

Yet another important source of employment for those interested in the geological sciences are careers that combine a knowledge of geology with another area of expertise, such as secondary education, technical writing dealing with geology-related information, sales of technological and/or scientific equipment, or business management or public relations in geology-related industries. An additional advantage of these geology-related careers is that the requirements for employment are usually satisfied by the completion of a bachelor of science or bachelor of arts degree in geology (unlike the previously listed technically-oriented careers, which usually require the completion of master's degree in geology), or a bachelor of arts degree in another area combined with an emphasis in geology.

The regions in which geology-related employment can be found are quite varied. Individuals specializing in petroleum or mining related geology usually will be working in the gulf coast region or in the mountainous areas of the western states. However, those individuals pursuing other applications in geology, such as the development of ground water resources or solutions to environmental problems, can find employment in a variety of regions.

Overseas employment also provides unique opportunities for those interested in pursuing their careers on an international level.

Bachelor degree recipients are most frequently employed as field assistants (a lot of geologic work goes on outdoors) or laboratory technicians. It is emphasized that an MS degree is generally regarded as the minimum qualification for many professional career paths in the Geosciences.

8.2 Graduate School

Since many career paths in geosciences require a Master's degree, it is important that students consider the requirements for admission to graduate school early in their undergraduate career. One of the most important things to note is that *most graduate programs require a minimum GPA of 3.0 for acceptance*. Do not wait until your senior year to attempt to raise a low GPA!

Deadlines to apply for graduate school admission vary by program but typically fall between January 1 and February 15 for most schools. Therefore, it is important to begin the process of evaluating potential graduate programs and advisors in the summer before your senior year or early fall quarter of your senior year.

Most applications require students to report scores for the GRE (Graduate Record Exam). You should spend some time preparing for this test; your scores will be much higher than if you walk in and try to take it cold. A variety of books and online study tools are available. Due to application deadlines, you should have completed the GRE by mid December your senior year.

Application to graduate programs also require three letters of reference from faculty members. Be sure to provide your referees at least two weeks to construct a thoughtful and supportive letter for you.

Ask your academic advisor or a faculty member in the subdiscipline you are interested in for more insight into selecting a graduate school and the admissions process. Each graduate program is different; they vary both by university and by subdiscipline.

APPENDIX I: Faculty, Department of Geological Sciences

Regular Faculty

ELIZABETH H. GIERLOWSKI-KORDESCH
Associate Professor
Ph.D., Case Western Reserve University
Limnogeology

DOUGLAS H. GREEN
Associate Professor
Ph.D., University of Wisconsin-Madison
Geophysics

DANIEL I. HEMBREE
Assistant Professor
Ph.D., University of Kansas
Ichnology, Paleopedology

DAVID L. KIDDER
Associate Professor
Ph.D., University of California, Santa Barbara
Earth Systems History and Sedimentary Geology

EUNG SEOK LEE
Assistant Professor
Ph.D., Indiana University
Hydrogeology

DINA L. LÓPEZ
Professor
Ph.D., Louisiana State University
Environmental Geochemistry

GREGORY C. NADON
Associate Professor and Chair
Ph.D., University of Toronto
Sedimentology, Subsurface Geology

R. DAMIAN NANCE
Professor
Ph.D., University of Cambridge
Structural Geology, Tectonics

KEITH A. MILAM
Assistant Professor
Ph.D., University of Tennessee
Planetary Geology, Impacts

GREGORY S. SPRINGER
Associate Professor
Ph.D., Colorado State University
Surficial Processes, Fluvial and Karst Geomorphology

ALYCIA L. STIGALL
Associate Professor
Ph.D., University of Kansas
Paleobiology, Evolution, Biogeography

Emeritus Faculty

ROYAL H. MAPES
University of Iowa
Invertebrate Paleontology

THOMAS R. WORSLEY
University of Illinois
Earth Systems Evolution

APPENDIX II: GEOLOGICAL SCIENCES COURSES

101 Introduction to Geology (5)
Nature and distribution of Earth materials and their utilization as natural resources; discussion of Earth structure, earthquakes, mountain building, and continental drift; development of landscapes. 4 lec, 2 lab. Not open to students who have had 283.

120 The Mobile Earth (4)
An examination of the Earth's dynamic systems including continental drift, sea-floor spreading, mountain building, volcanic activity, and earthquakes, and their explanation in terms of plate tectonic theory. Intended for both science and nonscience majors seeking a nontechnical overview of plate tectonics. 4 lec.

130 Geology of the National Parks (4)
Survey of the geologic features of the national parks of the United States, emphasizing the history of their geologic development. 4 lec.

135 Natural Disasters (4)
Analysis of threats associated with living on a dynamic planet. Focus on the origins and physical natures of hazardous geological events. Taught using case studies of actual disasters. Intended to convey how we can minimize our vulnerability to disasters by applying lessons learned from past earthquakes, volcanic eruptions, floods, landslides, and sinkhole collapses. Intended for science and nonscience majors seeking a basic understanding of geology and how it affects the human race. 4 lec.

170 Ore, Energy, and Society (4)
Survey of a broad array of Earth resources with the goal of examining the impact of those resources on society. The influence of plate tectonic processes and Earth's evolution on resource distribution will be considered. The manner in which technological changes in mineral processing are changing recycling rates and are fostering closer connections between industries, the environment, and society will be explored. 4 lec.

202 Introductory Geology Lab (1)
Prereq: 120 or 130 or 170 or 208 or 211 or 215 or 221 & or 231 & not 101 or 283. Laboratory covering mineral and rock identification, topographic and geologic map reading, and geologic time for students planning to major or minor in the geological sciences. 2 lab.

205 Statistical Methods in Geology (4)
Prereq: 101 or 202 (spring) D. Lopez. Elementary statistics applied to geologic data. Use of statistical software, spreadsheets, and tools for geologic data analysis (e.g., Rose and Stiff diagrams). Labs will use data sets from branches of geology including hydrology, sedimentology, geophysics, structural geology, and paleontology. 3 lec, 2 lab.

208 Geology of the Solar System (4)
Students can experience the thrill of geologic exploration of solid planets and moons in the solar system through the study of samples and knowledge obtained by manned and robotic spacecraft missions. This course focuses on changing perceptions and advancement of knowledge with each new mission and discovery. 4 lec.

211 Introductory Oceanography (4)
Survey of physical, chemical, biological, and geological aspects of oceanography. 4 lec.

215 Environmental Geology (4)
Survey of geological aspects of environmental crisis. Focus on major environmental processes, immediate and extended influence of humans, and prospects for future of physical environment. Presupposes no background in sciences. 4 lec.

221 Earth and Life History (4)
A nontechnical survey exploring the 4.5 billion year history of the interaction between life and the environment. Topics include the origin of the Earth, the origin and development of life, the origin and evolution of the continents, the history of the atmosphere and ocean, catastrophic extinctions, and the impact of human evolution. 4 lec.

231 Water and Pollution (4)
The interrelationship between geologic and hydrologic principles and technology as they relate to the use of water resources and the environmental problems associated with its pollution. 4 lec.

255 Historical Geology (4)
Prereq: 101 or 202. (winter) D. Kidder. An introduction to the geologic history of the Earth, emphasizing the tectonic, stratigraphic, and climatic record of North America. 3 lec, 2 lab.

281 Extreme Ancient Climates (3)
Prereq: 101 or 211 or 215 or 202 or GEOG 101. D. Kidder. Examination of Icehouse, Greenhouse, and Hothouse climates in Earth's past from an Earth System Science perspective. 3 lec.

283 Geology for Engineers (4)
(fall) Geologic principles applied to engineering projects and materials. 3 lec, 2 lab. Not open to students who have had 101.

312 Earth Materials and Resources (5)
Prereq: 101 or 202, CHEM 122 or 152, nonmajors only. An introduction to minerals and rocks, emphasizing common varieties and those important as mineral resources. 3 lec, 4 lab.

315 Mineralogy (5)
Prereq: 101 or 202, CHEM 122 or 152. (fall) K. Milam. Crystallography, crystal chemistry, and mineralogy, emphasizing mineral identification and formation and association of minerals in different geologic environments. 3 lec, 4 lab.

320 Petrology (4)
Prereq: 315. (winter) Characteristics and origin of igneous, sedimentary, and metamorphic rocks and their identification in hand specimens. 2 lec, 4 lab.

330 Principles of Geomorphology (5)
Prereq: 101 or 202. (spring) G. Springer. Basic concepts of origin and development of landforms. Lab study of topographic maps and aerial photographs. 4 lec, 2 lab.

341 Principles of Paleontology (4)
Prereq: 255. (fall). A. Stigall. Introduction to paleontology emphasizing paleontologic theory and the study of the morphology and biologic relationships of key groups preserved in the fossil record. 3 lec, 2 lab, field trip.

350 Stratigraphy-Sedimentology (4)
Prereq: 255 or concurrent, 320. (spring) G. Nadon. Introduction to principles of stratigraphy and sedimentation. Interpretation of depositional environments and their relation to plate tectonic setting. 3 lec, 2 lab.

360 Structural Geology (5)
Prereq: 350. (fall) D. Nance. Principles of rock deformation and interpretation of folding and faulting and related topics. Field-oriented structural problems, structural maps, and use of stereographic projections. 4 lec, 2 lab, field trip.

405 Modeling and Computational Methods in Geology (5)
Prereq: MATH 163B or 263B, CS 220, & GEOL 205 or MATH 250. (spring) D. Lopez. Applied computer-based mathematical methods in geology. Basic geostatistical concepts. Data analysis, conceptual models, and hypothesis testing in geological problems. Mathematical simulation of geological processes and analysis of solutions. Programming exercises in Fortran and use of software to model processes in hydrogeology, geochemistry, and other fields of geology. 4 lec, 2 lab.

408 Planetary Geology (4)
Prereq: 312 or 315. (winter) K. Milam. Planetary Geology is a discussion-and-lab-based course in which students examine current issues and questions regarding the geology of the solid inner planets, moons, and small bodies of our solar system. The laboratory component allows students to work with data from spacecraft missions and sample-based studies. 4 lec.

409 Geology of Mars (4)
Prereq: 312 or 320. (winter) K. Milam. Geology of Mars is designed for students who want to discover aspects of the geologic, magmatic, surficial and hydrologic evolution of the Red Planet. This is a discussion-based course where students will read the latest research papers concerning Mars and discuss and debate their merits and relative contributions to the field of planetary geology. 4 lec.

420 Petrography (5)
Prereq: 320 & 350 or concurrent. (spring) Petrogenesis of igneous, metamorphic, and sedimentary rocks and their identification via microscopic analysis of thin sections. 3 lec, 4 lab.

427 Water Geochemistry (4)
Prereq: 101 or 202, CHEM 123 or 153. D. Lopez. (fall) Geochemical origin of major ions in natural waters and the role of fluid-mineral interactions in the evolution of sediments, the ocean, and the atmosphere. Major geochemical cycles. Introduction to thermodynamical equilibrium, kinetics, complexation, oxidation-reduction, and cation exchange. Case studies of important geochemical and environmental issues. 3 lec, 2 lab.

428 Physical Geochemistry (4)
Prereq: 427. D. Lopez. (winter, alt.)Basic principles of physical chemistry for hydrogeologic, environmental, and geologic applications. Topics include adsorption and desorption reactions, chemistry of sulphur and iron, introduction to stable isotopes, transport mechanisms of chemical species, and origin, formation, and migration of oil. 3 lec, 2 lab.

429 Contaminant Geochemistry (4)
Prereq: 427. D. Lopez. The main purpose of this course is to provide students with knowledge of the chemical principles and processes involved in the generation and movement of contaminants. It will give students an understanding of the sources, fate, and chemical behavior of some of the most important classes of chemical pollutants. 4 lec.

432 Origin and Classification of Soils (4)
Prereq: 330. G. Springer. Consideration of concept of soil and factors of soil formation, introduction to soil morphology and systems of soil classification, discussion of major soil groups of world and soils of Ohio. 3 lec, 2 lab, field work.

439 Fluvial Geomorphology (4)
Prereq: 330 or GEOG 315. (fall) G. Springer. Study if stream processes and human interactions with rivers, including the qualitative and quantitative techniques used to study natural and disturbed streams as presented in lecture and field settings. 4 lec.

443 Advanced Invertebrate Paleontology (5)
Prereq: 341. (winter, alt) A. Stigall. Detailed topics may include paleobiogeography, macroevolutionary theory, phylogenetic theory, and methods, and other advanced paleontologic methods. 3 lec, 2 lab.

444 Ichnology (4)
Prereq: 341 or 350. (winter, alt) D. Hembree. The study of trace fossils, including tracks, trails, burrows, borings, and nests, in marine and continental environments throughout geologic time. Topics include ichnologic theory, ichnotaxonomy, applications to paleoecologic and taphonomic problems, application to sedimentologic and stratigraphic problems, and application to oil and natural gas exploration. Lecture, laboratory, and field trips.

446 Earth Systems Evolution (4)
Prereq: 350; PHYS 201 or 251, & Sr. (winter) T. Worsley. Synthesis of the coupled histories of the Earth's interior, surface, and life. 3 lec, 2 lab.

448 Paleoecology (4)
Prereq: 341. (winter or spring, alt) A. Stigall. Examination of concepts of the relationship of organism with their environment that can be effectively studied within the fossil record. Topics include competition, predation, ecologic convergence, community paleoecology, and relationship to macroevolution. This course will be divided between lectures and discussions of current paleoecologic literature. 4 lec.

451 Diagenesis (4)
Prereq: 424. D. Kidder. Critical view of diagenetic principles using numerous examples. Many topics are selected from recent journal articles. Students read, present, and discuss current literature, as well as writing a term paper. 4 lec.

452 Depositional Environments (4)
Prereq: 350. (fall) D. Kidder. Advanced coverage of depositional processes and environments. Latter part of course focuses on global sedimentation and events. Students read, present, and discuss current literature, as well as write a term paper. 4 lec.

453 Physical Limnology (4)
Prereq: 101 or 202, CHEM 123 or 153. (fall) E. Gierlowski-Kordesch. Physical parameters and processes in lake environments, including temperature, light, heat, oxygen, alkalinity, and dissolved ions. Labs include outdoor sampling and measurements. 3 lec, 2 lab.

454 Carbonate Depositional Systems I (3)
Prereq: 350. (winter, alt) A. Stigall. Study of carbonate rocks in the modern and geologic record, including patterns and processes of sedimentation and diagenesis as well as depositional models. 2 lec, 2 lab, field trips.

454A Carbonate Depositional Systems II (2)
Prereq: 454. (spring, alt) A. Stigall. Field study of modern and Pleistocene carbonate rocks and depositional environments of the Bahamas. Involves a week long field trip during spring break and a post-field project.

456 Paleopedology (4)
Prereq: 350. (spring, alt) D. Hembree. The study of paleosols (fossil soils) throughout geologic time. Topics include an overview of soil formation and major soil processes, field and laboratory techniques in Paleopedology, the use of paleosols as paleoenvironmental indicators and stratigraphic markers, as well their application in paleogeographic, paleoecologic, and paleoclimatic reconstructions. Lecture, laboratory, and field trips.

457 Petroleum Geology (4)
Prereq: 360 or concurrent. (spring) G. Nadon. Course is designed for geology students at the senior undergraduate and graduate level. It will provide students with an understanding of the basic concepts and processes that govern a) the generation, migration, and trapping of hydrocarbon resources, and b) the fundamentals of exploration for, and exploitation of, these resources. 3 lec, 2 lab.

458 Fluvial Sedimentology (4)
Prereq: 350. (fall) G. Nadon. Provides students with an understanding of how to interpret the depositional environment of sedimentary rocks deposited by rivers and the large and small-scale forces that control the formation and preservation of these deposits.

464 Regional Tectonics (4)
Prereq: 360. (spring) D. Nance. Global tectonics and structure of continental cratons and margins, mid-ocean ridges, island arcs, and major orogenic belts. 4 lec.

466 Geodynamics: The Earth's Interior (4)
Prereq: 320. (spring) D. Green. Solid Earth geophysics (gravity, magnetics, seismicity, heat flow) and internal structure, dynamics, and evolution of Earth's core, mantle, and crust. 4 lec.

467 Tectonophysics (4)
Prereq: MATH 340, PHYS 202 or 253. (winter) D. Green. Quantitative modeling of solid Earth physical processes. Physical properties of minerals, rocks, and unconsolidated materials. Modeling of tectonic plate flexure, geothermal heat flow, seismic wave propagation, and fault mechanics. 4 lec.

471 Advanced Environmental Geology (4)
Prereq: 101 or 202, CHEM 123 or 153. (fall) D. Lopez. Covers the conceptual basis for understanding transport and reaction processes that govern change in many environmental systems. Emphasizes processes occurring at the three major environmental interfaces: air and water, water and the adjoining earthen material, and air and soil. Includes chemical and thermal equilibrium, chemical transport, and transport and transfer of energy across the interfaces. 4 lec.

473 Forensic Geoscience (4)
Prereq: GEOL 350 or CHEM 433 or BIOS 364 or ANTH 447. (spring) Introduction to geologic, geophysical, and geochemical techniques employed by forensic investigators. For majors in chemistry, biology, anthropology and geology.

475A Field Camp I (4)
Prereq: 360 & sr. (fall) G. Nadon. Introduction to field mapping techniques based on projects in the Appalachian region This course, only in combination with GEOL 475B (Field Camp II), satisfies the field camp requirement.

475B Field Camp II: Death Valley (5)
Prereq: 475A. (winter intersession) K. Milam, D. Green. Application of field and mapping techniques learned in GEOL 475A, based on projects in the Death Valley region. This course, only in combination with GEOL 475A (Field Camp I), satisfies the field camp requirement.

476 Subsurface Methods (4)
Prereq: 350, PHYS 202 or 253. (winter) G. Nadon. Resumé of drilling, sampling, and logging by electric, radioactivity, temperature, and neutron methods as applied to petroleum exploration, water, and engineering projects. 3 lec, 2 lab.

480 Principles of Hydrogeology (4)
Prereq: 101 or 202 or 283, MATH 163B or 263B, PHYS 202 or 253. (fall) E. S. Lee. Principles governing occurrence, movement, and recovery of water in soil and aquifers. Hydrologic cycle, water budget, hydrology of agriculture, watershed studies, water chemistry, and pollution. 3 lec, 2 lab.

481 Groundwater Flow Modeling (4)
Prereq: 480. (winter) E.S. Lee. Steady and unsteady flow to well, analysis of pumping test data, water well design, well development, interference of wells, and design of well fields. 3 lec, 2 lab.

482 Transport Processes in Groundwater (4)
Prereq: 481, MATH 340. (spring) D. Lopez. Basic principles and fundamental equations; D.E. of groundwater motion, solution of boundary value problems for different types of aquifers. Analytical and numerical methods in subsurface hydrology with emphasis on finite difference method; digital model. 4 lec.

483 Field Hydrology (6)
Prereq: water resources background. (summer) K. Edwards, D. Green, D. Lopez. Field training in techniques of hydrology, hydrogeochemistry, and water resources evaluation. 3 wks.

485 Introduction to Applied Geophysics (4)
Prereq: PHYS 202 or 253. (fall) D. Green. Introductory course in environmental and geotechnical geophysics. Survey of applied geophysical methods including seismic, gravity, magnetic, electrical, and electromagnetic techniques. 3 lec, 2 lab.

486 Applied Seismology (4)
Prereq: 485. (spring) D. Green. Field methods and analysis techniques for seismic characterization of shallow subsurface, multichannel digital data acquisition, generalized reciprocal refraction and common offset refraction techniques as practiced in environmental and geotechnical industries. 4 lec.

490 Seminar in Geology (1–2)
Prereq: perm. Several seminars on specific topics in geological sciences will be offered yearly. It is recommended that all majors participate in at least one seminar.

491 Geologic Studies (1–6, max 12)
Prereq: perm. Staff. Individual or small group independent study arranged with faculty members.

492 Internship (1–15)
Prereq: perm. Provides qualified students with the opportunity to receive credit for work experience directly related to the geological sciences. Supervised by geological sciences faculty and evaluated by an on-the-job supervisor. A report detailing the internship activities is required before credit is awarded.

495 Senior Thesis (1–5)
Prereq: perm. Independent research project requiring departmental approval of thesis proposal before registering. Required for departmental honors program.