

1990

Department of Geological Sciences

Professors

Winthrop D. Means, Ph.D.,
University of California at Berkeley
Akiho Miyashiro, D.O.C.,
Tokyo University

Associate Professors

J. W. Delano, Ph.D.,
State University of New York at Stony Brook
Stephen E. DeLong, Ph.D.,
University of Texas at Austin
Gregory D. Harper, Ph.D.,
University of California at Berkeley
William S. Kidd, Ph.D.,
Cambridge University
George W. Putman, Ph.D.,
Pennsylvania State University

Teaching Assistants (estimated): 11

The department provides a broad introduction to the geological sciences. Within the last fifteen years, understanding of the earth has been revolutionized through the development of plate tectonic theory. Faculty teach courses aimed both at introducing students with varied backgrounds to this new dynamic picture of the world and at training future professionals. Developing shortages of raw materials for industry and energy production, and increasing interest in environmental problems will lead to a growing demand for professional geologists.

Careers

Graduates with a B.S. in geology have found satisfying employment not only in jobs directly related to the subject but also in a wide variety of other activities. Students graduating with a B.S. in geology and who pursue advanced degrees in geology, computer science, business administration, or geophysics have a competitive edge in the job market. Professional opportunities in jobs using geological expertise are much wider for graduates with master's degrees, in particular for employment with oil and mineral resource companies, and with state or federal agencies having responsibilities involving geological matters (geological surveys, water supply, environmental conservation, transport, etc.).

Special Programs or Opportunities

The department sponsors two weekly seminar series that provide students with a sampling of important topics in current geological research: (1) informal talks given by faculty and graduate students; and (2) formal seminars presented by outside speakers. The department sponsors field trips in New York, New England, and the Appalachians. The field mapping course attracts students from other schools.

Degree Requirements for the Major in Geology

General Program--Major in Geology

B.S.: A minimum of 65 credits for the combined major and minor including: Geo 200, 210, 220, 230, 240, 300, 310, 320, 400, 410, 412 or 440Z, 470Z, 480; Mat 112Y and 113Y; Phy 120N, 124N; Csi 101Y; Chm 120N, 121N, 122a, 122b. Students are encouraged to elect the following additional courses: Mat 214, 220, and 311. Students are permitted to substitute Csi 201Y

for Csi 101Y.

Major in Earth Science

Teacher Education Program, B.S.: A minimum of 65 credits for the combined major and minor including Geo 100N, 200, 210, 220, 230, 240, 300, 310; Mat 112Y and 113Y; Chm 120N, 121N, 122a, 122b; Phy 105N, 106, 108N, 109; Atm 103; Bio 110N, 111N; plus 8 additional credits in geology courses at the 300 level or above. Students are encouraged to elect Gog 201M.

Students interested in a career in secondary school teaching must apply for and be admitted to the Teacher Education Program administered by the Department of Educational Theory and Practice before they can be officially enrolled in this major in the teacher education program. Qualified students may apply after satisfactorily completing one year of undergraduate study and a minimum of 24 graduation credits. Admission requirements are described in this bulletin under the section headed "Department of Educational Theory and Practice." Students admitted to the program must complete the teacher education professional requirements described in this bulletin under "Undergraduate Professional Requirements" within the section headed "Department of Educational Theory and Practice." They must also complete those courses within the major and related fields which are listed in this section.

Combined B.S./M.S. Program

The combined B.S./M.S. program in geology provides an opportunity for students of recognized academic ability and educational maturity to fulfill integrated requirements of undergraduate and master's degree programs from the beginning of the junior year. A carefully designed program can permit a student to earn the B.S. and M.S. degrees within nine semesters.

The combined program requires a minimum of 138 credits, of which at least 30 must be graduate credits. In qualifying for the B.S., students must meet all University and college requirements, including the requirements of the undergraduate major described previously, the minimum 60-credit liberal arts and sciences requirement, general education requirements, and residency requirements. In qualifying for the M.S., students must meet all University and college requirements as outlined in the Graduate Bulletin, including completion of a minimum of 30 graduate credits and any other conditions such as a research seminar, thesis, comprehensive examination, professional experience, and residency requirements. Up to 12 graduate credits may be applied simultaneously to both the B.S. and M.S. programs.

The following graduate courses may substitute for required undergraduate courses: Geo 510 for Geo 410, Geo 545 for Geo 440Z, Geo 518 for Geo 480, and Geo 517 for Geo 470Z. A reading knowledge of a foreign language useful in the study of geology (French, German, Russian, Spanish, Portuguese, Chinese) must be demonstrated before completion of the program, or satisfactory proficiency in a research skill such as computer programming may be substituted for the language requirement at the discretion of the department.

Students are considered as undergraduates until completion of 120 graduation credits and satisfactory completion of all B.S. requirements. Upon meeting B.S. requirements, students are automatically considered as graduate students.

Students may apply for admission to the combined degree program in geology at the beginning of their junior year or after the

successful completion of 56 credits, but no later than the accumulation of 100 credits. A cumulative grade point average of 3.20 or higher and three supportive letters of recommendation from faculty are required for consideration.

Courses

Geo 100N Planet Earth (3)

Survey of current developments in our understanding of the evolution of the earth. Major topics covered will include composition and origin of the earth-moon system, seismology and earth structure, plate tectonics, origin of continents and oceans, and the origin of life. Three lectures each week. **Fall and spring sessions.**

Geo 200 Internal Processes and Physics of the Earth (3)

Origin of the earth; basic properties of minerals; geochronology; heat flow; internal structure of the earth; igneous and metamorphic petrology; introductory tectonics; rock deformation. Labs deal with mineralogy, igneous and metamorphic rocks, and maps. Students are expected to have completed courses in physics and chemistry in high school. Two lectures, one lab per week. **Fall session.**

Geo 210 Rock-Forming Minerals (2)

Atomic structures of minerals, principles of crystal chemistry, and the compositions of the rock-forming minerals. Introduction to x-ray diffractometry. Two lectures each week. Prerequisite: Geo 200 or permission of instructor. **Fall session.**

Geo 220 Optical Mineralogy (3)

Optical crystallography, with emphasis on optic determinations of the rock-forming minerals using the polarizing microscope. Two lectures, one lab each week. Prerequisite: Geo 210. **Spring session.**

Geo 230 Surface Processes and Stratigraphy (3)

Stratigraphic principles and correlation; weathering; introductory geomorphology; sedimentary transport; introduction to paleontology and historical geology. Labs cover these subjects as well as geological map interpretation and air photographs. A few field excursions will be included. Two lectures and one laboratory per week. Prerequisite: Geo 200 or permission of instructor. **Spring session.**

Geo 240 Structural Geology I (3)

Descriptive structural geology with emphasis on features seen on the outcrop and map scales. Regional structural associations. Two lectures, one lab each week including three field trips. Prerequisite: Geo 200 or permission of instructor. **Fall session.**

Geo 300 Introductory Field Geology (2)

Techniques used in acquiring and presenting field-derived geological data. Extensive field excursions throughout northeastern New York from which students write reports using their own observations. Regional geology of New York and adjacent regions. One lecture per week and nine all-day field trips held on weekends (required attendance). Prerequisites: Geo 200 and 230, or permission of instructor. **Spring session.**

Geo 310 Petrology - Petrography I (3)

Description, properties, classification, and occurrence of igneous and metamorphic rocks; their mineralogical and chemical relationships; principles of interpretation of rock textures. Examination of major rock types and series. Two labs, one lecture each week. **Fall session.** Prerequisite: Geo 220.

Geo 320 Petrology - Petrography II (3)

Description, properties, classification, and occurrence of metamorphic and sedimentary rocks. Mineralogy and texture of sediments; provenance, deposition, and diagenesis of clastic and chemical sediments. Two labs, one lecture each week. **Spring session.** Prerequisites: Geo 310, 220.

Geo 340 Structural Geology II (3)

Introduction to selected topics in mechanics including stress, strain, and stress-strain relations. Three lectures each week. Prerequisite: Geo 240. **Fall session.** May not be offered during 1990-91.

Geo 400 Field Mapping (4)

Supervised geological mapping. Three weeks of field work (camping in the field) followed by independent study and laboratory sessions for preparation of report (in Albany). **Field work starts in early August; laboratory sessions once a week in first quarter of fall session.** Prerequisites: Geo 230 and 240 or permission of instructor.

Geo 410 Geochemical Thermodynamics (3)

Basic principles of thermodynamics with applications to crystallization and fusion processes and mineral reactions. Treatment of silicate crystalline solutions. Analysis of phase diagrams of geological importance. **Fall session.** Prerequisites: Chm 120N, 121N; Phy 124N; Mat 113Y.

Geo 412 General Geochemistry (3)

Origins and histories of major geochemical systems and processes on Earth, including: a) planetary-scale differentiation and origins of the core, mantle, crust, atmosphere/hydrosphere; b) magmatism and igneous rocks; c) chemistry of sedimentary rocks and the biosphere; and d) fluid/rock reactions during metamorphism. **Spring session.** Prerequisite: Geo 410.

Geo 440Z (formerly 440) Structural Geology III (3)

Structural analysis, mechanisms of rock fracture and flow, interpretation of regional stress and strain history from structural features. Three lectures each week with some field work. The former Geo 440 does not yield writing-intensive credit. Prerequisite: Geo 340 or permission of instructor. **Spring session.** May not be offered during 1990-91.

Geo 450 Special Topics (2-3)

A structured program of reading and seminars leading to an in-depth understanding of a chosen topic in geology. Prerequisites: Geo 210, 220, 230, 240; and permission of instructor. Students may repeat course once for an additional two or three credits. **Either session.**

Geo 470Z (formerly 470) Tectonics (3)

Seismologic basis for plate tectonics, kinematics of plate motion, geometry and evolution of plate mosaics. Analysis of the structure and history of shields, platforms, rift valleys, plateaux, continental margins, island arcs, transcurrent fault zones, and orogenic belts. Two lectures, one lab each week. The former Geo 470 does not yield writing-intensive credit. Prerequisites: Geo 230, 240; or permission of instructor. **Fall session.**

Geo 480 World Historical Geology (3)

Integrated survey of the geologic history of the earth. Three lectures each week. Prerequisites: Geo 230, 240, or permission of instructor. **Spring session.**

Geo 497 Independent Study (2-3)

Field or laboratory investigation of a chosen geologic problem, including the writing of a research report to be undertaken during the senior year. Prerequisite: permission of instructor. Students may repeat course once for an additional two or three credits. **Either session.**

Department of Mathematics and Statistics

Faculty

Distinguished Teaching Professor

Edward S. Thomas Jr., Ph.D.,
University of California at Riverside

Professors

Louis Brickman, Ph.D.,
University of Pennsylvania
Lindsay N. Childs, Ph.D.,
Cornell University
Edward D. Davis, Ph.D.,
University of Chicago
Nathaniel A. Friedman, Ph.D.,
Brown University
Richard Z. Goldstein, Ph.D.,
University of Pennsylvania
Hugh Gordon, Ph.D.,
Columbia University
Benton N. Jamison, Ph.D.,
University of California at Berkeley
Joe W. Jenkins, Ph.D.,
University of Illinois
Melvin L. Katz, Ph.D.,
University of California at Berkeley
Boris Korenblum, Sc.D.,
Moscow State University
Timothy L. Lance, Ph.D.,
Princeton University
Thomas H. MacGregor, Ph.D.,
University of Pennsylvania
George E. Martin, Ph.D.,
University of Michigan
Hajimu Ogawa, Ph.D.,
University of California at Berkeley
Richard C. O'Neil, Ph.D.,
University of Chicago
R. Michael Range, Ph.D.,
University of California at Los Angeles
Edward C. Turner, Ph.D.,
University of California at Los Angeles
Donald R. Wilken, Ph.D.,
Tulane University

Associate Professors

Guy D. Allaud, Ph.D.,
University of Wisconsin
Herbert I. Brown, Ph.D.,

Rutgers University
William F. Hammond, Ph.D.,
Johns Hopkins University
Lloyd L. Lininger, Ph.D.,
University of Iowa
Ricardo Nirenberg, Ph.D.,
New York University
Erich Nussbaum, Ph.D.,
University of Virginia
Steven Plotnick, Ph.D.,
University of Chicago
Malcolm J. Sherman, Ph.D.,
University of California at Berkeley
Mark Steinberger, Ph.D.,
University of Chicago
Howard H. Stratton, Ph.D.,
University of California at Riverside
John T. Therrien, M.A.,
State University of New York at Albany
Assistant Professors
So-Chin Chen, Ph.D.,
Princeton University
Carlos Rodriguez, Ph.D.,
Columbia University
Daniel Zelterman, Ph.D.,
Yale University
Kehe Zhu, Ph.D.,
State University of New York at Buffalo

Adjuncts (estimated): 0

Teaching Assistants (estimated): 34

Students majoring in mathematics elect either the general program or the teacher education program. Under either program, a student may choose to complete the requirements for either the B.A. or B.S. degree. Under any of the four program-degree combinations, a student may apply for admission to the honors program.

Careers

The objective of the department is to serve the needs of students aspiring to careers that require mathematical background: physical, biological, social, and management sciences; statistics, actuarial work, computer science, applied mathematics; secondary school teaching; graduate work; college and university teaching; and research in mathematics. The department also welcomes students who wish to study mathematics as part of a traditional liberal arts education. In most cases, training beyond the bachelor's degree is desirable, but it can often be obtained after the graduate has secured employment.

Placement and Proficiency Credit

The University awards up to 8 credits and advanced placement in its sequences of calculus courses based on performance on the advanced placement calculus examinations administered by the College Board. Details concerning the decisions on credit and placement are available from the Admissions Office.

Admission

Students may not declare a major in mathematics until they have completed at least one of Mat 113Y, 117, or 214 with a grade of A, B, C, or S.

Transfer credits and grades may be used to satisfy the requirement.

This admission requirement applies to all students entering the University, either as freshmen or as transfer students, in the Fall 1987 semester or later.