Descriptive Forestry of Descriptions

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

FRENCH
See Romance and Classical Languages.

GENETICS

College of Natural Science

800. Genetics Seminar
Fall, Winter, Spring. 3(1-0) May reenroll for a maximum of 12 credits. Approval of director. Student seminar to cover genetics subjects not considered in formal courses. Course is also intended to give students experience in reviewing and organizing literature in a subject, and orally presenting and defending the analysis.

804. Gene Transmission
Fall. Winter, Spring. 3(1-0) ZOL 441 or approval of instructor. Molecular and formal genetic studies of the replication, recombination, repair and segregation of genetic information in procaroytes and eucaryotes. Experimental design and methodology will be emphasized.

805. Genetic Organization, Action and Regulation
(803) Winter. 3(3-0) GEN 804. Molecular and formal genetic studies of the organization, expression and regulation of gene activity in procaroytes and eucaryotes. Experimental design and methodology will be emphasized.

806. Population and Quantitative Genetics
(802) 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. 1 to 4 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 selected subjects in collaboration with genetics faculty.

890. Selected Topics in Genetics
Fall, Winter, Spring. 2 to 5 credits. May reenroll for a maximum of 9 credits. ZOL 441 and approval of instructor. Topics will be selected from molecular genetics, physiological genetics, polymorphism genetics, quantitative genetics, evolution, population genetics, and genetics of human behaviors and motivations.

GEOGRAPHY

College of Social Science
Courses are classified as follows:

170. World Economic Geography
Fall, Winter, Spring. 3(3-0) Approval of instructor. The geographic perspective is used to examine U.S. and world problems of major concern such as international conflicts, environment quality, spatial change, and economic development.

206. Physical Geography
Fall, Winter, Spring. 4(4-0) Analysis of weather, climate, landforms, soils, water and biotic factors of man's environment, including their spatial, genetic, and functional interrelationships.

206L. Physical Geography Laboratory
Fall, Winter, Spring. 1(0-2) GEO 206 concurrently. Laboratory study of geographic aspects of map interpretation, aerial photographs, weather, climate, soils, landforms, and vegetation.

IDC. Introduction to Latin America I
For course description, see Interdisciplinary Courses.

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

215. World Food Issues
Fall, Winter, Spring. 3(3-0) Interdepartmental with Food Science. Food resources as related to world distributions of population, soil, water, fuel and minerals. Special attention to urbanization, irrigation, and future food needs and global constraints.

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

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

IDC. Continuing Revolution in China: Problems and Approaches
For course description, see Interdisciplinary Courses.

280. Perspectives on Geography
Spring. 2(2-0) Introduction to the profession of geography for majors.

300. North America
Fall, Winter, Spring. 4(4-0) Human and physical geography of North America, north of the Mexican border.

307. Geography of Environmental Quality
Spring. 4(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.

309. Geography of Recreation
Fall, Winter. 3(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.
310. Historical Geography of the United States
Spring, Summer. 4(3-0)
Reconstruction of geographies of the United States as they existed in the past.

315. South America
Spring. 4(3-0) Sophomores or approval of department.
Regional geography of South America with special attention to contemporary geographic problems.

316. Middle America
Winter. 4(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.

318. Cities of the World
Fall, Spring, Summer. 4(3-0)
A cross-cultural examination of cities, their historic growth, regional functions, and internal dynamics.

319. Polar Regions
Winter of even-numbered years. 4(3-0)
Sophomores or approval of department. The Arctic, including the continental fringe lands of North America and Eurasia, and the Antarctic. Emphasis on exploration, physical geography, and recent developments in settlement and resource use.

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

321. Africa
Fall. 4(3-0) Sophomores or approval of department. Emphasis on continent south of Sahara: environments, peoples, problems, and potentials.

322. Africa: Contemporary Problems
Spring. 4(3-0) Sophomores or approval of department. Major development problems examined from environmental, historical, economic, and social perspectives.

324. Western Europe
Winter. 4(3-0) Sophomores or approval of department. Geographical analysis of physical and human character and resources of Western Europe (Scandinavia, British Isles, Benelux, Germany, France and Switzerland). Emphasis on major problems.

IDC. Contemporary Problems of South Asia
For course description, see Interdisciplinary Courses.

341. Climate
Fall, Spring. 3(3-0)
The study of climate, its variations, and their effects on the natural and social environment. Special attention to contemporary geographic problems.

351. Weather and Climate
Fall. 3(3-0)
Non-statistical treatment of general weather processes and patterns, including surface and middle atmospheric (jet stream) features, with emphasis on the U.S.

360. The Soviet Union
Fall. 4(3-0) Sophomores or approval of department. A geographical analysis of the Soviet Union and its inhabitants with emphasis on economic, social, political and ethnic problems.

362. East Asia
Winter. 4(3-0) Sophomores or approval of department. A geographical analysis of the major developmental (modernization) problems of East Asia. Focus is on China in odd-numbered years; on Japan, Korea, Taiwan and Hong Kong in even-numbered years.

363. Southeast Asia
Fall. 4(3-0) Sophomores or approval of department. A geographical analysis of the major developmental (modernization) problems of Southeast Asia (Philippines, Indochina, Thailand, Burma, Malaysia/Singapore, Indonesia).

364. Middle East and North Africa
Winter. 4(3-0) Sophomores or approval of department. Socio-political and economic geography and physical environment of Southwest Asia and Northern Africa.

IDC. Contemporary Problems of Japan
For course description, see Interdisciplinary Courses.

400H. Honors Work
Fall, Winter, Spring. 1 to 16 credits. Approval of department.

401. The Ghetto
Fall, Spring. 4(4-0) Juniors or approval of department. Interdepartmental with and administered by the Department of Urban and Metropolitan Studies. Analysis of the ghetto including its spatial organization, structure and distribution of nonwhite and ethnic populations in cities with emphasis on the United States.

402. The Geography of the City
Spring. 4(3-0) Interdepartmental with the Department of Urban and Metropolitan Studies. Spatial theories, concepts, and designs of internal urban economic, social, and political structures.

403. The American City and Its Region
Winter. 4(3-0)
The regional system of cities in terms of size, spacing, and functional relationships.

407. Michigan
Fall, Spring, Summer. 4(3-0)
Sophomores or approval of department. Selected aspects of the physical and cultural geography of Michigan.

408. Canada
Spring. 4(3-0) Sophomores or approval of department. An analysis of the physical, economic and cultural patterns of Canada.

409. Geography of Transportation
Fall. 4(3-0)
Analysis of spatial principles of transportation, including theories of interaction, network structures, and the role of transport in space-economy.

411. Problems in Geography
Fall, Winter, Spring, Summer. 1 to 6 credits. Approval of department. Research on specialized geographic problems.

412. Geography of Agriculture
Winter. 4(3-0)
Analysis of the nature and world distribution of agricultural activities and settlements.

413. Geography of Manufacturing
Winter. 4(3-0) GEO 213 or Juniors.
Evaluation of the distribution of different types of manufacturing industries. Formulation of models of industries and analysis of the role of manufacturing in society, economics and development.

415. Field Techniques
Fall. Spring. 4(1-7) May reenroll for a maximum of 8 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.

416. Man's Geo-Political World
Winter. 4(3-0) GEO 204 or Juniors. The organization and behavior of man in political space with emphasis on the United States.

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, streaming theories of remote sensing and applications.

425. Development of Geographic Thought
Winter, Spring. 4(3-0) Approval of department. Evolution of geographic thought from antiquity to the present emphasizing developments in 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, Spring. 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. 4(3-0) May reenroll for a maximum of 8 credits. GEO 266, 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. 4(3-0) GEO 266 or approval of department.
Regional analysis of the world's weather and climate.

431. Landform Analysis
Fall. 4(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. 4(3-0) GEO 266 or approval of department.
Patterns of vegetation, with emphasis on forests of eastern North America. Option for some field study.

433. Land Use and Location Theory
Spring. 4(3-0) GEO 213 or approval of department.
Location principles and theories of economic activities, including methods of regional analysis.

434. Production Cartography
Winter. 4(1-6) 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.

435. Climatic Patterns and Atmospheric Circulation
Winter. 4(3-0) GEO 266 or approval of department.
Relationship between weather, climate, and upper air flow, with emphasis on this climatology of North America.

436. Geography of Water
Fall. 4(2-0) GEO 206 or GEO 213.
Geographic aspects of global water resources, their utilization patterns, and the role of water in agricultural and industrial production.

437. Geography for Teachers
Winter. 4(3-0)
Problems and practices of teaching geography in elementary and secondary schools.

438. Social and Spatial Approaches to Community Service
Spring. 3(3-0) GEO 201 or SW 205 or approval of department. Interdepartmental with 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.

439. Geography of Health and Disease
Fall, Winter. 4(3-0)
Spatio-environmental concepts and the techniques applied to health problems, disease transmission cycles, community nutrition and health-care planning.

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

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

442. Seminar in Historical Geography
Winter. 3(3-0) Approval of department.
Approaches in research in historical geography.

443. 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.

444. Regional Seminar
Fall. Winter, Spring, Summer. Variable credit. May reenroll for a maximum of 9 credits. Approval of department.
Selected research topics in regional geography.

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

446. 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.

447. 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.

448. Seminar in Recreation Geography
Spring. 3(3-0) GEO 309 or approval of instructor.
Selected current problems in recreation geography in the U.S. and abroad.

449. 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).

450. Seminar in Location Theory
Fall. 3(3-0) Approval of department. GEO 435
Recent developments and research in location analysis and regional science.

451. Seminar in Population Geography
Fall. 3(3-0) Approval of department.
Studies of particular topics and problems in population geography.

452. Interdisciplinary Seminar on Africa
For course description, see Interdisciplinary Courses.

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

454. 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 field geographic problems.

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

456. Master's Thesis Research
Fall. Winter, Spring, Summer. Variable credit. Approval of department.
901. Problems in Cultural Geography
Fall, Winter, Spring. Variable credit. May reenroll for a maximum of 6 credits. Approval of department. Special research problems.

902. Problems in Physical Geography
Fall, Winter, Spring. Variable credit. May reenroll for a maximum of 6 credits. Supervised research in specific topics of physical geography.

906. Problems in Economic Geography
Fall, Winter, Summer. Variable credit. May reenroll for a maximum of 6 credits. Approval of department. Special research problems.

908. Problems in Political Geography
Fall, Winter, Spring. Variable credit. May reenroll for a maximum of 6 credits. Approval of department. Special research problems.

910. Problems in Historical Geography
Fall, Winter, Spring. Variable credit. May reenroll for a maximum of 6 credits. Approval of department. Special research problems in historical geography.

912. Independent Study in Regional Geography
Fall, Winter, Spring. Variable credit. May reenroll for a maximum of 15 credits. Approval of department. Individual studies in regional geography.

918. Problems in Geography
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, Summer. 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.

GEOLOGY

GEOLOGY - Descriptions of Courses

200. The Geology of Man's Environment
Fall, Winter, Summer. 3(3-0) Not open to Geology majors. Credit will be given in only one of the following: GLG 200, GLG 201, GLG 305.
Man and his 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.

2001. Laboratory—Geology of Man's 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.

201. Earth Processes
Fall, Winter, Spring. 4(4-2) Credits will be given for only one of the following: GLG 200, GLG 201, GLG 306.
Physical processes concerning evolution of Earth and its environment. 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 oceans. Man-sea interactions are emphasized including resource utilization and pollution.

221. Minerals, Rocks and Fossils
Spring. 3(3-0) Not open to majors. Description, occurrence and identification of minerals, rocks, fossils, and additional features of special significance to general science teachers and other earth science interest groups.

282. 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(4-0) 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.

301. 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 of department.
A historical accounting of the physical and economic geology of Michigan and its environment; 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. 1(0-2) GLG 200, or GLG 201, or GLG 202, or concurrently.

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

321. Mineralogy
Fall. 5(4-0) 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 practical crystallography; geochemistry of minerals.

335. Fossil Plants, Their History and Paleoenecology
Spring. 3(3-0) 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, paleocommunities and community structure. Field trip.

337. The Fossil Record of Organic Evolution
Spring. 3(0-3) One course in a natural science. Juniors. Interdepartmental with the Department of Zoology.

344. Field Geology—Summer Camp
Summer. 6 credits. GLG 202, GLG 363; Trigonometry: GLG 446, GLG 447, 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.