113 Introduction to Economic Geography
Fall, Spring. 3(3-0)
Spatial distribution of resources, population, enterprise, trade, consumption, and production. Interaction of those distributions at local to global scales.

151 Introduction to Human Geography
Fall, Spring. 3(3-0)
Systematic study of spatial patterns and processes that have shaped human use and alteration of the world.

201 Introduction to Plant Geography
Fall of even years. 3(3-0) R: Not open to graduate students.
Geographic distribution and characteristics of plants throughout the world; relationships between biomes and aspects of the physical environment (climate, soils, landforms, disturbance); plant ecology; human impacts on vegetation; optional field trip on campus.

203 Introduction to Meteorology
Fall. 3(3-0)

204 World Regional Geography
Fall. 3(3-0)
Economic, political, cultural, environmental, and technological processes and conditions that explain the diversity of world regions.

206 Physical Geography
Fall, Spring. 3(3-0)
Geographic and functional interrelationships within the physical environment: Earth-sun relationships, weather, climate, soils, vegetation and landforms (terrain characteristics).

206L Physical Geography Laboratory
Fall, Spring. 1(0-2) P: GEO 113 or GEO 151 or GEO 203 or GEO 204 or (GEO 206 or concurrently) or GEO 208 or GEO 211 or GEO 215 or GEO 221
Geographic aspects of weather, climate, soil, vegetation, and terrain. Interpretation and application of maps and remotely sensed imagery.

208 Physical Geography of the National Parks
Fall of odd years. 2(2-0)
Physical features such as geology, landforms, biota, and waters of United States and Canadian national parks, forests, seashores and lakeshores. Emphasis on formation and distribution.

211 Environmental Policy and Practice
Fall. 3(3-0)
Systematic study of environmental policy and resource management practices in the United States and the broader global context, emphasizing geographical and other social sciences perspectives.

214 Geography of Drugs
Fall of even years. 3(3-0)
Physical, ecological, and human geographies of drugs, drug crops, pharmaceuticals, alcohol, and their diffusions. Cultural geographies and geopolitical implications of drugs' consumption, trade, and regulation and prohibition.

215 Sports Geography
Fall of odd years. 3(3-0)
Geographical variables that influence the location, character, and spread of sports at the national and global scale. Human cultures and diffusion. Themes associated with the geography of sports. Origin and spread of collegiate, professional, international, and Olympic sports.

221 Introduction to Geographic Information
Fall, Spring. 3(3-0)
Principles and methods of spatial data collection, handling, analysis, and display. Introduction to remote sensing, geographic information systems, and cartography.

221L Introduction to Geographic Information Laboratory
Fall, Spring, Summer. 1(0-2) P: GEO 221 or concurrently RB: Basic computer and math skills
Basic skills for working with Geographic Information Systems, remotely sensed imagery, design of maps, geospatial tools and technologies for data analysis and problem-solving.

235 Geography of Environment and Health
Spring. 3(3-0)
Geographic patterns of global health and environmental inequalities; the built, physical and social environment; urban design; infectious and chronic diseases.

259 Geography of Recreation and Tourism
Fall of even years. 3(3-0)
Cultural, physical, and biotic factors affecting the distribution of recreation and tourism resources and participation. U.S. and international examples and case studies.

286 Undergraduate Research in Geography
Fall of even years. 3(3-0)
Supervised research on a topic or topics determined by the instructor. Applications of geographic tools and theory.

302 Climates of the World
Fall of odd years. 3(3-0) RB: GEO 206 or GEO 203 R: Not open to freshmen. Regional climates and underlying atmospheric circulation patterns. Climate classification, physical climate processes, spatial and temporal aspects of climate, changes, Sources and use of climate data.

303 Severe and Hazardous Weather
Spring of even years. 3(3-0) P: GEO 203 or approval of department
Extratropical cyclones, freezing precipitation and ice storms, lake effect snowstorms, cold waves, blizzards, thunderstorms, tornadoes, downbursts, tropical cyclones, floods, drought, and heat waves.

306 Environmental Geomorphology
Fall of even years. 3(3-0) Interdepartmental with Geological Sciences. Administered by Geography. P: CSS 210 or GEO 206 or GEO 333 or GLG 201 or GLG 304 or ISP 203A
Relationships of running water, weathering, gravity, ice, waves, wind, and biota (including humans) to terrain and soils. Evolution of landscapes. Classical and modern interpretations.

314 Methods for Investigation of Urban Systems
Spring. 4(3-2) Interdepartmental with Urban Planning. Administered by Urban Planning. P: UP 201 and CSE 101 and STT 201
Models, approaches, and techniques for urban and regional problem analysis, research, project evaluation, and project management. Application of related computer software.

324 Remote Sensing of the Environment
Fall. 4(2-4) P: GEO 221 SA: GEO 224
Features and interpretation methods of remotely-sensed imagery, especially black-and-white and color infrared airphotos. Basic features of radar, thermal, and multispectral imagery. Interpretation for agriculture, archaeology, fisheries, forestry, geography, landscape architecture, planning, and wildlife management.

325 Geographic Information Systems
Fall. 3(2-2) P: GEO 221 and GEO 221L
Technical and theoretical issues in the design, implementation, and use of geographic information systems for research and applications.

326 Cartographic Design and Production
Fall. 4(2-4) P: GEO 221 and GEO 221L SA: GEO 423
Map design, layout, and usability. Typography and color theory. Techniques of map production, print and digital display.

330 Geography of the United States and Canada
Spring, Summer. 3(3-0) SA: GEO 230
Regional analysis. Evolution and status of environmental, demographic, economic, and sociocultural patterns and processes.

333 Geography of Michigan and the Great Lakes Region
Spring. 3(3-0) SA: GEO 233
Michigan's physical, historical, and economic geography. Interrelationships between the physical environment (rocks, landforms, soils, climate, vegetation, hydrology) and historical and contemporary land uses. Demographic and agricultural patterns. Human history and settlement patterns. Contemporary recreational opportunities.

335 Geography of Latin America
Fall of odd years. 3(3-0)
Physical and human geography of Latin America. Current development issues, especially people-environment interaction in urban and rural areas. Topics include migration, urbanization, and industrialization.

336 Geography of Europe
Fall of even years. 3(3-0)
Major regions and nations, including their physical resources, peoples, political structures, and economies.
337 Geography of Asia-Pacific
Spring of odd years. 3(3-0)
Spatial patterns and processes of economic, urban, human and physical geography in eastern Asia, including China, Korea, Japan, Australia, New Zealand, the Indian subcontinent and other Asian countries. Contemporary regional development.

338 Geography of Africa
Fall. 3(3-0)
Physical and human geography of Africa. Current development issues, especially people-environment interaction in urban and rural areas. Topics include drought, agricultural patterns, hunger, rural development, migration, and urbanization.

339 Geography of the Middle East and North Africa
Spring of odd years. 3(3-0)

340 Geography of Eurasia
Spring of even years. 3(3-0)
Physical, ecological, and human geographies of the lands and peoples of the former Russian and Soviet empires and of neighboring regions.

363 Introduction to Quantitative Methods for Geographers
Fall. 3(3-0) RB: Completion of University mathematics requirement. SA: GEO 463 Quantitative techniques in the analysis and classification of spatial data.

370 Introduction to Zoogeography
Fall. 3(3-0) Interdepartmental with Fisheries and Wildlife and Integrative Biology. Administered by Integrative Biology. P: IBIO 355 SA: ZOL 370 Patterns of geographical distribution of animals and the ecological and historical processes leading to these patterns.

372 Ecological Monitoring and Data Analysis
Spring. 3(2-2) Interdepartmental with Forestry. Administered by Forestry. P: (MTH 124 or MTH 132) and completion of Tier I writing requirement) and (STT 201 or STT 224 or STT 231 or STT 421) SA: FOR 472 Design of ecological monitoring systems and analysis of resulting ecological data sets. Monitoring system design, model specification and implementation, and computational considerations from both a design and model-based perspective. Hands-on introduction to statistical software.

401 Global Plant Geography
Fall of odd years. 3(3-0) P: GEO 201 or FOR 101 or FOR 204 or PLB 218 or IBIO 355 or approval of department R: Not open to freshmen.
Patterns of global plant distributions. Plant-atmosphere interactions, ecological processes, biogeographic patterns and predictive models of plant distributions.

402 Agricultural Climatology
Fall of even years. 3(3-0) Interdepartmental with Biosystems Engineering. Administered by Geography. P: MTH 110 or MTH 116 R: Not open to freshmen or sophomores.
Relationships between climate and agriculture in resource assessment, water budget analysis, meteorological hazards, pests, crop-yield modeling, and impacts of global climate change.

403 Dynamic Meteorology [W]
Spring of odd years. 3(3-0) P: (MTH 234 and GEO 203) and completion of Tier I writing requirement RB: GEO 405 R: Open to juniors or seniors or master's students or doctoral students.
Principles of fluid dynamics and their application to the atmosphere.

405 Weather Analysis and Forecasting
Spring of even years. 4(2-4) P: GEO 203 and (MTH 110 or MTH 116) Dynamic and thermodynamic principles of atmospheric science applied to the development and evolution of extratropical cyclones. Laboratory sessions include analysis of current observations and satellite imagery.

407 Regional Geomorphology of the United States
Spring of odd years. 3(3-0) RB: GEO 306 or GLG 201 or GLG 412 or ISP 203A or ISP 203B
Geomorphic characteristics of physiographic regions of the United States.

408 Soil Geomorphology Field Study
Fall of odd years. 4(2-4) P: CSS 210 or GEO 306 or GLG 201 or GLG 412 or GEO 406 R: Not open to freshmen or sophomores.

409 Global Climate Change and Variability
Fall of odd years. 3(3-0) P: GEO 203 or GEO 406
Analysis of climate change and variability at various time and space scales. Climate systems, paleoclimatology, global warming, climate models, and climate impact assessment.

410 Geography of Food and Agriculture
Fall of even years. 3(3-0) RB: GEO 113 or GEO 151 or GEO 204 or GEO 206 R: Not open to freshmen or sophomores.
Spatial patterns of contemporary global agriculture and food systems. Human-environment geography of select agricultural practices and food systems. Effects of agricultural practices on natural and human resources.

411 Stream Systems and Landforms
Spring of even years. 3(3-0) RB: GEO 206 or GEO 306 or GLG 201 or GEO 431 R: Not open to freshmen or sophomores.

412 Glacial Geology and the Record of Climate Change
Spring. 4(3-2) Interdepartmental with Geological Sciences. Administered by Geological Sciences. RB: GLG 201 or GEO 306 or GEO 408 or GLG 301 R: Not open to freshmen or sophomores.
In-depth analysis of glacial geology and the record of climate change, with emphasis on North America and Europe. Field trip required.

413 Urban Geography
Spring. 3(3-0) Interdepartmental with Urban Planning. Administered by Geography. R: Not open to freshmen or sophomores.
Theories and models of urban spatial form. Underlying structures and processes. Socio-spatial dimensions of modern urbanism. Differentiation and locational conflict in residential, commercial, and industrial space.

414 Geography of Transportation
Fall of odd years. 3(3-0) Interdepartmental with Urban Planning. Administered by Geography. P: GEO 113 R: Not open to freshmen.
Spatial principles of transportation. Theories of interaction, network structures, and location-allocation models. Role of transport and transport planning.

415 Location Theory and Land Use Analysis
Fall of odd years. 3(3-0) Interdepartmental with Urban Planning. Administered by Geography. P: GEO 113 or UPI 201 RB: EC 201 or EC 202 R: Not open to freshmen or sophomores.
Classical and neoclassical, static and dynamic models of industrial location and spatial organization. Land rent theory. Central place theory. Multi-localational organization. Growth transmission.

418 The Ghetto
Fall of odd years. 3(3-0) Interdepartmental with Urban Planning. Administered by Geography. R: Not open to freshmen or sophomores.
Analysis of the ghetto including its spatial organization and structure. Distribution of racial and ethnic populations. Emphasis on U.S. cities.

419 Applications of Geographic Information Systems to Natural Resources Management
Spring. 4(2-4) Interdepartmental with Biosystems Engineering and Forestry and Fisheries and Wildlife. Administered by Forestry. RB: GEO 221 Application of geographic information systems, remote sensing, and global positioning systems to integrated planning and management for fish, wildlife, and related resources.

424 Advanced Remote Sensing
Spring. 4(3-2) P: GEO 324 Interaction of solar radiation with the atmosphere, lithosphere, hydrosphere, and biosphere. Introductory digital image processing. Earth-resources satellite sensors, data products, and applications. Radar and thermal remote sensing.
Remote Sensing of the Biosphere
Fall of even years. 3(3-0) P: GEO 424 or approval of department.

Gender, Justice and Environmental Change: Issues and Concepts
Fall. 3(3-0) Interdepartmental with Anthropology and Criminal Justice and Community Sustainability and Forestry and Fisheries and Wildlife and Sociology and Women's Studies. Administered by Community Sustainability. RB: Background in social science, environmental science, or natural resources. Issues and concepts related to gender, ecology, and environmental studies. Key debates and theoretical approaches to addressing environmental issues from a gender and social justice perspective. Gender and environment issues and processes from a global perspective.

Gender, Justice, and Environmental Change: Methods and Application
Spring. 3(3-0) Interdepartmental with Anthropology and Community Sustainability and Forestry and Fisheries and Wildlife and Sociology and Women's Studies. Administered by Anthropology. RB: Background in social science, environmental science, or natural resources. Methods and case studies related to gender, ecology, and environmental studies. Methodological and fieldwork issues from a feminist perspective in international and intercultural contexts. Qualitative and quantitative methods for integrating social and environmental data.

Advanced Quantitative Methods in Geography
Spring. 4(4-0) RB: GEO 363 Statistical and mathematical approaches. Multiple regression, principal components and factor analysis, discriminant analysis. Related taxonomic methods.

Spatial Data Analysis
Fall. 4(3-2) Interdepartmental with Statistics and Probability. Administered by Geography. RB: (GEO 363 or STT 421 or STT 430) or equivalent quantitative methods courses. SA: GEO 466 Theory and techniques for statistical analysis of point patterns, spatially continuous data, and data in spatial zones.

Hierarchical Modeling and Computing for Spatio-temporal Environmental Data
Spring of odd years. 3(3-0) Interdepartmental with Forestry. Administered by Forestry. RB: (FW 849 or concurrently) and (GEO 866 or concurrently) Specification and application of modeling frameworks for spatial and temporal data. Emphasis on point-referenced data analysis using Bayesian statistics, uncertainty assessment, forecasting, and computing. Applied focus on the analysis of environmental data sets.

Agent-Based Modeling
Spring. 3(3-0) Interdepartmental with Environmental Science and Policy. Administered by Geography. RB: Basic understanding of data structures and algorithms covered in an introductory course of any programming language. R: Approval of department.

Theoretical concepts related to simulating dynamic geographic phenomena in the intersection between human and natural systems. Innovative agent-based methodology applied to complex social-environmental systems. Hands-on experience of agent-based modeling, with special emphasis on modeling human decision-making and its impact on the natural environment.

Seminar in Physical Geography
Fall. 3(3-0) A student may earn a maximum of 12 credits in all enrollments for this course. RB: at least one course in physical geography. R: Approval of department.

Research on topics in physical geography.

Seminar in Human Geography
Fall. 3(3-0) A student may earn a maximum of 12 credits in all enrollments for this course. RB: at least one course in human geography. R: Approval of department.

Research on topics in human geography.

Seminar in Human-Environment Geography
Spring. 3(3-0) A student may earn a maximum of 12 credits in all enrollments for this course. RB: at least one course in human geography and one course in physical geography. R: Approval of department.

Research on topics in human-environment geography.

Seminar in Geographic Information Science
Spring. 3(3-0) A student may earn a maximum of 12 credits in all enrollments for this course. RB: at least one course in geographic information science, cartography or remote sensing R: Approval of department. Geographic information science (GIS) applications to social and environmental problems. Theory and related issues.

Research Design in Geography
Spring. 3(3-0) R: Approval of department. Research and writing in geography. Identification of geographic problems and their relative importance. Structuring and stating hypotheses. Data acquisition and tests for validity.

Advanced Readings in Geography
Fall, Spring, Summer. 1 to 8 credits. A student may earn a maximum of 12 credits in all enrollments for this course. R: Approval of department. Advanced independent readings.

Advanced Research in Geography
Fall, Spring, Summer. 1 to 4 credits. A student may earn a maximum of 12 credits in all enrollments for this course. Advanced independent research.