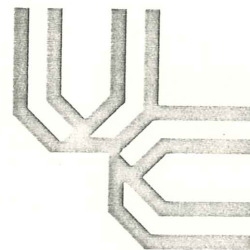


UNIVERSITY
OF
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of the geol.
dept



1980-1981

DIVISION OF
GRADUATE EDUCATION
AND RESEARCH

Published by the University of Cincinnati
Office of the University Bulletin
118 French Hall
Cincinnati, Ohio 45221

15-041-971. **Dissertation Research.** Preparation of the PhD dissertation, following completion of Comprehensive Examinations and faculty approval of a dissertation proposal. Credits vary with the research accomplished. Aut., Win., Spr., Sum. Qtrs.

Courses omitted in 1980-81: 771, Planned Urban Development; 772, Urban Blight; 773, Cultural Geographic Theory; 775, Behavioral Geography; 776, Global Forces for Environmental Change; 781, Population Geography; 878, Growth of Geographic Thought.

Geology

Head: Kilinc; Teaching Staff: Annis, Briskin, DeJong, Durrell, Grover, Huff, Johnson, Larsen, Maynard, Meyer, Nash, Potter, Pryor, Sunderman.

The Department of Geology offers graduate programs leading to the degrees of Master of Science (with or without thesis) and Doctor of Philosophy. Major areas of study and research include Economic Geology, Engineering Geology, Geochemistry, Geomechanics, Geomorphology, Mineralogy, Paleontology, Petrology, Regional Geology, Sedimentation, Stratigraphy and Structural Geology.

The department has a strong tradition of emphasis on field studies as the basis for geological instruction and research. In addition there are modern analytical and computational facilities as well as laboratories for experiments in mineralogy, paleomagnetism, petrology, rock mechanics, sedimentology, solution and high-pressure geochemistry, and extensive paleontologic collections. Field research is being carried out in many areas of the world, including Pakistan, Norway, Oregon, Montana, Utah, Ohio, Pennsylvania, Kentucky, Virginia and New Mexico.

Departmental manuals giving detailed descriptions of courses as well as requirements for MS and PhD students are available upon request from the Secretary, Department of Geology. Following are part of the requirements: A student admitted to graduate work must have at least a B-plus average in his or her major, and is expected to have satisfactorily passed one-year courses in physics and chemistry, and an approved course in calculus. A summer field course in geology, or its equivalent, such as a summer at a marine biological station for paleontology students is required before admission or early in the graduate program. A student must have taken GRE and AGRE, and must ask for letters of recommendation from three referees.

All graduate students are required to take Geology 651, Geological Data Analysis. They are required to participate each year in the annual, four-day departmental field trip (expenses about \$50). PhD students are required to have reading knowledge of one foreign language, preferably French, German, or Russian.

15-040-501, 502. **Elementary Petrology.** Descriptive petrology of the common rocks; microscope and hand lens. 3 gr. cr. Aut., Win. Qtrs. Prereq.: Geol. 301-2-3.

15-040-504. **Geomorphic Processes.** Mechanics of earth surface processes. 4 gr. cr. Aut. Qtr. Prereq.: Geol. 331 or perm. of instr.

15-040-505. **Landform Development.** Morphology, origin and development of landforms. 3 gr. cr. Win. Qtr. Prereq.: Geol. 504.

15-040-510, 511, 512. **Physical and Chemical Processes in Geology.** Study of interaction of chemical and mechanical processes in geology. 3 gr. cr. Prereq.: Physics, Chemistry & Calculus.

15-040-521, 522. **Paleontology.** Fundamental concepts; paleobiology and the geological occurrence and significance of fossil organisms. 4 gr. cr. Aut., Win. Qtr.

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.

15-040-544, 545. **Geology of Ore Deposits.** An introduction to the study of ore deposits — processes and principles. 3 gr. cr. Aut., Win. Qtrs. Prereq.: Geol. 301, 302, 331.

15-040-551. **Methods of Engineering Geology.** Introduction to engineering geology through study of engineering projects. Field trips. 3 gr. cr. Aut. Qtr. Prereq.: Geol. 331, 504, or perm. of instr.

15-040-552. **Engineering Legacies of the Pleistocene.** Engineering problems related to deposits formed during the Pleistocene in North America. 3 gr. cr. Win. Qtr.

15-040-553. **Anatomy of Landslides.** Geologic setting, geometry and mechanisms of large, classic landslides throughout the world. Methods of stability analysis. 3 gr. cr. Spr. Qtr.

150 Division of Graduate Education and Research

- 15-040-555. **Engineering Geologic Mapping.** Plane-table mapping of one of the fascinating landslides in Cincinnati. 3 gr. cr. Spr. Qtr.
- 15-040-561. **Interpretation of Aerial Photographs.** The basics of photogrammetry and photo-interpretation as applied to horizontal, oblique and vertical photography. 3 gr. cr. Win. Qtr.
- 15-040-576. **Advanced Geology Field Trip.** A two weeks field excursion during September 1980. Conferences and report in Autumn Quarter. 3 gr. cr. Aut. Qtr. Prereq.: Perm. of instr.
- 15-040-627, 628. **Solution Geochemistry.** Principles of solution chemistry as applied to sedimentary, hydrothermal and solid state processes. 3 gr. cr. Win., Spr. Qtrs. Prereq.: Geol. 648, or equiv., or perm. of instr.
- 15-040-631. **Clay Mineralogy.** Classification and structural mineralogy of the major groups of clay minerals. 3 gr. cr. Aut. Qtr. Prereq.: Geol. 301, 302.
- 15-040-641. **Geomorphology Seminar.** Cr. to be arranged.
- 15-040-651, 652. **Geological Data Analysis.** Application of statistics and computing to diverse geological and paleontological problems. Many case histories. 3 gr. cr. Aut., Win. Qtrs. Prereq.: Perm. of instr.
- 15-040-662. **Igneous Petrology.** Geology and petrology of major igneous rock groups. Petrographic demonstrations and exercises. Report. 4 gr. cr. Win. Qtr. Prereq.: Geol. 501.
- 15-040-663. **Metamorphic Petrology.** Geology and petrology of metamorphic terranes. Petrographic demonstrations and exercises. Report. 4 gr. cr. Spr. Qtr. Prereq.: Geol. 502.
- 15-040-668. **Mineral Chemistry.** Crystal chemistry; mineral solution models; inter- and intracrystalline reactions; controls of mineral stability. 3 gr. cr. Win. Qtr. Prereq.: Perm. of instr.
- 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. Prereq.: Geol. 668.
- 15-040-673. **Topics in Tectonics and Structural Geology.** Interpretation of tectonic structures. 3 gr. cr. Win. Qtr. Prereq.: Geol. 331 or perm. of instr.
- 15-040-675. **Problems of Ore Formation.** Mine field trip and study of selected ore deposits. 3 gr. cr. Aut. Qtr. Prereq.: Geol. 545, 501, 502 or equiv.
- 15-040-677. **Tectonics (Evolution of North America).** 3 gr. cr. Aut. Qtr. Prereq.: Permission of instructor.
- 15-040-678. **Tectonics (Mountain Belts outside North America).** 3 gr. cr. Spr. Qtr. Prereq.: Perm. of instr.
- 15-040-691. **The Solid Earth.** Physical and chemical processes of the earth's upper mantle and crust. Phase equilibria of rock systems. 3 gr. cr. Spr. Qtr.
- 15-040-692. **Petrogenesis.** Applications of thermodynamics and phase equilibria to the solution of petrological problems. 3 gr. cr. Aut. Qtr. Prereq.: Geol. 648 or equiv.
- 15-040-693. **Modern Concepts in Oceanography.** Water masses, surface and thermohaline circulation, oceanic-atmospheric interactions, productivity and marine life, deep-sea sediments and geological implications. 3 gr. cr. Spr. Qtr.
- 15-040-694, 695, 696. **Paleoecology.** Fundamental ecological processes. Physical and chemical parameters. Recent marine ecological models and ancient analogs. 3 gr. cr. ea. Qtr. Prereq.: Geol. 521, 522.
- 15-040-697, 698. **Micropaleontology-Survey.** Lecture and seminar approach. Selected key species of the geologic record; functional morphology, distribution, paleoecology, geologic implications. 4 ug. cr. Aut., Win. Qtrs.
- Primarily for Graduate Students*
- 15-040-721. **Theory and Application of Finite Strain.** Analysis and measurement of finite strain. 3 gr. cr. Aut. Qtr. Prereq.: Some mechanics.
- 15-040-722. **Theories of Folding and Density Instability.** Folding and diapirism of viscous, power-law, elastic, and strain-hardening materials. 3 gr. cr. Win. Qtr. Prereq.: Geol. 721.
- 15-040-723. **Theories of Fracturing, Jointing and Faulting of Rock.** Forms of fractures in porous, ductile and dense, brittle rocks. Foreland thrusting. 3 gr. cr. Spr. Qtr.

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Head: Glen Harris, Lew
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15-040-741. **Optical Crystallography.** Use of the polarizing microscope for recognition of transparent substances in immersion media. 4 gr. cr. Spr. Qtr.

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.

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

15-040-814, 815. **Advanced Sedimentary Petrology.** Advanced study of major groups of sedimentary rocks, composition, origins, geological interpretations. 4 gr. cr. Aut., Win. Qtrs.

15-040-816. **Sedimentary Ore Deposits.** Petrology, geochemistry and origin of low temperature ore deposits. 3 gr. cr. Spr. Qtr.

15-040-821, 822, 823. **Paleontology Seminar.** A graduate seminar dealing with many facets of paleontology: principles, organisms, methods. 3 gr. cr. ea. Qtr.

15-040-874, 875, 876. **Universal Stage Microscope Studies.** 2 gr. cr. ea. Qtr.

15-040-881. **Research - Special Problems in Geology.** Credit arranged. Offered ea. Qtr.

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

15-040-971. **Doctoral Dissertation Research.** Credit arranged. Offered ea. Qtr. Search - Special Problems in Geology. Credit arranged. Offered ea. Qtr.

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

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

Germanic Languages and Literatures

Head: Glenn; Director, Graduate Studies: Harris; Teaching Staff: Friedrichsmeyer, Galt, Glenn, Habersetzer, Harris, Lewis, Obrath, Richert, Schade, Torbruegge, and addl. staff. All located 730-742 Old Chem.

Students electing work in this department should have completed an undergraduate major in German or its equivalent. For precise requirements consult our *Guidelines to Graduate Studies*. 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. The MAT program is specifically designed for future high school and junior college teachers. It is conducted in collaboration with the College of Education; students can earn their teaching certificate together with the MAT in a two-year sequence. The International MBA program in the College of Business Administration is open to students who have earned an undergraduate degree in German; this degree may be earned in combination with an advanced Certificate in German Studies. For full program descriptions contact the Department.

For Advanced Undergraduate and Graduate Students

15-010-524. **Business German I.** An advanced language and area studies course. Conversational approach. The terminology of German business. Focus: Economic structures, the press and advertising. 3 ug., 4 gr. cr. Aut. Qtr. T Th 5:00-6:30. Galt.

15-010-525. **Business German II.** Same as above. Focus: Import-export trade; practice in German business-letter writing. 3 ug., 4 gr. cr. Win. Qtr. T Th 5:00-6:30. Galt.

15-010-526. **Business German III.** Same as above. Focus: Fiscal and corporate reports, stock market, relationship of business with government. 3 ug., 4 gr. cr. Spr. Qtr. T Th 5:00-6:30. Galt.

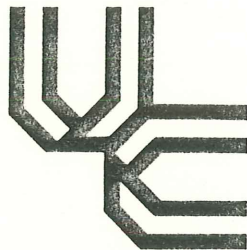
15-010-531, 532, 533. **Stylistics.** Topical conversations for students wishing greater perfection in spoken and written German with emphasis on stylistics. 3 ug., 4 gr. cr. ea. Qtr. T Th 9:30-11:00. Habersetzer, Richert, Friedrichsmeyer.

15-010-551. **Survey of German Literature, Part I.** Major trends from 750 to 1750 with particular emphasis on the change of ideas and forms. 3 ug., 4 gr. cr. Aut. Qtr. T Th 3:30-5:00. Lewis.

15-010-552. **Survey of German Literature, Part II.** Major trends of Storm and Stress, Classicism, Romanticism and Post-Romanticism. 3 ug., 4 gr. cr. Win. Qtr. T Th 3:30-5:00. Habersetzer.

15-010-553. **Survey of German Literature, Part III.** Major trends from 1850 to present: Realism, Naturalism, Impressionism, Expressionism, Post-War Literature. Literature of German Democratic Republic. 3 ug., 4 gr. cr. Spr. Qtr. T Th 3:30-5:00. Friedrichsmeyer.

**UNIVERSITY
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1980-1981

**McMICKEN COLLEGE
OF ARTS AND SCIENCES**

Published by the University of Cincinnati
Office of the University Bulletin
118 French Hall
Cincinnati, Ohio 45221

Interdisciplinary Environmental Courses

15-041-361. People and Environment: Part I. Alternative approaches to interdisciplinary study of the environment. World population dynamics emphasizing growth rates, controls, and urbanization. 3 ug. cr. Aut. Qtr. (E)

15-041-362. People and Environment: Part II. World hunger: avoidable or not? Must food production adversely affect the environment? 3 ug. cr. Win. Qtr. (E)

15-041-363. People and Environment: Part III. Alternative futures for mankind: ethical dilemmas and practical problems. Conventional vs. nuclear energy, man and appropriate technology (A.T.). 3 ug. cr. Spr. Qtr. (E)

Geology

Head: Professor Kilinc; Teaching Staff: Annis, Briskin, DeJong, Durrell, Grover, Huff, Johnson, Larsen, Maynard, Meyer, Nash, Potter, Pryor, Sunderman.

The BS program in geology provides background for students who wish to work in most areas of earth sciences, including petroleum, mining, energy, engineering and ground-water geology. Graduates are employed in industry, private practice, education and government. Graduate study usually is considered essential for a professional career in geology. Information on graduate programs may be obtained from the Secretary, Department of Geology.

Several scholarships are awarded to undergraduate students by the department on the basis of academic merit. These are: 1) the W. H. Bucher Freshman Scholarship, 2) the Walter and Kathryn Cooke Scholarships, awarded to two students in each year of study, and 3) two AMOCO Scholarships. See Student Awards.

The College requirements for the BS degree are described under *General Information* in this *Bulletin*. Geology 101, 2, 3 is prerequisite to all advanced geology courses. Following are additional departmental requirements for majors in Geology:

Geol. 371	Geologic Demonstration Field Trip	3 cr.
Geol. 301, 2	Mineralogy	8 cr.
Geol. 303	Intro. Optical Crystallography	4 cr.
Geol. 331	Elementary Structural Geology	3 cr.
Geol. 477	Introduction to Field Geology	3 cr.
Geol. 501, 2	Elementary Petrology	6 cr.
Geol. 504	Geomorphic Processes	4 cr.
Geol. 510, 1, 2	Physical and Chemical Processes in Geology	9 cr.
Geol. 521, 2	Invertebrate Paleontology	8 cr.
Geol. 531, 2	Stratigraphy and Sedimentology	6 cr.
	Geology electives (400 or higher)	9 cr.
Geol. 300	Summer Field Geology (see note 1)	9-15 cr.
Chem. 101, 2, 3; 111, 2, 3	Chemistry lecture and laboratory	15 cr.
Phys. 101, 2, 3; 111, 2, 3 or	Physics lecture and laboratory	15 cr.
Phys. 201, 2, 3; 211, 2, 3	Physics lecture and laboratory	15 cr.
Math. 241, 2, 3 or	Calculus	9 cr.
Math. 221, 2, 3	Calculus	15 cr.
	Total credits	126-137

Note 1) The Geology Department does not offer a summer field course. All students are required to take an approved field course offered by another university, or an equivalent. Descriptions of summer field courses offered by other universities are on file in the department office. Acceptable alternative field training might be a summer at a marine station for paleontology students, a summer with a geological survey, or summer field employment with a mining or oil company. These alternatives require the *prior* approval of the faculty.

Students should satisfy the language requirement with French, German or Russian.

Modifications in the BS program are possible by written petition, but such petitions must be submitted in advance of such modifications.

15-040-101, 102, 103. Introduction to Geology. A survey of physical and historical geology. Fulfills Natural Science requirement. Lect. and Lab. 5 ug. cr. ea. Qtr. (C)

15-040-104, 105, 106. Geology of Man's Environment. An introductory course for those not expecting to major in earth sciences. Will satisfy one 9-credit sequence in the Natural Science requirement. 3 ug. cr. ea. Qtr. (C)

15-040-107. Geology from Space. Major geologic concepts are explained with the aid of LANDSAT photographs. 3 ug. cr. Aut. Qtr. No prereq.

15-040-108. Geology of Greater Cincinnati. A survey of the earth history of the Cincinnati region for the past 450 million years. 3 ug. cr. Win. Qtr. No prereq.

15-040-109. Geology of National Parks. A survey based on illustrated lectures and map-reading of selected national parks whose main features include geologic phenomena, e.g., Grand Canyon, Yellowstone and Yosemite National Parks. 3 ug. cr. Spr. Qtr. No prereq.

15-040-111. Geology Laboratory for Pre-Service Elementary and Secondary Science Teachers. Laboratory on methods of earth science instruction. Must be taken concurrently with Geol. 104 or 106. 1 ug. cr. Aut., Spr. Qtrs.

Any three of the following courses entitled Topics in Geology (Geol. 261, 262, 263, 264) will satisfy one 9-credit sequence in the Natural Science (C) requirement.

15-040-261. Oceanography. The history of ocean basins, oceanic and atmospheric circulation, deep-sea sediments, paleoecology, past and future climate. 3 ug. cr. Aut. Qtr. No prereq.

15-040-262. Plate Tectonics. The revolutionary concept of Plate Tectonics and its implications as to distribution of earthquakes, volcanoes, hydrocarbons and metallic mineral deposits. 3 ug. cr. Win. Qtr. No prereq.

15-040-263. Energy. A survey of energy problems: geology, distribution, consumption, conservation; alternate future sources. 3 ug. cr. Spr. Qtr. No prereq.

15-040-264. Mineral Resources. Geologic, environmental, economic and human factors in supplying the growing world population with metals and industrial minerals. 3 ug. cr. Aut. Qtr. No prereq.

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

15-040-303. Introduction to Optical Crystallography. Use of polarizing microscope for recognition of transparent materials in immersion media. 4 ug. cr. Spr. Qtr. Prereq. Geol. 302 or permission of instructor.

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

15-040-371. Geologic Demonstration Field Trip. A two-weeks field trip. September 1980. One-hour weekly conference with readings and exercises. 3 ug. cr. Aut. Qtr.

15-040-374. Geology for Engineers. Physical geology pertinent to engineering. 4 ug. cr. Win. & Spr. Qtrs.

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.

15-040-421. Introduction to Geochemistry. Introduction to the application of chemical principles to various geologic problems. 3 ug. cr. Spr. Qtr. Prereq.: Chem. 105, Calculus.

15-040-477. Introduction to Field Geology. An introduction to field mapping techniques, section measurement and geologic sampling. 3 ug. cr. Spr. Qtr.

15-040-487, 488, 489. Individual Work in Geology. Credit depends on amount of work done. May be entered any quarter. Staff.

15-040-501, 502. Elementary Petrology. Descriptive petrology of the common rocks; microscope and hand lens. 3 ug. cr. Aut., Win. Qtrs. Prereq.: Geol. 301-2-3.

15-040-504. Geomorphic Processes. Mechanics of earth surface processes. 4 ug. cr. Aut. Qtr. Prereq.: Geol. 331 or permission of instructor.

15-040-505. Landform Development. Morphology, origin and development of landforms. 3 ug. cr. Win. Qtr. Prereq.: Geol. 504.

15-040-510, 511, 512. Physical and Chemical Processes in Geology. Study of interaction of chemical and mechanical processes in geology. 3 ug. cr. Prereq.: Physics, Chemistry & Calculus.

15-040-521, 522. Paleontology. Fundamental concepts; paleobiology and the geological occurrence and significance of fossil organisms. 4 ug. cr. Aut., Win. Qtr.

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.

15-040-544, 545. Geology of Ore Deposits. An introduction to the study of ore deposits — processes and principles. 3 ug. cr. Aut., Win. Qtrs. Prereq.: Geol. 301, 302, 331.

15-040-551. Methods of Engineering Geology. Introduction to engineering geology through study of engineering projects. Field trips. 3 ug. cr. Aut. Qtr. Prereq.: Geol. 331, 504, or permission of instructor.

15-040-552. Engineering Legacies of the Pleistocene. Engineering problems related to deposits formed during the Pleistocene in North America. 3 ug. cr. Win. Qtr.

15-040-553. Anatomy of Landslides. Geologic setting, geometry and mechanisms of large, classic landslides throughout the world. Methods of stability analysis. 3 ug. cr. Spr. Qtr.

15-040-555. Engineering Geologic Mapping. Plane-table mapping of one of the fascinating landslides in Cincinnati. 3 ug. cr. Spr. Qtr.

15-040-561. Interpretation of Aerial Photographs. The basics of photogrammetry and photo-interpretation as applied to horizontal, oblique and vertical photography. 3 ug. cr. Win. Qtr.

15-040-576. Advanced Geology Field Trip. A two weeks' field excursion during September 1980. Conferences and report in Autumn Quarter. 3 ug. cr. Aut. Qtr. Prereq.: Perm. of instr.

15-040-627, 628. Solution Geochemistry. Principles of solution chemistry as applied to sedimentary, hydrothermal and solid state processes. 3 ug. cr. Win., Spr. Qtrs. Prereq.: Geol. 648 or equivalent or perm. of instr.

15-040-631. Clay Mineralogy. Classification and structural mineralogy of the major groups of clay minerals. 3 ug. cr. Aut. Qtr. Prereq.: Geol. 301, 302.

15-040-641. Geomorphology Seminar. Credit to be arranged.

15-040-651, 652. Geological Data Analysis. Application of statistics and computing to diverse geological and paleontological problems. Many case histories. 3 ug. cr. Aut., Win. Qtrs. Prereq.: Perm. of instr.

15-040-662. Igneous Petrology. Geology and petrology of major igneous rock groups. Petrographic demonstrations and exercises. Report. 4 ug. cr. Win. Qtr. Prereq.: Geol. 501.

15-040-663. Metamorphic Petrology. Geology and petrology of metamorphic terranes. Petrographic demonstrations and exercises. Report. 4 ug. cr. Spr. Qtr. Prereq.: Geol. 502.

15-040-668. Mineral Chemistry. Crystal chemistry; mineral solution models; inter- and intracrystalline reactions; controls of mineral stability. 3 ug. cr. Win. Qtr. Prereq.: Perm. of instr.

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. Prereq.: Geol. 668.

15-040-673. Topics in Tectonics and Structural Geology. Interpretation of tectonic structures. 3 ug. cr. Win. Qtr. Prereq.: Geol. 331 or permission of instructor.

15-040-675. Problems of Ore Formation. Mine field trip and study of selected ore deposits. 3 ug. cr. Aut. Qtr. Prereq.: Geol. 545, 501, 502 or equiv.

15-040-677. Tectonics (Evolution of North America). 3 ug. cr. Aut. Qtr. Prereq.: Perm. of instr.

15-040-678. Tectonics (Mountain Belts outside North America). 3 ug. cr. Spr. Qtr. Prereq.: Perm. of instr.

15-040-691. The Solid Earth. Physical and chemical processes of the earth's upper mantle and crust. Phase equilibria of rock systems. 3 ug. cr. Spr. Qtr.

15-040-692. Petrogenesis. Applications of thermodynamics and phase equilibria to the solution of petrological problems. 3 ug. cr. Aut. Qtr. Prereq.: Geol. 648 or equivalent.

15-040-693. Modern Concepts in Oceanography. Water masses, surface and thermohaline circulation, oceanic-atmospheric interactions, productivity and marine life, deep-sea sediments and geological implications. 3 ug. cr. Spr. Qtr.

15-040-694, 695, 696. Paleocology. Fundamental ecological processes. Physical and chemical parameters. Recent marine ecological models and ancient analogs. 3 ug. cr. ea. Qtr. Prereq.: Geol. 521, 522.

15-040-697, 698. Micropaleontology-Survey. Lecture and seminar approach. Selected key species of the geologic record; functional morphology, distribution, paleoecology, geologic implications. 4 ug. cr. Aut., Win. Qtrs.

Germanic Languages and Literatures

Head: Professor Slessarev; Undergraduate Director: Obrath; Teaching Staff: Friedrichsmeyer, Galt, Glenn, Harris, Lewis, Obrath, Richert, Schade, Slessarev, Torbruegge, Wucherpfennig, and additional staff.

Two majors are available: a major in **German**, which emphasizes language and literature (63 credit hours) and a major in **German Studies**, emphasizing contemporary aspects of the German-speaking world. Both majors require a senior paper.

Students majoring in German Studies must complete at least the following courses within the department: German 331-2-3, 304-5-6, 314-5-6, 531-2-3 or 524-5-6, plus 9 additional hours of literature courses taught in German. The balance of the major credits must include 18 credits in approved courses from no more than two of the following fields: Anthropology, Art History, Economics, Geography, History, Linguistics, Music History, Philosophy, Political Science. These courses must pertain to the German-speaking world, and should provide background for the senior paper. Acceptance into this Program must be approved by the adviser.

German 101-2-3, 104-5-6, 107, 111-2, 121-2-3, 181-2-3, 201-2-3, 204-5-6, 207-8-9, 281-2-3 do not count toward either major.

Students of the German Department can participate in various Interdepartmental Programs: The **Comparative Literature Program**, the **Linguistics Program**, and the **Arts and Sciences 4A Program**. For the requirements of these programs see Professor Obrath, 736 Old Chemistry Building.

The **International Business Option** is another interdisciplinary program, available to students in German. For details on the joint program see the description under Special Programs in this *Bulletin*. Adviser for this International Business Option: Professor Galt, 740 Old Chemistry Building.

Professional Practice (Co-op) Program for German Majors.

German majors who select a program of study with business option may be eligible for participation in the Professional Practice Program. Students registering for the program participate in the National Work-Study Program in Germany after the sophomore year, followed by alternating study and work quarters with business firms in Germany and the U.S.

Students who successfully complete the five-year program receive a BA in German, a Certificate in International Business, and a Certificate of Professional Practice. Professional Practice I, 15-000-271, must be taken prior to enrollment. For requirements, see Mrs. Daley, Career Dynamics Center.

The National Work-Study Program in Germany. This program combines the study of language and area studies plus work experience in Hamburg, Germany from approximately mid-August to mid-December. 18 quarter credits are awarded. See Special Programs section of this *Bulletin*.

Note: The A&S language requirement may be satisfied (1) by establishing equivalence of two years' college level German on the placement test; (2) by taking German 107 for a total of 18 credit hours (admission by permission of instructor only); (3) by taking German 104-5-6 (emphasis on conversational skills) for a total of 18 credit hours; (4) by taking 18 hours consisting of one first-year sequence (101-2-3, 111-2, 121-2-3, or 181-2-3) followed by one second-year sequence: German 201-2-3 (emphasis on reading); 204-5-6 (emphasis on reading and translating factual material); German 207-8-9 (emphasis on conversational skills); or German 281-2-3 (German Honors).

Individualized Swedish, for a total of 18 credits, also fulfills the language requirement.

A Placement Test will be required of all students who have taken two or more years of a modern foreign language in high school and desire to continue that language in college for credit. The test is given prior to registration in this college. Such students will enroll for the language course indicated by their test scores. If such scores are satisfactory, may have the requirement waived.

All advanced courses in German may be entered at the beginning of the Winter or Spring Quarter, with the instructor's permission.