805. Business Ethics
Spring. 4(4-0) Graduate student in the College of Business or approval of instructor, Interdepartmental with and administered by the Department of Philosophy.
Ethical dimensions of such topics as corporate responsibility, preferential hiring, profit and taxation, deception and bribery, self-regulation versus government regulation, 'whistleblowing', and advertising. Readings from philosophical and business sources.

806. Population and Quantitative Genesitics
Spring. 3(3-0) ZOL 441 or approval of instructor.
Genetics of quantitative characteristics in populations with special reference to polygenic variation and its interactions with environment, gene action and its measurement, mating systems, and selection.

880. Special Problems
Fall, Winter, Spring, Summer. 1 to 4 credits. May reenroll for a maximum of 12 credits. Approval of instructor.
Students with special interests and abilities may study published literature in a selected genetics topic or they may carry on research in the laboratory on a selected subject in collaboration with genetics faculty.

999. Doctoral Dissertation Research
Fall, Winter, Spring. Summer. 3 to 12 credits. Majors.
Research for the doctoral dissertation in genetics.

GEOGRAPHY

College of Social Science
Courses are classified as follows:
Cultural—170, 201, 801, 901.
Economic—213, 409, 435, 809, 835, 906.
Field Techniques—415, 850.
Geographic Education—455.
History—310, 810, 910.
Independent Research—400H, 411, 818, 899, 918, 949.
Medical—470, 870, 970.
Political—170, 908.
Population—320, 836, 934.
Quantitative Methods—427, 428, 811.
Regional—204, 300, 315, 316, 321, 322, 340, 342, 393, 395, 812, 912.
Recreational and Environmental—100, 307, 309, 828.
Theory and Philosophy—130, 425, 825, 826.
Urban—418, 401, 462, 403, 468, 805.
Visual Media and Techniques—122, 223, 224, 424, 425, 446.

100. People, Location and Environment
Fall, Winter, Spring. 4(4-0)
Relationships between people and environments, their spatial consequences and resulting regional structures across the earth's surface.

122. The World of Maps
Fall, Winter, Spring. 3(3-0)
Discussion of types, practical applications, and sources of maps.
150. **Geography of Selected Current Problems**  
**IDC.** Contemporary Japan  
Fall, Winter, Spring. (2-2-0)  
For course description, see Interdisciplinary Courses.

160. **Future Worlds (S)**  
**IDC.** Contemporary South Asia  
Fall, Spring. (2-2-0)  
For course description, see Interdisciplinary Courses.

170. **Resource Ecology**  
**IDC.** Eastern and Southern Europe  
Fall. (3-0) Sophomores or approval of department.  
A geographical analysis of countries of Eastern and Southern Europe with emphasis on economic, political, social and ethnic problems.

201. **Geography of Culture**  
**IDC.** Winter, Spring. (3-0)  
A systematic discussion of cultural geography, stressing cultural processes and relationships.

202. **World Regional Geography (S)**  
**IDC.** Winter, Spring. (4-0)  
Human relationships with natural and cultural environments.

203. **Physical Geography**  
**IDC.** Fall, Winter, Spring, Summer. (4-4-0)  
Analysis of weather, climate, landforms, soils, water and biotic factors of the human environment, including its spatial, genetic, and functional interrelationships.

204. **World Regional Geography (S)**  
**IDC.** Fall, Winter, Spring, Summer. (4-4-0)  
Basic concepts of ecology which are the unifying basis for resource management, conservation policy and the analysis of environmental quality. Extensive use of guest lecturers.

206. **Physical Geography Laboratory**  
**IDC.** Fall, Winter, Spring, Summer. (4-4-0)  
Laboratory study of geographic aspects of map interpretation, aerial photography, weather, climate, soils, landforms, and vegetation.

210. **World Economic Geography**  
**IDC.** Fall, Winter, Spring, Summer. (4-4-0)  
Emphasis on distribution of natural resources, industries and service activities, stressing factors of location and economic concepts of locational change.

211. **Introduction to Cartography**  
**IDC.** Fall, Winter, Spring. (4-2-4)  
Principles and techniques of constructing maps and other graphic devices. Types of map reproduction.

220. **Remote Sensing: Airphoto Interpretation**  
**IDC.** Fall, Winter, Spring. (4-2-4)  
Use of aerial photographs in the identification and interpretation of physical and cultural features of the terrestrial environment. Includes principles of photogrammetry, and stresses application and practice.

222. **Introduction to Contemporary China**  
**IDC.** For course description, see Interdisciplinary Courses.

230. **Geography of Population**  
**IDC.** Fall. (3-4-0)  
Relationship of the size, composition, and distribution of population to geographic variations in the nature of places.

231. **Africa**  
**IDC.** Fall. (3-0) Sophomores or approval of department.  
Emphasis on continent south of Sahara: environments, peoples, problems, and potentials.

232. **Western Europe**  
**IDC.** Winter. (3-0) Sophomores or approval of department.  
Geographic analysis of physical and human character and resources of Western Europe (Scandinavia, British Isles, Benelux, Germany, France and Switzerland). Emphasis on major problems.

233. **Geography of Environmental Quality**  
**IDC.** Spring. (3-0) Sophomores or approval of department.  
Identification of the physical, cultural and psychological factors which constitute human environments, and how they vary and may be modified or controlled.

234. **Geography of Recreation**  
**IDC.** Winter. (3-0)  
Natural and cultural factors influencing the use of space for recreation. Emphasis on recreation land use in the United States and current problems and conflicts.

235. **South America**  
**IDC.** Spring. (3-0) Sophomores or approval of department.  
Regional geography of South America with special attention to contemporary geographic problems.

236. **Middle America**  
**IDC.** Winter. (3-0) Sophomores or approval of department.  
Interpretation of physical and cultural environment of Mexico, Central America, and the West Indies. Special attention to contemporary geographic problems.

237. **Cities of the World**  
**IDC.** Fall, Winter, Spring. (3-0)  
A cross-cultural examination of cities, their historic growth, regional functions, and internal dynamics.

238. **Historical Geography of the United States**  
**IDC.** Spring. (3-0)  
Reconstruction of geographies of the United States as they existed in the past.

239. **The Geography of the City**  
**IDC.** Spring. (3-0)  
Spatial theories, concepts, and designs of internal urban economic, social, and political structures.

241. **The Ghetto**  
**IDC.** UMS 401. Fall, Spring. (4-4-0) Juniors or approval of department.  
Analysis of the ghetto including its spatial organization, structure and distribution of non-white and ethnic populations in cities with emphasis on the United States.

242. **The American City and Its Region**  
**IDC.** Winter. (3-0)  
The regional system of cities in terms of size, spacing, and functional relationships.

243. **Michigan**  
**IDC.** Fall, Spring. (3-0) Sophomores or approval of department.  
Selected aspects of the physical and cultural geography of Michigan.

244. **Canada**  
**IDC.** Spring. (3-0) Sophomores or approval of department.  
An analysis of the physical, economic and cultural patterns of Canada.

245. **Geography of Transportation**  
**IDC.** Fall. (3-0)  
Analysis of spatial principles of transportation, including theories of interaction, network structures, and the role of transport in space-economy.

246. **Problems in Geography**  
**IDC.** Fall, Winter, Spring, Summer. 1 to 6 credits. Approval of department.  
Research on specialized geographic problems.
Descriptions – Geography

of Courses

415. Field Techniques
Fall, 4(1-7) May reenroll for a maximum of 6 credits. Approval of department.
Basic methods for making physical and cultural observations and measurements including map reading, photo interpretation, field sketch mapping, compass traverses, sampling, questionnaire design, interviewing, analysis and reporting. Requires work off campus.

418. Critical Issues in Contemporary Africa
Fall, Spring. 3(3-0) May reenroll for a maximum of 9 credits of different topics are taken. One course on African subject and approval of instructor. Interdepartmental with African Languages and the departments of Anthropology, History, Political Science, and Sociology. Administered by the Department of History.
Four separate multidisciplinary topics will be offered at different times; The Horn of Africa, Southern Africa, Africa and the Americas, Social Impact Studies.

424. Advanced Remote Sensing Techniques
Spring. 4(2-4) GEO 224.
Extraction, analysis, and interpretation of information obtained from remote sensors including conventional, infrared and radar imagery. Introduction to stereo-plotting devices, stressing theories of remote sensing and applications.

425. Development of Geographic Thought
Spring. 3(3-0) Approval of department.
Evolution of geographic thought from antiquity to the present emphasizing developments in the 20th century America. Survey of the theory and methodology of contemporary geography.

426. Advanced Cartography
Spring. 4(1-6) GEO 223.
Development of advanced skills in construction of maps, including ink drafting, lettering systems, map projections, scribbling and photo reproduction.

427. Quantitative Methods in Geography
Fall 4(4-0) Approval of department.
Basic quantitative techniques used in the analysis and classification of geographic data.

428. Computer Mapping in Geography
Spring. 4(4-0) CPS 120.
The preparation of computer maps and the application of the computer to the development and testing of models in geography.

429. Landforms of North America
Winter, Spring, 3(3-0) May reenroll for a maximum of 6 credits. GEO 206, GLG 201 or approval of department.
Study of the surface features of eastern U.S.A. (winter term) and western U.S.A. (spring term).

430. Climates of the World
Spring, 3(3-0) GEO 206 or approval of department.
Regional analysis of the world’s weather and climate.

431. Landform Analysis
Fall, 3(3-0) GEO 206, GLG 201 or approval of department.
A problem approach is utilized to explain classical and contemporary interpretations of the nature of selected landforms, including treatment of related tools and techniques. Option for some field study.

432. Biogeography
Spring, 3(3-0) GEO 206 or approval of department.
Patterns of vegetation, with emphasis on forests of eastern North America. Option for some field study.

435. Land Use and Location Theory
Spring, 3(3-0) GEO 213 or approval of department.
Location principles and theories of economic activities, including methods of regional analysis.

436. Microclimatology
Winter, 3(3-0) MTH 108; GEO 351 recommended. Interdepartmental with and administered by Agricultural Engineering Technology.
Physical environment in the lower few hundred meters of the atmosphere and within the biosphere.

440. Spatial Aspects of Regional Development
Spring, 3(3-0) GEO 213 or one 300 level regional geography course or approval of department.
Spatial and environmental factors in regional development at national and international scales.

446. Production Cartography
Winter, 4(3-4) GEO 223 or approval of department.
Deals with the technical aspects of map and graphics production both as a sequence of operations and as a series of problems of organizations. Theoretical and applied aspects, process photography, typography, and proofing.

451. Climatic Patterns and Atmospheric Circulation
Winter, 3(3-0) GEO 206 or approval of department.
Relationship between weather, climate, and upper air flow, with emphasis on this climatology of North America.

458. Geography for Teachers
Winter, 3(3-0)
Problems and practices of teaching geography in elementary and secondary schools.

466. Social and Spatial Approaches to Community Service
Spring, 3(3-0) GEO 201 or SW 205 or approval of department. Interdepartmental with and administered by the School of Social Work.
Analysis of major themes in social service planning: communities and neighborhoods, public policy administration, social service networks, location of public facilities, evaluation and accountability of service systems.

470. Geography of Health and Disease
Fall, Winter, 3(3-0)
Spatio-environmental concepts and the techniques applied to health problems: disease transmission cycles, community nutrition and healthcare planning.

501. Seminar in Cultural Geography
Fall, 3(3-0) Approval of department.
Theory, methodology, and techniques in cultural geography.

505. Seminar in Urban Geography
Spring, 3(3-0) Approval of department.
Selected research topics on the geography of the city.

Methods and techniques for accurate measurement and interpretation of environmental parameters. Temperature, humidity, wind and air flow characteristics, radiation, light intensity, gaseous and particulate concentrations in atmospheric microclimates will be discussed.

509. Seminar in Transportation Geography
Winter, 3(3-0) Approval of department, GEO 409.
Selected research topics.

511. Advanced Quantitative Methods in Geographic Research
Winter, 4(2-4) Approval of department, GEO 427.
Statistical and mathematical approaches to spatial distributions and areal data.

512. Regional Seminar
Fall, Winter, Spring, Summer. 1 to 3 credits. May reenroll for a maximum of 9 credits. Approval of department.
Selected research topics in regional geography.

518. Readings in Geography
Fall, Winter, Spring, Summer. Variable credit. May reenroll for a maximum of 15 credits. Approval of department.

525. History and Philosophy of Geography
Fall, 3(3-0) Approval of department.
Analysis of the monographic and serial literature dealing with the theory and evolution of geographic science.

526. Research Design in Geography
Winter, Spring, 3(3-0) Approval of department.
Formalized approach to research and writing in geography: Identification of geographic problems and their relative importance, structuring and stating hypotheses, data acquisitions, and tests for validity.

528. Seminar in Recreation Geography
Spring, 3(3-0) GEO 369 or approval of instructor.
Selected current problems in recreation geography in the U.S. and abroad.

534. Seminar in Physical Geography
Winter, Spring, 3(3-0) May reenroll for a maximum of 9 credits. Approval of department.
Analysis of classical and contemporary problems in physical geography treated as follows: climatology (winter), biogeography (spring), geomorphology (spring).
835. Seminar in Location Theory
Fall, 3(3-0) Approval of department, GEO 435.
Recent developments and research in location theory and regional science.

839. African Research
(IDC 938) Fall, Winter, Spring, 2 to 4 credits. May be repeated for a maximum of 8 credits. Graduate standing or approval of instructor. Interdepartmental with African Languages and the departments of Administration and Curriculum, Anthropology, History, Political Science, and Sociology. Administered by the Department of Anthropology. African related archival and field research topics and methodologies viewed from the perspective of relevant social science and humanistic disciplines associated with the African Studies Center.

846. Seminar in Cartography
Winter, 3(3-0) May be repeated 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, 1 to 4 credits. May be repeated for a maximum of 8 credits. Instruction and practical training in the selection, data-gathering, on-site analysis, and presentation of geographic field problems.

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

899. Master's Thesis Research
Fall, Winter, Spring, Summer, Variable credit. Approval of department.

901. Problems in Cultural Geography
Fall, Winter, Spring, 1 to 3 credits. May be repeated for a maximum of 6 credits. Approval of department. Special research problems.

902. Problems in Physical Geography
Fall, Winter, Spring, Summer, 1 to 3 credits. May be repeated for a maximum of 6 credits. Supervised research in specific topics of physical geography.

906. Problems in Economic Geography
Fall, Winter, Spring, Summer, 1 to 3 credits. May be repeated for a maximum of 6 credits. Approval of department. Special research problems.

910. Problems in Historical Geography
Fall, Winter, Spring, Summer, 1 to 3 credits. May be repeated for a maximum of 6 credits. Approval of department. Special research problems in historical geography.

912. Independent Study in Regional Geography
Fall, Winter, Spring, Summer, 1 to 3 credits. May be repeated for a maximum of 15 credits. Approval of department. Individual studies in regional geography.

918. Problems in Geography
Fall, Winter, Spring, Summer, 1 to 3 credits. May be repeated for a maximum of 9 credits. Approval of department. Research on specific geographical problems.

934. Problems in Population
Fall, Winter, Spring, Summer, 1 to 3 credits. May be repeated for a maximum of 9 credits. Approval of department. Special research problems.

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

GEOLOGICAL SCIENCES
(For additional courses see Department of Geology)

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

201. Laboratory-Geology of Our Environment
Fall, Winter, Spring, 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.

202. Earth Processes
Fall, Winter, Spring, 4(4-2) Credit will be given in 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.

203. 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 our present environment has evolved; problems and controversies in the development of ideas of geologic and organic evolution.

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

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.

300. Solar System Geology
Winter, 4(4) AST 119 or AST 217 or AST 229; GLG 200 or GLG 201. 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 humans.

304. Geology of Michigan
Fall, 3(3-0) GLG 200 or GLG 201 and/or GLG 202, or approval of 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 geologic environment.

306. Engineering Geology
Fall, Spring, 3(3-2) Credit will be given in only one of the following: GLG 200, GLG 201, GLG 306. Sophomore Engineering students.

307. Geology Central Appalachians
Winter, 1(0-2) GLG 200, or 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, paleontological, and structural principles as applied to field methods.

312. Mineralogy
Fall, 3(4-1) One term of chemistry. Basics of crystallography, crystallography, and crystal chemistry. The classification, occurrence, composition and identification of minerals. Mineral genesis.

323. Introduction to Optical Mineralogy
Winter, 3(3-0) GLG 321. Basic principles underlying the use of the polarizing microscope. Recognition and understanding fundamental optical properties. Identification of minerals and textures in thin sections of rocks.

327. Introduction to Geochemistry