

Year 1973-1974

4:00 p.m.

Dec. 8.

Dec. 8.

4:00 p.m.

1973

4:00 p.m.

UNIVERSITY OF CINCINNATI BULLETIN

Announcement

of



*Division of
Graduate Studies*

1973-1974

Published by the University of Cincinnati
Van Wormer Administration Building
Cincinnati, Ohio 45221
Telephone 513-475-8000

15-041-780. *Geographic Methods: Advanced Quantitative Techniques*. Study of quantitative methods specifically designed for the analysis of spatial distributions, spatial associations, and spatial series. Problems and applications from the current literature. 4 gr. cr. Win. Qtr. Mr. Roder. Prereq.: Math. 107-8-9, or consent of instructor.

15-041-785,786. *Seminar in the Location Theory Research Cluster*. Introduction to major current ideas in urban-economic-transportation geography as reflected in the professional literature of the last decade; movement, networks, nodes, hierarchies, surfaces, spatial decision making; perception, and institutional settings; seminar papers required. 4 gr. cr. Win., Spr. Qtrs. Mr. McNee.

15-041-791. *The Regional Concept and Area Analysis*. Spatial policy problems in Australia, Britain, and Appalachia; regional forecasting. 4 gr. cr. Spr. Qtr. Mr. Ryan.

15-041-792. *Geographic Methods: Research Models*. Application of mathematical, methods to relationships indicated by geographic theory. The construction and use of spatial models, especially multi-variate, in current geographic literature. 4 gr. cr. Spr. Qtr. Mr. Roder.

15-041-795. *Contemporary Research Frontier*. Emphasis on the behavioral mode (e.g., decision making; perception of the environment) in current research. 4 gr. cr. Spr. Qtr. Mr. Symanski.

15-041-797. *Seminar in Graduate Research II*. Research design; preparation of thesis or dissertation proposal. 4 gr. cr. Aut. Qtr. Mr. Symanski.

15-041-810. *Research Orientation*. For Ph.D. students. Designed to facilitate research specialization. 4 gr. cr. Win. Qtr. Mr. Ryan.

15-041-814,815,816. *Interdisciplinary Seminar: Frontiers of Urban Research*. Current research trends and techniques in the urban aspects of sociology, history, and geography, and the inter-relations among these research strands. For advanced graduate students especially Ph.D. students. Admission only by permission of instructor. 3 gr. cr. ea. Qtr. Messrs. Hinman, Miller, Ryan. (Cross-listed with History and Sociology.)

15-041-871. *Thesis Research*. Independent individual research in the preparation of the thesis for the M.A. degree. Offered ea. Qtr. Credits to be arranged. Staff.

15-041-971. *Dissertation Research*. Preparation of the Ph.D. dissertation. Offered ea. Qtr. Credits to be arranged. Staff.

Courses Omitted in 1973-1974: 531, 533, Advanced Physical Geography; 575, Geographics; 710, Seminar: Geographic Communication, I; 721, Modern Concepts in Regional Geography: U.S. and Canada; 730, Modern Concepts in Regional Geography: Australia and Southwest Pacific; 765, Seminar: Spatial Behavior of Large Organizations; 772, Seminar: Urban Blight; 781, Research Seminar in Population Geography; 782, Seminar in Historical Geography; 783, Advanced Geography of U.S.; 784, Seminar in Location Theory Research Cluster; 788, Seminar: Geography of Manufacturing; 789, Research Seminar: Geography of Transportation; 878, Seminar: Growth of Geographic Thought.

Geology

Head: Professor Lattman (105C); Professors Caster (104A), Jenks (232), Larsen (220), Potter (107), Pryor (101); Associate Professors Durrell (233), Huff (225), Sunderman (231); Assistant Professors Briskin (304 Basic Sci.), Bullard (10B), Davis (102), DeJong (236), Fleming (223), Grover (235), Kilinc (220), Maynard (200 Basic Sci.). (All in Old Tech Building unless otherwise noted.)

The Department offers work leading to the degrees of Master of Science and Doctor of Philosophy.

A student admitted to graduate work in geology must have at least a B-plus average in his major and 3 referees, and is expected to have satisfactorily passed one-year courses in physics and chemistry and an approved course in calculus or statistics. Biology is recommended as preparation for graduate work chiefly in paleontology. A summer field course in geology or its equivalent, such as a summer at a marine biological station for paleontology majors, is required before admission or early in the graduate program. Also a student must have taken GRE and AGRE.

Interviews and early exploratory conferences are required to help determine the student's prior training and aptitude for advanced studies and independent research.

Laboratories for research in paleontology, mineralogy, experimental petrology, geochemistry, geomorphology, remote sensing, and sedimentology afford modern facilities for study. The Geological Museum provides extensive research collections particularly with respect to Paleozoic biota.

A requirement for either graduate degree is the satisfactory completion of a thesis or dissertation describing the results of the student's research work. 15 to 20 credit hours of advanced course work in allied sciences is an alternate option for the M.S. thesis.

All graduate students are required to take Geology 651-652.

By agreement between the Secretary of the Smithsonian Institution and the President of the University of Cincinnati, graduate students in paleontology may apply for summer internships at the United States National Museum, to work with specialists there on subjects of mutual interest. Such work is commonly related to the subject of the student's dissertation. Academic year fellowships at the Smithsonian are sometimes available to outstanding advanced students when the Language and Candidacy examinations at the University are satisfactorily completed. Satisfactory research work under this program carries University graduate credit.

For Advanced Undergraduate and Graduate Students

15-040-037,038,039. *Geology Seminar*. Expected of all graduate students majoring in geology. No credit. W 4:00-5:00. Staff.

15-040-501,502,503. *Petrology*. Aut. Qtr.: The polarizing microscope; Win., Spr. Qtrs.: The rock cycle, hand lens petrography, thin section studies of rocks. 3 gr. cr. ea. Qtr. Tu 11:00; TTh 2:00-5:00. Messrs. Bullard, Larsen, Potter, Pryor. Prereq.: Geol. 302.

15-040-521,522,523. *Paleontology*. Fundamental concepts and the paleobiology of geologically and biologically significant invertebrates. 3 gr. cr. ea. Qtr. TTh 9:30; W 1:00-4:00. Mr. Davis. Prereq.: Geol. 322, or permission of instructor.

15-040-525. *Advanced Historical Geology*. Evolution of the higher forms of plant and animal life and their significance in the interpretation of earth history. 4 gr. cr. Spr. Qtr. TTh 8:00; Tu 2:00-5:00; S 9:00-12:00. Mr. Caster.

15-040-531,532,533. *Stratigraphy and Sedimentation*. Physical and biological processes, environmental interpretation, facies analysis, stratigraphic analysis, basin analysis, and tectonics. 3 gr. cr. ea. Qtr. MW 11:00; M 1:00-4:00. Mr. Pryor.

15-040-551. *Engineering Geology*. Physical properties of earth materials and their response to short term stresses. Field trips. 3 gr. cr. Aut. Qtr. MW 9:00; F 2:00-5:00. Mr. Fleming. Prereq.: Geol. 331, 405 or permission of instructor.

15-040-552. *Hydrogeology*. The geology of groundwater. A study of the occurrence, movement and utilization of subsurface water. 3 gr. cr. Win. Qtr. TTh 11:00. Mr. Fleming.

15-040-572. Mr. Durrell.

15-040-573. Mr. Durrell.

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15-040-576. Summer of 1 3 gr. cr. Au

15-040-580. erosion, and Mr. Latman

15-040-581. graphic theo and illustrat

15-040-621,6 chemical pr 9:30-11:00.

15-040-631. minerals, lab Prereq.: Ge

15-040-641,6 scope for re 3 gr. cr. ea.

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15-040-651,6 diverse geol Spr. Qtrs.

15-040-664. tions, anal F 9:00-12:00

15-040-668. Win. Qtr. per

15-040-671. 3 gr. cr. ea or per

15-040-674. and applica 9:00-12:00

15-040-677. 3 gr. cr. ea

15-040-680. 3 gr. cr. ea

15-040-572. *Physiography of Western United States*. 3 gr. cr. Aut. Qtr. MWF 1:00. Mr. Durrell.

15-040-573. *Physiography of Eastern United States*. 3 gr. cr. Win. Qtr. MWF 1:00. Mr. Durrell.

15-040-574. *Glacial Geology*. 3 gr. cr. Aut. Qtr. MW 10:00; F 2:00-5:00. Mr. Durrell.

15-040-576. *Advanced Geology Field Trip*. A two weeks' field excursion during the Summer of 1973. Historical and regional geology. Conferences and report in Aut. Qtr. 3 gr. cr. Aut. Qtr. Mr. Pryor. Prereq.: Permission of instructor.

15-040-580. *Advanced Geomorphology*. The physics and chemistry of processes of erosion, and equilibrium theories of landscape evolution. 3 gr. cr. Win. Qtr. MWF 8:00. Mr. Lattman. Prereq.: Geol. 405 or permission of instructor.

15-040-581. *Basic Photography for the Geological Sciences*. Systematic study of photographic theory and technique for geological research, with emphasis on documentation and illustration. 2 gr. cr. Win. Qtr. M 12:00. 3 laboratory hours. Mr. Bullard.

15-040-621,622. *Introduction to Geochemistry*. Introduction to the application of chemical principles to various geologic problems. 3 gr. cr. Aut., Win. Qtrs. TTh 9:30-11:00; M 1:00-4:00. Mr. Maynard.

15-040-631. *Clay Mineralogy*. Structural mineralogy, distribution, and origin of clay minerals; lab devoted to analytical methods. 3 gr. cr. Aut. Qtr. TTh 11:00. Mr. Huff. Prereq.: Geol. 301-2.

15-040-641,642,643. *Optical Mineralogy*. Crystal optics, use of the polarizing microscope for recognition of transparent substances in immersion media and thin sections. 3 gr. cr. ea. Qtr. WF 1:00-4:00. Mr. Sunderman.

15-040-648. *Thermodynamics in Geological Processes*. Principles of thermodynamics and their application to geological problems. 3 gr. cr. Aut. Qtr. MWF 10:00. Mr. Kilinc. Prereq.: Permission of instructor.

15-040-651,652. *Geological Data Analysis*. Application of statistics and computing to diverse geological and paleontological problems. Many case histories. 3 gr. cr. Win., Spr. Qtrs. MWF 9:00. Messrs. Lattman, Potter. Prereq.: Permission of instructor.

15-040-664. *Metamorphic Petrology I*. Principles and methods: minerals, phase relations, analysis and calculations, lab methods. 4 gr. cr. Aut. Qtr. MW 8:00; M 1:00-4:00; F 9:00-12:00. Mr. Larsen. Prereq.: Geol. 501-2-3 or equivalent.

15-040-665. *Metamorphic Petrology II*. Occurrence, genesis, petrography. 4 gr. cr. Win. Qtr. MW 8:00, M 1:00-4:00; F 9:00-12:00. Mr. Larsen. Prereq.: Geol. 664 or permission of instructor.

15-040-666. *Seminar in Metamorphic Petrology*. Major problems, current literature. 3 gr. cr. Spr. Qtr. MWF 11:00. Messrs. Larsen, Grover, Kilinc. Prereq.: Geol. 665 or permission of instructor.

15-040-668. *Mineral Chemistry*. Crystal chemistry; mineral solution models; inter- and intracrystalline reactions; controls of mineral stability. 3 gr. cr. Win. Qtr. MWF 9:00. Mr. Grover. Prereq.: Permission of instructor.

15-040-669. *The Rock-forming Minerals*. The crystal chemistry and phase relations of the rock-forming minerals and their use as petrogenetic indicators. 3 gr. cr. Spr. Qtr. MWF 9:00. Mr. Grover. Prereq.: Geol. 668.

15-040-673. *Structural Geology II*. Interpretation of tectonic structures. 3 gr. cr. Win. Qtr. TTh 11:00; Th 2:00-5:00. Mr. DeJong. Prereq.: Geol. 331 or permission of instructor.

15-040-674,675,676. *Geology of Ore Deposits*. 3 gr. cr. ea. Qtr. TTh 8:00-9:30; M 1:00-4:00. Mr. Jenks. Prereq.: Permission of instructor.

15-040-677. *Regional Geology. (The Evolution of North America.)* 3 gr. cr. Aut. Qtr. TTh 11:00; Th 2:00-5:00. Messrs. Jenks, DeJong. Prereq.: Permission of instructor.

15-040-678. *Regional Geology. (The Mediterranean Mountain Belts.)* 3 gr. cr. Spr. Qtr. TTh 11:00; Th 2:00-5:00. Messrs. Jenks, DeJong. Prereq.: Permission of instructor.

Primarily for Graduate Students

15-040-701,702,703. *Advanced Sedimentology*. Aut., Win. Qtrs.: Principles of physical and chemical sedimentology. Spr. Qtr.: Modern and ancient depositional environments. 4 gr. cr. ea. Qtr. TTh 8:00-9:30; Tu 1:00-4:00. Messrs. Maynard, Potter, Pryor.

15-040-711. *Micropaleontology I*. Morphology, biology, and geologic occurrence of selected microfossils, especially conodonts and ostracods. 3 gr. cr. Aut. Qtr. MW 10:00; Th 2:00-5:00. Mr. Davis. Prereq.: Geol. 521-2-3 or equivalent.

15-040-712. *Micropaleontology II*. Foraminifera I. Taxonomy and biostratigraphy of foraminifera, emphasizing planktonic forms. 3 gr. cr. Win. Qtr. MW 10:00; Th 2:00-5:00. Miss Briskin. Prereq.: Geol. 521-2-3 or equivalent.

15-040-713. *Micropaleontology III*. Foraminifera II. The use of planktonic foraminifera in paleoclimate and paleocirculation studies. 3 gr. cr. Spr. Qtr. MW 10:00; Th 2:00-5:00. Miss Briskin. Prereq.: Geol. 521-2-3 or equivalent.

15-040-731. *Geochemistry of Hydrothermal Processes*. Geochemistry of processes involving hydrothermal fluids under metamorphic and igneous conditions. 3 gr. cr. Win. Qtr. MWF 10:00. Mr. Kilinc. Prereq.: Permission of instructor.

15-040-751. *Seminar in Physical Geology*. 3 gr. cr. Spr. Qtr. TTh 11:00. Mr. Fleming. Prereq.: Permission of instructor.

15-040-775. *Field Studies in Modern and Ancient Depositional Environments*. 10- to 14-day field trip during Spring vacation or in June. Report. 2 gr. cr. Mr. Pryor.

15-040-777. *Field Studies in Mining Geology—Ore Deposits*. 10- to 14-day field trip during Spring vacation or in June. Report. 2 gr. cr. Mr. Jenks.

15-040-778. *Field Studies in Structural Geology*. 10- to 14-day field trip during Spring vacation or in June. Report. 2 gr. cr. Mr. DeJong.

15-040-779. *Field Studies in Volcanology*. 2-week field trip in September or December. Report. 2 gr. cr. Mr. Larsen.

15-040-780. *Methods of Geological Instruction*. Credits to be arranged. Offered ea. Qtr. Staff.

15-040-821. *Seminar in Paleontologic Principles*. 3 gr. cr. Aut. Qtr. MWF 8:00. Miss Briskin, Messrs. Caster, Davis. Permission of instructors required.

15-040-822,823. *Seminar in Megascopic Paleontology*. Reading knowledge of German and French desirable. 3 gr. cr. Win., Spr. Qtrs. MWF 8:00. Miss Briskin, Messrs. Caster, Davis. Permission of instructor required.

15-040-844. *Seminar in Geomorphology*. 3 gr. cr. Spr. Qtr. MWF 8:00. Mr. Lattman.

15-040-874,875,876. *Universal Stage Microscope Studies*. 2 gr. cr. ea. Qtr. 6 lab hours to be arranged. Mr. Sunderman.

15-040-881. *Research*. ea. Qtr. Miss Bris

15-040-882. *Research*. Qtr. Messrs. Bull

15-040-883. *Research*. Messrs. DeJong.

15-040-884. *Research*. Grover, Kilinc, L

15-040-885. *Research*. Jenks.

15-040-886. *Research*. Offered ea. Qtr.

15-040-887. *Research*. Messrs. Maynard

15-040-888. *Research*. ea. Qtr. Messrs.

15-040-889. *Research*. Messrs. Huff, M

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15-040-891. *Research*. ea. Qtr. Mr. Fl

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15-040-893. *Research*. Ma

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Courses Omitted
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15-040-881. *Research—Special Problems—Paleontology*. Credit to be arranged. Offered ea. Qtr. Miss Briskin, Messrs. Caster, Davis.

15-040-882. *Research—Mineralogy, Geochemistry*. Credit to be arranged. Offered ea. Qtr. Messrs. Bullard, Grover, Huff, Kilinc, Maynard, Sunderman.

15-040-883. *Research—Structural Geology*. Credit to be arranged. Offered ea. Qtr. Messrs. DeJong, Jenks.

15-040-884. *Research—Petrology*. Credit to be arranged. Offered ea. Qtr. Messrs. Grover, Kilinc, Larsen.

15-040-885. *Research—Economic Geology*. Credit to be arranged. Offered ea. Qtr. Mr. Jenks.

15-040-886. *Research—Geomorphology and Remote Sensing*. Credit to be arranged. Offered ea. Qtr. Messrs. Durrell, Lattman.

15-040-887. *Research—Sedimentary Petrology*. Credit to be arranged. Offered ea. Qtr. Messrs. Maynard, Potter, Pryor.

15-040-888. *Research—Stratigraphy—Sedimentary*. Credit to be arranged. Offered ea. Qtr. Messrs. Caster, Maynard, Pryor, Potter.

15-040-889. *Research—Clay Mineralogy*. Credit to be arranged. Offered ea. Qtr. Messrs. Huff, Maynard.

15-040-890. *Research—Geophysics (Paleomagnetism)*. Credit to be arranged. Offered ea. Qtr. Mr. DeJong.

15-040-891. *Research—Geology Applied to Engineering*. Credit to be arranged. Offered ea. Qtr. Mr. Fleming.

15-040-892. *Research—Geology Applied to Archaeology*. Credit to be arranged. Offered ea. Qtr. Mr. Bullard.

15-040-893. *Master's Thesis Research*. Credit to be arranged. Offered ea. Qtr. Staff.

15-040-971. *Doctoral Dissertation Research*. Credit to be arranged. Offered ea. Qtr. Permission of adviser required. Staff.

Courses Omitted in 1973-1974: 561-2, Interpretation of Aerial Photographs; 575-577, Alternate Advanced Geology Field Trips; 578, World Physiography; 649,650, Phase Equilibria; 661-2, Igneous Petrology; 663, Seminar in Igneous Petrology; 672, Elements of Structural Analysis; 732, Geochemistry of Hydrothermal Ore Deposits; 776, Field Studies in Igneous and Metamorphic Petrology; 814-5-6, Advanced Sedimentary Petrology; 973, Seminar in Economic Geology.

Germanic Languages and Literatures

Head: Professor Stern; Director of Graduate Programs: Professor Slessarev; Director of Graduate Advising: Professor Glenn; Professors Friedrichsmeyer, Merkel; Associate Professor Richert; Assistant Professor Harris; Instructors Clark, Cobbs, Obrath, Remys; Visiting Professors Duncan (Aut.), Saine (Win., Spr.). (All in 730-740 Old Chemistry Building.)

This Department offers work leading to the Degrees of Master of Arts, Master of Arts in Teaching and Doctor of Philosophy in Germanic Languages and Literatures.

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UNIVERSITY OF CINCINNATI BULLETIN

Announcement

of



*McMicken College
of Arts and Sciences*

1973-1974

Published by the University of Cincinnati
Van Wormer Administration Building
Cincinnati, Ohio 45221
Telephone 513-475-8000

Honors Courses: 194-5-6, Honors Independent Study and Guided Research; 197, Geography Honors Special Topics I: Field Studies in Landscape Change; 199, Geography Honors Special Topics II: Appalachia and the Future Environment of North America; 501-2-3, Problems in Geography; 601-2-3, Field Projects.

For complete course descriptions, see Honors section of this *Bulletin*.

Geology

Professors Lattman (Head, 105C), Caster (104A), Jenks (232), Larsen (220), Potter (107), Pryor (101); Associate Professors Durrell (233), Huff (225), Sunderman (231); Assistant Professors Briskin (304 B.Sci.), Bullard (B-10), Davis (102), DeJong (236), Fleming (223), Grover (235), Kilinc (220), Maynard (200 B.Sci.). (All in Old Tech Building unless otherwise noted.)

Entering Freshmen intending to major in Geology may apply for the W. H. Bucher Scholarship (see page 20).

Geol. 101-2-3 is preliminary to all advanced courses in geology. Students who have completed 104-5-6 and wish to major in geology will be asked to take 101-2-3.

To qualify for the B.S. degree in geology a student shall include in his program Geol. 271 (or 272 or 273), 301-2, 321-2, 331, 405-6, 501-2-3, 525; Chem. 101-2-3, 111-2-3, 9 to 14 credits of Calculus or other approved Mathematics courses and 9 to 15 credits of physics or biology. In addition to the basic core of geology courses listed above, at least 18 credits in advanced courses in geology must be elected and should include 521-2-3 or 531-2-3 and 677 where feasible. Students majoring in Geology are strongly advised to develop a reading capability in a foreign language, preferably in French, German or Russian.

The B.S. major may lead to graduate work in geology, usually considered essential for a professional career. A properly planned program may lead to the M.S. degree one year after obtaining the B.S. Typical programs may be obtained from the adviser.

All students are required to take a six to eight weeks' summer field course or its equivalent. Alternative acceptable field training may be obtained by summer work at a marine biological station or with one of the geological surveys, or by summer field employment by a mining or oil company, with the approval of the staff.

Each autumn some students majoring in geology will be invited to attend a four-day field trip and should anticipate living expenses of about \$25.

15-040-101,102,103. Introduction to Geology. A survey of physical and historical geology. Lect. and Lab. 5 ug. cr. ea. Qtr. Staff.

101. Weathering; Mass wasting; Streams; Ground Water; Glaciers; Oceanography.

102. Volcanoes; Minerals; Rocks; Geologic time; Metamorphism; Sedimentation; Seismology; Mountain building; Ore deposits; Sea-floor spreading.

103. Stratigraphy; Paleontology; History of North America.

15-040-104,105,106. *Geology of Man's Environment.* An elementary course for those not expecting to major in earth sciences. Fulfills B.A. science requirement when taken with an elementary course in another science. 3 ug. cr. ea. Qtr. Lect. Staff.

15-040-151. *Urban Geology.* Basic principles and concepts in geology are applied to problems of the urban environment. 3 ug. cr. Aut. Qtr. Mr. Fleming. Not open to Geology majors.

15-040-271. *Geologic Demonstration Trip.* A two-weeks' field trip. September 1973. One-hour conference weekly. 3 ug. cr. Aut. Qtr. Staff.

15-040-301,302. *Mineralogy.* Crystallography, crystal chemistry, atomic structures, geochemistry, and systematics of the common minerals. 4 ug. cr. Aut., Win. Qtrs. Mr. Grover. Prereq.: College chemistry or permission of instructor.

15-040-321,322. *Historical Geology.* The physical and biological history of the earth with particular emphasis on North America. Field trips. 4 ug. cr. Aut., Win. Qtrs. Mr. Caster. Prereq.: Geol. 101-2-3.

15-040-331. *Elementary Structural Geology.* Description of tectonic structures. Laboratory methods in Structural Geology. Field trip. 3 ug. cr. Aut. Qtr. Mr. DeJong.

15-040-405. *Principles of Geomorphology.* Fundamental concepts of land forms in terms of lithology, structure and geologic history. 3 ug. cr. Win. Qtr. Mr. Durrell. Prereq.: Geol. 331 or permission of instructor.

15-040-406. *Major Problems in Geology.* A study of current major problems relating to the interpretation of the origin of the earth's crust. 3 ug. cr. Spr. Qtr. Staff.

15-040-037,038,039. *Geology Seminar.* Expected of all juniors and seniors majoring in geology. No credit. Staff.

15-040-440. *Archaeological Geology.* The geological framework of ancient city sites and its bearing on archaeological recovery of historical data. 3 ug. cr. Win. Qtr. Mr. Bullard. Prereq.: Geol. 101-2-3 or equivalent.

15-040-501,502,503. *Elementary Petrology.* Aut. Qtr.: The polarizing microscope; Win., Spr. Qtrs.: The rock cycle, hand lens petrography, thin section studies of rocks. 3 ug. cr. ea. Qtr. Messrs. Bullard, Larsen, Potter, Pryor. Prereq.: Geol. 302.

15-040-521,522,523. *Paleontology.* Fundamental concepts and the paleobiology of geologically and biologically significant invertebrates. 3 ug. cr. ea. Qtr. Mr. Davis. Prereq.: Geol. 322, or permission of instructor.

15-040-525. *Advanced Historical Geology.* Evolution of the higher forms of plant and animal life and their significance in the interpretation of earth history. 4 ug. cr. Spr. Qtr. Mr. Caster.

15-040-531,532,533. *Stratigraphy and Sedimentation.* Physical and biological processes, environmental interpretation, facies analysis, stratigraphic analysis, basin analysis, and tectonics. 3 ug. cr. ea. Qtr. Mr. Pryor.

15-040-551. *Engineering Geology.* Physical properties of earth materials and their response to short term stresses. Field trips. 3 ug. cr. Aut. Qtr. Mr. Fleming. Prereq.: Geol. 331, 405, or permission of instructor.

15-040-552. *Hydrogeology.* The geology of groundwater. A study of the occurrence, movement, and utilization of subsurface water. 3 ug. cr. Win. Qtr. Mr. Fleming.

15-040-572. *Physiography of Western United States.* 3 ug. cr. Aut. Qtr. Mr. Durrell.

15-040-573. *Physiography of Eastern United States*. 3 ug. cr. Win. Qtr. Mr. Durrell.

15-040-574. *Glacial Geology*. 3 ug. cr. Aut. Qtr. Mr. Durrell.

15-040-576. *Advanced Geology Field Trip*. A two weeks' field excursion during September 1973. Conferences and report in Autumn Quarter. 3 ug. cr. Aut. Qtr. Prereq.: Permission of instructor. Mr. Pryor.

15-040-580. *Advanced Geomorphology*. The physics and chemistry of processes of erosion, and equilibrium theories of landscape evolution. 3 ug. cr. Win. Qtr. Mr. Lattman. Prereq.: Geol. 405 or permission of instructor.

15-040-581. *Basic Photography for the Geological Sciences*. Systematic study of photographic theory and technique for geologic research, with emphasis on documentation and illustration. 2 ug. cr. Win. Qtr. 3 laboratory hours. Mr. Bullard.

15-040-621,622. *Introduction to Geochemistry*. Introduction to the application of chemical principles to various geologic problems. 3 ug. cr. Aut., Win. Qtrs. Mr. Maynard.

15-040-631. *Clay Mineralogy*. Structural mineralogy, distribution, and origin of clay minerals; lab devoted to analytical methods. 3 ug. cr. Aut. Qtr. Mr. Huff. Prereq.: Geol. 301-2.

15-040-641,642,643. *Optical Mineralogy*. Crystal optics, use of the polarizing microscope for recognition of transparent substances in immersion media and thin sections. 3 ug. cr. ea. Qtr. Mr. Sunderman.

15-040-648. *Thermodynamics in Geological Processes*. Principles of thermodynamics and their application to geological problems. 3 ug. cr. Aut. Qtr. Mr. Kilinc. Prereq.: Permission of instructor.

15-040-651,652. *Geological Data Analysis*. Application of statistics and computing to diverse geological and paleontological problems. Many case histories. 3 ug. cr. ea. Qtr. Win., Spr. Qtrs. Messrs. Lattman, Potter. Prereq.: Permission of instructor.

15-040-664. *Metamorphic Petrology I*. Principles and methods: minerals, phase relations, analysis and calculations, lab methods. 4 ug. cr. Aut. Qtr. Mr. Larsen. Prereq.: Geol. 501-2-3 or equivalent.

15-040-665. *Metamorphic Petrology II*. Occurrence, genesis, petrography. 4 ug. cr. Win. Qtr. Mr. Larsen. Prereq.: Geol. 664 or permission of instructor.

15-040-666. *Seminar in Metamorphic Petrology*. Major problems, current literature. 3 ug. cr. Spr. Qtr. Messrs. Larsen, Grover, Kilinc. Prereq.: Geol. 665 or permission of instructor.

15-040-668. *Mineral Chemistry*. Crystal chemistry; mineral solution models; inter- and intracrystalline reactions; controls of mineral stability. 3 ug. cr. Win. Qtr. Mr. Grover. Prereq.: Permission of instructor.

15-040-669. *The Rock-forming Minerals*. The crystal chemistry and phase relations of the rock-forming minerals and their use as petrogenetic indicators. 3 ug. cr. Spr. Qtr. Mr. Grover. Prereq.: Geol. 668.

15-040-673. *Structural Geology II*. Interpretation of tectonic structures. 3 ug. cr. Win. Qtr. Mr. DeJong. Prereq.: Geol. 331 or permission of instructor.

15-040-674,675,676. *Geology of Ore Deposits*. 3 ug. cr. ea. Qtr. Mr. Jenks. Prereq.: Permission of instructor.

15-040-677. *Regional Geology*. (The evolution of North America.) 3 ug. cr. Aut. Qtr. Messrs. Jenks, DeJong. Prereq.: Permission of instructor.

15-040-678. *Regional Geology*. (The Mediterranean Mountain Belts.) 3 ug. cr. Spr. Qtr. Messrs. Jenks, DeJong. Prereq.: Permission of instructor.

Courses Omitted in 1973-1974: 272-3, Alternate Routes Geologic Demonstration Field Trip; 561-2, Interpretation of Aerial Photographs; 575-577, Alternate Advanced Geology Field Trips; 578, World Physiography; 649-50 Phase Equilibria; 661-2, Igneous Petrology; 663, Seminar in Igneous Petrology; 672, Elements of Structural Analysis.

Honors Courses: 182-3, Introduction to Geology; 194-5-6, Honors Independent Study and Guided Research; 199, Geology Honors Special Topics; 487-8-9, Individual Work in Geology.

For complete course descriptions, see Honors section of this *Bulletin*.

Germanic Languages and Literatures

Professors Stern (Head), Friedrichsmeyer, Glenn, Merkel, Slessarev; Associate Professor Richert; Assistant Professors Abt, Harris; Instructors Clark, Cobbs, Obrath, Remys; Visiting Professors Duncan (Aut.), Saine (Win., Spr.). (All offices in 730-740 Old Chemistry Building.)

German 101-2-3, 104-5-6, 201-2-3, 204-5-6, and 207-8-9 will not count toward a major in German. German 231-2-3, 401-2-3 or equivalents, 437-8-9, shall be offered as a part of the requirement toward a major in German. In addition, German majors are expected to select German 171-2-3 as one of their elective courses in preparation for Part I (German Culture) of their Comprehensive Examinations.

All advanced courses in German, except Senior Readings (437-8-9), may be entered at the beginning of the Winter or Spring Quarter, with the instructor's permission. To enter 100- and 200-level courses after the Autumn Quarter, students must obtain permission of the Department Head.

Related courses in the Department of English recommended for majors:

15-001-221,222,223. *World Literature*. For description, see page 54.

15-003-301,302,303. *Foreign Backgrounds of English Literature*.

15-003-314,315,316. *Development of the Drama*.

15-003-371. *Modern Fiction I. Late Nineteenth Century*.

15-003-372. *Modern Fiction II. Early Twentieth Century*.

15-003-373. *Modern Fiction III. Mid-Twentieth Century*.

15-003-581,582,583. *Literature and the Visual Arts*.

Note: The language requirement may be satisfied in *one of four* ways. (1) By taking one or more nonelementary courses for a total of 9 credits. (2) By taking German 207-8-9, 15 credits. (3) By taking German 101-2-3 (3 hours per week), followed by German 201-2-3 or 204-5-6 (3 hours per week). The fulfillment of the requirement in this manner requires *two years* of study; the emphasis is placed on the acquisition of *reading skill* in German. (4) By taking German 104-5-6 (5 hours per week). The fulfillment of the requirement in this manner requires *one year* of study; the emphasis is placed upon the acquisition of *conversational skill* in German.