The department offers courses in geology and meteorology. Majors can be earned in earth science (B.A., B.S.), geology (B.S.), and meteorology (B.S.). Candidates for all degrees must satisfy the requirements established by the College of Liberal Arts and Sciences (see Liberal Arts and Sciences, Curriculum). In addition, the department has requirements for each major. A minimum of 120 credits are required.

The bachelor of science in Geology prepares the student for a professional career and/or graduate study in the geological sciences. Students selecting geology as a major will elect an option in traditional geology or environmental geology/hydrogeology. The traditional option prepares a student for employment in state and U.S. geological surveys, mineral and petroleum exploration, and graduate study in most aspects of geology. Required courses in this option include:

- GEOL 100 The Earth 3
- GEOL 100L The Earth: Laboratory 1
- GEOL 102 History of the Earth 3
- GEOL 102L History of the Earth: Laboratory 1
- GEOL 302 Summer Field Studies 6
- GEOL 315 Mineralogy and Earth Materials 3
- GEOL 315L Laboratory in Mineralogy and Earth Materials 1
- GEOL 316 Optical Mineralogy 2
- GEOL 356 Structural Geology 5
- GEOL 365 Igneous and Metamorphic Petrology 3
- GEOL 368 Sedimentary Geology 4
- GEOL 479 Surficial Processes 3
- And 9 credits of geology electives 9

Total Credits 44

The environmental geology/hydrogeology option prepares a student for employment in environmental consulting, state and U.S. geological surveys, regulatory agencies, and graduate study in the environmental aspects of geology. Required courses in this option include:

- GEOL 100 The Earth 3
- GEOL 100L The Earth: Laboratory 1
- GEOL 102 History of the Earth 3
- GEOL 102L History of the Earth: Laboratory 1
- GEOL 302 Summer Field Studies 6
- GEOL 315 Mineralogy and Earth Materials 3
- GEOL 315L Laboratory in Mineralogy and Earth Materials 1
- GEOL 316 Optical Mineralogy 2
- GEOL 356 Structural Geology 5
- GEOL 365 Igneous and Metamorphic Petrology 3
- GEOL 368 Sedimentary Geology 4
- GEOL 419 Aqueous and Environmental Geochemistry 3
- GEOL 426 Stable Isotopes in the Environment 4
- GEOL 479 Surficial Processes 3
- And 6 credits of geology electives 6

Total Credits 45

Required supporting courses include:

- CHEM 177 General Chemistry I 4
- CHEM 177L Laboratory in General Chemistry I 1
- CHEM 178 General Chemistry II 3
- CHEM 178L Laboratory in College Chemistry II 1
- PHYS 111 General Physics 5
- PHYS 112 General Physics 5
- One of the following 4
  - MATH 165 Calculus I
  - MATH 181 Calculus and Mathematical Modeling for the Life Sciences I
- One of the following 4
  - MATH 166 Calculus II
  - MATH 182 Calculus and Mathematical Modeling for the Life Sciences II
- And 6 additional credits from an approved departmental list of courses in the science, engineering, or mathematical disciplines outside of geology 6

Total Credits 33

No more than 9 credits in 490 may be counted toward a degree in Geology.

Graduates work to understand natural processes on Earth and other planets. They are able to apply their knowledge of forces and factors that shape the Earth to reconstruct the past and anticipate the future. Graduates provide essential information for solving problems for resource management, environmental protection, and public health, safety, and welfare. They work as consultants on engineering and environmental problems, explorers for new minerals and hydrocarbon resources, researchers, teachers, writers, editors, and museum curators. Graduates are able to integrate field and laboratory data and to prepare reports. They are able to make presentations that include maps and diagrams that illustrate the results of their studies.
Communication Proficiency requirement: The LAS College requires a C or better in ENGL 250. The department requires a grade of C or better in ENGL 309, ENGL 314, ENGL 302 or JL MC 347.

ENGL 150 Critical Thinking and Communication 3
ENGL 250 Written, Oral, Visual, and Electronic Composition 3
or ENGL 250H Written, Oral, Visual, and Electronic Composition: Honors

One of the following: 3
ENGL 309 Proposal and Report Writing
ENGL 314 Technical Communication
ENGL 302 Business Communication
JL MC 347 Science Communication

Total Credits 9

Minor - Geology

A minor in Geology may be earned by taking 15 credits of geology coursework, including:

3 credits:
GEOL 100 The Earth 3-4
& 100L and The Earth: Laboratory
or GEOL 201 Geology for Engineers and Environmental Scientists
GEOL 102 History of the Earth 3
GEOL 102L History of the Earth: Laboratory 1

The remainder should be at the 300 level or above.

Geology, B.S. - Env-Geol/Hydro Option

Freshman

Fall Credits Spring Credits
ENGL 150 3 GEOL 102 3
GEOL 100 3 GEOL 102L 1
GEOL 100L 1 CHEM 178 3
CHEM 177 4 CHEM 178L 1
CHEM 177L 1 MATH 166 or 182 4
MATH 165 4 Social-Science Choice 3
or 181
LIB 160 1

17 15

Sophomore

Fall Credits Spring Credits
ENGL 250 3 Arts-and-Humanities Choice
GEOL 315 3 Social-Science Choice
GEOL 315L 1 PHYS 112 5
GEOL 316 2 Foreign Language/Elective
PHYS 111 5
Foreign Language/Elective 3-4

17-18 14-15

Junior

Fall Credits Spring Credits Summer Credits
GEOL 411 4 GEOL 356 5 GEOL 302 6
GEOL 368 4 Arts-and-Humanities Choice
Arts-and- Humanities Choice 3 Science/Engineering/Mathematics Choice 1
GEOL 479 3 Elective 3-4

14 14-15 6

Senior

Fall Credits Spring Credits
Geology Choice 1
GEOL 419 3 GEOL 434 3
or GEOL 426 or elective 1
Science/Engineering/Mathematics Choice 1
Science/ Humanities choice
Choice
GEOL 309 or 302 or
314 or JL
MC 347 3 Social-
Science Choice

3
Students in all ISU majors must complete a three-credit course in U.S. diversity and a three-credit course in international perspectives. Check (http://www.registrar.iastate.edu/courses/div-ip-guide.html) for a list of approved courses. Discuss with your adviser how the two courses that you select can be applied to your graduation plan.

LAS majors require a minimum of 120 credits, including a minimum of 45 credits at the 300/400 level. At least 8 credits in the major from 300+ courses must earn grade C or better. The average grade of all courses in the major must be 2.0 or higher. You must also complete the LAS foreign-language requirement.

Choose from list of approved courses available from an adviser or the departmental office.

### Geology, B.S.- Traditional Option

#### Freshman

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### Junior

#### Fall

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#### Senior

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<td>Social-Science</td>
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<tr>
<td>MC 347</td>
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Graduate Study

The department offers programs leading to the master of science and doctor of philosophy with majors in Earth Science, Geology, and Meteorology. Program options are available for the M.S. and Ph.D. degrees in earth science leading to careers in teaching. The department also cooperates in the interdepartmental major in Water Resources (see Index). Students desiring a major in the above fields normally will have a strong undergraduate background in the physical and mathematical sciences. Individuals desiring to enter a graduate program are evaluated by considering their undergraduate background and performance and their expressed goals.

Programs of study are designed on an individual basis in accordance with requirements of the Graduate College and established requirements for each departmental major. Additional coursework is normally taken in aerospace engineering, agronomy (soil science), chemistry, civil and construction engineering, computer engineering, computer science, engineering mechanics, materials engineering, mathematics, mechanical engineering, microbiology, physics, or statistics. Departmental requirements provide a strong, broad background in the major and allow considerable flexibility in the program of each individual.

A dissertation is required of all Ph.D. candidates.

M.S. students in Geology are required to complete a thesis. The M.S. in Earth Science is available to students electing the non-thesis (Creative Component) option in Geology or Meteorology. A non-thesis option is also offered for the M.S. degree in Meteorology.

Graduates in Geology specialize in a subdiscipline, but they comprehend and can communicate the basic principles of geology and supporting sciences. They possess the capacity for critical and independent thinking. They are able to write a fundable research proposal, evaluate current relevant literature, carry out the proposed research, and communicate the results of their research to peers at national meetings and to the general public. They work as consultants on engineering and environmental problems, explorers for new minerals and hydrocarbon resources, researchers, teachers, writers, editors, and museum curators.

Course requirements for the MS degree include MTEOR 542, 543, 507 or 518, 552 or 516x, and 502 or 504 or 505 or 605. In addition to the 5 required courses from this list, students must take at least 3 more credits of graduate course work in Meteorology, Agricultural Meteorology, or a field related to their research interests (students will work closely with their POS committee to determine the exact amount of structured course work required – typically this is 18-21 credits). Students without prior synoptic meteorology course work must complete MTEOR 511 and may substitute these credits in place of the required MTEOR 507 or 518 courses.

Graduates in Meteorology have a good comprehension of basic principles, a capacity for critical and independent thought and an ability to communicate effectively with scientific colleagues. They have an appropriate breadth in their understanding of meteorology with a suitable specialization. Graduates are able to undertake thorough research and explain the results in a scientifically reasonable fashion.