This program represents a new Geosciences emphasis area in integrative Earth systems science. In recent years, the Department of Geosciences has expanded to include diverse and rigorous cross-disciplinary inquiry, particularly in the area of Geotechnologies. Links with other departments and programs have strengthened, and this new program in Earth and Environmental Systems formalizes cross-disciplinary linkages in the curriculum. Furthermore, recent personnel changes have permitted the department to devote an open position to the area of Earth Systems and Geotechnologies applications.

Modern environmental science includes a wide range of emphases that stem from a solid foundation in the physical sciences. The need for cross-disciplinary study has been recognized by governmental agencies, private industry and other institutions of higher learning. For example the National Science Foundation provides over 400 million dollars worth of funding (over 10% of its total research budget) to multidisciplinary research; employment opportunities for environmental scientists are expected to increase by 21–35% between 2002 and 2012 (Bureau of Labor Statistics, http://www.bls.gov), and over 1500 colleges and universities within the US have new programs for environmental study and natural resource management. These programs of study, and areas of new job growth, focus on understanding the feedbacks and linkages between geology, biology, chemistry, and human management and interactions with these systems.

Cross-disciplinary specialists who can bring together teams of subject-area specialists often address environmental concerns most effectively, and the cross-disciplinary specialist needs knowledge in the physical, biological, and social sciences to succeed in many situations. The purpose of this program is to deliver a multidisciplinary education with environmental geosciences as a foundation, while also
drawing upon existing courses from a diverse array of campus programs.

The emphasis in this program spans local to global concerns. Three reoriented Geosciences courses (GEOL1115 Introduction to Earth System Science, 4406 Environmental Geology, and 4415 Past Global Changes) and one new course (4416 Global Environmental Change) allow the student to integrate and explore knowledge across different parts of the Earth System. Existing classes in the curriculum develop specific knowledge areas related to the environment. The general design of the program is shown in the chart above. Core knowledge is developed through a set of required courses across several disciplines, emphasizing the Geosciences, and through required and elective core courses. The student then chooses a specific track composed of other disciplinary courses.

**CURRICULUM OUTLINE**

The Earth and Environmental Systems curriculum consists of three components: required cross-disciplinary courses, required and elective core courses, and required and elective courses in one of five cross-disciplinary tracks. Most students will be able to complete degree requirements (76–80 credits) and general education requirements (40–46 credits) within the typical 128–credit, 4-year Bachelor’s degree. Some of the degree requirements will also satisfy general education requirements. Depending on results of placement tests in mathematics and other areas, some students use as many as 61 credits to satisfy general education requirements, and will thus require more than 128 credits to fulfill both general education and degree requirements.

Core Course Requirements

*Required introductory courses* (30–32 credits): 1000–level courses in Biological Sciences and Mathematics, and one of three upper-division, environmental issues courses in History, Economics, Political Science, or Geosciences. Some of these courses will satisfy general education goals. (See following description for course descriptions.)

*Required and elective core courses* (29–32 credits): 1000– through 4000–level courses in Geosciences, including integrative Earth Systems courses and Geotechnologies courses.

**CROSS-DISCIPLINARY TRACK REQUIREMENTS**

*Cross-disciplinary tracks* (21 credits): the student will pursue one of five tracks, each consisting of specified and elective courses:

1. **Biological Systems**: 2000– through 4000–level courses in Biological Sciences, Geosciences (Earth Systems), Chemistry, and Sociology

2. **Environmental Geochemistry**: 2000– through 4000–level courses in Chemistry, Geosciences, and Biological Sciences

3. **Environmental Health**: 2000– through 4000–level courses in Biosciences, Sociology, Anthropology and Health Education

4. **Environmental Policy and Management**: 2000– through 4000–level courses in Economics, Management, Political Science, Biological Sciences, History, Speech, and English

5. **Global Environmental Change**: 2000– through 4000–level courses in Anthropology, Political Science, Geosciences (Earth Systems, Geotechnologies), and Sociology
This program is currently being revised. Please meet with an adviser for current information about required classes.

**Required General Courses (27-28 credits)**

The Required General Courses provide a solid background in areas outside of the Department of Geosciences. Environmental Systems include both physical and human systems; thus, we require course work in biological sciences, physical science, mathematics, statistics and social sciences. Many of these courses will satisfy General Education Goal requirements, specifically Goal 4 (Biological Sciences), Goal 5 (Physical Sciences), Goal 3 (Mathematics), and either Goal 9 (U.S. History) or Goal 11 (Political Science/Economics).

**All of the Following 4 Courses (17 credits)**

- BIOL 1101/1101L – Biology I and Lab (4 credits)
- BIOL 1102/1102L – Biology II and Lab (4 credits)
- CHEM 1111 – General Chemistry I (5 credits)
- BIOL 2209 – General Ecology (4 credits)

**One of the Following 3 Courses (7-8 credits)**

- MATH 1147 – Precalculus (5 credits) (B.A.)
- MATH 1160 – Applied Calculus (3 credits) (B.S.)
- MATH 1170 – Calculus I (4 credits) (B.S.)

**Plus**

- MATH 1153 – Introduction to Statistics (3 credits) or another approved statistics course

**One of the Following 4 Courses (3 credits)**

- HIST 4430 – Global Environmental History (3 credits)
- POLS 4455 – Environmental Politics and Policy (3 credits)
- SOC 3335 – Population and Environment (3 credits)
- GEOL/HIST/AMST 4471 – Idaho Historical Geography (3 credits)

**Recommended (3–4 credits)**

- ENGL 3307 – Professional and Technical Writing (3 credits)
- PHYS 2211 – Engineering Physics (4 credits) (B.S.)
**REQUIRED AND ELECTIVE CORE COURSES (28-31 CREDITS):**
The required and elective core provides a broad background in Earth Systems and Geosciences. The GEOL 1115 course introduces the Earth System components and GEOL 4406 covers modern environmental issues and their relationship to the Geosciences. GEOL 4415, Past Global Changes (new name and revised focus) and GEOL 4416, Global Environmental Change, are capstone integrative courses intended for seniors who have completed most degree requirements.

**REQUIRED COURSES (17 CREDITS)**
- GEOL 1115 – Introduction to Earth Systems Science (NOTE: replaces Physical Geography) (4 credits)
- GEOL 1110 – Physical Geology for Scientists Laboratory (1 credit)
- GEOL 2210 – Earth in Space and Time (3 credits)
- GEOL 3315 – Evolution of the Earth’s Surface (3 credits, new course Spring 2009)
- GEOL 4406 – Environmental Geology (revised focus, 3 credits)
- GEOL 4416 – Global Environmental Geology (proposed new course, 3 credits)

**GEOTECHNOLOGIES CORE COURSES—CHOOSE AT LEAST 2 COURSES FROM THIS LIST (6 CREDITS)**
- GEOL 4403 – Principles of Geographic Information Systems (3 credits)
- GEOL 4404 – Advanced Geographic Information Systems (3 credits)
- GEOL 4407 – Global Positioning Applications in Research (3 credits)
- GEOL 4409 – Remote Sensing (3 credits)

*(note: students who earn a total of 19 credits in geotechnologies, including GEOL 210 and these four Geotechnologies core courses, will have completed the Geotechnology minor)*

**ELECTIVES—CHOOSE AT LEAST 2 COURSES FROM THIS LIST (5-8 CREDITS)**
- GEOL 3313 – Earth Materials I (3 credits)
- GEOL 4402 – Geomorphology (4 credits)
- GEOL 4403 – Principles of Geographic Information Systems (3 credits)
- GEOL 4404 – Advanced Geographic Information Systems (3 credits)
- GEOL 4405 – Volcanology (3 credits)
- GEOL 4407 – Global Positioning Applications in Research (3 credits)
- GEOL 4409 – Remote Sensing (3 credits)
- GEOL 4410 – Science in American Society (2 credits)
- GEOL 4417 – General Soils (3 credits)
- GEOL 4420 – Principles of Geochemistry (3 credits)
- GEOL 4421 – Structural Geology (4 credits)
- GEOL 4430 – Principles of Hydrogeology (3 credits)
- GEOL 4431 – Geobiology and the History of Life (3 credits)
- GEOL 4452 – Sedimentation–Stratigraphy (4 credits)
- GEOL 4456 – Geology of Southern Idaho OR GEOL 4458 – Geology of North America (3 credits)
- GEOL 4482 – Independent Problems and Studies in Geology (3 credits)
- GEOL 4450 – Field Geology (6 credits)
- GEOL 4451 – Field Methods in Environmental Sciences (proposed new course, 3 credits)
 TRACKS —— STUDENTS MUST CHOOSE ONE EMPHASIS AREA FROM THE FOLLOWING LIST (AT LEAST 21 CREDITS):

**BIOLOGICAL SYSTEMS EMPHASIS (B.S.):**
This track develops knowledge and skill in the biological sciences to complement the geoscience core. This emphasis track will train students interested in field–related positions who need to understand the environmental relations between geologic and living systems. The student must complete the required courses, plus electives to equal or exceed 21 credits.

**REQUIRED (15–16 CREDITS)**
*All of the following 3 courses*
- BIOL 4416 – Population and Community Ecology (3 credits)
- BIOL 4462 – Freshwater Ecology (4 credits)
- BIOL 4489 – Field Ecology (3 credits)

*2 of the following 7 courses (remaining courses may be taken as electives)*
- BIOL 2213 – Fall Flora (2 credits)
- BIOL 2214 – Spring Flora (2 credits)
- BIOL 4426 – Herpetology (3 credits)
- BIOL 4427 – Ichthyology (3 credits)
- BIOL 4438 – Ornithology (3 credits)
- BIOL 4431 – Entomology (3 credits)
- BIOL 4441 – Mammology (3 credits)

**ELECTIVES**
- SOC 3335 – Population and Environment (3 credits)
- BIOL 3315 – Introduction to Biometry (3 credits)
- BIOL 3337 – Conservation of Natural Resources (3 credits)
- BIOL 4476 – Ecology of Water Pollution (3 credits)
- HIST 4430 – Global Environmental History (3 credits)
- ENVE 4404 – Environmental Risk Analysis (3 credits)
- GEOL 4402 –Geomorphology (4 credits)
- GEOL/HIST/AMST 4471 – Idaho Historical Geography (3 credits)
- GEOL 4451 – Field Methods in Environmental Sciences (proposed new course, 3 credits)
ENVIRONMENTAL GEOCHEMISTRY EMPHASIS (B.S.):
This track develops knowledge and skill in the chemical, biological and engineering sciences to complement the Geoscience core. This emphasis track will train students interested in field– or laboratory–related positions who need to understand geochemical and biological components of hydrologic systems. The student must complete the required courses, plus electives to equal or exceed 21 credits.

REQUIRED (19 CREDITS)
GEOS 4420 – Principles of Geochemistry (3 credits)
CHEM 1112 – General Chemistry II (4 credits)
CHEM 2211 – Inorganic Chemistry I (2 credits)
CHEM 3301/3303 – Organic Chemistry I and Lab (4 credits)
ENVE 4410 – Introduction to Environmental Engineering (3 credits)
BIOL 4432 – Biochemistry (3 credits)

ELECTIVES
BIOL 2221/2221L – Introductory Microbiology and Lab (4 credits)
CHEM 2232/2234 – Quantitative Analysis and Lab (4 credits)
CHEM 3351– Physical Chemistry (3 credits, note prerequisites)
CHEM 3352 – Physical Chemistry (3 credits, note prerequisites)
CHEM 4435 – Environmental Chemistry (2 credits)
ENVE 4404 – Environmental Risk Analysis (3 credits)
BIOL 4476 – Ecology of Water Pollution (3 credits)
GEOL 4451 – Field Methods in Environmental Sciences (possible new course, 3 credits)
ENVIRONMENTAL HEALTH EMPHASIS (B.A.):
This track focuses on the relationship between environment and health concerns. It combines health science knowledge with the Geoscience core to train students interested in environment and health connections. Students from this track may find work in health or environmental governmental agencies and private sector employers looking for a broad range of science and social science skills. The student must complete the required courses, plus electives to equal or exceed 21 credits.

REQUIRED (16 CREDITS)
BIOL 2221/2221L – Introductory Microbiology and Lab (4 credits)
BIOL 4476 – Ecology of Water Pollution (3 credits)
ANTH 2230 – Introduction to Biological Anthropology and Lab (4 credits)
ANTH 4431 – Nutritional Anthropology (3 credits)
HE 4442 – Environmental Health and Health Education (2 credits)

ELECTIVES
HE 3383 – Epidemiology (3 credits)
SOC 2206 – Sociological Methods (3 credits)
SOC 2207 – Social Statistics (3 credits)
SOC 3330 – Sociology of Health and Illness (3 credits)
SOC 3335 – Population and Environment (3 credits)
ANTH 4408 – Special Topics in Medical Anthropology (3 credits)
BIOL 2230 – Bioethics (3 credits cross listed as PHIL 230)
BIOL 3315 – Introduction to Biometry (3 credits)
BIOL 4423 – General Parasitology (3 credits)
MATH 4459 – Applied Multivariate Analysis (3 credits)
GEOL/HIST/AMST 4471 – Idaho Historical Geography (3 credits)
ENVIRONMENTAL POLICY AND MANAGEMENT EMPHASIS (B.A.):
This track develops knowledge needed to address environment and business issues. Students from this track will have skills necessary to work in business, government, non-profit, or policy-making venues where scientific background is valuable. The student must complete the required courses, plus electives to equal or exceed 21 credits.

REQUIRED (15 CREDITS)
MGT 4462 – Issues in Business and Society (3 credits)
POLS 4455 – Environmental Politics and Policy (3 credits)
POLS 4453 – Public Policy Analysis (3 credits)
ECON 3352 – Environmental Economics (3 credits)
BIOL 4416 – Population and Community Ecology (3 credits)

ELECTIVES
ECON 2201 – Principles of Macroeconomic (3 credits)
ECON 2202 – Principles of Microeconomics (3 credits)
ECON 4411 – Political Economy (3 credits)
ECON 4433 – Economic Development (3 credits)
POLS 4405 – Administrative Process
POLS 4409 – Community and Regional Planning (3 credits)
HIST 4430 – Global Environmental History (3 credits)
SPCH 4452 – Conflict Management (3 credits)
PHIL 4430 – Philosophy of Science (3 credits)
SPCH 2208 – Group Communication (3 credits)
ENGL 3307 – Technical Writing (3 credits)
ENGL 3308 – Business Communications (3 credits)
MGT 2216 – Business Statistics (3 credits)
MGT 2217 – Advanced Business Statistics (3 credits)
GEOL 4410 – Science in American Society (2 credits)
GEOL/HIST/AMST 4471 – Idaho Historical Geography (3 credits)
GLOBAL ENVIRONMENTAL CHANGE (B.S.):
This track examines the mechanisms and societal implications of global environmental change. The focus of this track includes feedbacks and mechanisms of environmental change, the magnitude and nature of recent environmental change within a longer-term context, and the role of people in altering their environment. The student must complete the required courses, plus electives to equal or exceed 21 credits.

REQUIRED (13 CREDITS)
GEOL 4402 – Geomorphology (4 credits)
ANTH 4402 – Ecological Anthropology (3 credits)
BIOL 4416 – Population and Community Ecology (3 credits)
GEOL 4404 – Advanced Geographic Information Systems (3 credits)

ELECTIVES
SOC 3335 – Population and Environment (3 credits)
PHYS 3325 – Introduction to Weather and Climate (3 credits)
POLS 4453 – Public Policy Analysis (3 credits)
POLS 4455 – Environmental Politics and Policy (3 credits)
ANTH 2250 – Introduction to Sociocultural Anthropology (3 credits)
ANTH 4493 – Indigenous Conservation
HIST 4430 – Global Environmental History (3 credits)
SOC 2206 – Sociological Methods (3 credits)
SOC 2207 – Social Statistics (3 credits)
BIOL 3337 – Conservation of Natural Resources
POLS 4433 – Politics of Developing Nations (3 credits)

This program is currently being revised. Please meet with an adviser for current information about required classes.