### Geography - Descriptions of Courses

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Name</th>
<th>Description</th>
<th>Credits</th>
<th>Prerequisites</th>
</tr>
</thead>
<tbody>
<tr>
<td>406</td>
<td>Soil Geomorphology Field Study</td>
<td>Fall, 4(3-2)</td>
<td>P: CSS 220 or GEO 306 or GLG 201 or GLG 412 or ISP 203. R: Not open to freshmen and sophomores. Common geographic relationships among soils, landforms, and vegetation in lower Michigan. Description, analysis, and genesis of soils and landscapes. Surficial processes. Field trips required.</td>
<td>1</td>
</tr>
<tr>
<td>412</td>
<td>Glacial and Quaternary Geology</td>
<td>Spring, 4(3-2) Interdepartmental with Geological Sciences. Administered by Geological Sciences.</td>
<td>P: GLG 201 or GLG 301 or GEO 306 or GEO 408. R: Not open to freshmen and sophomores. Glacial and Quaternary geology with emphasis on North America and Europe. Laboratory focuses on glacial processes. One weekend field trip required.</td>
<td>1</td>
</tr>
<tr>
<td>413</td>
<td>Urban Geography</td>
<td>Fall, 3(3-0) Interdepartmental with Urban Planning.</td>
<td>P: GEO 113. R: Not open to freshmen and 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.</td>
<td>1</td>
</tr>
<tr>
<td>414</td>
<td>Geography of Transportation</td>
<td>Fall of odd-numbered years. 3(3-0) Interdepartmental with Urban Planning.</td>
<td>P: GEO 113. R: Not open to freshmen and sophomores. Spatial principles of transportation. Theories of interaction, network structures, and location-allocation models. Role of transport and transportation planning.</td>
<td>1</td>
</tr>
<tr>
<td>415</td>
<td>Location Theory and Land Use Analysis</td>
<td>Fall, 3(3-0) Interdepartmental with Urban Planning.</td>
<td>P: GEO 113. R: Not open to freshmen and sophomores. Classical and modern theories of static and dynamic models of industrial location and spatial organization. Land rent theory. Central place theory. Multi-localization organization. Growth transmission.</td>
<td>1</td>
</tr>
<tr>
<td>418</td>
<td>The Ghetto</td>
<td>Fall of odd-numbered years. 3(3-0) Interdepartmental with Urban Planning.</td>
<td>P: GEO 413 or SOC 375 or UP 201 or ISS 320 or MC 342 or MC 354 or approval of department. R: Not open to freshmen and sophomores. Analysis of the ghetto including its spatial organization and structure. Distribution of racial and ethnic populations. Emphasis on U.S. cities.</td>
<td>1</td>
</tr>
<tr>
<td>419</td>
<td>Geographical Information Systems in Natural Resource Management</td>
<td>Spring, 4 credits. Interdepartmental with Fisheries and Wildlife; Forestry; Resource Development; Agricultural Engineering; and Park, Recreation and Tourism Resources. Administered by Fisheries and Wildlife.</td>
<td>P: GEO 221. The application of geographic information systems, remote sensing, and global positioning systems to integrated planning and management for fish, wildlife, and related resources.</td>
<td>1</td>
</tr>
<tr>
<td>423</td>
<td>Map Production and Design</td>
<td>Spring, 4(2-4)</td>
<td>P: GEO 221. Manual and automated techniques. Design solutions, map planning, overlay construction, user interfaces, typography, color theory, and color selection.</td>
<td>1</td>
</tr>
<tr>
<td>424</td>
<td>Advanced Remote Sensing</td>
<td>Fall, 4(3-2)</td>
<td>P: GEO 224. R: Not open to freshmen and sophomores. 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.</td>
<td>1</td>
</tr>
<tr>
<td>425</td>
<td>Geographic Information Systems</td>
<td>Spring, 4(3-2) Interdepartmental with Urban Planning.</td>
<td>P: GEO 221. Technical and theoretical issues in the design, evaluation, and implementation of geographic information systems for research and application.</td>
<td>1</td>
</tr>
<tr>
<td>428</td>
<td>Digital Terrain Analysis</td>
<td>Fall of even-numbered years. 4(3-2)</td>
<td>P: GEO 204 or GEO 424; GEO 201. R: Open only to Juniors or seniors. Theoretical and technical issues of collection, management, analysis, and display of terrain data. Application of photogrammetry, geographic information systems, and cartography.</td>
<td>1</td>
</tr>
<tr>
<td>434</td>
<td>Urban Transportation Planning</td>
<td>Spring, 3(3-0) Interdepartmental with Urban Planning.</td>
<td>P: GEO 221. Completion of University mathematics requirement. R: Open only to majors in Geography or Urban and Regional Planning or approval of department. Principles of decision-making in urban transportation planning. Demand and supply analysis, social and environmental impacts, implementation programs. Use of computer models.</td>
<td>1</td>
</tr>
<tr>
<td>435</td>
<td>Geography of Health and Disease</td>
<td>Fall, 3(3-0)</td>
<td>R: Not open to freshmen, sophomores, juniors. Spatio-environmental concepts and techniques applied to health problems. Disease transmission cycles, community nutrition, and health-care planning.</td>
<td>1</td>
</tr>
<tr>
<td>439</td>
<td>Population and Development</td>
<td>Spring of odd-numbered years. 3(3-0)</td>
<td>P: GEO 113 or GEO 151 or GEO 220 or GEO 233 or GEO 355 or GEO 356 or GEO 357. Demographic issues related to economic development and environmental sustainability in selected world regions.</td>
<td>1</td>
</tr>
<tr>
<td>443</td>
<td>Spatial Aspects of Regional Development</td>
<td>Spring of odd-numbered years. 3(3-0)</td>
<td>P: GEO 204 or GEO 151, or GEO 220, or GEO 233, or GEO 355, or GEO 356, or GEO 357. Spatial patterns and processes associated with regional development in selected world areas.</td>
<td>1</td>
</tr>
<tr>
<td>445</td>
<td>Tourism in Regional Development</td>
<td>Spring of odd-numbered years. 3(3-0)</td>
<td>P: GEO 220 or GEO 230 or GEO 233, or GEO 355, or GEO 356, or GEO 357. The role of tourism in regional development. Examples from Michigan and the United States and other nations. Environmental considerations.</td>
<td>1</td>
</tr>
<tr>
<td>453</td>
<td>Introduction to Quantitative Methods for Geographers and Planners</td>
<td>Fall, 3(3-0) Interdepartmental with Urban Planning.</td>
<td>P: Completion of University mathematics requirement. R: Open only to majors in Geography, Urban Planning, and Landscape Architecture. Quantitative techniques in the analysis and classification of spatial data.</td>
<td>1</td>
</tr>
<tr>
<td>478</td>
<td>Urban Transportation Planning</td>
<td>Spring, 3(0-9) Interdepartmental with Urban Planning.</td>
<td>P: GEO 221. The application of geographic information systems, remote sensing, and global positioning systems to integrated planning and management for fish, wildlife, and related resources.</td>
<td>1</td>
</tr>
<tr>
<td>492</td>
<td>Geographic Research Problems</td>
<td>Fall, Spring, Summer. 1 to 4 credits. A student may earn a maximum of 12 credits in all enrollments for this course. R: Not open to freshmen and sophomores. Approval of department. Supervised individual research on selected aspects of geography.</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>495</td>
<td>Field Study</td>
<td>Fall, Spring, Summer. 1 to 4 credits. A student may earn a maximum of 8 credits in all enrollments for this course. R: Not open to freshmen and sophomores. Approval of department. Supervised field study in geography.</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>498</td>
<td>Internship in Geography</td>
<td>Fall, Spring, Summer. 1 to 4 credits. A student may earn a maximum of 8 credits in all enrollments for this course. R: Open only to juniors and seniors. Approval of department. Individual experience in geography in an approved organization.</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>806</td>
<td>Advanced Geomorphology</td>
<td>Spring of even-numbered years. 3(3-0)</td>
<td>R: Open only to seniors. Advanced study in geomorphology, surficial processes and soils.</td>
<td>1</td>
</tr>
<tr>
<td>809</td>
<td>Seminar in Physical Geography</td>
<td>Spring, 3(0-3) A student may earn a maximum of 9 credits in all enrollments for this course. Review of research on topics in physical geography such as climatology, geomorphology, soils, or plant geography.</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>813</td>
<td>Seminar in Urban and Economic Geography</td>
<td>Spring, 3(0-3) A student may earn a maximum of 9 credits in all enrollments for this course. Review of research on topics in urban and economic geography.</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>814</td>
<td>Applied Research Methods for Planning and Development</td>
<td>Spring, 3(2-0) Interdepartmental with Urban Planning. Administered by Urban Planning. R: Open only to master's students in Urban and Regional Planning, Public Administration, and Geography. Techniques in urban and regional planning analysis. Forecasting models. Methods of urban project evaluation.</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>819</td>
<td>Spatial Epidemiology and Medical Geography</td>
<td>Spring of even-numbered years. 3(3-0) Interdepartmental with Human Medicine. Administered by Human Medicine. R: Open only to master's students in Epidemiology or approval of college. Concepts, techniques, and utilization of spatio-epidemiologic analyses for human health.</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>823</td>
<td>Map Automation</td>
<td>Fall of even-numbered years. 3(2-2)</td>
<td>R: Open only to seniors in Geography. Completion of Tier II writing requirement. History, philosophy, and methodology of the geographic discipline as it has evolved within academic and social contexts.</td>
<td>1</td>
</tr>
<tr>
<td>825</td>
<td>Geoprocessing</td>
<td>Fall of odd-numbered years. 4(4-0)</td>
<td>R: Not open to freshmen and sophomores. Approval of department. Supervised individual research on selected aspects of geography.</td>
<td>1</td>
</tr>
</tbody>
</table>

A-83
826. Seminar in Cartography and Geoprocessing
Spring, 3(0-0) A student may earn a maximum of 9 credits in all enrollments for this course. Review of research in cartography, geographic information systems, and remote sensing.

832. Environmental and Natural Resource Law
Fall, 3(0-0) Interdepartmental with Resource Development, Agricultural Economics, Forestry, and Crop and Soil Sciences. Administered by Resource Development.
R: RD 430.

840. Seminar in Regional Geography
Fall of even-numbered years, Spring, 3(0-0) A student may earn a maximum of 9 credits in all enrollments for this course. Review of research on contemporary geographic issues in different world regions.

854. Economics of Planning and Development
Spring, 3(0-0) Interdepartmental with Urban Planning. Administered by Urban Planning.
R: RB 401.

860. Methods and Modeling in Regional Science
Spring, 3(0-0) Interdepartmental with Resource Development. Administered by Resource Development.
R: RD 461.
Regional research techniques. Economic base analysis, input-output analysis, mathematical programming, and econometric and simulation analysis.

865. Advanced Quantitative Methods in Geography
Spring, 4(4-0)
P: GIE 465.

867. Methods and Modeling in Regional Science
Spring of even-numbered years, 3(0-0) Interdepartmental with Resource Development and Urban Planning.
R: EC 201, GEO 465; GEO 415 or RD 461.
Techniques for regional economic base analysis, input-output analysis, mathematical programming, and econometric and simulation analysis.

880. Advanced Research in Geography
Fall, Spring, Summer. 1 to 6 credits. A student may earn a maximum of 12 credits in all enrollments for this course.
R: Approval of department. Advanced independent readings.

889. Master's Thesis Research
Fall, Spring, Summer. 1 to 12 credits. A student may earn a maximum of 30 credits in all enrollments for this course.
R: Open only to graduate students in Geography.

890. Advanced Research in Geography
Fall, Spring, Summer. 1 to 6 credits. A student may earn a maximum of 12 credits in all enrollments for this course.
Advanced independent research.

898. Theory and Methods in Geography
Spring, 3(0-0) R: Open only to Ph.D. students in Geography.

900. Doctoral Dissertation Research
Fall, Spring, Summer. 1 to 24 credits. A student may earn a maximum of 36 credits in all enrollments for this course.

GEOLOGICAL SCIENCES GLG
Department of Geological Sciences
College of Natural Science

201. The Dynamic Earth
Fall, Spring, 4(2-4)
R: Not open to students with credit in GLG 301.
Physical and chemical processes related to the past, present, and future behavior of the earth system, and the energy systems that drive these processes. A study of the earth's materials, the earth's surface and the earth's interior.

202. Physical and Biological History of the Earth
Fall, Spring, 3(3-0)
P: GLG 201.

301. Engineering Geology
Fall, 3(3-0)
R: Not open to freshmen. Open only to College of Engineering students. Not open to students with credit in GLG 201.

302. Geology of Michigan
Spring, 3(3-0)
P: GLG 201 or GLG 301 or ISP 203.
Integration of the geological evolution of Michigan with its social and economic development.

303. Oceanography
Fall, 4(4-0)
P: CEM 142 or CEM 152 or PHY 184 or PHY 232 or CEM 141, PHY 235 or CEM 151, PHY 331. Physical, chemical, biological, and geological aspects of oceanography: ocean circulation, waves, tides, air-sea interactions, chemical properties of ocean water, ocean productivity, shoreline processes, and sediments.

319. Introduction to Earth System Science
Fall, 3 credits. Interdepartmental with Entomology, Botany and Plant Pathology, Zoology, and Sociology. Administered by Entomology.
P: Completion of one course in biological or physical science.
Systems approach to Earth as an integration of geochemical, geophysical, biological and social components. Global dynamics at a variety of spatio-temporal scales. Sustainability of the Earth system.

310. Mineralogy and Geochemistry
Fall, 4(3-2)
P: GLG 201 or GLG 301 or concurrently; CEM 142 or CEM 152; PHY 194 or PHY 195. Geochemical properties and processes in the origin, modification, structure, dynamics and history of Earth materials. Crystallography and crystal chemistry. Mineral classification and identification.

311. Vertebrate Life of the Past
Spring, 3(0-0) Interdepartmental with Zoology.
R: BS 110 or BS 111 or juniors and above. Not open to Zoology majors. Not open to students with credit in GLG 415.
Evolution and diversity of fossil vertebrates from fish to humans with emphasis on dinosaurs and Pleistocene events.

332. Social Impact of Paleobiology
Spring, 3(0-0)
P: ISB 200 or ISP 203 or GLG 201 or BS 110; one ISS and one JSP course. R: Completion of Tier I Writing Requirement.
Social impact and influence of paleobiological thought and discoveries, from early ideas on the origins of fossils to evolution as a dominant force shaping the design of organic life. Involvement of paleobiology in social Darwinism, evolutionary humanism, evolutionary mysticism, and conflicts with creationists.

335. Plants Through Time
Spring of odd-numbered years, 3(0-0) Interdepartmental with Botany and Plant Pathology. Administered by Botany and Plant Pathology.
R: BS 110 or BOT 105 or GLG 201 or LBS 114. R: Juniors and above. Evolutionary history of plants, the development of ecosystems, and the use of plant fossils in the reconstruction of ancient environments and climate.

351. Structural Geology
Fall, 4(3-2)
P: GLG 361, MTH 116.
Structural geology. Mechanical behavior and kinematic history of the lithosphere. Stress and strain. Deformation features such as folds, faults and microstructure. Methods of analysis and interpretation. One weekend field trip required.

361. Petrology (W)
Spring, 4(3-2)
P: GLG 201, GLG 321. R: Completion of Tier I writing requirement.
Evolution, origin, occurrence and tectonic setting of igneous and metamorphic rocks. Phase relations of igneous and metamorphic systems. Studies of rocks in thin sections. SA: GLG 461.

371. Plate Tectonics (W)
Spring, 4(3-2)
P: MTH 116; PHY 183 or PHY 183B or PHY 231 or PHY 231B. R: Completion of Tier I writing requirement.
Geophysical methods of studying the structure and dynamics of the earth and planets. Plate kinematics and global geodynamic processes, plate margin processes and evolution, marine geology.

411. Hydrogeology
Fall, 4(3-2)