GEOG 499A Geography Internship Program (2-5)

Students in the intern program will be given the opportunity to gain practical experience using geographical skills by working in a variety of county and city agencies in the Sonoma State University service area. Credit is given for three hours per unit work per week as arranged with the intern coordinator. Must have junior- or senior-level class standing, and a minimum GPA of 2.75, or permission from the Department Chair. GEOG 499A is offered in Fall; GEOG 499B is offered in Spring.

GEOG 499B Geography Internship Program (2-5)

Students in the intern program will be given the opportunity to gain practical experience using geographical skills by working in a variety of county and city agencies in the Sonoma State University service area. Credit is given for three hours per unit work per week as arranged with the intern coordinator. Must have junior- or senior-level class standing, and a minimum GPA of 2.75, or permission from the Department Chair. GEOG 499A is offered in Fall; GEOG 499B is offered in Spring.

GEOG 595 Graduate Special Studies (1-6)

Advanced research and writing. Students work under close supervision of faculty members. Subject matter variable. May be repeated for credit. Prerequisites: consent of instructor and completed special studies form.

Geology (GEOL)

GEOL 102 Our Dynamic Earth: Introduction to Geology (3)

Lecture, 2 hours; laboratory, 3 hours. A study of the minerals, rocks and landforms that make up our Earth in the context of the dynamic forces that form them. Emphasis on local geology, including earthquakes and other environmental aspects. Laboratory study of minerals, rocks and maps. Required one-day weekend field trip. Fee required. Satisfies GE, category B1 (Physical Sciences) and GE laboratory requirements.

GEOL 105 The Age of Dinosaurs (3)

Lecture, 3 hours. The life and death of dinosaurs as evidenced by the fossil record will be studied to show how geology and biology combine in the discipline of paleontology. The evolution of dinosaurs over a 150 million- year time span sets the stage to investigate several interesting and ongoing controversies surrounding dinosaurs, including: why dinosaurs became extinct, the metabolism of dinosaurs, and the relationship between birds and dinosaurs. Satisfies GE, category B1 (Physical Sciences).

GEOL 107 Introduction to Earth Science (3)

This course studies the operation of the Earth system and its solar system home. It introduces the fundamental aspects of 4 major areas: astronomy; geology, including plate tectonics, and the planetary history of the Earth and its moon; physical oceanography; and weather and climate. There is no lab. The course is designed to prepare students for the earth science and astronomy parts of the SET examination. The prerequisite is that a student must be enrolled in the AMCS, LIBS, CALS, or ENSP credential program.

GEOL 110 Natural Disasters (3)

A course to examine the interaction between natural processes and human activities and the often costly and fatal results. Course emphasis will be on the principles underlying natural disasters such as earthquakes, volcanic eruptions, landslides, floods, severe weather, coastal processes, asteroid impacts, fires, great dyings, and population growth. Many examples will be drawn from the northern California area. Course content may vary with instructor. Satisfies GE, category B3 (Physical Sciences, Specific Emphasis).

GEOL 120 Regional Field Geology (3)

Lecture, 1 hour. The heart of geology is in the field. The course is an examination of rocks, minerals and landforms, and the processes that form them. This course includes a 10-day field trip taken during spring vacation, or multiple weekend field trips, where the natural world becomes our classroom. Prerequisites or co-requisite: any 100 level geology course or instructor consent; students must be in good physical condition.

GEOL 205 Mineralogy (4)

Lecture, 3 hours; laboratory, 3 hours. Principles of crystal chemistry, crystallography, properties, and origin of common rock-forming minerals. Laboratory sessions emphasize hand specimen and petrographic mineral identification characterization. Prerequisites: completion of or concurrent enrollment in GEOL 303 and CHEM 115A.

GEOL 205A Mineralogy, Optics (2)

Supplementary course to be held concurrently with GEOL 205. For students who already have taken a mineralogy course but have not gained sufficient experience in optical mineralogy. Consists of the lecture and laboratory portion of GEOL 205 relevant to optical mineralogy. Pre/co-requisite: GEOL 303 and CHEM 115A.

GEOL 301 Natural History of the Hawaiian Islands (3)

Lecture, 3 hours. The origin and evolution of the flora and fauna of the most isolated archipelago in the world; geologic history and context of volcanic oceanic islands; conservation biology efforts to save the rare and endangered species of Hawaii. Satisfies GE, category B3 (Specific Emphasis in Natural Sciences). Prerequisite: BIOL 115 or 121/122.

GEOL 302 Geology of Climate Change (3)

Lecture, 3 hours. Climate changes on time scales of days to millions of years. We will review methods by which the amplitude and pacing of climate changes are measured, use data analysis to assess the significance of past climate variability, and consider interpretations and theories proposed to explain Earth's climate. Prerequisites: GEOL 102 and CHEM 115A.

GEOL 303 Advanced Principles of Geology (4)

Lecture, 3 hours; laboratory, 3 hours. Advanced treatment of the principles, methods and tools within the Geological Sciences. We will discuss topics such as: Plate Tectonics, Earth materials and resources, Earth surface processes, Geological hazards, How to read geological and topographic maps, How we decipher geological history, and much more. Prerequisite: One of the following: GEOL 102, 105, 107,110, 120; ANTH 201, ENSP 303, ENSP 309, BIOL 310 or GEOG 204.

GEOL 304 Geologic Mapping and Report Writing (1)

Field studies and report preparation done in conjunction with GEOL 303. Required weekend field trips. Prerequisite: concurrent enrollment in GEOL 303. Students must be in good physical condition.

GEOL 306 Environmental Geology (3)

Lecture, 3 hours. Study of geological principles and processes as they relate to our natural environment emphasizing interaction between human activities and the geological environment. Major topics include the nature and behavior of rocks and soils; earthquakes and their associated hazards; landslides, slope stability and building construction; groundwater and pollution; stream processes and flooding; shoreline processes and coastal development; engineering geology and construction of highways and dams; development of natural resources, conservation and ecology. Specific content varies year to year, depending on instructor. Prerequisite: GEOL 102 or consent of instructor.

GEOL 307 Igneous and Metamorphic Petrology (4)

Lecture, 3 hours; laboratory, 3 hours. A study of the origin, properties, classification and occurrence of igneous and metamorphic rocks. Laboratory exercises in the classification and description of minerals, textures and structures of the more common rock types. Laboratory work will emphasize both hand specimen analysis and microscopic petrography. Prerequisites: GEOL 205 and GEOL 102 or GEOL 303.

GEOL 308 Igneous and Metamorphic Petrology Field Course (1)

Field studies done in conjunction with GEOL 307. Required weekend field trips. Fee required. Prerequisites: Concurrent enrollment in GEOL 307. Students must be in good physical condition.

GEOL 309 Computer Applications in Geology (4)

Lecture, 3 hours, laboratory, 3 hours. This course aims to provide our majors with some fundamental skills for manipulating and representing geological data using computer applications. Applications include using digitizing field maps and data into GIS format, creating figures in computer aided drawing programs, using basic functions computational software and generating histograms, and rose diagrams. Pre/co-requisite: GEOL 303 and GEOL 304.

GEOL 310 Geophysics (4)

Lecture, 3 hours; laboratory, 3 hours. This course will cover the basic principles underlying various geophysical methods, field procedures and data collection, and how to interpret geophysical data. Topics include seismic reflection and refraction, paleomagnetism, gravity and magnetic surveying, and how geophysical methods have augmented our overall understanding of the earth's structure and earth processes. Prerequisite: GEOL 303.

GEOL 311 Sedimentary Geology (4)

Lecture, 3 hours; laboratory, 3 hours. The description, classification and origin of sedimentary rocks. Discussion of weathering and origin of sediment, sediment transportation and sedimentary structures, clastic and nonclastic classification; and petrology. Prerequisite: GEOL 303 and 304.

GEOL 312 Sedimentary Geology Field Course (1)

Lecture, 1 hour. Field studies done in conjunction with GEOL 411. Required weekend field trips. Prerequisites: GEOL 303 and concurrent enrollment in GEOL 311. Students must be in good physical condition.

GEOL 313 Paleontology (4)

Lecture, 3 hours; laboratory, 3 hours. The study of fossils in their geological context. Topics include taxonomy, morphology, evolution, biogeography, extinction and biostratigraphy of the main groups of invertebrate fossils. Laboratory work will include becoming familiar with stratigraphically important fossil groups and the use of fossils in solving both geological and biological problems. Prerequisites: GEOL 303 for majors, GEOL 102 for non-majors, or instructor consent.

GEOL 314 Paleontology Field Course (1)

Lecture, 1 hour. Field studies done in conjunction with GEOL 313. Required weekend field trips. Prerequisites: GEOL 303 for majors, GEOL 102 for non-majors, and concurrent enrollment in GEOL 313. Students must be in good physical condition.

GEOL 317 Structural Geology (4)

Lecture, 3 hours; laboratory, 3 hours. An introduction to deformation processes within the earth's crust and the geological structures that result from these processes. We will examine deformation running the gamut of scales (from atomic scale to tectonic scale). The laboratory portion of this course will focus on methods of structural interpretation. Prerequisites: GEOL 303, GEOL 304, MATH 107 and pre/co-requisite of GEOL 309.

GEOL 318 Structural Geology Field (1)

Lecture, 1 hour. Field studies done in conjunction with GEOL 317. Required weekend field trips. Pre/co-requisite: GEOL 317. Students must be in good physical condition.

GEOL 320 Basin Analysis (4)

Lecture, 3 hours; laboratory, 3 hours. Origin and evolution of sedimentary basins; tectonic settings and significance, subsidence and thermal histories, basin-scale depositional systems, paleocurrent, provenance, and paleogeographic analysis, basin types, paleoclimatic influences, resources. Prerequisite: GEOL 311, 312, 317 and 318

GEOL 321 Burgess Shale Paleontology (3)

Lecture, 2 hours; laboratory, 3 hours. Advanced examination of the Cambrian Burgess Shale fossil deposits in British Columbia, Canada. Field work supplements lecture sessions on campus. Prerequisites: GEOL 313, GEOL 314, and consent of instructor. Students must be in good physical condition.

GEOL 323 Hydrology (3)

Lecture, 3 hours. Water as a natural resource, the hydrologic cycle, distribution of water on the earth. Atmospheric water, soil water, runoff and groundwater as related to water supply and use. Applications to problems of flood control, water management and water pollution, with special emphasis on California and Sonoma County. Prerequisites: GEOL 102 or consent of instructor; MATH 106 or 107.

GEOL 326 Stratigraphy and Earth History (4)

Lecture, 3 hours; laboratory, 3 hours. The principles of stratigraphy and historical geology will be discussed, with special emphasis given to the application of these principles to the geologic development of North America. The geologic history of California will be treated in detail. The use of sedimentary rocks, fossils, and structural and tectonic principles will be discussed, especially as they relate to our understanding of historical geology. Laboratory work will include a study of sedimentary rocks and their properties, fossils and their occurrence and distribution, the construction and interpretation of various types of stratigraphic maps, and detailed studies of selected maps representative of the various geologic provinces of North America. Required field trip. Prerequisite: GEOL 303 or consent of instructor.

GEOL 395 Community Involvement Program (1-4)

CIP involves students in community problems such as tutoring, aiding in school science classes, and advisement of county agencies. A total of 6 units of CIP credit may be applied toward a degree. May be taken by petition only. Not applicable to the geology major.

GEOL 396 Internship in Geology (1-4)

Professional geologic work for a geologic firm or agency. Forty-five hours of work per unit. Not applicable to the geology major. Prerequisite: GEOL 303 and consent of instructor.

GEOL 406 X-ray Mineralogy (2)

Lecture, 1 hour; laboratory, 3 hours. Introduction to the use of x-ray diffraction techniques. Prerequisites: CHEM 115A/116A and GEOL 205 or concurrent enrollment, and consent of instructor.

GEOL 420 Field Geology (4)

Lecture, 2 hours. This course is a synthesis of the geology-major, core courses. This course aims to hone our students' abilities to make valid geologic field interpretations through detailed field mapping and report writing. Twelve days of fieldwork are required. Prerequisites: GEOL 308, GEOL 309, GEOL 312, and GEOL 318. Students must be in good physical condition.

GEOL 422 Geochemistry (3)

Lecture, 3 hours. Introductory cosmochemistry and origin of the elements; meteorites; the earth as a chemical system, chemistry of processes at the surface of the earth; mineral crystal chemistry; introduction to geochronology and stable isotope variations in nature; thermodynamics and its geological application; geochemical prospecting. Prerequisite: GEOL 303, CHEM 115AB/116AB, MATH 161, or consent of instructor.

GEOL 425 Economic Geology (3)

Lecture, 3 hours. Classification, origin and alteration of metallic ore deposits. Laboratory sessions on hand sample identification of ore and alteration minerals and petrographic analysis of selected ore suites. Prerequisites: previous or concurrent enrollment in GEOL 307 and CHEM 115B/116B.

GEOL 426A Senior Thesis I (3)

426A is the first semester of a senior thesis project. A senior thesis is an opportunity for students to engage in primary research. Students must write a proposal, defining the scope of their project. Thesis projects must be a two-semester project. Students will be required to present their projects at the Geology Colloquium. Prerequisite: thesis-advisor consent.

GEOL 426B Senior Thesis II (3)

426B is the second semester of a senior thesis project. A senior thesis is an opportunity for students to engage in primary research. Students must write a proposal, defining the scope of their project. Thesis projects must be a two-semester project. Students will be required to present their projects at the Geology Colloquium. Prerequisite: thesis-advisor consent. Prerequisite: GEOL 426A.

GEOL 427 Advanced Field Geology (4)

A minimum of five weeks of detailed mapping in igneous, metamorphic and sedimentary rocks, and the preparation of field reports and geological maps. Students may also complete this course at another university, but should do so only in consultation with the Geology Department. Students must demonstrate equivalence in terms of field hours and course content to GEOL 427. Prerequisite: senior standing in geology. GEOL 420 strongly recommended.

GEOL 495 Special Studies (1-4)

Individual study, under guidance of an advisor, of an advanced field, laboratory or literature problem. The student must have demonstrated ability to work independently and do quality work. The student must have a faculty sponsor who is willing to advise the project and will set up a schedule of meetings for this purpose.

GEOL 496 Selected Topics in Geology (1-3)

An intensive study of an advanced topic in geology. May be repeated for additional credit with new subject matter. Prerequisite: adequate preparation for topic under consideration. Additional fee may be required.

GEOL 498 Geology Practicum (1-4)

Application of previously studied theory through supervised instructional work experience in geology, generally as a teaching assistant in geology laboratory classes. Intended for professional growth. May be repeated for up to a total of 4 units. Not applicable for the geology major or minor. Prerequisites: upper-division standing in geology and consent of instructor. Students needs to have passed the course that he/she will be a teaching assistant in with a grade of B or better. To be a teaching assistant in GEOL 102 laboratory, student needs to have received a B or better in GEOL 303.