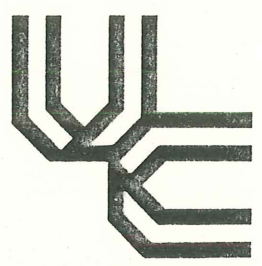


139

UNIVERSITY OF CINCINNATI BULLETIN



1979-1980

**DIVISION OF
GRADUATE EDUCATION
AND RESEARCH**

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



Elective Research Seminars

15-041-730. Seminar: Modern Concepts in Regional Geography. Choosing new locations for human activities — the impact of environmental legislation and energy resources. 4 gr. cr. Win. Qtr. South.

15-041-765. Seminar in Spatial Behavior. How people perceive their geographic environment and respond to it: spatial cognition, space preferences of homeseekers and businesses, human migration, diffusion of innovations. 4 gr. cr. Win. Qtr. Selya.

15-041-773. Seminar in Cultural Geographic Theory. New perspectives on the global distribution of languages, religions, artifacts, and social institutions. Is cultural diversity facing extinction? 4 gr. cr. Spr. Qtr. Wolf.

15-041-776. Seminar: Global Forces for Environmental Change. How the multinationals affect world food and energy supplies. Do they degrade the environment? 4 gr. cr. Aut. Qtr. McNee.

15-041-778. Seminar in Geographic Development. Modernization of traditional societies and economies. Racial and political confrontations over land. Can international agencies help? 4 gr. cr. Aut. Qtr. Roder.

15-041-782. Seminar in Historical Geography. Settlement origins and dispersals; evolution of regions and urban networks; use of archival maps; preservation of historic landscapes. 4 gr. cr. Spr. Qtr. Mesinger.

15-041-814, 815, 816. Interdisciplinary Seminar: Frontiers of Urban Research. Current research trends and techniques in the shared urban aspects of geography, history, political science, and sociology. For advanced graduate students wanting early reactions to theses or dissertations. Admission only with faculty approval. 3 gr. cr. ea. Qtr.

Supervised Individual Research

15-041-501, 502, 503. Problems in Geography. Individual research projects in the library or laboratories, requiring prior faculty approval. Credits and hours to be arranged. Aut., Win., Spr. Qtrs.

15-041-601, 602, 603. Field Projects. Off-campus research in the "real world," requiring prior faculty approval. Credits and hours to be arranged. Aut., Win., Spr. Qtrs.

15-041-701, 702, 703. Geographic Research. Advanced research projects, pursued individually in the library or laboratories, requiring prior faculty approval. Credits and hours to be arranged. Aut., Win., Spr. Qtrs.

15-041-871. Thesis Research. Preparation of the MA thesis, contingent upon faculty approval of a thesis proposal. Credits vary with the research accomplished. Aut., Win., Spr., Sum. Qtrs.

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 1979-80: 583, Radical Geography; 731, Man's Physical Environment; 771, Planned Urban Development; 772, Urban Blight; 779, Multinational Corporations; 788, Manufacturing; 789, Transportation 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

138 Division of Graduate Education and Research

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. Hand lens petrography; thin section studies of common rocks. 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 permission of instructor.

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.

15-040-546. Geology of Industrial Mineral Deposits. 3 gr. cr. Spr. Qtr.

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 permission of instructor.

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. Aut. Qtr.

15-040-573. Physiography of the United States. A systematic review of the natural subdivisions of the United States, including Alaska. 3 gr. cr. Spr. Qtr.

15-040-574. Glacial Geology. Glaciers and glaciation, their relation to climatic changes with emphasis on the Pleistocene history of the Cincinnati region. 3 gr. cr. Spr. Qtr.

15-040-576. Advanced Geology Field Trip. A two weeks field excursion during September 1979. Conferences and report in Autumn Quarter. 3 gr. cr. Aut. Qtr. Prereq.: Permission of instructor.

15-040-613. Ichnology and Trace Fossils. Survey of literature in biogenic sedimentary features, their geologic occurrence, biologic significance and interpretation. 3 gr. cr. Spr. Qtr.

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.

15-040-648. Thermodynamics in Geological Processes. Principles of thermodynamics and their application to geological problems. 4 gr. cr. Aut. Qtr.

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.: Permission of instructor.

15-040-653. Megasedimentology. The study of on- and offshore basins. Methods and principles; case histories and written reports. 3 gr. cr. Spr. Qtr. Prereq.: Geol. 531-2.

15-040-661. Igneous and Metamorphic Petrology I. Rock forming minerals, parageneses, and phase petrology; laboratory methods, calculations and graphic representations. 4 gr. cr. Aut. Qtr. Prereq.: Geol. 303, 501, 502 or equivalent.

15-040-662. Igneous and Metamorphic Petrology II. Geology, genesis, mineralogy and petrochemistry of classical igneous rock series through literature study and descriptive petrology of rock suites. 4 gr. cr. Win. Qtr. Prereq.: Geol. 661.

15-040-663. Igneous and Metamorphic Petrology III. Geology, genesis, mineralogy and petrochemistry of classical metamorphic terrains through literature studies and descriptive petrology of rock suites. 4 gr. cr. Spr. Qtr. Prereq.: Geol. 662.

15-040-668. Mineral Chemistry. Crystal chemistry; mineral solution models; inter- and intracrystalline reactions; controls of mineral stability. 3 gr. cr. Win. Qtr. 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. 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 permission of instructor.

15-040-675. Problems of Ore Formation. 3 gr. cr. Spr. Qtr. Prereq.: Geol. 544, 501, 502 or equivalent.

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.: Permission of instructor.

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.

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.

15-040-711, 712. Micropaleontology Seminar. 3 gr. cr. Aut., Win. Qtr.

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.

15-040-731. Geochemistry of Hydrothermal Processes. Applications of thermodynamics to geochemical problems at high temperatures and pressures. 3 gr. cr. Win. Qtr.

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.

15-040-821, 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.

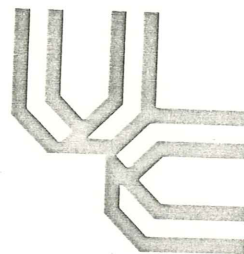
15-040-971. Doctoral Dissertation Research. Credit arranged. Offered ea. Qtr. Permission of adviser required.

Germanic Languages and Literatures

Head: Slessarev; Director, Graduate Studies: Friedrichsmeyer; Teaching Staff: Friedrichsmeyer, Frühsorge, Galt, Glenn, 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

UNIVERSITY OF CINCINNATI BULLETIN



1979-1980

McMICKEN COLLEGE OF ARTS AND SCIENCES

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

Evening (Five weeks each)
First June 16 - July 17
Second July 21 - Aug. 21
Quarter June 16 - Aug. 21
Commencement Aug. 22

Day Terms (3 1/3 weeks each)
First June 16 - July 8
Second July 9 - Aug. 30
Third July 31 - Aug. 21
Quarter June 16 - Aug. 21

First June 18 - July 19
Second July 23 - Aug. 23
Quarter June 1 - Aug. 23
Commencement Aug. 24

Second June 18 - July 10
Third July 11 - Aug. 1
Quarter Aug. 2 - Aug. 23
Commencement June 18 - Aug. 23

Calendars of the Evening College and the Summer Session will be found in those Bulletins.

Geology

Head: Associate 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. 271	✓ 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.
	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 to take 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 the LANDSAT photographs. 3 ug. cr. Win. 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. Aut. 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.

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 sediments, paleoecology, past

15-040-262. Plate Tectonics. The distribution of earthquakes, vol. prereq.

15-040-263. Energy. A survey of alternate future sources. 3 ug.

15-040-264. Mineral Resources. A growing population with metal

15-040-271. Geologic Demonstrations. weekly and final report. 3 ug.

15-040-301, 302. Mineralogy. systematics of the common minerals. instructor.

15-040-303. Introduction to Op. parent materials in immersion

15-040-331. Elementary Structural Geology. Field trip.

15-040-374. Geology for Engi

15-040-406. Major Problems in the origin of the earth's crust

15-040-421. Introduction to Geologic problems. 3 ug. cr. S

15-040-477. Introduction to Field ment and geologic sampling

15-040-487, 488, 489. Individual any quarter. Staff.

15-040-501, 502. Elementary Field cr. Aut., Win. Qtrs. Prereq: G

15-040-504. Geomorphic Processes 331 or permission of instructor

15-040-505. Landform Development Prereq.: Geol. 504.

15-040-510, 511, 512. Physical mechanical processes in geologic

15-040-521, 522. Paleontology significance of fossil organisms

15-040-531, 532, 533. Stratigraphic interpretation, facies analysis

15-040-544, 545. Geology of principles. 3 ug. cr. Aut., Win

15-040-546. Geology of Indu

15-040-551. Methods of Engineering engineering projects. Field

15-040-561. Interpretation of as applied to horizontal, ob

 Geology

Grover, Huff, Johnson,

in most areas of earth geology. Graduates are usually considered to have been obtained from the

the basis of academic in Cooke Scholarships. See Student Awards.

ation in this *Bulletin*. Additional departmental

.....	3 cr.
.....	8 cr.
.....	4 cr.
.....	3 cr.
.....	3 cr.
.....	6 cr.
.....	4 cr.
.....	9 cr.
.....	8 cr.
.....	6 cr.
.....	9 cr.
.....	9-15 cr.
.....	15 cr.
.....	15 cr.
.....	15 cr.
.....	9 cr.
.....	15 cr.
total credits	126-137

are required to take an eight-week summer field alternative field training a geological survey, or the prior approval of the

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geology. Fulfills Natural

r those not expecting to requirement. 3 ug. cr. ea.

he aid of the LANDSAT

cinnati region for the past

map-reading of selected Canyon, Yellowstone and

263, 264) will satisfy one

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 growing population with metals and industrial minerals. 3 ug. cr. Aut. Qtr. No prereq.

15-040-271. Geologic Demonstration Trip. A two-weeks' field trip. September 1979. One-hour conference weekly and final report. 3 ug. cr. Aut. Qtr.

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.

15-040-374. 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 and final report. 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. Hand lens petrography; thin section studies of common rocks. 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.

15-040-546. Geology of Industrial Mineral Deposits. 3 ug. cr. Spr. Qtr.

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.

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



- 15-040-573. **Physiography of the United States.** A systematic review of the natural subdivisions of the United States, including Alaska. 3 ug. cr. Spr. Qtr.
- 15-040-574. **Glacial Geology.** Glaciers and glaciation, their relation to climatic changes with emphasis on the Pleistocene history of the Cincinnati region. 3 ug. cr. Spr. Qtr.
- 15-040-576. **Advanced Geology Field Trip.** A two weeks' field excursion during September 1979. Conferences and report in Autumn Quarter. 3 ug. cr. Aut. Qtr. Prereq.: Perm. of instr.
- 15-040-613. **Ichnology and Trace Fossils.** Survey of literature in biogenic sedimentary features, their geologic occurrence, biologic significance and interpretation. 3 ug. cr. Spr. Qtr.
- 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.
- 15-040-648. **Thermodynamics in Geological Processes.** Principles of thermodynamics and their application to geological problems. 4 ug. cr. Aut. Qtr.
- 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.
- 15-040-653. **Megasedimentology.** The study of on- and offshore basins. Methods and principles; case histories and written reports. 3 ug. cr. Spr. Qtr. Prereq.: Geol. 531-2.
- 15-040-661. **Igneous and Metamorphic Petrology I.** Rock forming minerals, parageneses, and phase petrology; laboratory methods, calculations and graphic representations. 4 ug. cr. Aut. Qtr. Prereq.: Geol. 303, 501, 502 or equiv.
- 15-040-662. **Igneous and Metamorphic Petrology II.** Geology, genesis, mineralogy and petrochemistry of classical igneous rock series through literature study and descriptive petrology of rock suites. 4 ug. cr. Win. Qtr. Prereq.: Geol. 661.
- 15-040-663. **Igneous and Metamorphic Petrology III.** Geology, genesis, mineralogy and petrochemistry of classical metamorphic terrains through literature studies and descriptive petrology of rock suites. 4 ug. cr. Spr. Qtr. Prereq.: Geol. 662.
- 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.** 3 ug. cr. Spr. Qtr. Prereq.: Geol. 544, 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.
- 15-040-693. **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.

Germanic Languages and Literatures

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

Two majors are available: a major in *German*, which emphasizes language and literature (54 credit hours) and which culminates in a Senior Comprehensive Examination; a major in *German Studies*, emphasizing contemporary aspects of the German-speaking world and requiring a senior paper.

Students majoring in German Studies must complete at least the following courses within the department: German 231-2-3, 304-5-6, 314-5-6, and 331-2-3. The balance of the major credits may include up to 18

credits in approved courses of Economics, Geography, History. Must pertain to the German Studies courses are strongly recommended.

German 101-2-3, 104-5-6, 107 toward either major.

Students of the German Departmentive Literature Program, the requirements of these programs see

The International Business Option. For details on the joint program International Business Option

Professional Practice (Co-op) German majors who select a Professional Practice Program Study Program in Germany at business firms in Germany at

Students who successfully complete national Business, and a German taken prior to enrollment. For

The National Work-Study Program. studies plus work experience. quarter credits are awarded.

Note: The A&S language requirement level German on the placement permission of instructor only. 15 credit hours; (4) by taking German 201-2-3 (emphasis German 207-8-9 (emphasis on

Swedish 151-2-3 followed by requirement.

A Placement Test will be required language in high school and registration in this college. Score or, if such scores are satisfactory

All advanced courses in German instructor's permission.

15-010-101, 102, 103. Elementary the language requirement. Qtr. (B)

15-010-104, 105, 106. Elementary. Some assignments required

15-010-107. Individualized requirement. 1-15 ug. cr. Qtr. of instructor. (B)

15-010-111, 112. Beginning language laboratory. 5 ug. cr.

15-010-121, 122, 123. Elementary of students in CCM. 3 ug. cr.

15-010-151, 152, 153. Elementary 15-010-181, 182, 183. Elementary program. (B)