245. The Political Economy of Urban and Regional Development (4)
Lecture—4 hours. Prerequisite: Community & Regional Development 157, 244, or the equivalent. How global, political, and economic restructuring and national and state policies are mediated by community politics; social production of urban form; role of the state in uneven development; dynamics of urban growth and decline; regional development in California. (Same course as Community & Regional Development 245.)—II. (III.)

246. The Political Economy of Transnational Migration (4)
Lecture—4 hours. Prerequisite: graduate standing. Theoretical perspectives and empirical research on social, cultural, political, and economic processes of transnational migration to the U.S. Discussion of conventional theories will precede contemporary comparative perspectives on class, race, ethnicity, citizenship, and the ethic economy. (Same course as Community & Regional Development 246.)—II. (III.) Guarnizo

248. Social Policy, Welfare Theories and Communities (4)
Seminar—4 hours. Prerequisite: graduate standing. Theories and comparative histories of modern welfare states and social policy in relation to legal/normative, organizational, and administrative aspects. Analysis of specific policy issues within the U.S. and California context. Not open for credit to students having completed Community & Regional Development 248A and 248B. (Same course as Community & Regional Development 248.) Offered in alternate years.—II. (III.) Hirtz

252. Landscape and Power (4)
Seminar—4 hours. Prerequisite: graduate standing or consent of instructor. How various representations of landscape have historically worked as agents of cultural power. Course framework is interdisciplinary, including studies of landscape representation in literature, art, photography, cartography, cinema, and landscape architecture. (Same course as Landscape Architecture 260.)—I. (I.) Schniker

270. Experimental Design and Analysis (5)
Lecture—5 hours, discussion/lab—2 hours. Prerequisite: Plant Sciences 120 or equivalent. Introduction to the research process and statistical methods to plan, conduct, and interpret experiments.—II. (III.) Dubcovsky

271. Applied Multivariate Modeling in Agricultural and Environmental Sciences (4)
Lecture—6 hours; discussion/lab—2 hours. Prerequisite: one of Plant Sciences 120, 205, Statistics 106, 108, or equivalent. Multivariable linear and nonlinear models. Model selection and parameter estimation. Analysis of manipulative and observational agricultural experiments. Discriminant, principal component, and path analyses. Logistic and biased regression. Bootstrapping. Exercises based on actual research by UC Davis students.—I. (I.) Jacob

279. Discrete Choice Analysis of Travel Demand (4)
Lecture—4 hours. Prerequisite: Civil and Environmental Engineering 114. Behavioral and statistical principles underlying the formulation and estimation of discrete choice models. Practical application of discrete choice models to characterize of choice behavior, hypothesis testing, and forecasting. Emphasis on computer exercises using real-world data sets. (Same course as Civil and Environmental Engineering 254.)—III. (III.)

280. Field Studies in Geography (3)
Lecture—1 hour; fieldwork—6 hours. Prerequisite: undergraduate or graduate coursework in geografia and consent of instructor. A topic or subdiscipline of geography will form the theme for the course in any given offering, with a focus on current research on this topic, field methodologies, and data analysis in human and physical geography. May be repeated twice for credit. Limited enrollment.

281. Transportation Survey Methods (4)
Lecture—4 hours. Prerequisite: Statistics 13; Civil and Environmental Engineering 251 recommended. Description of a variety of surveys commonly used in transportation demand modeling, including travel and activity diaries, attitudinal, panel, computer, and stated-response surveys. Discussion of sampling, experimental design, and survey design issues. Analysis methods, including factor, discriminant and cluster analysis. Not open for credit to students who have taken Civil and Environmental Engineering 255. (Same course as Transportation Technology and Policy 200.)—II. (III.)

286. Selected Topics in Environmental Remote Sensing (3)
Discussion—2 hours; lecture—1 hour; project. Prerequisite: consent of instructor; Environmental and Resource Sciences 186 or equivalent required; Environmental and Resource Sciences 186 recommended. In depth investigation of advanced topics in environmental and remote sensing, measurements, and theory. Not open for credit to students who have taken Civil and Environmental Engineering 255. (Same course as Hydrologic Science 286.) May be repeated for credit. Offered irregularly.—Ustin

290. Seminar in Geographic Information (1-3)
Seminar—1 hour. Prerequisite: Graduate standing or consent of instructor. Seminar will focus on specific topical areas within geography, which will vary from quarter to quarter. Students will be expected to present an oral seminar on an aspect of the general topic under discussion. May be repeated six times for credit. (S/U grading only)—I, II, III. (II, III.)

291. Seminar in Cultural Geography (4)
Seminar—3 hours. (II.)

293. Graduate Internship (1-12)
Prerequisite: consent of instructor. Individually designed, supervised internship, off campus, in community or institutional setting. Developed with advice of faculty member. May be repeated for credit. (S/U grading only)—I, II, III. (II, III.)

295. Seminar in Urban Geography (4)
Seminar—3 hours. —II. (III.)

297. Graduate Group in Geography (1)
Seminar—4 hours. Discussion—1 hour; term paper. Prerequisite: consent of instructor. Seminars by UC Davis faculty and prominent national and international scholars; research presentations by Graduate Group in Geography Ph.D. candidates. May be repeated for credit. (S/U grading only)—I, II, III. (II, III.)

299. Research (1-12)
(S/U grading only)

299D. Individual Study (1-12)
Prerequisite: graduate student status in Geography and consent of instructor. (S/U grading only)

Professional

396. Teaching Assistant Training Practicum (1-4)
Prerequisite: graduate standing. May be repeated for credit. (S/U grading only)

Geology

[College of Letters and Science]

The Major Programs

CEivilization exists by geological consent—subject to change without notice.—Will Durant

Geology is the study of the Earth, and in particular its history, structure, and the processes that have molded our planet and its biosphere. Geology involves the origin of continents and ocean basins, earthquakes and volcanoes, variations in global cli-

mate, and how these physical changes impact the evolution of life. All of these planetary processes are viewed through the prism of "deep time," a perspec-
tive unique to geologists and one that distinguishes geology from most of the other physical sciences.

A significant component of geology is oriented toward the interaction between humans and the Earth. This aspect includes the study of resources such as minerals, oil, and water; identification and mitigation of Earth hazards such as earthquakes, landslides, floods, and volcanic eruptions; identification and mitigation of pollution and groundwater problems; land use planning; and the study of ancient and modern climate change.

The Program. Students interested in becoming professional geologists or continuing their geological studies at the graduate level should choose the Bachelor of Science degree program. The Bachelor of Arts program is for students interested in an interdisciplinary program of study, or who plan to go into precollege teaching. Both programs allow students to emphasize an aspect of the field of particular interest to them. The upper division electives are not restricted to geology courses but must be chosen to provide a relevant, coherent, and in-depth program of study. Transfer students should have completed as much as possible of the preparatory subject matter listed below.

Internships and Career Alternatives. In recent years, in addition to labs, many geolo-
gists have been environmental and geological consulting firms, with oil companies, research labo-
ratories and government agencies also providing opportunities. Students graduating with a Bachelor's degree may get entry-level positions in the private sector or they may go on to attain their teaching cre-
dential to fill the growing need for science teachers at all precollege levels. A Master's degree is the most versatile professional level degree, and a Ph.D. is generally required for research and academic positions. Internships are strongly encouraged for undergraduates and are an important part of planning their potential career opportunities that can lead to posi-
tions after graduation. UC Davis students have interned at the California Division of Mines and Geology, the State Department of Water Resources, CALEPA, and various consulting firms.

Education Abroad Options. The department strongly encourages interested students to pursue a portion of their studies abroad. Within the con-
straints of the campus advising and administration requirements, it is possible for students to complete significant portions of the Geology major at an inter-
national institution provided that the student consults with one of the undergraduate advisors and carefully plans a course of study abroad that will complement their coursework at Davis. In recent years, UC Davis Geology majors have spent their junior or senior years completing upper division coursework at EAP partner institutions in New Zealand, Ghana, Chile, and the United Kingdom.

A.B. Major Requirements:

UNITS

Preparatory Subject Matter................40-43
Geology 3, 3L, 50, 50L 60.........................13
Mathematics 16A-16B or 21A-21B...........6-8
Chemistry 2A-2B ..................................10
Physics 7A-7B .....................................8
Statistics 13 or 13V or 32 or 100................3-4

Depth Subject Matter.........................36
Additional upper division electives chosen from upper division courses in geology. Upper division courses in related fields may satisfy this requirement if approved in advance by the major advisor. —16

Total Units for the Major.........................76-79

Recommended. Chemistry 100 or Hydrologic Sci-
cence 134, Physics 7C.
Pre-Fall 2011 General Education (GE)  
Art/Humanities: Art and Humanities; Science and Social Sciences;  
Science and Engineering: Geology, Marine Science, Soil Science;  
So/Lib: Visual, Writing Experience;  
WRT/SCI: Scientific or Social Science;  
Writing Experience: Writing Experience  

### Preparatory Subject Matter  
**GEOL 132 or Geology 134**  
**Statistics 32 or 100**  
**Physics 7A-B  
Geology**  
**Mathematics 21D**  
**Physics 9A-B-C**  
**Quantitative/Geophysics option**  
**Mathematics 21D and 22A**  
**Physics 9A-B-C**

### Pre-Fall 2011 General Education (GE)  
**Art/Humanities:** Art and Humanities; Science and Social Sciences;  
**Science and Engineering:** Geology, Marine Science, Soil Science;  
**So/Lib:** Visual, Writing Experience;  
**WRT/SCI:** Scientific or Social Science;  
**Writing Experience:** Writing Experience

20. Geology of California (2) Lecture—2 hours. The geologic history of California, the origin of rocks and the environment in which they were formed, the structure of the rocks and the interpretation of their structural history, mineral resources, and appreciation of the California landscape. GE credit: SciEng | SE, SL, VL.—II. (II.) Cowgill

25. Geology of National Parks (3) Lecture—3 hours. Appreciation of the geologic framework underlying the inherent beauty of U.S. National Parks. Study of the environmental impacts of individual parks to geologic processes such as mountain building, volcanism, stream erosion, glacial action and landscape evolution. GE credit: SciEng | SE, SL, VL.—I. (I.) Oslegor


30. Fractals, Chaos and Complexity (3) Lecture/discussion—3 hours. Prerequisite: Mathemat- ics 16A or 21A. Brief summary of the fundamental ideas of fractal geometry, chaos and complexity. Basic theory and applications with examples from physics, earth sciences, mathematics, population dynamics, ecology, history, economics, biology, computer science, art and architecture. Offered in alternate years. (Same course as Physics 30.) GE credit: SciEng | GI, SE.—(II.) Rundle

32. Volcanoes (3) Lecture—3 hours. Origin, history, types and eruptions of volcanoes in shaping the planet's surface, influencing its environment, and providing essential human resources. GE credit: SciEng | SE, SL—II. (II.) Cooper

35. Rivers (3) Lecture—3 hours. Introduction to geomorphology, climate and geography of rivers and watersheds, with case examples from California. Assessment of impacts of logging, agriculture, mining, urbanization and human activities on rivers and processes. Optional river field trips. GE credit: SciEng | SE, SL


50. Physical Geology (3) Lecture—3 hours. Prerequisite: high school physics and chemistry. The Earth, its materials, its internal and external processes, its development through time by sea-floor spreading and global plate tectonics. Students with credit for course 1 or the equiva- lent may receive only 2 units for course 50. GE credit: SciEng | SE, SL.—I. II. (I.) Billen, Lesher, Ziegenor

50L. Physical Geology Laboratory (2) Laboratory—6 hours. Prerequisite: course 50 (prefer- ably taken concurrently). Introduction to classifica- tion and identification of minerals and rocks and to interpretation of topographic and geologic maps and aerial photographs. Students with credit for course 1L or the equivalent may receive only 1 unit for course 50L. GE credit: SciEng | SE.—I. II. (II.) Billen, Lesher

60. Earth Materials: Introduction (4) Lecture—3 hours; laboratory—3 hours. Prerequisite: Chemistry 2A; Mathematics 16A or 21A; course 1 or 50. Physical and chemical properties of rocks, minerals and other earth materials; structure and composition of rock-forming minerals; formation of minerals by precipitation from aqueous liquids and aqueous fluids and by solid state transformations. GE credit: SciEng | SE.—I. (I.) Day

62. Optical Mineralogy (2) Lecture—1 hour, laboratory—3 hours. Prerequisite: course 60. Course may be taken concurrently. High school geology is strongly recommended. Optical properties of inorganic crystals; techniques of mineral identifica- tion using the polarizing microscope; strategies for studying rocks in thin section. GE credit: SciEng | SE, VL.—I. (I.) Day

81. Learning in Science and Mathematics (2) Lecture/discussion—2 hours; field work—2 hours. Limited enrollment. Exploration of how students learn and develop understanding in science and mathe- matics classrooms. Introduction to case studies and interview techniques and their use in K-6 classrooms to illuminate current learning. (Same course as Education 81.) [P/NP grading only] GE credit: SS, VI, WE.—II., II, III. (II, III.)

91. Geology of Campus Waterways (1) Lecture—3 hours. Fieldwork—1 hour. Exploration of wetland and riparian processes in waterways on campus including links among hydro- logic, atmospheric, physical, and human processes; basic physical and chemical processes in surface waters; field research techniques; research project design and implementation; implications of results for society and environmental policy. May be repeated for credit three times. (P/NP grading only.) GE credit: SE.—II. (II.)

92. Internship (1-12) Internship—3-36 hours. Prerequisite: consent of instructor; lower division standing. Work/learn expe- rience on and off campus in all subject areas offered by the department. Internships supervised by a mem- ber of the faculty. May be repeated for credit up to 12 units. (P/NP grading only.) GE credit: SE.—I, II, III. (II, III, III.)

98. Directed Group Study (1-5) Prerequisite: consent of instructor. May be repeated for credit. May be repeated for credit up to three times. (P/NP grading only.) GE credit: SE.—I, II, III. (II, III, III.)

99. Special Study for Undergraduates (1-5) Prerequisite: consent of instructor; lower division standing. (P/NP grading only.) GE credit: SE.

101. Structural Geology (3) Lecture—3 hours. Prerequisite: courses 50 and 50L, Physics 7A or 9A, Mathematics 16B or 21B, or con- sent of instructor. Study of structures and products of rock deformation. Introduction to structural geology through a survey of the forms and geometries of faults and folds, techniques of strain analysis, and continuum mechanics of rock deformation. GE credit: SciEng | SE.—II. (II.) Cowgill, Oksin

101L. Structural Geology Lab (2) Laboratory—6 hours; fieldwork—2 hours. Prerequisite: courses 50 and 50L, Physics 7A or 9A, and 101 (may be taken concurrently); or consent of instructor. Class size limited to 15 students per ses- sion. Laboratory work includes field trips and products of rock deformation. Introduction to the practice of structural geology through observations and analysis of rock deformation, including field measurement techniques and geologic mapping. GE credit: SciEng | SE, VL.—II. (II.) Cowgill, Oksin

103. Field Geology (3) Fieldwork and laboratory—9 hours; 7-8 days on weekends during quarter. Prerequisite: course 101L or consent of instructor. A field course on preparing, collecting and analyzing projects and writing geological reports. Weekly classroom meet- ings devoted to preparation of maps, cross sections, stratigraphic sections, rock descriptions, and reports. GE credit: SciEng | SE, VL, WE.—II. (II.) Cowgill

105. Earth Materials: Igneous Rocks (4) Lecture—2 hours; laboratory—6 hours. Prerequisite: course 101, 103, Mathematics 16A or 21A, Chemistry 2B (may be taken concurrently). Origin and occurrence of igneous rocks. Laboratory exercises emphasize the study of these rocks in hand specimen and thin section. GE credit: SciEng, Wrt | SE, WE.—II. (II.) Cooper, Lesher

106. Earth Materials: Metamorphic Rocks (4) Lecture—2 hours; laboratory—6 hours. Prerequisite: course 105, Chemistry 2B, Mathematics 16A or 21A. Physical and chemical processes of meta- morphic rocks; interpretation of metamorphic environ- ments. Laboratory exercises emphasize the study of these rocks in hand specimen and thin section. GE credit: SciEng, Wrt | SE, WE.—III. (III.)

107. Earth History: Paleobiology (3) Lecture—3 hours. Prerequisite: courses 3-3L or Biologi- cal Sciences 1B. The evolution and ecological structure of the biosphere from the origin of the life to the present. GE credit: SciEng | SE.—I, II, III, III. (III) Carlson, Matanoni

107L. Earth History: Paleobiology Laboratory (2) Laboratory—6 hours. Prerequisite: courses 3-3L or Biological Sciences 1B; course 107 (may be taken concurrently). Exercises in determining the ecologi- cal functions and evolution of individuals, popula- tions, and communities of fossil organisms in field and laboratory. GE credit: SciEng | SE.—III. (III.) Carlson, Matanoni

108. Earth History: Paleoclimates (3) Lecture—3 hours. Prerequisite: course 1 or Geol- ogy/Environmental Science and Policy 116; and Chemistry 2A; or consent of instructor. Geological and environmental factors controlling climate change, the greenhouse effect with a detailed analy- sis of the Earth's climate fluctuations over the last 600 million years. Past and present climate records are used to examine potential future climatic scenarios. GE credit: SciEng, Wrt | SE, SL, WE.—III. (III.) Spera, Montlehie

109. Earth History: Sediments and Strata (2) Lecture—2 hours. Prerequisite: courses 50-50L. Prin- ciples of stratigraphic and sedimentologic analysis. Evaluation of historical and modern global changes in sedimentation within terrestrial and marine envi- ronments. Examination of the plate tectonic, climatic and oceanographic factors controlling the distribution and exploitation of economic fluids within sedi- mentary rocks. GE credit: SciEng | SE.—II. (II.) Summer

109L. Earth History: Sediments and Strata Laboratory (2) Laboratory—6 hours (includes four 1-day field trips). Prerequisite: course 109 (may be taken concur- rently). Methods of stratigraphic and sedimentologic analysis of modern and ancient sediments. Identifi- cation of major sediment and sedimentary rock types. Outcrop and subsurface correlation of sedimentary basins. GE credit: SciEng, Wrt | SE, WE.—II. (II.) Summer

110. Summer Field Geology (8) Fieldwork—8 hours/day, 6 days/week for six weeks. Prerequisite: course 105 recommended. Advanced application of geologic and geophysical field methods to the study of rocks. Includes development and interpretation of geologic maps and cross sections, magnetic, electric, and geother- mal resistivity and seismic surveys; and field analysis of plutonic and volcanic rock suites. GE credit: SciEng, Wrt | SE, VL, WE.—IV. (IV.) McClain, Oksin, Cowgill

115. Earth Science, History, and People (4) Lecture—3 hours; discussion—1 hour. Prerequisite: upper division standing; course 1. Study of interplay between the Earth and its human inhabitants through history, including consideration of catastrophic events such as earthquakes and eruptions as well as the geology of resources, topography, and water. GE credit: SciEng or SocSci, Wrt | VL, WE, SL, WE.—II. (II.) Versosh
116N. Oceanography (3)
Lecture—2 hours; laboratory—3 hours; field work. Prerequisite: one of Geology 1, 2, 16 or 50. Advanced oceanography and geochemistry, physical, geological, and biological processes; research methods and data analysis; marine resources, anthropogenic and climatic change; integrated earth/ocean/atmosphere systems, weekly lab and one weekend field trip. (Same course as Environmental Science & Policy 116N.) GE credit: SciEng | GE credit: SciEng | SE, WE—III. (III.) Hill, McClain, Spero

120. Origins: From the Big Bang to Today (3)
Lecture—3 hours. Limited enrollment. Long-term and large-scale perspectives on the origins of the universe, stars, and human evolution. The rise of civilization and the modern world. Multi-disciplinary approach to ‘Big History’ involving cosmology, astronomy, geology, climatology, biology, anthropology, and cultural history. GE credit: SciEng | SE—II. (II.) Osleger

129. Sample Preparation and Techniques for Petrology (1)
Laboratory—3 hours. Prerequisite: courses 60-60L. Introduction to petrographic laboratory techniques for petrologists. Topics covered may include thin and polished section preparation, rock crushing/grinding, mineral separation, staining, and photomicrography. GE credit: SE

130. Non-Renewable Natural Resources (3)
Lecture—3 hours. Prerequisite: course 1. Origin, occurrence, and distribution of non-renewable resources, including metallic, nonmetallic, and energy-producing materials. Problems of discovery, production, consumption, exploration, and conservation of non-renewable resources. GE credit: SciEng | SE, SL—II. (II.) Verousch

131. Risk: Natural Hazards and Related Phenomena (3)
Lecture—3 hours. Prerequisite: upper division standing. Theoretical and practical perspectives on the understanding of natural hazards, including earthquakes, volcanic eruptions, landslides, floods, storms, fires, and/or glacial advances or retreats. GE credit: SciEng | SE, SL—II. (II.) Rundle

132. Introductory Inorganic Geochemistry (3)
Lecture—3 hours. Prerequisite: course 60, may be taken concurrently, Chemistry 2B. Nucleosynthesis of chemical elements, physical and chemical properties of elements, ionic substitution, elemental partitioning, and distribution and transport of elements around the earth, water, and atmosphere. GE credit: SciEng | SE, SL—II. (II.) Ocampo

134. Integrative Geospatial and Land Use Planning (3)
Lecture—3 hours. Prerequisite: one course in Geology, preferably course 50 or 1, or consent of instructor. Geologic aspects of land use and development planning. Geologic problems concerning volcanic and earthquake hazards, land stability, floods, erosion, coastal hazards, non-renewable resources extraction, waste disposal, water resources. GE credit: SciEng | SE, SL—II. (II.) Montanez

136. Ecogeomorphology of Rivers and Streams (5)
Lecture—1 hour; discussion/laboratory—2 hours; fieldwork; term paper or discussion. Prerequisite: upper division standing. Geologic processes concerning sediment loading, fluvial processes, and sediment transport, and their effects on the environment. Lab experiences include field trips to rivers and streams, and laboratory work. GE credit: SciEng | SE, WE—II. (II.) Verousch

138. Introductory Volcanology (4)
Lecture—2 hours; fieldwork—6 hours. Prerequisite: upper division standing, course 60 and 109 or the equivalent, or consent of instructor. Principles of physical and chemical volcanology. Taught in a volcanically active setting (e.g., Hawaii) with a strong field component. GE credit: SciEng | SE, WE—II. (II.) Zierenberg

139. Rivers: Form, Function and Management (4)
Lecture—3 hours; fieldwork—3 hours. Prerequisite: courses 50, 50L, or equivalent; Mathematics 16B or 21B recommended. principles of river form and processes, emphasis on fluvial geomorphology, and river and stream restoration; case studies to illustrate concepts and applications. Two weekend field trips required. GE credit: SciEng | SE, WE—II. (II.) Zierenberg

140. Introduction to Process Geomorphology (4)
Lecture—3 hours; laboratory—3 hours. Prerequisite: course 1 or 50 or equivalent; Mathematics 16B or 21B, or equivalent. Quantitative description and interpretation of landscapes with emphasis on the relationships between physical processes, mass conservation, and landform evolution. Topics covered include physical and chemical weathering, hillslopes, debris flows, fluvial systems, alluvial fans, pedogenesis, eolian transport, glaciation and Quaternary geomorphology. Offered in alternate years. GE credit: SciEng | SE, WE—II. (II.) Molzon

141. Evolutionary History of Vertebrates (3)
Lecture—3 hours. Evolutionary history of vertebrates; fossil record and phylogeny; timing of major evolutionary events; comparative anatomy of major vertebrate groups; physical constraints in vertebrate evolution; paleobiogeography of vertebrates; effect of continental movement on vertebrate evolution; dinosaurs and other strange vertebrates. Offered in alternate years. GE credit: SciEng | SE, WE—II. (II.) Matani

141L. Evolutionary History of Vertebrates Laboratory (1)
Laboratory—3 hours. Prerequisite: course 141 (may be taken concurrently). Augments lecture course 141 through handling of specimens enabling in-person examination of three dimensional features observed in vertebrate skeletons, both fossil and living. Offered in alternate years. GE credit: SciEng | SE, WE—II. (II.) Matani

142. Basin Analysis (3)
Laboratory—3 hours; lecture—2 hours. Prerequisite: courses 50, 50L, and 109. Analysis of sedimentary basins from an integrated approach including control on sedimentary fill, subdivision, analysis, sequence stratigraphy, core logs, and applications to petroleum exploration and hydrology. One two-day field trip. GE credit: SciEng | SE, WE—II. (II.) Cooper, Lesher

144. History of the Earth (3)
Lecture—3 hours. Prerequisite: upper division course in environmental science or ecology, or an introductory course in paleobiology. Ancient ecosystems and the factors that caused them to change. Species, expansion and contraction of life forms, paleoceanography, and paleoclimate change. Radiometric dating of rocks. GE credit: SciEng | SE, WE—II. (II.) Verousch

145. Advanced Metamorphic Petrology (5)
Lecture—3 hours; laboratory—6 hours. Prerequisite: course 106, Hydrologic Science 134 or Chemistry 2C, Mathematics 16C or 21C. Metamorphic processes and the origin of metamorphic rocks. Laboratory study of representative rock suites. Offered in alternate years. GE credit: SciEng | SE, WE—II. (II.) Verousch

146. Radiogenic Isotope Geochemistry and Cosmochemistry (3)
Lecture—3 hours. Prerequisite: Chemistry 2C, Physics 7C, and Mathematics 16C. Basic principles of nuclear chemistry and physics applied to geology to determine the ages of terrestrial rocks, meteorites, and chemical objects, age of the Earth, to trace geochemical/environmental processes, and to determine the formation of the chemical elements in the Universe. Offered in alternate years. GE credit: SciEng | QL, SE—II. (II.) Yin

147. Geology of Ore Deposits (4)
Lecture—3 hours; laboratory—3 hours; optional one-weekend field trip. Prerequisite: Chemistry 2C or Hydrologic Science 134, courses 60, 62, and 105. Tectonic, lithologic and geochemical setting of major metallic ore deposits and implications for ore deposit generation, water/rock interaction and the environmental effects of mining. Offered in alternate years. GE credit: SciEng | QL, SE—III. (III.) Zierenberg

150. Stable Isotopes and Geochronological Tracers (3)
Lecture—3 hours. Prerequisite: Chemistry 2C or Hydrologic Science 134, courses 50, 50L, 60. Use of oxygen and hydrogen isotopes in defining hydrologic processes; carbon, nitrogen, and sulfur isotopes as indicators of exchange between the lithosphere, hydrosphere, atmosphere and biosphere. Radiogenic, cosmogenic, and noble gas isotope tracers. Offered in alternate years. GE credit: SciEng | QL, SE—III. (III.) Zierenberg

149. Geothermal Systems (3)
Lecture—3 hours. Fieldwork. Prerequisite: courses 50 and 50L, Chemistry 2B or consent of instructor. Geothermal geochemistry and geophysics of natural systems, including electrical power generation and direct use applications. Includes one day field trip on a weekend during the quarter. GE credit: SciEng | SE—II. (II.) Zierenberg

150A. Physical and Chemical Oceanography (4)
Lecture—3 hours; discussion—1 hour. Prerequisite: course 116, Environmental Science and Policy 116, Physics 7B, Mathematics 21D, Chemistry 2C, or upper division standing in a natural science and consent of instructor. Physical and chemical properties of seawater, fluid dynamics, air-sea interaction, currents, waves, tides, mixing, major oceanic geothermals. (Same course as Environmental Science and Policy 150A.) GE credit: SciEng | QL, SE—I. (I.) McClain, Spero

151A. Biological Oceanography (3)
Lecture—4 hours; discussion—1 hour; fieldwork—one weekend field trip required. Prerequisite: Biological Sciences 1A and a course in general ecology or consent of instructor. Ecology of major marine habitats, including intertidal, shelf, benthic, deep-sea and plankton communities. Existing knowledge and contemporary issues in research. Segment devoted to human use. (Same course as Environmental Science and Policy 150C.) GE credit: SciEng | SE, WE—II. (II.) Hill

151B. Biogeography (3)
Lecture—4 hours; discussion—1 hour; fieldwork—one weekend field trip required. Prerequisite: Biological Sciences 1A and a course in general ecology or consent of instructor. Ecology of major marine habitats, including intertidal, shelf, benthic, deep-sea and plankton communities. Existing knowledge and contemporary issues in research. Segment devoted to human use. (Same course as Environmental Science and Policy 150C.) GE credit: SciEng | SE, WE—II. (II.) Hill

152. Paleoecology of Protista (4)
Lecture—2 hours; laboratory—6 hours. Prerequisite: courses 107 or Biological Sciences 1A or consent of instructor. Morphology, systematics, evolution, and ecology of single-celled organisms that are preserved in the fossil record. Offered in alternate years. GE credit: SciEng | SE—II. (II.) Zierenberg

153. Hydrogeology and Contaminant Transport (5)
Lecture—3 hours; laboratory—3 hours, term paper. Prerequisite: Hydrologic Science 145, Civil and Environmental Engineering 144 or the equivalent.
160. Geological Data Analysis (3)
Lecture/discussion—3 hours. Prerequisite: Geology 21C, Physics 7C or 9C, or consent of instructor. Theory and application of linear statistical methods, including basic principles of statistics and probability. Use of computer in lectures and homework. GE credit: SciEng | QL, SE—II. (F) Eng.

161. Geophysical Field Methods (3)
Lecture/discussion—3 hours; term paper. Prerequisite: course 1 or 50, Mathematics 21C, Physics 7C or 9C, or consent of instructor. Geophysical methods applied to determining subsurface structure in tectonics, hydrogeology, geotechnical engineering, hydrocarbon and mineral exploration. Theory, survey design and interpretation of gravity, electrical resistivity, electromagnetic, reflection and refraction seismology, and ground-penetrating radar measurements. GE credit: SciEng | QL, SE—III. (B) Eng.

162. Geophysics of the Solid Earth (3)
Lecture—3 hours. Prerequisite: Mathematics 21C, Physics 5C or 7C or 9C, or consent of instructor. Theory and use of physics in the study of the solid earth: Gravity, tides, geoid, paleomagnetism, and heat flow. Application to the interpretation of the regional and local-scale structure of the earth and to plate tectonics. Offered in alternate years. GE credit: SciEng | QL, SE—II. (F) Eng.

163. Planetary Geology and Geophysics (3)
Lecture—3 hours. Prerequisite: Mathematics 21C, Physics 7C or 9C, and course 50 or 36 or Astronomy 10, or consent of instructor. Principles of planetary science. Planetary dynamics, including orbital mechanics, tidal interactions and ring dynamics. Theory of planetary interiors, gravitational fields, rotation dynamics. Physics of planetary atmospheres. Geological processes, landforms and their modification. Methods of analysis from Earth-based observations and spacecraft. GE credit: SciEng | QL, SE—III. (F) Eng.

175. Advanced Field Geology (3)
Discussion—3 hours; fieldwork—6 hours. Prerequisite: consent of instructor. Advanced field studies of selected geologic terrains, interpretation and discussion of field observations. May be repeated two times for credit when instructor varies. (P/NP grading only.) GE credit: SE—III. (I, II, III.) (F) Eng.

181. Teaching in Science and Mathematics (2)
Lecture/discussion—2 hours; field work—2 hours. Prerequisite: major in mathematics, science, or engineering; or completion of a one-year sequence of science or calculus and consent of the instructor. Class size limited to 40 students per section. Exploration of effective teaching practices based on examination of how middle school students learn math and science. Limited to 40 students per section. GE credit: SciEng | QL, SE—II. (F) Eng.

182. Field Studies in Marine Geochemistry (2-8)
Lecture—3 hours; laboratory—1-3 hours; field work—6-40 hours. Prerequisite: consent of instructor. Marine geochemistry with the opportunity of going to sea or into the field on land. Techniques of sea-floor geology, bottom photography, marine geochemical sampling, and methods of data reduction and sample analysis. Analysis of data/samples collected. GE credit: SciEng | SE—III. (F) Eng.

183. Teaching High School Mathematics and Science (3)
Lecture/discussion—2 hours; field work. Prerequisites: course 81/Education 81 or course 181/Education 181 and major in mathematics, science, or engineering; or completion of a one-year sequence of science or calculus and consent of the instructor. Limited to 40 students per section. Exploration and creation of effective teaching practices based on examination of how high school students learn mathematics and science. Field experience in high school classrooms. (Same course as Education 183.) GE credit: SocSci | QL, SS, WE—II, III, IV. (I, II, III.) (III) Pass-more

190. Seminar in Geology (1)
Discussion—2 hours; seminar—1 hour; written abstracts. Prerequisite: major in Geology. Presentation and discussion of current topics in geology by visiting lecturers, staff, and students. May be repeated for credit. (P/NP grading only.) GE credit: SE—II. (II) (F) Eng.

192. Internship in Geology (1-12)
Internship. Prerequisite: upper division standing; project approval prior to internship. Supervised work experience in geology. May be repeated for credit for a total of 10 units. (P/NP grading only) GE credit: SE.

194A-194B. Senior Thesis (3-3)
Prerequisite: open to Geology majors who have completed 135 units and who do not qualify for the honors program. Senior thesis. Independent study of selected topic, leading to the writing of a senior thesis. (Deferred grading only, pending completion of coursework.) GE credit: SciEng | SE, WE.

194A-194B. Senior Honors Project (3-3)
Independent study—9 hours. Prerequisite: open to Geology majors who have completed 135 units and who qualify for the honors program. Guided independent study of a selected topic, leading to the writing of an honors thesis. (Deferred grading only, pending completion of sequence.) GE credit: SciEng | SE, WE.

198. Directed Group Study (1-5)
Prerequisite: senior standing in Geology or consent of instructor. Directed study of a selected topic, leading to the writing of an honors thesis. (Deferred grading only, pending completion of sequence.) GE credit: SciEng | SE, WE.

199. Special Study for Advanced Undergraduates (1-5)
(P/NP grading only.) GE credit: SE.

Graduate

205. Advanced Field Stratigraphy (3)
Lecture—1 hour; field work—2 hours. Prerequisites: courses 109 and 110 or consent of instructor; course 206 recommended. Fieldwork over spring break. Application of stratigraphic techniques to research problems. Collection, compilation, and interpretation of field data. Integration of data with models for deposition and interpretations of Earth history. Topics vary. May be repeated for credit. (I, II, III.) (I) Summer

206. Stratigraphic Analysis (3)
Lecture—3 hours. Prerequisites: courses 109, 109L or consent of instructor; course 144 recommended. Topics in advanced methods of stratigraphic analyses, regional stratigraphy and sedimentation, and sedimentary basin analysis. Emphasis on techniques used to interpret stratigraphic records and on current issues in stratigraphy and sedimentation. May be repeated for credit when topics differ. (I, II, III.) (Summer

214. Active Tectonics (3)
Lecture/discussion—3 hours. Prerequisite: graduate standing or consent of instructor. Active deformation associated with faults, landslides, and volcanoes. Geometric measurement techniques such as triangulation, trilateration, and GLONASS positioning system (GPS), and radar interferometry. GPS data acquisition and analysis. Inversion of geodetic data and mechanical models of crustal deformation. (I, II, III.) (Summer

216. Tectonics (3)
Lecture/discussion—3 hours. Prerequisite: course 101 or consent of instructor. Nature and evolution of tectonic features of the Earth. Causes, consequences, and evolution of plate motion, with selected examples from the Earth's deformed belts. Offered in alternate years. (I, III.) (Summer

217. Topics in Geophysics (3)
Lecture—1 hour; seminar—2 hours. Prerequisite: consent of instructor. Discussion and evaluation of current research in a given area of geophysics. Topic will change from year to year. May be repeated for credit. (I, II.) (I) Biology, (II)艰巨

218. Analysis of Structures in Deformed Rocks (3)
Seminar—3 hours. Prerequisite: courses 100, 100L, 101, 101L, 170; or consent of instructor. Recent advances in the understanding and analysis of structures in brittle and ductile deformed rocks. Detailed investigation of the characteristics of the structures, models for their formation, and applications to inferring the kinematics of larger scale tectonics. Offered in alternate years. (I, II.) (II) Biology

219. Fracture and Flow of Rocks (3)
Lecture—3 hours. Prerequisite: courses 100, 101, Mathematics 21C, Physics 7 or 9, or consent of instructor. Origins of geologic structures in rocks associated with brittle and ductile deformation. Theoretical analysis, using continuum mechanics, and experimental evidence for the origin of the structures with emphasis on deformation mechanisms in the earth. Offered in alternate years. (I, II.) (II) Biology

220. Mechanics of Geoelastic Structures (3)
Lecture—3 hours. Prerequisite: course 170, Mathematics 21C, Physics 5 or 7A, or consent of instructor. Advanced mechanics of solids and structures. Development in tensor notation of the balance laws of continuum mechanics, and constitutive theories of elasticity, viscosity, and plasticity and their application to understanding development of geologic structures such as fractures, faults, dikes, folds, foliations, and boudinage. Offered in alternate years.

226. Advanced Sedimentary Petrology (3)
Lecture—2 hours; laboratory—2 hours. Prerequisite: courses 144 and consent of instructor. Advanced petrography and geochemistry of sediments and sedimentary rocks. Geochemical, textural and mineralogical evolution of sedimentary rocks reflecting depositional or burial processes. Laboratory work emphasizes thin section study of rocks. May be repeated for credit when topic differs. (I, II, III.) (Summer

227. Stable Isotope Biogeochernistry (4)
Lecture—2 hours; laboratory—6 hours. Prerequisite: graduate standing and consent of instructor. Discussion and application of stable isotope techniques for scientific research problems. Course emphasizes carbon, oxygen, nitrogen, hydrogen, and sulfur isotopes. Laboratory will deal with sample preparation, cryogenic gas extraction and specific techniques for individual research using stable isotopes. (I, II, III.) (I) Summer

228. Topics in Paleoceanography (3)
Lecture—3 hours. Prerequisite: courses 108, 150A or consent of instructor. Critical discussion and review of selected topics in paleoceanography and paleoclimatology relating to the history of the processes controlling and affecting climate change and ocean circulation throughout the Phanerzoic. Topics vary. May be repeated for credit. Offered in alternate years. (I, II, III.) (I) Summer

230. Geomorphology and River Management (3)
Seminar—3 hours. Prerequisite: graduate standing, course 139 or equivalent. Impacts of management and land use activities on the geomorphology of rivers and streams. Evaluation and use of analytical tools for river assessment and restoration, and stream restoration strategies and emerging issues in river management. May be repeated for credit when topic differs.
232. The Oceans and Climate Change (3)
Lecture/discussion—3 hours. Prerequisite: graduate standing or consent of instructor. Modern climate change and linkages between the ocean-atmosphere-terrestrial climate system. Importance of the ocean in forcing climate change, and the impacts of anthropogenic processes on the ocean. Topics vary. May be repeated three times for credit. Offered in alternate years. —(III) Hill

235. Surface Processes (3)
Seminar—3 hours. Prerequisite: courses 50, 50L, 139, Mathematics 218 or 168 recommended. Recent advances in understanding of landscapes and their evolution. Detailed investigation of the tools used to document surface processes. Evaluation of concepts and processes that govern landscape evolution. May be repeated for credit when topic differs. —(III) Oskin

236. Inverse Theory in Geology and Geophysics (3)
Lecture—3 hours. Prerequisite: consent of instructor. Inversion of data for model parameters. Evaluation of parameter uncertainties. Linear and nonlinear problems for discrete and continuous models. Bakus-Gilbert inversion. Offered in alternate years. —McClain

238. Theoretical Seismology (3)
Lecture—3 hours. Prerequisite: consent of instructor. Elastodynamic wave equation. Greens functions and source representations. Ray theory. Plane and spherical waves and boundary conditions. Elastic wave propagation in stratified media. Offered in alternate years. (F/P/NP grading only.)—McClain

240. Geophysics of the Earth (3)
Lecture—3 hours. Prerequisite: Earth Sciences and Resources 10B, 110 or consent of instructor. Physics of the earth’s crust, mantle, and core. Laplace’s equation and spherical harmonic expansion of gravity and magnetic fields. Elastic wave equation in geologic media. Surface and body seismic waves. Equations of state, thermal structure of the earth. Offered in alternate years. —(III)

241. Geomagnetism (3)

242. Paleomagnetism (3)
Lecture—3 hours. Prerequisite: graduate standing. Principles and applications of paleomagnetism. Physical basis of field and laboratory techniques. Instrumentation. Analysis of paleomagnetic data. Statistical methods. Rock magnetic properties. Geologic and geophysical applications. Offered in alternate years. —Versosub

246. Physical Chemistry of Metamorphic Processes (3)
Lecture—3 hours. Prerequisite: course 145, Chemistry 110A, or consent of instructor. Physical principles of metamorphic mineral assemblages and methods of interpreting the paragenesis of metamorphic rocks. Offered in alternate years. —Day

247. Metamorphic Petrology Seminar (3)
Seminar—3 hours. Prerequisite: course 145 or consent of instructor. Critic review of selected topics in geochemistry including: ore genesis, hydrothermal and geothermal fluids, recent and ancient sediments, isotope geology, origin and chemistry of the oceans. Subject varies yearly depending on student interest. May be repeated for credit. Offered in alternate years.

251. Advanced Topics in Isotope Geochemistry and Cosmochemistry (3)
Lecture/discussion—2 hours; term paper. Prerequisite: graduate standing or consent of instructor. Atmospheric and space composition, isotopes, evolution of the solar system, isotopes in the atmosphere and the solar system, isotopes in the atmosphere and the solar system. May be repeated for credit when topics differ. Offered in alternate years. —(II) Yin

253. Current Topics in Igneous Petrology (3)
Seminar—3 hours. Prerequisite: standing in Geology; course 143 or consent of instructor. Topical seminar designed to help graduate students develop and maintain familiarity with current and past literature in the field of petrology. May be repeated for credit when topics differ. (S/U grading only)—II, Lesher, Cooper

254. Physical Chemistry of Igneous Processes (3)
Lecture—3 hours. Prerequisite: course 142 or consent of instructor; Chemistry 110A required. Chemistry 110B and 110C recommended. Introduction of modern concepts in chemical thermodynamics and kinetics, and fluid flow systems for graduate students in petrology. Offered in alternate years. —Lesher

255. Experimental Petrology (3)
Lecture—2 hours; laboratory—3 hours. Prerequisite: course 143 or consent of instructor. Physical basis of experiments on Earth-forming minerals and rocks. Problems and examples from igneous and metamorphic petrology will be utilized. Offered in alternate years. —Lesher

260. Paleontology (3)
Seminar—3 hours. Prerequisite: graduate standing in geology or a biological science. Selected problems in paleontology. Subject to be studied will be decided at an organizational meeting. May be repeated for credit when topics differ. —(III) Vermey

261. Paleobiology Graduate Seminar 1: Evolutionary Aspects (3)
Lecture—1 hour; seminar—2 hours. Prerequisite: graduate standing in Geology or a biological science; qualified undergraduates accepted on an exception-only basis. This class will treat one or more of several topics in paleobiology from a phylogenetic perspective, including major patterns in evolution, development of the tree of life, extinction and phylogeny, phylogenetic systematics, or the relation between taxonomy and phylogeny. May be repeated for credit when topics vary. —(I) Carlson

262. Paleobiology Graduate Seminar: Methodological Aspects (3)
Lecture—1 hour; seminar—2 hours. One or more major methods used in the study of fossils: Morphometrics and three-dimensional reconstruction of fossils, phylogenetic methodology, the application of geochemical techniques, and the use of microscopy. May be repeated four times for credit if topic varies. —II, Motani

281N. Instrumental Techniques for Earth Sciences (3)
Lecture—2 hours; laboratory—3 hours. Prerequisite: Mathematics 21A, 21B, 21C, Physics 7A, 7B, 7C or 9A, 9B, 9C or consent of instructor. Laboratory research techniques for new graduate students in Geology. Demonstration of and exposure to appropriate techniques in research. —III, Spero, Yin

285. Field Studies in Marine Geochemistry (2-8)
Lecture—3 hours; laboratory—1-3 hours; fieldwork—6-40 hours. Prerequisite: consent of instructor. Marine geochemistry. Students have the opportunity of going to sea or into the field on land. Techniques of sea-floor mapping using bottom photography, marine geochemical sampling, and methods of data reduction and sample analysis. Analysis of data/samples collected. —Hill

290. Seminar in Geology (1)
Seminar—1 hour; discussion—1 hour. Presentation and discussion of current topics in geology by visiting lecturers, staff, and graduate students. (S/U grading only)—I, II, III, (I, II, III)

291. Geology of the Sierra Nevada (1)
Seminar. Prerequisite: consent of instructor. Short oral presentations by students and faculty concerning results of their past work and future projects in the Sierra. A written abstract is required following the format required at professional meetings. (S/U grading only) —Day

292. River Forum (1)
Seminar—1 hour. Prerequisite: graduate standing. Review and discussion of latest research and fundamental issues surrounding riverine systems, with emphasis on physical processes. Topics vary. (S/U grading only)—I, II, III, (I, II, III)

293. Geologic Event of the Week (1)
Discussion—0.5 hours; seminar—0.5 hours. Prerequisite: graduate standing. Seminar/discussion group to review and discuss recent earthquakes, volcanic eruptions, and other significant geologic events. The focus is on understanding the available observations, the physical processes behind each event, the geological setting, and societal consequences. May be repeated for credit for up to three units. (S/U grading only)—Kellogg

294. Structure/Tectonics Forum (1)
Seminar—1 hour. Prerequisite: graduate student in geology or consent of instructor. Seminar/discussion group to review and discuss recent research in structural geology and tectonics, and on-going research of participants. Topics will vary each quarter depending on the interests of the group. Occasional field trips to areas of current interest. May be repeated for credit when topics differ. Offered in alternate years. (S/U grading only)—I, III, (I, II, III)

295. Advanced Problems in Geodynamics (3)
Seminar—3 hours. Prerequisite: courses 100 and 101 or consent of instructor. Seminar dealing with problems in geodynamics. Topics will vary (e.g., tectonic deformation mechanisms, brittle fracture, earthquake prediction, driving forces for plate tectonics, mantle convection). Emphasis on recent literature. May be repeated for credit when topics differ. Offered in alternate years. (S/U grading only)

296. Advanced Problems in Tectonics (3)
Seminar—3 hours. Prerequisite: course 101 or consent of instructor. Seminar dealing with current problems in tectonics of selected regions. Topics will change from year to year. Emphasis on study of recent literature. May be repeated for credit. Offered in alternate years. (S/U grading only)—I, Cowgill

297. Geophysics Forum (1)
Seminar—0.5 hours; discussion—0.5 hours. Prerequisite: graduate student standing in the Geology Department, or consent of instructor. Seminar/discussion group to review and discuss latest research in geophysics, and ongoing research of participants. Topics will change each quarter depending on the interests of the group. May be repeated three times for credit. (S/U grading only)—I, II, III, (I, II, III) Kellogg

298. Group Study (1-5)
(S/U grading only)

299. Research (1-12)
(S/U grading only)

Professional

300. Methods of Teaching Geology (2)
Extensive writing or discussion—2 hours. Prerequisite: graduate student standing in the Geology Department. Introduction to graduate-level writing and undergraduate-level teaching skills in geology. Persuasive (proposals) writing workshop; discussions on campus teaching resources, presenting information, managing class.
Geophysics

Minor Program Requirements:

<table>
<thead>
<tr>
<th>Course</th>
<th>Units</th>
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<tbody>
<tr>
<td>Geophysics</td>
<td>19-26</td>
</tr>
<tr>
<td>Engineering 6 or Computer Science Engineering 30 or Mechanical Engineering 5</td>
<td></td>
</tr>
<tr>
<td>Engineering 5 (or the equivalent)</td>
<td></td>
</tr>
<tr>
<td>Applied Science Engineering 115</td>
<td></td>
</tr>
<tr>
<td>Minor Adviser: Magali Billen</td>
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</tbody>
</table>

(Associate Professor, Emeritus)

Department of Earth and Planetary Sciences Building 2119

German

A.B. Major Requirements:

<table>
<thead>
<tr>
<th>Course</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>German 1-2-3 (or the equivalent)</td>
<td>0-15</td>
</tr>
<tr>
<td>German 20, 21, 22</td>
<td>0-12</td>
</tr>
</tbody>
</table>

Depth Subject Matter for the General Program:

<table>
<thead>
<tr>
<th>Course</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>German 101A, 101B, 103</td>
<td>12</td>
</tr>
<tr>
<td>German 120 or 118E</td>
<td>4</td>
</tr>
<tr>
<td>Four courses chosen from upper-division offerings taught in German</td>
<td>12</td>
</tr>
<tr>
<td>Three additional upper division courses selected from either 104-109 or 121-198</td>
<td>12</td>
</tr>
<tr>
<td>Or courses in other disciplines that focus on German history, thought, and culture, upon approval of the major advisor. Electives include, but are not limited to:</td>
<td></td>
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<tr>
<td>Art History 176C, 177A, 177B</td>
<td></td>
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<tr>
<td>Comparative Literature 138, 140-142, 147 Economics</td>
<td></td>
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<tr>
<td>110B, 116, 160A and 160B, 162</td>
<td></td>
</tr>
<tr>
<td>Film Studies 142, 176A, 176B</td>
<td></td>
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<tr>
<td>History 142A, and 142B, 144A and 144B Music</td>
<td></td>
</tr>
<tr>
<td>110A, 110C, 110D, 110E, 110E</td>
<td></td>
</tr>
<tr>
<td>Philosophy 170, 175</td>
<td></td>
</tr>
<tr>
<td>Political Science 117, 118C, 137</td>
<td></td>
</tr>
<tr>
<td>Note: Many of the above electives from other disciplines have prerequisites. The total of 44 upper-division units may include units earned in the Education Abroad Program.</td>
<td></td>
</tr>
<tr>
<td>Total Units for the Major:</td>
<td>44</td>
</tr>
</tbody>
</table>

Minor Program Requirements:

The Department offers a German minor consisting of at least 20 upper-division units of courses taught in German. Students wishing to minor in German should consult the undergraduate advisor.

<table>
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<tr>
<th>Course</th>
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<tbody>
<tr>
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<tr>
<td>German 120 or 118E</td>
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</tr>
<tr>
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<tr>
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<td></td>
</tr>
<tr>
<td>110A, 110C, 110D, 110E, 110E</td>
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<td>Philosophy 170, 175</td>
<td></td>
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<tr>
<td>Political Science 117, 118C, 137</td>
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<tr>
<td>Note: Many of the above electives from other disciplines have prerequisites. The total of 44 upper-division units may include units earned in the Education Abroad Program.</td>
<td></td>
</tr>
<tr>
<td>Total Units for the Major:</td>
<td>44</td>
</tr>
</tbody>
</table>

Major Adviser: C. Zhang

Honors and Honors Program. The honors program consists of two quarters of research (194H) terminating in an honors thesis. For details consult the undergraduate major advisor. Graduation with high or highest honors requires participation in the honors program.

Graduate Study. The Department offers programs of study and research leading to the M.A. degree and to the Ph.D. degree in German literature. Additional degree options for a designated emphasis are available through departmental affiliations with the programs in Social Theory and Comparative History, Critical Theory, Feminist Theory, and Second Language Acquisition. Detailed information may be obtained by writing to the Department Chairperson or the Graduate Adviser.

Graduate Adviser. SE Rose

Prerequisite Credit. Credit normally will not be given on the lower-division level for a course that is a prerequisite of a course already successfully completed.

Courses in German (GER)

Lower Division

Course Placement: Students with two years of high school German normally continue in German 2; those with three years, German 3; those with four years, German 20.

1. Elementary German (5)

Discussion—5 hours; laboratory—1 hour. Introduces German grammar and development of all language skills in a cultural context with special emphasis on communication. Students who have successfully completed German 2 or 3 in the 10th or higher grade in high school may receive unit credit for this course on a P/N grading basis only. Although a passing grade will be charged to the student's P/N option, no petition is required. All other students will receive a letter grade unless a P/N petition is filed. Not open to students who have taken course 1A. GE credit: ArtHum | AH, WC,—I, II, III, IV, III, I

2. Elementary German (5)

Discussion—5 hours; laboratory—1 hour. Prerequisite: course 1. Continuation of course 1 in areas of grammar and basic language skills. Not open to credit students who have taken course 1A. GE credit: ArtHum | AH, WC,—I, II, III, IV, III, I

3. Elementary German (5)

Discussion—5 hours; laboratory—1 hour. Prerequisite: course 2. Completion of grammar sequence and continuing practice of all language skills through cultural texts. Not open to students who have taken course 1A. GE credit: ArtHum | AH, WC,—I, II, III, IV, III, I

4. Conversational German (4)

Discussion—3 hours; term paper. Prerequisite: course 3. Course 6 may be taken concurrently with course 20. Designed to develop intermediate language skills with special emphasis on communication and grammatical accuracy. GE credit: ArtHum | AH, WC.—I, II, I, II

10. German Fairy Tales from the Grimm's to Disney (4)

Discussion—3 hours; term paper. Introduction to the genre of fairy tale with a focus on the Brothers Grimm and Hans Christian Andersen in their respective political/cultural contexts. Discusses filmic adaptations by Disney, DEFA and Hollywood. GE credit: ArtHum, Div, Wrt | AH, VL, WE.—I, II, I, II