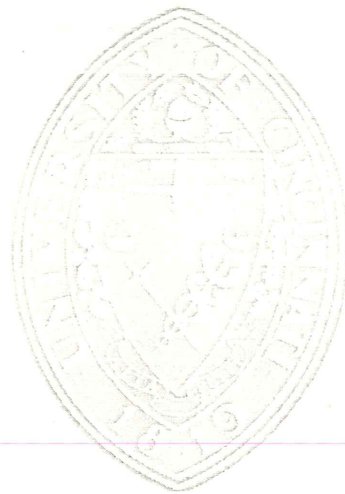


**UNIVERSITY
OF
CINCINNATI
BULLETIN**



1977-1978

**DIVISION OF
GRADUATE EDUCATION
AND RESEARCH**

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

15-041-585, 586. **Geographic Methods: Quantitative Techniques.** Introduction to areal statistics, computer mapping, and computer use. 3 gr. cr. Aut., Win. Qtrs.

15-041-601, 602, 603. **Field Projects.** Execution of individual field projects under regular faculty supervision. Credit varies with work completed. Offered ea. Qtr. Hours to be arranged.

Primarily for Graduate Students

15-041-701, 702, 703. **Geographic Research. I.** Independent individual research. Credit varies with work completed. Offered ea. Qtr. Hours to be arranged.

15-041-704, 705, 706. **Staff Seminar.** Forum for discussing research papers by visiting speakers, faculty, graduate students. Credit varies with extent of student's participation. 1-15 gr. cr. ea. Qtr.

15-041-715. **Introduction to Graduate Geography.** A common first term for all incoming graduate students, focusing on geographic research problems, data, and techniques. 4-12 gr. cr. Aut. Qtr.

15-041-730. **Modern Concepts in Regional Geography.** Regional development strategies; Lagging regions in advanced countries. 4 gr. cr. Spr. Qtr.

15-041-771. **Seminar in Planned Urban Development.** Comparison of strategies and effectiveness of planned urban development with an emphasis on North America and Western Europe. Includes theoretical models, research concepts, data sources. 4 gr. cr. Win. Qtr.

15-041-773. **Seminar: Cultural Geographic Theory.** Problems in the development of theories and models concerning the interaction of Habitat, Society, and Culture; Cultural Diffusion and Evolution; the Taxonomy of Culture Regions. 4 gr. cr. Aut. Qtr.

15-041-775. **Seminar in Behavioral Geography.** Theory and methodology of spatial behavior; environmental cognition, space preferences, and decision-making. 4 gr. cr. Win. Qtr.

15-041-779. **Seminar: Multinational Corporations.** Contemporary corporations as change agents in global economic, urban, cultural, and political geography. New developments in location theory. 4 gr. cr. Aut. Qtr.

15-041-781. **Seminar: Population Geography.** Population growth, distribution, redistribution. Pre-industrial, industrial, post-industrial sociocultural systems; geographic-demographic implications. 4 gr. cr. Win. Qtr.

15-041-785, 786. **Seminar in the Location Theory Research Cluster.** Urban-economic-transportation geography reflected in professional literature of last decade: movement, networks, nodes, hierarchies, surfaces, spatial decision making; perception, institutional settings; seminar papers required. 4 gr. cr. Win., Spr. Qtrs.

15-041-792. **Geographic Methods: Research Models.** Application of mathematical methods to relationships indicated by geographic theory. Construction, use of multi-variate spatial models. 4 gr. cr. Spr. Qtr.

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

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. Admission by permission of instructor. 3 gr. cr. ea. Qtr. (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.

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

Geology

Head: Killinc; Teaching Staff: Briskin, Caster, De Jong, Durrell, Grover, Huff, Jenks, Larsen, Maynard, Meyer, Potter, Pryor, Sunderman.

The Department offers work leading to the degrees of Master of Science (with or without thesis option) 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. 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.

A requirement for the M.S. (thesis) and the Ph.D. is the satisfactory completion of a thesis or dissertation describing the results of student's research work. The non-thesis M.S. option — students not planning to work toward a doctorate may petition to enter the non-thesis Master's program. This requires (1) 15 to 20 credit hours of approved, advanced work in an allied discipline, and (2) completion of an approved research project under the supervision of a faculty member.

A reading knowledge of one foreign language, preferably French, German or Russian, is required for the Ph.D.

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

All graduate students are required to participate in the annual four-day departmental field trip and should anticipate living expenses of about \$50.

For Advanced Undergraduate and Graduate Students

15-040-501, 502. **Petrology.** Hand lens petrography, thin section studies of common rocks. 3 gr. cr. Aut., Win. Qtrs. Larsen. Prereq.: 301-2-3.

15-040-521, 522. **Paleontology.** Fundamental concepts; paleobiology and the geological occurrence and significance of fossil organisms. 3 gr. cr. ea. Qtr. Meyer.

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

15-040-561. **Interpretation of Aerial Photos.** 3 gr. cr. Win. Qtr. Durrell

15-040-576. **Advanced Geology Field Trip.** A two weeks' field excursion during the Summer of 1977. Historical and regional geology. Conferences and report in Aut. Qtr. 3 gr. cr. Aut. Qtr. Pryor.

15-040-580. **Advanced Geomorphology.** The physics and chemistry of processes of erosion; equilibrium theories of landscape evolution. 3 gr. cr. Win. Qtr.

15-040-581. **Field Studies in Structural Geology.** Reading in Win. Qtr., and 10-day field trip in Spring break. 3 gr. cr. Win. Qtr. Prereq.: Perm. of instr. De Jong.

15-040-631. **Clay Mineralogy I.** Structural mineralogy, polytypism, ion exchange properties and dehydration-rehydration reactions in clays. 3 gr. cr. Aut. Qtr. Huff.

15-040-632. **Clay Mineralogy II.** Geology of clays. Clay formation in soils, continental and marine environments. Problems in diagenesis. 3 gr. cr. Win. Qtr. Huff.

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

15-040-651, 652. **Geological Data Analysis.** Application of statistics, computing to diverse geological, paleontological problems. Case histories. 3 gr. cr. Aut., Win. Qtrs. Potter.

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.: 531-2. Potter, Pryor, Maynard.

15-040-664. **Metamorphic Petrology I.** Principles and methods; minerals, phase relations, analysis and calculations, lab methods. 4 gr. cr. Aut. Qtr. Prereq.: Geol. 303, 501, 502 or equiv. Larsen.

15-040-665. **Metamorphic Petrology II.** Occurrence, genesis, petrography. 4 gr. cr. Win. Qtr. Prereq.: 664. Larsen.

15-040-666. **Seminar in Metamorphic Petrology.** Major problems, current literature. 3 gr. cr. Spr. Qtr. Prereq.: 665. Grover, Kilinc, Larsen.

15-040-668. **Mineral reactions; controls of**

15-040-669. **The Role of minerals and their u**

15-040-673. **Topics**

15-040-675. **Problems Jenks.**

15-040-677. **Regions**

15-040-678. **Regions**

15-040-693. **Modern oceanic-atmospheric tions. 3 gr. cr. Spr.**

15-040-695, 696. **Recent marine ecology Briskin, Meyer.**

Primarily for Graduate
15-040-701, 702, 703. **Sedimentology. Spr Pryor.**

15-040-711, 712. **Microbiology of planktonic cr. ea. Qtr. Aut., W**

15-040-731. **Geochronology of fluids under metam**

15-040-741. **Optical substances in imm**

15-040-775. **Field Studies in Spring vacation or**

15-040-780. **Methods**

15-040-821. **Seminars**

15-040-822, 823. **Field Studies. 3 gr. cr.**

15-040-844. **Seminars**

15-040-874, 875, 876. **Research**

15-040-881. **Research**

15-040-882. **Research**

15-040-883. **Research**

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15-040-886. **Research**

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15-040-888. **Research**

15-040-889. **Research**

15-040-890. **Research**

15-040-891. **Research**

15-040-892. **Research**

15-040-893. **Master's**

15-040-971. **Doctoral**

required.

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. Grover.

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. Grover.

15-040-673. Topics in Structural Geology II. Interpretation of tectonic structures. 3 gr. cr. Spr. Qtr. DeJong.

15-040-675. Problems of Ore Formation. 3 gr. cr. Win. Qtr. Prereq.: Geol. 475, 501, 502 or equivalent. Jenks.

15-040-677. Regional Geology. (The Evolution of North America.) 3 gr. cr. Aut. Qtr. DeJong.

15-040-678. Regional Geology. (Mountain Belts outside North America.) 3 gr. cr. Spr. Qtr. DeJong.

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. Briskin.

15-040-695, 696. Paleocology. Fundamental ecological processes. Physical and chemical parameters. Recent marine ecological models and ancient analogs. 3 gr. cr. Aut., Win. Qtrs. Prereq.: Geol. 521, 522. Briskin, Meyer.

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. Maynard, Potter, Pryor.

15-040-711, 712. Micropaleontology-Paleocirculation Models of the Late Cenozoic. Ecology and paleoecology of planktonic foraminifera. Reconstruction of oceanic circulation and global climatic shifts. 3 gr. cr. ea. Qtr. Aut., Win. Qtrs. Briskin.

15-040-731. Geochemistry of Hydrothermal Processes. Geochemistry of processes involving hydrothermal fluids under metamorphic and igneous conditions. 3 gr. cr. Win. Qtr. Kilinc.

15-040-741. Optical Crystallography. Use of the polarizing microscope for recognition of transparent substances in immersion media. 4 gr. cr. Spr. Qtr. Sunderman.

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. Pryor.

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

15-040-821. Seminar in Paleontologic Principles. 3 gr. cr. Aut. Qtr.

15-040-822, 823. Seminar in Megascopic Paleontology. Reading knowledge of German and French desirable. 3 gr. cr. Win., Spr. Qtrs.

15-040-844. Seminar in Geomorphology. 3 gr. cr. Spr. Qtr.

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

15-040-881. Research — Special Problems — Paleontology. Credit arranged. Offered ea. Qtr.

15-040-882. Research — Mineralogy. Credit arranged. Offered ea. Qtr.

15-040-883. Research — Structural Geology. Credit arranged. Offered ea. Qtr.

15-040-884. Research — Petrology. Credit arranged. Offered ea. Qtr.

15-040-885. Research — Economic Geology. Credit arranged. Offered ea. Qtr.

15-040-886. Research — Geomorphology and Remote Sensing. Credit arranged. Offered ea. Qtr.

15-040-887. Research — Sedimentary Petrology. Credit arranged. Offered ea. Qtr.

15-040-888. Research — Stratigraphy — Sedimentation. Credit arranged. Offered ea. Qtr.

15-040-889. Research — Clay Mineralogy. Credit arranged. Offered ea. Qtr.

15-040-890. Research — Geophysics (Paleomagnetism). Credit arranged. Offered ea. Qtr.

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

15-040-892. Research — Geochemistry. 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.

UNIVERSITY OF CINCINNATI BULLETIN



1977-1978

McMICKEN COLLEGE OF ARTS AND SCIENCES

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

First June 19 — July 20
Second July 24 — Aug. 24
Quarter June 19 — Aug. 24
Commencement Aug. 25

First June 19 — July 11
Second July 12 — Aug. 2
Third Aug. 3 — Aug. 24
Quarter June 19 — Aug. 24

First June 20 — July 21
Second July 25 — Aug. 25
Quarter June 20 — Aug. 25
Commencement Aug. 26

First June 20 — July 12
Second July 13 — Aug. 3
Third Aug. 4 — Aug. 25
Quarter June 20 — Aug. 25

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

15-041-241. **Geography of Australia and the Southwest Pacific.** Regional economic development in Australia, New Zealand, Melanesia; immigration policies; alternative urban futures; environmental management. 3 ug. cr. Aut. Qtr.

15-041-251. **Geography for Travelers.** Designed for people who might be traveling in the U.S. or in foreign countries. In addition to general travel-related material, several geographic tools, techniques, and concepts will be discussed that might be of use to the traveler. 3 ug. cr. Spr. Qtr.

Urban and Economic Geography

15-041-321. **Urban Geography: Comparative.** Comparative analysis of leading world cities in differing economies and cultures; the urban network of the United States. 3 ug. cr. Aut. Qtr.

15-041-322. **Urban Geography: Historical.** Origin, location, and evolution of cities. History of urban development from ancient times through the twentieth century. 3 ug. cr. Win. Qtr.

15-041-341. **Economic Geography.** Manufacturing, agriculture, and services as related to resources and location. Regional economic systems. Location theory. 3 ug. cr. Aut., Win. Qtrs.

15-041-560. **Marketing and Transportation Geography.** Concepts and techniques of economic and urban geography as applied to productive and service locations and spatial interaction. 3 ug. cr. Spr. Qtr. Prereq.: 341 or permission of instructor.

15-041-572. **Urban Geography: Systematic.** Central place theory, economic base study, form and function; the relation of theory to urban planning. 3 ug. cr. Spr. Qtr. Prereq.: Geog. 321 or 322 or permission of instructor.

15-041-573. **The Urban Habitat.** Modern North American cities as physical and social environments at various scales. Ecological problems of the city as a spatial system. 3 ug. cr. Win. Qtr.

Geographical Theory and Techniques

15-041-501, 502, 503. **Problems in Geography.** Individual research problems. Credit depends on amount of work completed. Offered ea. Qtr. Hours to be arranged.

15-041-574. **Introductory Cartography.** Map compilation, generalization, symbolization. Drafting and lettering techniques. Reproduction. Maps as a research and teaching tool. 3 ug. cr. Win. Qtr.

15-041-575. **Geo-Graphics.** Problems in effective design of maps and diagrams in Geography, Geology, Planning, and Social Sciences. 3 ug. cr. Spr. Qtr.

15-041-578. **History and Philosophy of Geography.** Growth of geographic thought from Greco-Roman to German, French, British, Russian, and American Schools with emphasis on contemporary problems. 3 ug. cr. Win. Qtr.

15-041-579. **Field Work and Research Methods.** Training in field study, methods and techniques, including mapping, air photo use, interviewing, and report writing, with stress on urban areas. 3 ug. cr. Aut. Qtr.

15-041-582. **Contemporary Geographical Theory.** Geography as a discipline; recent major conceptual statements in geography, analyzing meaning and significance to the field as well as relationships to other fields. 3 ug. cr. Spr. Qtr.

15-041-585, 586. **Geographic Methods: Quantitative Techniques.** Introduction to areal statistics, computer mapping, and computer use. 3 ug. cr. Aut., Win. Qtrs.

15-041-601, 602, 603. **Field Projects.** Execution of individual field projects under regular faculty supervision. Credit varies with work completed. Offered ea. Qtr. Hours to be arranged.

Geology

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

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

The department also has the Amoco Scholarship, covering the academic period of 1976-77 through 1979-80.

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 may be asked to take 101-2-3.

To qualify for the B.S. 331, 405-6, 445, 501-2. In addition to the basic in geology must be a majoring in Geology and in French, German or

The B.S. major may career. Information on

All students are required acceptable field training of the geological survey of the staff.

Each autumn some staff is available, and should

15-040-101, 102, 103 lab. 5 ug. cr. ea. Qtr. 102; Volcanoes; Mineral building; Ore deposits

15-040-104, 105, 106 to major in earth science another science 3 ug

15-040-271. Geologic weekly and final report

15-040-281. Geology human factors in society No prereq.

15-040-282. Geology distribution, consumption

15-040-289. Principles sediments, oceanic majors.

15-040-301, 302. Minerals systematics of the class of instructor.

15-040-303. Introduction transparent minerals

15-040-321, 322. History emphasis on North America

15-040-331. Elements Structural Geology.

15-040-405. Principles structure and geology

15-040-406. Major Principles of the origin of the

15-040-421, 422. Introduction various geologic processes

15-040-445. Quantitative in the solution of geologic

15-040-474, 475. Geology

15-040-476. Geology

15-040-477. Introduction ment and geologic

To qualify for the B.S. degree in geology a student shall include in his/her program Geol. 271, 301-2-3, 331, 405-6, 445, 501-2, 521-2, Chem. 101-2-3, 111-2-3, 9 to 14 credits of calculus and 15 credits of physics. 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 321-2 or 531-2, 525 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. Information on graduate programs may be obtained from the Director of Graduate Studies.

All students are required to take a six- to eight-week 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 may be included in a four-day field trip providing space is available, and should anticipate living expenses of about \$50.

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

15-040-271. Geologic Demonstration Trip. A two-weeks' field trip. September 1977. One-hour conference weekly and final report. 3 ug. cr. Aut. Qtr.

15-040-281. Geology and Technology of Mineral Resources. Geologic, environmental, economic and human factors in supplying growing population with metals and industrial minerals. 3 ug. cr. Aut. Qtr. No prereq.

15-040-282. Geology and Technology of Energy Resources. A survey of energy problems: geology, distribution, consumption, conservation; alternate future sources. 3 ug. cr. Spr. Qtr. No prereq.

15-040-289. Principles of Oceanography. The history of ocean basins, oceanic circulation, oceanic sediments, oceanic pollution and the atmospheric-oceanic system. 3 ug. cr. Aut. Qtr. For non-science majors.

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 minerals in immersion media. 4 ug. cr. Spr. Qtr.

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.

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

15-040-405. Principles of Geomorphology. Fundamental concepts of land forms in terms of lithology, structure and geologic history. 3 ug. cr. Aut. Qtr. 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.

15-040-421, 422. Introduction to Geochemistry. Introduction to the application of chemical principles to various geologic problems. 3 ug. cr. Aut., Win. Qtrs. Prereq.: Chem. 106.

15-040-445. Quantitative Geological Methods. The application of mathematical and computer techniques in the solution of geological problems. 3 ug. cr. Spr. Qtr.

15-040-474, 475. Geology of Ore Deposits. 3 ug. cr. Aut., Win. Qtrs. Prereq.: Geol. 301, 302, 331.

15-040-476. Geology of Industrial Mineral Deposits. 3 ug. cr. Spr. Qtr.

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

Geology

Grover, Huff, Jenks.

Scholarship (see page

16-77 through 1979-80.

have completed 104-5-6

58 McMicken College of Arts and Sciences

- 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.
- 15-040-521, 522. **Paleontology.** Fundamental concepts; paleobiology and the geological occurrence and significance of fossil organisms. 3 ug. cr. ea. Qtr.
- 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.
- 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.
- 15-040-551. **Engineering Geology.** Physical properties of earth materials and their response to short term stresses. Field trips. 3 ug. cr. Aut. Qtr. Prereq.: Geol. 331, 405, or permission of instructor.
- 15-040-561. **Interpretation of Aerial Photos.** 3 ug. cr. Win. Qtr.
- 15-040-576. **Advanced Geology Field Trip.** A two weeks' field excursion during September 1977. Conferences and report in Autumn Quarter. 3 ug. cr. Aut. Qtr. Prereq.: Permission of instructor.
- 15-040-580. **Advanced Geomorphology.** The physics and chemistry of processes of erosion, and equilibrium theories of landscape evolution. 3 ug. cr. Win. Qtr. Prereq.: Geol. 405 or permission of instructor.
- 15-040-581. **Field Studies in Structural Geology.** Reading in Win. Qtr., and 10-day field trip in Spring break. 3 ug. cr. Win. Qtr. Prereq.: Permission of instructor.
- 15-040-631. **Clay Mineralogy I.** Structural mineralogy, polytypism, ion exchange properties and dehydration-rehydration reactions in clays. 3 ug. cr. Aut. Qtr.
- 15-040-632. **Clay Mineralogy II.** Geology of clays. Clay formation in soils, continental and marine environments. Problems in diagenesis. 3 ug. cr. Win. Qtr.
- 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. ea. Qtr. 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 ug. cr. Spr. Qtr. Prereq.: Geol. 531-2.
- 15-040-664. **Metamorphic Petrology I.** Principles and methods; minerals, phase relations, analysis and calculations, lab methods. 4 ug. cr. Aut. Qtr. Prereq.: Geol. 301-2-3 and 501-2.
- 15-040-665. **Metamorphic Petrology II.** Occurrence, genesis, petrography. 4 ug. cr. Win. Qtr. Prereq.: Geol. 664.
- 15-040-666. **Seminar in Metamorphic Petrology.** Major problems, current literature. 3 ug. cr. Spr. Qtr. Prereq.: Geol. 665.
- 15-040-668. **Mineral Chemistry.** Crystal chemistry; mineral solution models; inter- and intracrystalline reactions; controls of mineral stability. 3 ug. 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 ug. cr. Spr. Qtr. Prereq.: Geol. 668.
- 15-040-673. **Topics in Structural Geology.** Interpretation of tectonic structures. 3 ug. cr. Spr. Qtr. Prereq.: Geol. 331 or permission of instructor.
- 15-040-675. **Problems of Ore Formation.** 3 ug. cr. Win. Qtr. Prereq.: Geol. 475, 501, 502 or equivalent.
- 15-040-677. **Regional Geology.** (The evolution of North America.) 3 ug. cr. Aut. Qtr. Prereq.: Permission of instructor.
- 15-040-678. **Regional Geology.** (Mountain Belts outside North America.) 3 ug. cr. Spr. Qtr. Prereq.: Permission of instructor.

15-040-693. **Modern Con**
oceanic-atmospheric inter
tions. 3 ug. cr. Spr. Qtr.

15-040-695, 696. **Paleoec**
Recent marine ecological

Head: Professor Slessare
Harris, Ketelsen, Lewis, C

Two majors are available
in a Senior Comprehensive
of the German world and

German 101-2-3, 104-5-6

All advanced courses in
the instructor's permissi
in the course indicated b

The German major cons
is strongly recommended
Examination; petitions fo

Students majoring in Ge
German 231-2-3, 234-5-6
of the major credits ma
following fields: Anthrop
Philosophy, Political Sc
background for the seni

Students of the German
Literature and the Arts
Obrath, Chemistry Build

Linguistics. For Linguist

The International Busin
For details on the joint pr
Business Option Mr. G

The A&S Coop Program
15-000-271 must be tak

Note: The A&S languag
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for a total of 15 credit
German 201-202-203 (e
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Swedish 151-152-153 f
language requirement.

A Placement test will b
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15-010-101, 102, 103. f
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15-010-104, 105, 106.
requirement. Some ass

15-010-107. Individual
requirement. 1-15 ug. C
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 ug. cr. Spr. Qtr.

15-040-695, 696. Paleoeecology. Fundamental ecological processes. Physical and chemical parameters. Recent marine ecological models and ancient analogs. 3 ug. cr. Aut., Win. Qtrs. Prereq.: Geol. 521, 522.

Germanic Languages and Literatures

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

Two majors are available: a conventional major in *German*, which emphasizes literature and which culminates in a Senior Comprehensive Examination; a major in *German Studies*, emphasizing contemporary aspects of the German world and requiring a senior paper.

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

All advanced courses in German may be entered at the beginning of the Winter or Spring Quarter, with the instructor's permission. Students with previous German must take the placement test to be placed in the course indicated by their scores.

The German major consists of 54 credits in German courses beyond the level of 209. German 171-2-3 is strongly recommended as an elective in preparation for the German Culture section of the Comprehensive Examination; petitions for permission to count this course toward a major in German will be considered.

Students majoring in German Studies must complete at least the following courses within the department: German 231-2-3, 234-5-6, 237-8-9, and 331-2-3. German 171-2-3 is strongly recommended. The balance of the major credits may include up to 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 world, and should provide background for the senior paper. Acceptance into this Program must be approved by the adviser.

Students of the German Department can participate in the Interdepartmental *Program in Comparative Literature and the Arts and Sciences 4A Program*. For the requirements of this program see Professor Obrath, Chemistry Building.

Linguistics: For Linguistic course offerings in German, see Linguistics section of this *Bulletin*.

The International Business Option is another interdisciplinary program, available to students in German. For details on the joint program see the description on page 24 of this *Bulletin*. Adviser for this International Business Option: Mr. Galt, 742 Old Chemistry Bldg.

The A&S Coop Program is open to German students with interest in business. Professional Practice I, 15-000-271 must be taken prior to enrollment. For requirements see Mrs. Daley, Career Dynamics Center.

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 15 credit hours (admission by permission of instructor only); (3) by taking German 104-105-106 (emphasis on conversational skills) for a total of 15 credit hours; (4) by taking the 18 hour sequence of German 101-102-103 followed by German 201-202-203 (emphasis on reading), or 204-205-206 (emphasis on reading and translating factual material), or German 207-208-209 (emphasis on conversational skills).

Swedish 151-152-153 followed by 251-252-253 (emphasis on conversation and reading) 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 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, or, if such scores are satisfactory, may have the requirement waived.

15-010-101, 102, 103. Elementary German. This course followed by 201-2-3, 204-5-6 or 207-8-9, will satisfy the language requirement. Some assignments require attendance in the language laboratory. 3 ug. cr. ea. Qtr.

15-010-104, 105, 106. Elementary German with Conversation. This course will satisfy the language requirement. Some assignments require attendance in the language laboratory. 5 ug. cr. ea. Qtr.

15-010-107. Individualized Elementary German. Program tailored to individual needs. Fulfills language requirement. 1-15 ug. cr. Offered ea. Qtr. May be repeated for a maximum of 15 cr. hrs. Adm. by permission of instructor.