

Japanese Graduate Courses

JAPAN g570 Readings in Japanese 2 credits. Reading, discussion, and preparation of reports on selected topics in Japanese literature. May be repeated once with different content. Conducted in English or Japanese, depending on each student's skills. PREREQ: PERMISSION OF INSTRUCTOR.

Latin Graduate Courses

LATN g570 Readings in Latin 2 credits. Reading, discussion, and preparation of reports on selected topics in Latin literature. May be repeated once with different content. PREREQ: PERMISSION OF INSTRUCTOR.

Russian Graduate Courses

RUSS g570 Readings in Russian 2 credits. Reading, discussion, and preparation of reports on selected topics in Russian literature. May be repeated once with different content. PREREQ: PERMISSION OF INSTRUCTOR.

Spanish Graduate Courses

SPAN g500 Spanish Advanced Grammar 3 credits. Survey of selected grammar and composition topics on the advanced level. PREREQ: SPAN 301 OR 302 OR PERMISSION OF INSTRUCTOR.

SPAN g512 Medieval Spanish Literature 3 credits. Study of representative works of Medieval Spanish literature with an emphasis on the major trends that shaped Spanish thought and letters. PREREQ: SPAN 301 OR 302 OR PERMISSION OF INSTRUCTOR.

SPAN g514 Golden Age Spanish Literature 3 credits. Study of representative works of Renaissance and Baroque Spanish Literature with an emphasis on the major trends that shaped Spanish thought and letters. PREREQ: SPAN 301 OR SPAN 302 OR PERMISSION OF INSTRUCTOR.

SPAN g515 Cervantes and His Age 3 credits. Study of Cervantes' artistic creation and relation to the 16th and 17th centuries. The course includes Don Quijote and the Novelas Ejemplares. May be offered in English. PREREQ: PERMISSION OF INSTRUCTOR.

SPAN g522 Colonial Spanish American Literature 3 credits. Study of major writers and their historical contexts from the conquest to the eve of independence, including indigenous and colonial prose, poetry and drama. Conducted in Spanish. PREREQ: SPAN 301 OR 302 OR PERMISSION OF INSTRUCTOR.

SPAN g525 Nineteenth Century Spanish American Literature 3 credits. Study of major writers and their historical contexts in the nineteenth century, including prose, poetry and drama. Conducted in Spanish. PREREQ: SPAN 301 OR 302 OR PERMISSION OF INSTRUCTOR.

SPAN g530 Spanish Enlightenment and Romanticism 3 credits. Consideration of literary currents

from the beginning of the Bourbon Monarchy in Spain (1700) until 1868. Conducted in Spanish. PREREQ: SPAN 301 OR 302 OR PERMISSION OF INSTRUCTOR.

SPAN g540 Spanish Realism through Generation of '98 3 credits. Examination of major literary works beginning with the realist and naturalist authors and concluding with the Generation of 1898. Conducted in Spanish. PREREQ: SPAN 301 OR 302 OR PERMISSION OF INSTRUCTOR.

SPAN g550 Twentieth Century Spanish Literature 3 credits. Examination of modern Peninsular letters as evidenced in poetry, the short story, the novel, and the essay. Conducted in Spanish. PREREQ: SPAN 301 OR 302 OR PERMISSION OF INSTRUCTOR.

SPAN g560 Spanish Translation and Interpretation 3 credits. Theory and principles of translation and/or interpretation and their application in the fields of literature, business, law, and medicine. Topics may vary. May be repeated once with a different content. PREREQ: SPAN 301 AND 302, 341 AND 342, OR BY PERMISSION OF INSTRUCTOR.

SPAN g562 Early Twentieth Century Spanish American Literature 3 credits. Study of major writers and their historical contexts from "modernism" to the World War II, including prose, poetry and drama. Conducted in Spanish. PREREQ: SPAN 301 OR 302 OR PERMISSION OF INSTRUCTOR.

SPAN g565 Contemporary Spanish American Literature 3 credits. Study of major writers and their historical contexts from World War II until the present, including prose, poetry and drama. Conducted in Spanish. PREREQ: SPAN 301 OR 302 OR PERMISSION OF INSTRUCTOR.

SPAN g568 US Latino Literature 3 credits. Examination of major works and authors in historical perspective, with emphasis on literary and cultural contexts. PREREQ: SPAN 301 OR 302 OR PERMISSION OF INSTRUCTOR.

SPAN g570 Readings in Spanish 2 credits. Reading, discussion, and preparation of reports on selected topics in Spanish literature. May be repeated once with different content. PREREQ: SPAN 301 OR 302 OR PERMISSION OF INSTRUCTOR.

SPAN g580 Independent Studies in Spanish 3 credits. A directed project, under the guidance of an instructor, emphasizing individual study or research according to the needs of the study. PREREQ: SPAN 301 OR 302 OR PERMISSION OF INSTRUCTOR.

SPAN g590 Spanish Senior Seminar 3 credits. Advanced studies in selected topics from language, culture, literatures or methods of research. May be repeated up to 6 credits with different content. Conducted in Spanish. PREREQ: SPAN 301 OR 302 OR PERMISSION OF INSTRUCTOR.

Department of Geosciences

Interim Chair and Professor Rodgers
Professors: Hughes, Link, McCurry, Thackray
Assistant Professors: Ames, Crosby, Tapanila
Research Associate Professor: Glenn
IGS Supervisory Research Geologist: Welhan
GIS TRC Director Weber
Affiliate Faculty: Akersten, Cecil, Kuntz, Mahar, McGinnis, Panda, Smith, Stephens, Winterfeld

Overall Department Goals - All Programs

- A. Graduates will think critically and comprehend written and verbal communications about geoscience topics.
- B. Graduates will have specific skills for careers in geoscience and related industries, licensure, or to continue in graduate study.
- C. Graduates will attain employment in geology or related fields or gain admission to graduate programs.

Graduate Degree Programs

- I. Goals
 - D. Graduates will be prepared to communicate effectively at the professional level.
 - E. Graduates will be prepared to define, implement, and complete geologic investigations.
 - F. Graduates will have professional skills for employment or further graduate study.
- II. Objectives
 - A. Provide graduate students with coursework, laboratory experiences, field exercises and research opportunities in order to achieve all goals set forth above.
 - B. Provide graduate students with a professional interactive environment that improves their opportunities to enter successful careers in geoscience.
 - C. Increase graduate students' probability

of obtaining employment in academia or industry, or of being accepted for doctoral studies.

Application for Admission - Graduate Degree Programs

A complete graduate application for classified status in the ISU Geosciences Department consists of:

- a. GRE aptitude scores - 50th percentile or above in two of the three categories, or strengths clearly demonstrated in other components of the application
- b. A letter of intent and statement of goals in Graduate School
- c. An ISU Graduate School application form with official copies of transcripts from all previous coursework
- d. Three letters of recommendation
- e. Notification to the department: geology@isu.edu

Doctor of Philosophy in Engineering and Applied Science

A Ph.D. program in Engineering and Applied Science, administered through the College of Engineering, is available to Geoscience students who wish to emphasize Subsurface Science. The complete program description is provided under the College of Engineering section of the *Graduate Catalog*.

Master of Science in Geology

The M.S. degree is offered to those students who have degrees in geology who have demonstrated the potential for research and a professional career. Classified (degree-seeking, fully accepted) admission to the program is decided by the graduate faculty of the Geosciences Department. In addition, the student must apply to, and meet all criteria for, admission to the Graduate School. In addition to the general requirements of the Graduate School, the student must provide:

Applicants must hold the degree of Bachelor of Science or Bachelor of Arts in geology or the equivalent as determined by the department. The student's course of study will be determined by consultation and possibly an

entrance examination. Students will normally be required to complete as deficiencies at the undergraduate level any courses required for the B.S. in geology at Idaho State University that they have not already taken. Continued enrollment in the program is contingent upon maintaining a 3.0 grade point average and upon making satisfactory progress toward the degree.

Unclassified status is used for students with large numbers of deficiencies or with very low undergraduate GPAs. Unclassified students may petition for classified status when their performance warrants.

Requirements

A student who wants to earn an M.S. in Geology must complete at least 30 credits of course work. These credits must be earned under the following conditions:

- a) The student must earn at least 17 credits (including six Thesis credits) at the 600 level in Geology.
- b) The remaining 13 credits may be earned at the 500 or 600 level, of which eight credits may come from a related discipline.

In addition to the 30 required credits, each student must take two approved courses from outside the Geosciences Department (e.g., technical writing, anthropology, etc.) or may opt to take the foreign language challenge exam at the elementary level.

The department requires that the following core courses be completed. These classes are normally taken during the first and second semesters of graduate study:

GEOL 591	Seminar	1 cr
GEOL 601	Advanced Physical Geology	2 cr
GEOL 603	Geologic Writing Seminar	1 cr

Graduate students may not sign up for GEOL 650 (Thesis) until their thesis prospectus has been submitted and approved by the Thesis Committee. Additionally, all graduate students are required to present at least one geology colloquium dealing with their thesis topic prior to taking their oral examination.

Master of Science in Geology with Emphasis in Environmental Geoscience

A Geology M.S. degree may be awarded with the annotation "Emphasis in Environmental Geoscience" added, if the student completes the requirements for an M.S. Geology degree plus at least 9 credits in approved graduate-level courses in the general area of Environmental Geoscience. Students who wish their M.S. degree to contain the added designation "With Emphasis in Environmental Geoscience", need to file an amended program of study form with the Graduate School. The curriculum may be developed in, but is not limited to, the following areas: surface and groundwater hydrology; environmental geochemistry; surficial geological processes; geomorphology; volcanic, earthquake and other geologic hazards; environmental geophysics; assessment and remediation of hazardous waste sites; Neogene and Quaternary geology. Courses in related sciences and engineering disciplines may also be included.

The curriculum must be approved by the student's graduate committee, and may include components taken at Boise State University and/or the University of Idaho. Inter-university graduate committees are encouraged.

Master of Science in Geographic Information Science

The M.S. in GISc degree is offered to students who wish to become competent as researchers and as Geographic Information Systems (GIS) analysts and developers. The program focuses on advancing knowledge to acquire, store and manage, visualize, model, and analyze information about spatial features and phenomena, with strong emphasis on real-world geospatial applications. The M.S. in GISc is designed as an interdisciplinary study of the nature and function of spatial information systems and the application of these systems in research. Students will be involved in the technical study of the design and evaluation of methods, tools, and techniques that will involve formulating hypotheses, collecting spatial information, and developing techniques for spatial analysis.

Applicants must hold a degree of Bachelor of Science or Bachelor of Arts in any discipline that allows research focus on geotechnologies including, but not limited to: Geosciences, Anthropology, Biology, Business, and

Engineering. Students can focus on either (1) the development of new GIS tools and analytical procedures or (2) the application of established and new tools and procedures to scientific problems. Each student in this program will have a member of the current Geotechnology Faculty as his/her major advisor. Applicants will be requested to state an advisor preference at the time of application, otherwise a preliminary advisor will be assigned upon acceptance to the program.

NOTE: Due to the interdisciplinary nature of this program, applicants should initially contact a faculty member or the Graduate Program Director in the department in order to match their interests with those of potential faculty advisors.

Requirements

The student must apply to, and meet all criteria for, admission to the Graduate School. In addition to the general requirements of the Graduate School, the student must comply with the following:

A minimum of 30 credit hours is required for completion of the M.S. in Geographic Information Science, with a minimum of 15 credit hours (including six Thesis credits) completed in 600-level courses. The student's graduate advisory committee (major advisor and co-advisor) will establish specific research goals, thesis topic, and the course electives in the program of study.

A 600-level graduate seminar and eight credits taken as core courses are required of each student. Generally these will be taken during the first year of study. Prerequisites for core courses are designed to permit students entering the M.S. program from all disciplines. Students entering with some or all of the core courses taken at the undergraduate level may, with permission from the student's advisory committee, substitute other graduate-level courses in the program of study. Program requirements are summarized as follows:

Graduate Seminar, 600-level (taken in appropriate department): BIOL 691, ANTH 600, GEOL 601	1 cr
Core Geotechnologies Courses	8 cr
Electives (ANTH, BIOL, GEOL, etc.)	15 cr
Thesis (ANTH 650, BIOL 650, GEOL 650, etc.)	6 cr
Total (includes 15 hours at 600-level)	30 cr
Section A - Core Courses	
GEOL 504 Advanced GIS	3 cr
GEOL 507 GPS Applications in Research	3 cr
GEOL 508 Geotechnology Seminar	2 cr
GEOL 509 Remote Sensing	3 cr

Section B - Electives

ANTH 523	Anthropology of International Health	3 cr
ANTH 582	Independent Problems in Anthropology	3 cr
ANTH 593	Interdisciplinary Anthropology	3 cr
ANTH 641	Research Project	1-6 cr
ANTH 649	Independent Studies	1-4 cr
BIOL 518	Ecotopics: Ecological Applications of GIS	2 cr
BIOL 648	Graduate Problems	1-9 cr
CIS 580	Database Management Systems	3 cr
GEOL 555	Geologic Data Methods	3 cr
GEOL 527	Information Technology for GIS	3 cr
GEOL 528	Programming for GIS	3 cr
GEOL 581	GeoTechnology Internship	1-3 cr
GEOL 628	Advanced GIS Programming	3 cr
GEOL 606	Geostatistical Spatial Data Analysis and Modeling	3 cr
GEOL 607	Spatial Analysis	3 cr
GEOL 609	Advanced Image Processing	1 cr
GEOL 648	Research Problems	1-6 cr

Electives may also include extra core courses taken as electives beyond the required minimum number of core credits. Certain graduate courses not shown in the list above may be acceptable with approval of the student's advisory committee. All courses in the program of study require approval by the student's advisory committee and final approval by the Graduate School. Students are expected to complete a thesis that will be original and encompass all stages of scientific work, including project design, implementation, and communication.

Graduate students may sign up for Thesis credits only after their thesis prospectus has been submitted and approved by the advisory committee. Additionally, all graduate students are required to present at least one colloquium dealing with their thesis topic prior to taking their oral examination.

Master of Natural Science in Geology

The Master of Natural Science (MNS) degree in Geology is designed primarily for teachers and prospective teachers who wish to broaden their understanding of geologic processes, the nature of natural resources, and the effect of humans on their environment. This is a non-thesis program of study with an emphasis on subject matter that will enhance the ability of the teacher to give students an interesting, up-to-date class in earth science or geology. Those interested in the program should possess or be working toward a standard teaching certificate. Requirements include completion of a prescribed program of study

of 30 credits approved by a departmental committee selected by the student in consultation with the student's major professor and approved by the Dean of the Graduate School, and satisfactory performance on final written and oral examinations. See Master of Natural Science in the General information section of this catalog for details of the M.N.S. degree.

Cooperative ISU-Boise State University Master's Degree in Geology

Graduate students admitted to the ISU M.S. program in Geology may, subject to the approval of their thesis committee, transfer up to 12 credits of graduate credit from Boise State University (BSU). The thesis committee consists of three or more people: an ISU Geosciences faculty member, a graduate faculty representative from ISU, a Geology and Geophysics faculty member from BSU (must be member of ISU graduate faculty), and perhaps an additional Geosciences graduate faculty as desired by the student.

Thesis research can be conducted under the auspices of faculty at BSU or ISU, but registration must be for ISU GEOL 650 (Thesis) totaling six credits. Students can register for GEOL 650 only after a thesis prospectus has been approved. Normally, students must spend at least one semester at ISU. Students may apply credits of GEOL 648 (Research Problems-ISU credit), taught by BSU faculty, to their degree. These are ISU credits, not BSU transfer credits.

The total credits required are the same as for a normal ISU M.S. degree in Geology (at least 17 at 600 level; at most 13 at 500 level.) The requirement of two approved courses from outside the field of geology can be met at either ISU or BSU. Presentation of at least one geology colloquium at ISU is required.

Cooperative ISU-Boise State University Master's Degree

in Applied Geophysics

Graduate students admitted to the Boise State University M.S. Program in applied geophysics may, subject to the approval of their thesis committee, transfer up to 12 credits of graduate credit from ISU. For details of this cooperative program, the student should consult the BSU Graduate Catalog and the BSU Department of Geology and Geophysics.

University of Idaho-Boise State University-ISU Master's Degree in Hydrology

Access to the University of Idaho (of I) M.S. program in hydrology is provided to ISU and BSU graduate students via the offering of University of Idaho hydrology classes at Boise State University. Students interested in the University of Idaho hydrology degree should consult the of I Graduate Studies Catalog and the of I Department of Geology.

Post-Baccalaureate GeoTechnology Certificate

(19 credits required)

GeoTechnology Certificate

I. Goals

- Graduates will have the knowledge and skills necessary to apply geotechnology in their chosen careers or fields of interest.
- Graduates will have the background to compete successfully for industrial and academic positions.

II. Objectives

- Learn and perform techniques in Geographic Information Systems, Global Positioning System, Remote Sensing, and related skills.
- Increase knowledge of how geotechnical applications are incorporated into research, education, and industry.
- Increase knowledge of geotechnical workforce needs and the future direc-

tions of geotechnological applications.

The Graduate Certificate in GeoTechnology is offered to students who wish to become proficient in the collection, management, and analysis of spatial data. Courses in three disciplines—geographic information systems (GIS), global positioning systems (GPS), and remote sensing—are used to teach the theory and application of GeoTechnology. Students may pursue the Certificate independently or in conjunction with another ISU degree.

Classified admission is necessary to complete the Certificate and is decided by the graduate faculty of the Geosciences Department in accordance with standards set by the Graduate School. Applicants must have a baccalaureate degree from an accredited school and must obtain a score of 35% or higher on the GRE Verbal, Quantitative, or Analytical sections. All applicants must submit an application to the Graduate School. In addition, students who wish to apply for a Graduate Assistantship should submit to the Geosciences Department a GA request form, 3 letters of recommendation, and a statement of goals for graduate study.

Students will complete 14 credits of required course work and 5 credits of elective course work to obtain the Certificate. The following courses are relevant:

Core Courses (14 credits required):

GEOL 503	Principles of GIS	3 cr
GEOL 504	Advanced GIS	3 cr
GEOL 507	GPS Applications in Research	3 cr
GEOL 508	GeoTechnology Seminar	2 cr
or		
BIOL 518	Ecological Topics	1 cr
GEOL 509	Remote Sensing Applications	3 cr

Electives (5 credits required):

ANTH 582	Independent Problems in Anthropology*	3 cr
BIOL 582	Independent Problems in Biology	1-3 cr allowed
CIS 580	Data Base Management Systems	3 cr
or		
GEOL 527	Information Technology for GIS	3 cr
or		
GEOL 528	Programming for GIS	2 cr
GEOL 580	Special Topics in GIS	1-3 cr
GEOL 581	GeoTechnology Internship	1-3 cr
GEOL 606	Geostatistics Spatial Data Analysis and Modeling	4 cr
GEOL 607	Spatial Analysis	3 cr
GEOL 628	Advanced GIS Programming	3 cr
GEOL 648	Research Problems	1-3 cr allowed
		TOTAL: 19 cr

* Topic: Geographical Information Systems and Anthropology (or GIS and Anthropology)

For current information regarding GIS Center and courses, see the website: <http://giscenter.isu.edu>

Geology Graduate Courses

GEOL g502 Geomorphology 4 credits. Process-response approach to landforms and landscapes. Historical perspectives, endo- and exogenetic processes, equilibrium and relict landforms. Emphasis on interrelations among various geologic sub-disciplines. Field trips, some lab exercises. PREREQ: GEOL313 OR PERMISSION OF INSTRUCTOR.

GEOL g502L Geomorphology Laboratory 0 credits.

GEOL g503 Principles of Geographical Information System 3 credits. Study of GIS fundamentals, introduction to GPS, databases, and metadata. Practical application of ESRI ArcView®. Build, edit, and query a GIS; basic spatial analysis. Requires competence in computer operating systems. PREREQ: CIS 101; COREG: GEOL g503L OR INSTRUCTOR APPROVAL.

GEOL g503L Principles of GIS Laboratory 0 credits.

GEOLg504 Advanced Geographic Information Systems 3 credits. Study of relational databases, including spatial analysis, and remote sensing. Practical application of Arc/Info and Idrisi. Exercises include digitizing, querying, digital terrain modeling, and image processing. PREREQ: GEOL g503, GEOL g503L OR PERMISSION OF INSTRUCTOR.

GEOL g505 Volcanology 3 credits. Aspects of physical and chemical volcanology: types of volcanoes; interpretation of volcanic deposits; properties of magma; generation, rise, and storage of magma; volcanic hazards and prediction. PREREQ: ONE OF GEOL 314, GEOLg502, GEOL 421, OR GEOL g552.

GEOL g506 Environmental Geology 3 credits. Humans and the environment. Topics include: industrial exploitation of fossil fuels, energy sources, soils, water and other materials, environmental health, pollution, waste disposal, hazards, disasters, and land use. PREREQ: GEOL 100 OR GEOL 101.

GEOL g507 GPS Application in Research 3 credits. Overview of satellite positioning systems usage. Topics include GPS theory, basic mapping concepts, use of mapping grade receivers for GIS data collection, and processing of carrier phase data for high precision applications.

GEOL g508 GeoTechnology Seminar 2 cr. GIS applications in natural and social sciences, ethical and legal issues, current status and recent advances in GeoTechnology. Lectures, discussion, readings. PREREQ: GEOL g503, GEOL g503L OR PERMISSION OF INSTRUCTOR.

GEOL g509 Remote Sensing 3 credits. Fundamentals and applications of single frequency, multispectral, and hyperspectral remote sensing for physical, natural, engineering, and social sciences. Emphasis on acquiring, processing, integrating, and interpretation of imagery. Requires competence in computer operating systems.

GEOLg510 Science in American Society 2 cred-

its. Observational basis of science; technology's historical influences on scientific developments; perceptions of science in contemporary America; tools/strategies for teaching science. Cross-listed as PHYS g510. PREREQ: JUNIOR STANDING AND PERMISSION OF INSTRUCTOR.

GEOL g511 Planetary Petrology 3 credits. Chemistry, mineralogy, tectonic association and petrogenesis of the principal igneous and metamorphic rock types on Earth and other planetary bodies. PREREQ: GEOL 314.

GEOL g512 Petrology Lab 2 credits. Microscopic identification of igneous and metamorphic minerals and rocks. PREREQ: GEOL 313 AND GEOL 211. COREQ: GEOL g511.

GEOL g515 Quaternary Global Change 3 credits. Use and interpretation of landforms, sediments, and fossil life in the reconstruction of Quaternary events, environment, and climates. PREREQ: PERMISSION OF INSTRUCTOR.

GEOL g517 General Soils 3 credits. Formation, morphology, and distribution of soils, including developments in soil classification. PREREQ: GEOL 100 OR GEOL 101 OR GEOL 115, OR PERMISSION OF INSTRUCTOR.

GEOL g520 Principles of Geochemistry 3 credits. Chemistry of the earth; discussion of factors controlling abundance, distribution, and migration of chemical elements within the earth. PREREQ: GEOL 211, AND CHEM 112, OR PERMISSION OF INSTRUCTOR.

GEOL g522 Planetary Geology 3 credits. Formation of planetary bodies (planets, moons, asteroids, and comets), internal and surficial processes, tectonics, and planetary exploration. PREREQ: GEOL 100 OR GEOL 101 OR PERMISSION OF INSTRUCTOR.

GEOL g527 Information Technology for GIS 3 credits. Study of servers, networks, system administration, relational database design and management, spatial database engines, and serving maps on the internet. The course uses traditional lectures along with demonstrations, and hands-on exercises. PREREQ: GEOL g503, GEOL g503L OR PERMISSION OF INSTRUCTOR.

GEOL g528 Programming for GIS 3 credits. Course introduces students to Visual Basic programming for GIS. Students will learn the fundamentals of object oriented programming, rapid application development, basic coding, help documentation, and compiling. Students will complete a project where they develop a GIS utility of their choice. PREREQ: MATH 147 AND GEOL 100 OR 101, OR PERMISSION OF INSTRUCTOR.

GEOL g530 Principles of Hydrogeology 3 credits. Surface and groundwater occurrence, movement and recovery, water quality and pollution, well construction principles, and computer modeling. PREREQ: GEOL 100 OR GEOL 101, OR PERMISSION OF INSTRUCTOR.

GEOL g531 Geobiology and History of Life 4 credits. Principles of biology and geology

applied to the study of fossil invertebrates; consideration is given to morphology, classification, evolution, paleoecology, and the stratigraphic significance of fossils. PREREQ: PERMISSION OF INSTRUCTOR.

GEOL g531L Invertebrate Paleontology Laboratory 0 credits.

GEOL g535 Vertebrate Paleontology 4 credits. Phylogenetic history of the vertebrates outlined in the light of morphology, classification, evolution, paleoecology, and the significance of fossils. Field trips. Cross-listed as BIOL g535. PREREQ: GEOL g531 OR BIOL 314 OR EQUIVALENT.

GEOL g539 Principles of Taphonomy 3 credits. Effects of processes which modify organisms between death and the time the usually fossilized remains are studied. Emphasis on vertebrates. Cross-listed as ANTH g539 and BIOL g539. PREREQ: PERMISSION OF INSTRUCTOR.

GEOL g540 Ore Deposits 3 credits. Nature, mode of occurrence, and origin of ores with each type related to a given rock association and as the product of a particular environment. PREREQ: ONE OF GEOL 314, GEOL g552 (RECOMMENDED), OR GEOL 421.

GEOL g545 Environmental and Engineering Geophysics 4 credits. Geophysical applications to environmental and geological engineering problems. Includes seismic, gravity, magnetic, electrical, and electromagnetic methods. (Includes lab.) PREREQ: MATH 144 OR 147, GEOL 100 OR 101, OR PERMISSION OF INSTRUCTOR.

GEOL g550 Field Geology 6 credits. Five-week summer field camp, applying standard geologic field instruments and geologic concepts to a series of field problems. PREREQ: GEOL g552 AND 421.

GEOL g552 Sedimentation Stratigraphy 4 credits. Principles of sedimentation from source to diagenesis. The basis of stratigraphic nomenclature, classification, and correlation of rock units. Laboratory covers unconsolidated sediment, hand specimens, subsurface, and field techniques. PREREQ: GEOL 210 AND ENGL 102 OR PERMISSION OF INSTRUCTOR.

GEOL g554 Basic Engineering Geology 3 credits. Geology applied to engineering projects; geotechnical problems in civil projects; site methods. Subsurface investigations including scope, logging, and in situ and geophysical methods. Cross-listed as CE g554. PREREQ: GEOL 314 OR CE 332.

GEOL g555 Geologic Data Methods 3 credits. Classification of geotechnical projects. Geologic mapping for civil engineering purposes. Development of engineering geologic profiles. Pre-bid geotechnical investigations and field instrumentation for civil works projects. Cross-listed as CE g555. PREREQ: GEOL 450.

GEOL g556 Geology of Idaho 2 credits. Geologic provinces and plate tectonic history of Idaho. Topics include basement, Belt Supergroup, Phanerozoic passive margin, Cordilleran orogen, accreted ter-

ranes, Idaho batholith, Challis volcanics, Idaho mineral deposits, Basin and Range, Snake River and Pleistocene floods. PREREQ: GEOL 100 OR GEOL 101.

GEOL g558 Geology of North America 3 credits. Regional stratigraphy and tectonics of North America emphasizing National Parks and the Intermountain West. Graduate students will do extensive additional reading in current literature. PREREQ: GEOL 100 OR GEOL 101.

GEOL g565 Subsurface Geology 3 credits. Principles of well log interpretation and correlation, core and cuttings description, cross section and subsurface map creation. Environmental geology, hydrogeology, mining, geological engineering, and petroleum applications. PREREQ: GEOL 210 OR PERMISSION OF INSTRUCTOR.

GEOL g571 Historical Geography of Idaho 3 credits. Influences of geography and geology on Idaho's economic, political and cultural history. May be team taught and include field trips, discussion sections. Cross-listed as HIST g571 and POLS g571.

GEOL g575 Essentials of Geomechanics 3 credits. Essentials of rock fracture relevant to geological engineering including stress and strain, properties and classification of rock masses, rock fracture mechanisms. Cross-listed as CE g575. PREREQ: GEOL 421 OR ENGR 350.

GEOL g576 Engineering Geology Project 1 credit. Team projects studying actual problems in engineering geology. Cross-listed as CE g576. PREREQ: GEOL g554 OR CE g554.

GEOL g580 Special Topics in GIS 1-3 credits. Visual Basic programming for GIS. PREREQ: GEOL g503, GEOL g503L AND PERMISSION OF INSTRUCTOR.

GEOL g581 GeoTechnology Internship 1-3 credits. Choose a project with either natural resource or municipal GIS emphasis and work with real-world data at the internship's off-campus location. Projects focus on using/creating geotechnical data. PREREQ: GEOL g503 OR PERMISSION OF INSTRUCTOR.

GEOL g583 Earthquake Engineering 3 credits. Mechanism and characterization of earthquakes; seismic risk analysis; site and structural response; applications from points of view of engineer and geologist. Cross-listed as CE g580. PREREQ: GEOL 313 OR CE 332, OR PERMISSION OF INSTRUCTOR.

GEOL g591 Seminar 1 credit. Field trip or discussion of current geologic literature and geologic problems. May be repeated until 3 credits are earned. PREREQ: PERMISSION OF INSTRUCTOR. Graded S/U.

GEOL 597 Professional Education Development Topics. Variable credit. A course for practicing professionals aimed at the development and improvement of skills. May not be applied to graduate degrees. May be repeated. May be graded S/U.

GEOL 601 Advanced Physical Geology 2 credits. An advanced level course in physical geology

required for all first year graduate students. A review of the principles of physical geology, and an overview of current hypotheses and research in the field.

GEOL 602 Advanced Geomorphology 3 credits. Seminar in the treatment of theoretical concepts in classical and modern geomorphology.

GEOL 603 Geologic Writing Seminar 1 credit. Review of quality geologic writing practices; extended field trip and introduction to regional geology. Topics include databases, abstracts, stratigraphic terminology, grant proposals, thesis prospecti, and use of reference library. Required for all Geosciences graduate students.

GEOL 604 Watershed Modeling 3 credits. Use of geographic information systems and integrated simulation models to study the hydrologic cycle, water quality, agricultural and industrial impacts, environmental and related issues at the watershed scale. PREREQ: GEOL g404.

GEOL 606 Geostatistical Spatial Data Analysis and Modeling 4 credits. Description, analysis and modeling of spatial data in the geosciences, emphasizing hands-on application of geostatistical software tools for spatial analysis and probabilistic modeling in petroleum and groundwater reservoirs, environmental remediation, and mining or any application involving spatially-varying data. PREREQ: PERMISSION OF INSTRUCTOR.

GEOL 607 Spatial Analysis 3 credits. This course focuses on advanced techniques for spatial data analysis covering issues in sampling, characterizing, visualizing, exploring and modeling spatial data. Techniques for point patterns, continuous data, area data, and spatial interaction data will be emphasized. PREREQ: GEOL g503, MATH 170/175, AND A BASIC STATISTICS CLASS (e.g., MATH 253) OR PERMISSION OF INSTRUCTOR.

GEOL 609 Advanced Image Processing 1 credit. An advanced-level course in image processing techniques, such as using transforms, filters, and classifiers for data derived in the visible, infrared, and microwave. Specific topics include preprocessing, endmember analysis, classification (including spectral unmixing), and accuracy assessment. Practical application of theory for graduate student theses and dissertations. PREREQ: GEOL g509.

GEOL 615 Neutron Activation Analysis 4 credits. Theory and use of neutron activation methods for quantitative chemical analysis of natural and synthetic materials. Applications in geologic systems will be emphasized. Cross-listed as CHEM 615, PHYS 615. PREREQ: PERMISSION OF INSTRUCTOR.

GEOL 617 Environmental Geochemistry 3 credits. Geochemistry of environmental systems. Emphasis given to low-temperature water-rock interactions, including sorption processes, retardation, reaction kinetics and reaction-mass transport modeling. Cross-listed as CHEM 617. PREREQ: CHEM 112 AND GEOL g520 OR CHEM 351.

GEOL 618 Applied Geophysics 3 credits. Geologic interpretation of reflection seismic, refraction seismic, gravity, magnetic, and ground-penetrating radar data.

GEOL 621 Advanced Structural Geology 3 credits. Current aspects of structural geology or tectonics. May focus on regional structures, tectonic theories, orogenic mechanics, global tectonic model(s), or topics of special interest in structural geology.

GEOL 622 Orogenic Belts of the World 3 credits. Interdisciplinary analysis of Alpine and Cordilleran-type mountain belts including their infrastructure, tectonic evolution, and mechanisms of formation.

GEOL 623 Tectonics and Sedimentation 3 credits. Sedimentary basin analysis and mechanisms of subsidence. Extensional, compressional and strike-slip tectonics as related to depositional systems, facies architecture, and provenance.

GEOL 625 Quantitative Geochemistry Lab 3 credits. Practical application of theory involving use and operation of instrumental techniques. Cross-listed as CHEM 625.

GEOL 628 Advanced GIS Programming 3 credits. Course focuses on Visual Basic for Applications (VBA) programming for ArcGIS. Students will learn to navigate, interact, and utilize ArcObjects to customize ArcGIS and to create and distribute their own customizations (i.e., dll). PREREQ: GEOL g503, GEOL g528, AND PERMISSION OF INSTRUCTOR.

GEOL 630 Advanced Hydrogeology 3 credits. Advanced topics in hydrogeology, including precipitation and stream flow, soil moisture, principles and modeling of groundwater flow, migration of wastes in both saturated and unsaturated zones, design and impact of production wells, water chemistry. PREREQ: GEOL g530 OR EQUIVALENT.

GEOL 631 Sedimentology 3 credits. Provenance, dispersal, and environments of deposition; emphasis on various aspects of surface equilibria.

GEOL 641 Advanced Petrology 3 credits. Selected topics in igneous and/or metamorphic petrology, regional and/or global aspects of current interest, including relationship to major advances in other areas of solid earth sciences.

GEOL 646 The Sedimentary Record 4 credits. Earth history as revealed in sedimentary facies, provenance, chemical and isotopic excursions. Methods of analysis including sequence stratigraphy, geochronology, biogeochemistry, chemostratigraphy. Sedimentary petrology and field methods emphasized in lab.

GEOL 648 Research Problems 1-6 credits. Independent research on non-thesis subject matter, subject to approval of the staff before results receive credit. Course may be repeated until 10 credits are earned.

GEOL 650 Thesis 1-9 credits. Ordinarily a field-

problem with supporting laboratory work undertaken by the student with approval of the geology graduate faculty, and after a thesis prospectus has been accepted. Graded S/U .

GEOL 699 Doctoral Dissertation (Ph.D. in Engineering and Applied Science) variable credits. Research toward and completion of the dissertation. May be repeated Graded S/U .

Department of History

Chair and Associate Professor Woodworth-Ney

Professors: Christelow, Christelow, Hale, Hatzenbuehler, Owens

Associate Professors: Kuhlman, Marsh

Assistant Professors: Hinman

Adjunct Faculty: Reinke

Emeritus Faculty: Marley, Ruckman, Swanson

Master of Arts in Historical Resources Management

This innovative program offers a curriculum in geographically-integrated history that combines an emphasis on the use of geographic information systems (GIS) and related information technologies to conduct historical research along with an internship that develops skills in analysis, collaboration, and written, oral, and visual communication. Students receive strong preparation that will enable graduates to compete successfully for a wide variety of jobs with businesses and educational, government, and private agencies and to prepare them for further graduate study.

Admission

The student must apply to, and meet all criteria for, admission to the Graduate School. In addition the student must comply with the following departmental requirements:

- Applicants must have a 3.0 or above in the last two years of undergraduate work and a 3.5 or above in any graduate work in History or related subjects.
- Applicants must submit three letters of recommendation at least two of which should be from individuals familiar with