GEOG 603 Processes in Economic Geography  
Credits 3.3 Lecture Hours.  
Spatial organization and distribution of economic activity; patterns of land rent and land use; theories of economic development; models of spatial decision making.  
Prerequisite: GEOG 304 or equivalent or approval of instructor.

GEOG 604 Processes in Physical Geography  
Credits 3.3 Lecture Hours.  
Methodologies and problems of physical geography with emphasis on the interrelationships of the physical environment; a foundation course for graduate work in geography.  
Prerequisite: Approval of instructor.

GEOG 605 Processes in Cultural Geography  
Credits 3.3 Lecture Hours.  
Evolution of cultural landscapes; processes of innovation, diffusion and adaptation in context of developing human-environment relationships.  
Prerequisite: Approval of instructor.

GEOG 610 Geographical Methods and Theory  
Credits 3.3 Lecture Hours.  
Development of geography as a discipline; methods and theories used in geography for understanding place and for spatial analysis of human and biophysical phenomena.  
Prerequisite: Graduate classification in geography or approval of instructor.

GEOG 611 Geographical Research Design  
Credits 3.3 Lecture Hours.  
Methods, techniques and conceptual models for the conception, design, planning and conduct of geographical research.  
Prerequisite: Graduate classification in geography or approval of instructor.

GEOG 612 Applied Climatology  
Credits 3.3 Lecture Hours.  
Climate data and methods to solve a wide range of environmental problems; collection, processing, analysis and interpretation of surface observations, radar, satellite, reanalysis and climate model data; statistical methods and physical modeling; practical problems and development of tools for decision makers.  
Prerequisite: Graduate classification.

GEOG 616 Urban Geography  
Credits 3.3 Lecture Hours.  
Spatial patterns and processes of urban systems; growth and sprawl; environmental impacts; residential choice models; political fragmentation; economic development; power and privilege; place-based identity.  
Prerequisite: GEOG 306 or equivalent.

GEOG 619 Human Impact on the Environment  
Credits 3.3 Lecture Hours.  
Human alterations of landscapes, the atmosphere and the waters of the earth; interference with natural chemical cycles; disturbance of ecological equilibria; depletion of natural resources; roles of technology and population growth.  
Prerequisite: Approval of instructor.

GEOG 621 Land-Use and Land-Cover Change  
Credits 3.3 Lecture Hours.  
Human dimensions of land-use and land-cover change; theories of global and regional land-use and land-cover changes that emphasize processes, institutions, and patterns at multiple scales; methodologies and research agendas including geo-spatial analysis, modeling, and social science approaches.  
Prerequisites: GEOG 619 or approval of instructor; Graduate classification.

GEOG 624 Biogeography: Theory and Methods  
Credits 3.3 Lecture Hours.  
Prerequisite: Approval of instructor.  
Cross Listing: ENTO 625/GEOG 625.

GEOG 626 Fluvial Geomorphology  
Credits 3.3 Lecture Hours.  
Concepts and methods applicable to the fluvial systems; components affecting rivers and drainage basin and analysis geomorphology; analytical treatment of problems arising from fluvial changes.  
Prerequisite: GEOG 203 or approval of instructor.

GEOG 627 Arid Lands  
Credits 3.3 Lecture Hours.  
Processes and landforms in dryland environments; nature and dynamics of gravity, water and wind in deserts; Quaternary climates and arid lands; human impact in drylands.  
Prerequisite: GEOG 604 or approval of instructor.

GEOG 629 Cultural and Political Ecology  
Credits 3.3 Lecture Hours.  
History of ideas about humans and environment; political and social meanings of nature and culture; access and control of resources; theories of environmental change; geographic approaches to political ecology research; current debates and future directions.

GEOG 635 Advanced Biogeography  
Credits 3.3 Lecture Hours.  
Theory and contemporary research in biogeography; methods used in conducting biogeographical research; spatial and temporal changes in the distribution of organisms; influences of humans and the physical environment on biogeographic patterns.  
Prerequisite: GEOG 624 or approval of instructor.
GEOG 642/GEOS 642 Past Climates
Credits 3. 3 Lecture Hours.
Terrestrial and marine proxy records of past climate variability, including tree rings, coral, and sediments; past climate change events such as the Little Ice Age and Medieval Warm Period; greenhouse gases and global temperature; insight into the nature of climate change and challenges humankind faces in the next few centuries.
Prerequisite: Graduate classification.

GEOG 644 Geographic Education: Theory and Practice
Credits 3. 3 Lecture Hours.
Geography as an element of the educational system: K-12, undergraduate, graduate; geography's role in curricula and its practice in classrooms; course design and integration of geographic concepts into classroom instruction.
Prerequisite: Graduate classification.

GEOG 645 Research in Geographic Education
Credits 3. 3 Lecture Hours.
Research in geographic education and the interface between research in geography and geographic education; identification of research questions; choice of methodology; review of literature; data collection and analysis; communication of results.
Prerequisite: Graduate classification.

GEOG 648 Political Geography of the World-System.
Credits 3. 3 Lecture Hours.
Political and geopolitical evolution of the modern world-system; major geopolitical theories, settler colonization, extractive colonization, imperialism, decolonization, development of European state-system hegemonic change and theory of world leadership cycles.
Prerequisite: Graduate classification.

GEOG 651 Remote Sensing for Geographical Analysis
Credits 3. 3 Lecture Hours.
Provides and introduction to remote sensing fundamentals. Discussion of past, present and planned earth observing sensors as well as technical issues involved in the collection, processing and interpretation of remote sensing images with emphasis on application to geographic problems, including geomorphology, hydrology and coastal oceanography.
Prerequisite: Graduate classification.

GEOG 652 Quantitative Methods in Geography
Credits 3. 3 Lecture Hours.
Designed to acquaint with quantitative methods commonly used in geographical research to describe, characterize, model and analyze geo-spatial data.
Prerequisite: Approval of instructor.

GEOG 659 Geodatabases
Credits 4. 3 Lecture Hours. 2 Lab Hours.
GIS data modeling; introductory and advanced spatial SQL (structured query language); spatial database management system (DBMS) server setup, management and maintenance; spatial DBMS design, implementation, tuning, performance analysis and indexing; connecting spatial data services and warehouses to GIS software.

GEOG 660 Applications in GIS
Credits 3. 3 Lecture Hours.
Integrates spatial analysis and modeling with GIS for environmental and socio-economic applications.
Prerequisites: GEOG 390; STAT 651 and STAT 652.

GEOG 661 Digital Image Processing and Analysis
Credits 3. 3 Lecture Hours.
Principles of georectifying, processing, manipulating and interpreting data collected by nonphotographic sensors concentrating on solid earth resources using Thematic Mapper with supplemental data from the SPOT satellite.
Prerequisite: GEOG 332 or approval of the instructor.

GEOG 662 GIS in Land and Property Management
Credits 3. 2 Lecture Hours. 2 Lab Hours.
Introduction to concepts of design, planning and implementation of GISs related to commercial real estate development; case studies for land and property management; laboratory exercises in practical applications for real estate.
Prerequisites: Enrollment in Master of Land Economics and Real Estate; approval of instructor.

GEOG 665 GIS-Based Spatial Analysis and Modeling
Credits 3. 3 Lecture Hours.
Investigates methodology of integrating various spatial analysis and modeling techniques with GIS for environmental/socio-economic applications; practical applications; theoretical/technical aspects of related issues in detail.
Prerequisites: GEOG 390; STAT 651 or equivalent; approval of instructor.

GEOG 666 Coastal Geomorphology
Credits 3. 3 Lecture Hours.
Essential concepts and methods to coastal geomorphology; review history and processes of coastal geomorphology; analytical treatment of problems associated with coastal environmental changes.
Prerequisite: GEOG 203 or equivalent.

GEOG 667 Dynamic Modeling of Earth and Environmental Systems
Credits 4. 3 Lecture Hours. 2 Lab Hours.
Dynamical systems modeling; dynamic complexity; key concepts, processes and human impact on earth and environmental systems; model building and testing; system behavior over time; model validation and sensitivity; examples from the applications in earth and environmental sciences.
Prerequisite: Approval of instructor.

GEOG 668 Arctic Climates
Credits 3. 3 Lecture Hours.
Arctic climate system, physical characteristics and climatic features, the atmospheric energy budget, the atmospheric circulation, the surface energy budget, the hydrologic cycle, and the interactions between the atmosphere, Arctic Ocean, and the sea ice cover.
Prerequisite: Graduate classification.

GEOG 676 GIS Programming
Credits 4. 3 Lecture Hours. 2 Lab Hours.
Automation of GIS software; integration of custom code as extensions into GIS software; programmatic manipulation of GIS data.
Prerequisite: Graduate classification.

GEOG 678 WebGIS
Credits 4. 3 Lecture Hours. 2 Lab Hours.
Internet architectures; setup, management and maintenance of web-based Geographic Information System (WebGIS) servers, data and services; use of WebGIS data in services in the creation of custom web-based maps; analysis of WebGIS system architecture, design and implementation.
Prerequisite: Graduate classification.
GEOG 681 Seminar  
Credit 1. 1 Lecture Hour.  
Reports and discussions of current research and selected topics.  
Prerequisite: Approval of department head.

GEOG 685 Directed Studies  
Credits 1 to 6. 1 to 6 Other Hours.  
For students with major or minor in geography to undertake investigations in special aspects of geography.  
Prerequisite: Approval of instructor.

GEOG 687/ANTH 624 Geoarchaeology  
Credits 3. 3 Lecture Hours.  
Application of geological concepts and methods to archaeological research; history of geoarchaeology; site formation processes; modification of archaeological sites and sediments; landscape reconstruction and change and their effects on human behavior.  
Prerequisite: ANTH 602 or equivalent.  
Cross Listing: ANTH 624/GEOG 687.

GEOG 689 Special Topics in...  
Credits 1 to 4. 1 to 4 Lecture Hours. 0 to 4 Lab Hours.  
Selected topics in an identified area of geography. May be repeated for credit.  
Prerequisite: Approval of instructor.

GEOG 691 Research  
Credits 1 to 23. 1 to 23 Other Hours.  
Original research in various areas of geography. Research for thesis or dissertation.

GEOG 695 Frontiers in Geographic Information Science  
Credits 3. 3 Lecture Hours.  
Theoretical foundations and the latest development of geographic information science (GIScience); topics related to representations of space and time, geocomputation, spatially integrated social sciences, and social informatics.  
Prerequisite: Introductory GIS.

GEOG 696 Geomorphology and Remote Sensing  
Credits 3. 3 Lecture Hours.  
Application of remote sensing to study landforms, imagery, includes, aerial photography; LANDSAT; SPOT, TM and shuttle photography.  
Prerequisite: GEOG 203 or approval of instructor.