**Descriptions - Geography of Courses**

** IDC. Interdisciplinary Seminar on Africa**
For course description, see Interdisciplinary Courses.

**846. Seminar in Cartography**
Winter. 3(3-0) May reenroll for a maximum of 12 credits. Approval of department.
Selected research topics in cartographic theory and map design.

**850. Advanced Field Techniques**
Fall, Winter, Spring, Summer. Variable credit. May reenroll for a maximum of 6 credits.
Instruction and practical training in the selection, data-gathering, on-site analysis, and presentation of geographic field problems.

**855. Seminar in Geographic Education**
Spring. 3(3-0) Approval of department.
Treatment of selected topics in geographic education.

**870. Seminar in Medical Geography**
Winter. 3(0-0) Spatio-environmental analysis of selected health problems.

**899. Master's Thesis Research**
Fall, Winter, Spring, Summer. Variable credit. May reenroll for a maximum of 9 credits. Approval of department. Research on specific geographical problems.

**934. Problems in Population**
Fall, Winter, Spring. Variable credit. May reenroll for a maximum of 9 credits. Approval of department. Special research problems.

**970. Problems in Medical Geography**
Fall, Winter, Spring. Variable credit. May reenroll for a maximum of 6 credits. Approval of department. Selected research topics in medical geography.

**999. Doctoral Dissertation Research**
Fall, Winter, Spring, Summer. Variable credit. Approval of department.

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**GEOLOGY GRG**

**College of Natural Science**

**200. The Geology of Man's Environment**
Fall, Winter, Spring, Summer. 3(3-0) Not open to Geology majors. Credit will be given in only one of the following: GLG 200, GLG 201, GLG 306.
Man and his geologic environment: earthquakes, volcanoes, landslides, subaerial flooding, coastal erosion, hydrology and human use, waste disposal, geologic aspects of environmental health, resources and energy, environmental law.

**200L. Laboratory-Geology of Man's Environment**
Fall, Winter, Spring, Summer. 1(0-3) GLG 200 or concurrently. Laboratory study of geologic processes associated with environmental hazards. Emphasis placed on land-use planning, applying geologic criteria to evaluate land potentials.

**201. Earth Processes**
Fall, Winter, Spring, 4(4-2) Credit will be given for only one of the following: GLG 200, GLG 201, GLG 306.
Physical processes concerning evolution of Earth and its environments. Conservation and interaction of energy and matter through time. Laboratory stresses interpretation of process through studies of geologic data.

**202. Evolution of the Earth**
Fall, Winter, Spring. 4(4-2) GLG 200, or GLG 201, or GLG 306. Integration of physical, chemical and biological processes from which man's present environment has evolved; problems and controversies in the development of ideas of geologic and organic evolution.

**205. Oceanology-The Marine Environment and Man**
Fall. 3(3-0) Physical oceanography, including origin, hydrologic, chemical, geological properties; and environmental quality of the ocean. Man-sea interactions are emphasized including resource utilization and pollution.

**221. Minerals, Rocks and Fossils**
Spring 3(2-3) Not open to majors. Description, occurrence and identification of minerals, rocks, fossils, and additional features of especial significance to general science teachers and other earth science interest groups.

**252. Energy Resources of the Earth**
Winter. 3(3-0) World energy resources of petroleum, coal, and atomic fuel. Social, political, economic and environmental problems of fuels.

**306. Solar System Geology**
Winter. 4(4-0) AST 219 or AST 231. The origin, relationships, make-up and features of the bodies in the solar system emphasizing recent space exploration results and developing theories.

**302. Vertebrate Life of the Past**
Fall. 3(3-0) One course in a physical or biological science or Juniors. Interdepartmental with the Department of Zoology. Fossil vertebrates from fish to man.

**304. Geology of Michigan**
Fall. 3(3-0) GLG 200 or GLG 201 and/or GLG 202, or approval or department. A historical accounting of the physical, historical and economic geology of Michigan and its environs; a course designed for students seeking an overall picture of the rather unique Michigan geological environment.

**306. Engineering Geology**
Fall, Spring. 3(3-2) Credit will be given for only one of the following: GLG 200, GLG 201, GLG 306. Sophomore Engineering students.
Fundamental principles of geology as applied to civil engineering practice. Minerals and rocks, aerial photographs, topographic and aerial geologic maps, and geologic cross sections studied in laboratory. Source of geologic literature and maps.

**307. Geology Central Appalachians**
Winter. 10(2) GLG 201, or GLG 202, or concurrently. General geology of the Central Appalachians. A preparatory course for GLG 308. Field excursions-Central Appalachians during spring vacation.

**308. Field Excursion-Central Appalachians**
Spring. 2 or 3 credits. GLG 307. Training in stratigraphic, sedimentological, paleontologic, and structural principles as applied to field methods.

**321. Mineralogy**
Fall. 3(1-4) One term of chemistry. Introduction to crystal systems and forms exhibited by minerals, followed by study of composition, occurrence, classification, and identification of nonmetallic minerals.

**322. Mineralogy**
Winter. 4(3-4) GLG 321. Economic and chemical importance of minerals; mineralogy of nonmetallic; practical crystallography; geochemistry of minerals.
335. **Fossil Plants, Their History and Paleoeocology**

   Spring, 3(3-4) One course in geology or botany or biology or approval of department. Interdepartmental with the Department of Botany and Plant Pathology.

   History of plants through geologic time; their form and evolution; how and where found, identified and reconstructed; their use in determining ancient geographic patterns, paleoenvironments, paleoclimates and community structure. Field trip.

337. **The Fossil Record of Organic Evolution**

   Spring, 3(3-4) One course in natural science. Juniors. Interdepartmental with the Department of Zoology.


344. **Field Geology-Summer Camp**

   Summer. 9 credits. GLG 292, GLG 363. Trigonometry; GLG 446, GLG 437, GLG 451 recommended.

   Methods and techniques of geological surveying and mapping. Field interpretation of geological phenomena in igneous, metamorphic and sedimentary rocks in northern Michigan and Wisconsin.

   A. **Introduction to Field Techniques**

      3 credits.

      Introduction to field techniques with stress in those that apply to sedimentary rocks. Stratigraphic correlation.

   B. **Methods of Geological Mapping**

      4 credits.

      Plane table surveys, aerial photo and reconnaissance mapping. Examination and interpretation of structural and textural relationships in igneous and metamorphic rocks.

   C. **Geologic Interpretation of Selected Areas**

      2 credits.

      Independent mapping and interpretation.

363. **Lithology**

   Winter. 4(3-4) GLG 321.

   Processes that form igneous, metamorphic and sedimentary rocks, and their distribution, variation and occurrence of rock. Study of rock properties in the field, in laboratory, and with the microscope.

392. **Sedimentology**

   (492.) Spring, 3(3-3) GLG 363.

   Grain and aggregate properties of sediments; relationships of these processes to processes in the environment of deposition and to the pre-depositional and post-depositional history.

400H. **Honors Work**

   Fall, Winter, Spring. Variable credit. Approval of department.

401. **Environmental Geology**

   Spring of odd-numbered years. 3(3-0) GLG 200, or GLG 201, or GLG 306, MTH 113, or approval of department.

   Quantitative solution of geological problems applied to environmental planning and management, including surface and ground water waste disposal, urban geology, and methods for prediction of geologic hazards and resources.

403. **Fluvial Geomorphology**

   Fall, 4(3-4) Junior majors in GLG, E E, and CSS; one course in physical geology and junior standing in geology, civil engineering or soil science.

   Quantitative analyses of the fluvial processes associated with the development of drainage basin morphology, with emphasis on stream bed erosion and sediment transport. Field trips are required.

411. **Hydrogeology**

   Winter. 3(3-2) One term of geology and trigonometry.

   Principles of the sources, occurrence, and movement of ground water. Surface and subsurface investigations of ground water and elementary groundwater hydrology.

413. **Glacial Geology**

   Spring, 4(3-4) GLG 201.

   Geological aspects of glaciers and glaciation. Theories of ice ages through geologic time. Origin and development of glacial features. Character and chronology of the Pleistocene. Laboratory techniques, with field trips to observe glacial materials and features of Michigan.

426. **Optical and X-ray Mineralogy**

   Fall, 4(3-4) GLG 321, PHY 230 or PHY 289.

   Theory, principle and application of the polarizing microscope and X-ray diffractometer in mineral analysis.

430. **Vertebrate Paleontology**

   Winter, 4(3-3) ZOL 428 or approval of department. Interdepartmental with the Department of Zoology.

   Fossil vertebrates with emphasis on the evolution of major groups. Laboratories on modern techniques and on the identification and interpretation of fossils.

437. **Invertebrate Paleontology**

   Fall, 4(3-4) GLG 202 or ZOL 303 or approval of department. Interdepartmental with the Department of Zoology.

   Systematics and evolution of marine invertebrates; roles of fossils in correlation and delineation of geologic time; structure and morphology of fossils as related to evolutionary development.

438. **Paleoecology**

   Spring, 4(3-4) GLG 203 or ZOL 389 or approval of department. Interdepartmental with the Department of Zoology.

   Distribution and abundance of marine fossils, response of skeletal morphology to environmental conditions, uses of fossils in reconstructing ancient climates and depositional environments.

445. **Field Studies**

   Fall, Winter, Spring, Summer. Variable credit. May enroll for a maximum of 12 credits. Approval of department.

   Advanced geologic or geophysical field studies.

446. **Principles of Stratigraphy**

   Fall, 3(3-0) GLG 437, GLG 392 or approval of department.

   Covers principles of stratigraphy and application and exemplification of these principles to known geologic occurrences.

451. **Structural Geology**

   Spring, 4(3-4) GLG 392. Description, classification, and origin of secondary structures such as folds, faults, joints, cleavages, foliations and lineations. Three-dimensional visualization stressed in economic laboratory problems involving descriptive geometry, stereographic projections, areal, and structural geologic maps.

463. **Petrology**

   Winter, 4(3-4) GLG 363.

   Introduction to the chemical and physical processes that are responsible for the origin and evolution of igneous and metamorphic rocks. Laboratory studies of rock suites that illustrate basic processes in petrology.

474. **Exploration Geophysics**

   Winter, 4(3-2) GLG 201 or GLG 396; MTH 112; PHY 239 or PHY 299.

   Techniques used in geophysical exploration, with application in petroleum prospecting, minerals exploration, and engineering. Includes gravity, magnetic, seismic, electrical and other methods, and well logging. Interpretation of geophysical data.

475. **Solid Earth Geophysics**

   Fall, 3(3-0) MTH 112; PHY 239 or PHY 299, one term of geology.

   Geophysics, including Earth's composition and structure, its dynamic character, radioactivity and age determinations, seismicity and seismology, gravity and magnetic fields, heat flow, physical properties of earth materials.

479. **Geotectonics**

   Winter of even-numbered years. 3(3-0) GLG 451 or approval of department.

   Aspects of global dynamics and geotectonics. Includes the origin and distribution of major structural features, geological and geophysical evidence for crustal movements, continental drift, behavior of earth materials.

482A. **Mineral Resources**

   (492.) Spring of odd-numbered years. 4(4-0) GLG 321, GLG 451.


482B. **Mineral Resources Evaluation**

   Spring of even-numbered years. 3(3-0) GLG 321, GLG 451 and approval of department.

   Emphasis on practical applications of geoscience to mineral resources and the extractive industries. Aspects of exploration and development of reserves including evaluation, grade estimation, drilling, recovery, and beneficiation.

483. **Petroleum Geology**

   Fall, 4(3-2) Approval of department.

   Fundamental principles of the origin, migration and accumulation of petroleum. Exploration techniques to include well drilling, electric and radioactive well logging, seismic interpretation, and other surface exploration methods, seismic surveys, land leasing and oil field development. Laboratory study of well log plotting and subsurface mapping technique.
493. Carbonate Sedimentology
Winter. 3(3-2) GLG 392.

Genesis of carbonate sediments including discussion of carbonate-secreting organisms, effects of environment on mineralogy, depositional environments and diagenesis.

495. Geochemistry
Fall. 3(3-0) GLG 201, EEM 152 or approval of department.

Origin of the elements. Geochemical evolution of universe, solar system, earth. Factors affecting the distribution of elements in earth including the applications of thermodynamics and crystal field theory. Isotope geology.

496. Geochemical Cycles
Spring of odd-numbered years. 3(3-0).

GLG 495 or approval of department.

Examination of the natural circulation of the elements, human impact on these cycles; and the effect of trace elements on health and disease.

500. Special Problems
Fall, Winter, Spring, Summer. Variable credit. Approval of department.

Special problems in hydrogeology, geomorphology and glacial geology, mineralogy and crystallography, petrology, palaeontology, structural geology, and petroleum stratigraphic and geophysical geology. Special problems in paleontology, petrology, economic geology, palaeobiology, sedimentation, and geochemistry.

503. World Regional Geology
Spring of even-numbered years. 3(3-0).

One course each in structural geology, sedimentation. World regional geology emphasizing mountain building, basin structure and associated sediments, continental drift and plate tectonics.

810. Seminar
Fall, Winter, Spring. 1 to 3 credits. May reenroll for a maximum of 12 credits.

Seminar relating to current research in geology.

825. Clay Mineralogy
Winter. 3(3-4) CSS 540, CSS 550 or approval of department. Interdepartmental with the Department of Crop and Soil Sciences. Structures and properties of clays; their origins, occurrence, and utilization. Methods of studying clays including X-ray diffraction, differential thermal analysis, infrared absorption and other chemical and physical techniques.

839. Paleobotany
Fall. 4(3-4) Approval of department. Interdepartmental with and administered by the Department of Botany and Plant Pathology. Survey of fossil plants: their preservation, occurrence, geology, paleoecology, palaeoecology, evolutionary history, classification and representative types. One weekend field trip to fossil plant locality.

843. Paleozoic Stratigraphy
Winter of odd-numbered years. 4(5-0)

GLG 446, GLG 392.

Classification, distribution, paleogeography, palaeontology, interrelation, and structural setting of stratigraphic units within the Paleozoic systems. Laboratory work includes construction of correlation charts, structure and restored sections, geologic, paleoecologic, and lithologic maps, and study of certain key fossils.

844. Mesozoic and Cenozoic Stratigraphy
Winter of odd-numbered years. 3(3-0)

GLG 446.

Stratigraphy and paleontology with emphasis on tectonics and sedimentation.

852. Structure of Ore Bodies
Winter of even-numbered years. 3(2-4)

GLG 451, MTH 214.

Mathematics and physics applied to problems in structural geology.

856. Evolution of the Earth’s Crust and Mantle
Fall. 3(3-0) GLG 462.

The composition, mineralogy and petrology of the Earth’s mantle and crust. Plate tectonics and its relationship to earlier models of geosynclines, orogenic cycles, continental drift, etc.

862. Petrology—Igneous
Spring of even-numbered years. 2 to 4 credits. May reenroll for a maximum of 8 credits. GLG 462. Must enroll for laboratory with initial registration.

Physical and chemical principles involved in the origin of igneous rocks. Application of experimental techniques in petrology.

863. Petrology—Metamorphic
Spring of odd-numbered years. 2 to 4 credits. May reenroll for a maximum of 8 credits. GLG 462. Must enroll for laboratory with initial registration.

Origin and classification of metamorphic rocks. Study includes thin section investigation of the metamorphic textures and mineral associations and the physical-chemical principles involved in their development.

870. Topics in Geophysics
Spring. 1 to 3 credits. May reenroll for a maximum of 12 credits. Approval of department.

Topics and problems in geophysics, such as tectonophysics, terrestrial heat flow, processing and analysis of geophysical data, geomagnetism, paleomagnetism, high-pressure geophysics.

872. Exploratory Seismology
Fall of even-numbered years. 2(4-2)

GLG 474.

Theory and technique of field seismic exploration methods. An associated geophysical survey will be conducted and a report prepared.

873. Seismology I
Winter of odd-numbered years. 3(3-0)

MTH 215 or concurrently, PHY 289 or concurrently.

Theory and application of seismic wave propagation in earth materials.

874. Seismology II
Spring of even-numbered years. 3(3-0)

GLG 573 or approval of department.

Continuation of GLG 873.

875. Advanced Geophysical Exploration I
Fall of odd-numbered years. 4(3-2)

GLG 474.

Theory and technique of gravity and magnetic methods, and their use in geophysical exploration. Associated practical exercises and laboratory work.
876. Advanced Geophysical Exploration II
Winter of even-numbered years. 4(3-2)
GLG 474, MTH 214.

Methods and techniques in geophysical exploration, including electrical, electromagnetic, radioactivity, geophysics, economic geology, petrology, sedimentation, and geochronology.

879. Rock Magnetism and Paleomagnetism
Spring of even-numbered years. 3(3-0)
GLG 321, GLG 475, one year mathematics, one year physics, or engineering or physics majors.

Geomagnetism, and application to earth science. Character and history of the Earth's magnetic field, physics of remnant magnetism, magnetic properties of minerals and rocks, paleomagnetism, experimental results and procedures.

899. Doctoral Dissertation Research
Fall, Winter, Spring, Summer. Variable credit. Approval of department.

998. Topics in Comparative Literature
Fall, Winter, Spring. 3(3-0) or 4(4-0)
May reenroll for a maximum of 12 credits if different topics are offered. Interdepartmental with the departments of English and Romance and Classical Languages and administered by the Department of Romance and Classical Languages.

Varying topics on relationships among writers, themes, genres, movements and periods in different national literatures, and between literature and other arts.

825. Comparative Literature: Studies in Theme and Idea
Fall. 3(3-0) May reenroll for a maximum of 9 credits. Interdepartmental with the departments of Romance and Classical Languages and English and administered by the Department of Romance and Classical Languages.

Myths, archetypes, Topics, significant ideas and intellectual currents in different periods and cultural traditions.

856. Comparative Literature: Literature and Other Disciplines
Winter. 3(3-0) May reenroll for a maximum of 9 credits. Interdepartmental with the departments of Romance and Classical Languages and English and administered by the Department of Romance and Classical Languages.

Relations between literature and the sciences and other arts; social, historical, psychological, philosophical bases of literary study.

878. Comparative Literature: Methods in the Study of Comparative Literature
Fall, 3(3-0) Interdepartmental with the departments of English and Romance and Classical Languages and administered by the Department of English.

Rationale and techniques of study in comparative literature.

902. Comparative Literature: Studies in Form and Genre
Winter, Spring. 3(3-0) Interdepartmental with the departments of English and Romance and Classical Languages and administered by the Department of English.

Development and interrelationships of individual and collective forms and genres of literatures of the Western world, including the drama, tragedy, the novel, the short story, the theory and forms of poetry, popular literature, and the tale.

903. Comparative Literature: Studies in Periodization
Fall, Winter, Spring. 3(3-0) Interdepartmental with the departments of English and Romance and Classical Languages and administered by the Department of English.

Analysis of the manner in which various genres, conventions and continuing traditions of literature interact with the creative and critical climates of particular periods and movements, such as classicism, the Middle Ages, the baroque, or romanticism, in qualifying or modifying characteristic literary works.

987. Seminar: Special Topics in Comparative Literature
Spring. 3(3-0) Advanced graduates. Interdepartmental with the departments of Romance and Classical Languages and English and administered by the Department of Romance and Classical Languages.

GERMAN AND RUSSIAN

College of Arts and Letters

Students who have had high school work in the foreign language in which they wish to continue their studies must take a placement examination in that language. Placement in the appropriate course is determined by the results of this examination. University credit is not given for courses waived by performance on the placement examination.

GERMAN AND RUSSIAN COURSES

303. Folklore
Spring, 3(3-0)
Folk heritage of peoples as revealed in their legends, superstitions, ballads, folk songs, heroic tales, sayings, customs, and beliefs. Historical development of traditional lore as a reflection of social attitudes and the source for national mythologies.

417. Scandinavian Contributions to Literary Tradition
Winter. 3(3-0) Approval of department.
Interdepartmental with the departments of English and Romance and Classical Languages.

Development and influence of the ideas, forms and motifs of the Scandinavian literatures in the literatures of the world.

418. Scandinavian Contributions to Literary Tradition
Winter. 3(3-0) Approval of department.
Interdepartmental with the departments of English and Romance and Classical Languages.

Continuation of G R 417.