Undergraduate Programs

- Environmental Studies - B.A.
- Geography - B.A.

Minors

- Climatology
- Geographic Information Science
- Geography
- Urban Studies and Planning

Graduate Programs

- Geographic Information Science - M.GISc
- Geography - M.A.
- Geography - Ph.D.

Certificates

Graduate Certificates

- Cyber Geographic Information Science
- Environmental Geographic Information Science
- Geographic Information Science

Department of Geography Faculty

- Amey, Katherine S. (2009), Assistant Professor, Ph.D., Kent State University, 2011
- Curtis, Andrew J. (2012), Professor
- Curtis, Jacqueline W. (2012), Assistant Professor, Ph.D., Louisiana State University, 2005
- Haley, Mary Ann (1993), Assistant Professor
- Lee, Jay (1991), Professor, Ph.D., University of Western Ontario, 1989
- Mapes, Jennifer E. (2012), Assistant Professor, Ph.D., University of Southern California, 2009
- Muller, Keith D. (1990), Associate Professor
- Munro-Stasiuk, Mandy (1999), Professor, Ph.D., University of Alberta, 1999
- Paryak, Rebecca P. (2008), Associate Professor, Ph.D., Texas State University, 2010
- Post, Christopher (2008), Associate Professor, Ph.D., University of Kansas, 2006
- Schmidlin, Thomas W. (1985), Professor, Ph.D., Cornell University, 1984
- Sheridan, Scott C. (2000), Professor, Ph.D., University of Delaware, 2000
- Smiley, Sarah L. (2010), Associate Professor, Ph.D., University of Kansas, 2007
- Turner, Victoria K. (2013), Assistant Professor, Ph.D., Arizona State University, 2013
- Tyner, James A. (1997), Professor, Ph.D., University of Southern California, 1995
- Widner, Emariana S. (2009), Associate Professor, Ph.D., Texas State University, 2009
- Ye, Xinyue (2013), Assistant Professor, Ph.D., San Diego State University, 2010

Geography (GEOG)

GEOG 10160  INTRODUCTION TO GEOGRAPHY (KSS)  3 Credit Hours
A broad introduction to the study of geographic patterns on Earth. This course describes and explains spatial patterns of human activity and environmental processes, as well as the interaction between these two realms. Topics include weather, climate, landforms, human-environment interactions, population, culture, economy and politics.  
Prerequisite: none.
Schedule Type: Lecture  
Contact Hours: 3 lecture  
Grade Mode: Standard Letter  
Attributes: Kent Core Social Sciences, Transfer Module Social Sciences

GEOG 16001  SOIL AND HORTICULTURAL MANAGEMENT  3 Credit Hours
To provide students with an understanding of the relationship of soil, nutrients and fertilizers, and to understand how to properly plant trees, shrubs and flowers. Offered at Salem campus only.  
Prerequisite: None.
Schedule Type: Lecture  
Contact Hours: 3 lecture  
Grade Mode: Standard Letter

GEOG 17063  WORLD GEOGRAPHY (DIVG) (KSS)  3 Credit Hours
An overview of the differences and similarities within and between regions of the world, studying the impacts of spatial processes as they operate at regional, global, and local scales. The course emphasizes the effects of globalization on culture, economies, geopolitical relationships, population and the environment.  
Prerequisite: None.
Schedule Type: Lecture  
Contact Hours: 3 lecture  
Grade Mode: Standard Letter  
Attributes: Diversity Global, Kent Core Social Sciences, TAG Social and Behavioral Sciences, Transfer Module Social Sciences

GEOG 17064  GEOGRAPHY OF THE UNITED STATES AND CANADA (DIVD) (KSS)  3 Credit Hours
An overview of the differences and similarities within and between regions of the U.S. and Canada. The class focuses on social, economic, settlement, and environmental patterns and processes.  
Prerequisite: None.
Schedule Type: Lecture  
Contact Hours: 3 lecture  
Grade Mode: Standard Letter  
Attributes: Diversity Domestic, Kent Core Social Sciences, Transfer Module Social Sciences

Department of Geography
GEOG 20195 SPECIAL TOPICS IN GEOGRAPHY 1-3 Credit Hours (Repeatable for credit) Explores emerging topics in geography not covered in other existing courses. Variable content course. **Prerequisite:** None. **Schedule Type:** Lecture **Contact Hours:** 1-3 lecture **Grade Mode:** Standard Letter

GEOG 21062 PHYSICAL GEOGRAPHY (KBS) 3 Credit Hours Introduction to the study of the spatial characteristics of the Earth's physical environment, including how humans interact with it. Topics include weather and climate, vegetation, soils, ecosystems, landforms and land-formation processes, human impacts on Earth systems and human societal adaptations to the physical environment. **Prerequisite:** None. **Schedule Type:** Lecture **Contact Hours:** 3 lecture **Grade Mode:** Standard Letter **Attributes:** Kent Core Basic Sciences, TAG Social and Behavioral Sciences, Transfer Module Natural Sciences

GEOG 21063 PHYSICAL GEOGRAPHY LABORATORY (KBS) (KLAB) 1 Credit Hour This course offers practical experience examining physical geographic processes, including the study and manipulation of map projections, Earth-sun relationships and experiments relating to the atmosphere, biosphere, lithosphere and hydrosphere. This lab is taught in conjunction with the lecture, and is designed to expand and reinforce concepts discussed in lecture through hands on activities. **Corequisite:** GEOG 21062. **Schedule Type:** Laboratory **Contact Hours:** 2 lab **Grade Mode:** Standard Letter **Attributes:** Kent Core Basic Sciences, Kent Core Basic Sciences Lab, Transfer Module Natural Sciences

GEOG 22040 INTRODUCTION TO GLOBAL TOURISM (DIVG) 3 Credit Hours (Cross-listed with RPTM 26060) Introduction to travel and tourism around the world, including tourism technologies, cultural and natural environments as attractions, benefits of travel, travel ethics, and sustainable development. **Prerequisite:** None. **Schedule Type:** Lecture **Contact Hours:** 3 lecture **Grade Mode:** Standard Letter **Attributes:** Diversity Global

GEOG 22061 HUMAN GEOGRAPHY (DIVG) (KSS) 3 Credit Hours Human Geography is an introduction to the spatial patterns and processes of human activity on Earth. This course examines how humans understand and interact with the world. It considers how cities are structured, economic and cultural differences, the interaction between politics and identity, and the environmental consequences of human activities. **Prerequisite:** None. **Schedule Type:** Lecture **Contact Hours:** 3 lecture **Grade Mode:** Standard Letter **Attributes:** Diversity Global, Kent Core Social Sciences, TAG Social and Behavioral Sciences, Transfer Module Social Sciences

GEOG 29160 MAPPING OUR WORLD 3 Credit Hours Introduction to maps and their uses, stressing their importance as a vehicle for understanding and communicating information about our world and its spatial characteristics. **Prerequisite:** None. **Schedule Type:** Lecture **Contact Hours:** 3 lecture **Grade Mode:** Standard Letter

GEOG 31062 FUNDAMENTALS OF METEOROLOGY 3 Credit Hours Analysis of weather elements emphasizing energy exchanges and controls, and atmospheric circulation. Methods of weather prediction and man's modification of weather are highlighted. **Prerequisite:** None. **Schedule Type:** Lecture **Contact Hours:** 3 lecture **Grade Mode:** Standard Letter

GEOG 31064 PRINCIPLES OF CLIMATOLOGY 3 Credit Hours A study of the physical processes causing the distribution of world climates. Focus on local and urban climates, climatic change and societal impacts of climate. **Prerequisite:** GEOG 31062. **Schedule Type:** Lecture **Contact Hours:** 3 lecture **Grade Mode:** Standard Letter

GEOG 31070 POPULATION AND THE ENVIRONMENT 3 Credit Hours Course examines the interrelations of population growth, resource depletion and the environment from a geographic perspective, including the principal themes of space and place. **Prerequisite:** None. **Schedule Type:** Lecture **Contact Hours:** 3 lecture **Grade Mode:** Standard Letter

GEOG 31080 GEOGRAPHY OF WINE 3 Credit Hours Examines the physical environment of viticulture including climate, soil and farm practices; the cultural tradition of wine making, consumption and trade; and regional production styles. **Prerequisite:** None. **Schedule Type:** Lecture **Contact Hours:** 3 lecture **Grade Mode:** Standard Letter

GEOG 32080 POLITICS AND PLACE (DIVG) 3 Credit Hours Spatial aspects of political behavior as manifested in boundary changes, the sizes of states, interstate relations and spatial organization. **Prerequisite:** None. **Schedule Type:** Lecture **Contact Hours:** 3 lecture **Grade Mode:** Standard Letter **Attributes:** Diversity Global

GEOG 34070 ECONOMIC GEOGRAPHY 3 Credit Hours Study of worldwide variations in economic activities, emphasizing both the reasons for and the significance of these variations. **Prerequisite:** None. **Schedule Type:** Lecture **Contact Hours:** 3 lecture **Grade Mode:** Standard Letter
GEOG 35065  GEOGRAPHY OF TRANSPORTATION AND SPATIAL INTERACTION  3 Credit Hours
Prerequisite: None.
Schedule Type: Lecture
Contact Hours: 3 lecture
Grade Mode: Standard Letter

GEOG 36065  CITIES AND URBANIZATION (DIVG)  3 Credit Hours
Course examines what is a city, how it has evolved over time under changing economic conditions, what is its internal structure and how this has been influenced by transportation developments. Special attention is paid to the causes and consequences of social diversity within the city and how cities differ throughout the world.
Prerequisite: None.
Schedule Type: Lecture
Contact Hours: 3 lecture
Grade Mode: Standard Letter
Attributes: Diversity Global

GEOG 37010  GEOGRAPHY OF OHIO  3 Credit Hours
Study of Ohio as a distinctive region, its environment and the varied characteristics of its population, its historical geographic development and contemporary patterns and problems.
Prerequisite: junior standing.
Schedule Type: Lecture
Contact Hours: 3 lecture
Grade Mode: Standard Letter

GEOG 37040  GEOGRAPHY OF AFRICA (DIVG)  3 Credit Hours
This course deals with the complex geographical and cultural elements in Africa. It demonstrates how the interaction of these elements has affected Africa's linkages to other continents especially North America. Furthermore it, discusses how this diversity has affected Africa's economic development and political evolution.
Prerequisite: None.
Schedule Type: Lecture
Contact Hours: 3 lecture
Grade Mode: Standard Letter
Attributes: Diversity Global

GEOG 37045  GEOGRAPHY OF THE MIDDLE EAST  3 Credit Hours
The Middle East is a world region where the interactions between human and physical geographies have shaped its history, culture, economies, and population patterns. This course uses a thematic approach to understand these interactions and how they shape the modern Middle East and its relationship with the wider world.
Prerequisite: None.
Schedule Type: Lecture
Contact Hours: 3 lecture
Grade Mode: Standard Letter
Attributes: Diversity Global

GEOG 37050  GEOGRAPHY OF RUSSIA AND THE COMMONWEALTH OF INDEPENDENT STATES (DIVG)  3 Credit Hours
Study of the physical, economical, political and cultural geography of Russia, Ukraine, Central Asia and other components of the former Soviet Union.
Prerequisite: None.
Schedule Type: Lecture
Contact Hours: 3 lecture
Grade Mode: Standard Letter
Attributes: Diversity Global

GEOG 37066  GEOGRAPHY OF EUROPE (DIVG)  3 Credit Hours
Examination of the cultural, economic, political and physical geography of Western and Eastern Europe (excluding the former USSR).
Prerequisite: None.
Schedule Type: Lecture
Contact Hours: 3 lecture
Grade Mode: Standard Letter
Attributes: Diversity Global

GEOG 37070  GEOGRAPHY OF EAST AND SOUTHEAST ASIA (DIVG)  3 Credit Hours
Analysis of the physical and cultural geography of East and Southeast Asia, extending from Japan and China to Burma and Indonesia.
Prerequisite: None.
Schedule Type: Lecture
Contact Hours: 3 lecture
Grade Mode: Standard Letter
Attributes: Diversity Global

GEOG 37072  GEOGRAPHY OF CHINA  3 Credit Hours
Examination of China's physical environment, natural and human resources, social and cultural characteristics and role in the global environment.
Prerequisite: None.
Schedule Type: Lecture
Contact Hours: 3 lecture
Grade Mode: Standard Letter
Attributes: Diversity Global

GEOG 37079  GEOGRAPHY OF SOUTH ASIA (DIVG)  3 Credit Hours
Physical and cultural geography of South Asian region including India, Pakistan, Bangladesh, Nepal, Bhutan and the Maldive Islands.
Prerequisite: None.
Schedule Type: Lecture
Contact Hours: 3 lecture
Grade Mode: Standard Letter
Attributes: Diversity Global

GEOG 37084  GEOGRAPHY OF SOUTH AMERICA (DIVG)  3 Credit Hours
Overview of region and survey of each country emphasizes systematic similarities and differences in physical environment, culture, economic development, population, land use, politics and history.
Prerequisite: None.
Schedule Type: Lecture
Contact Hours: 3 lecture
Grade Mode: Standard Letter
Attributes: Diversity Global

GEOG 37085  GEOGRAPHY OF LATIN AMERICA AND THE CARIBBEAN (DIVG)  3 Credit Hours
Latin America and the Caribbean is a traditional geographic region that has been uniquely shaped through multiple physical and cultural factors. In this course, a thematic approach is taken to understanding the interplay of these factors, and how they shape modern Latin America-Caribbean identity, the diversity of the environment and culture within the region, and how the region relates to the rest of the world.
Prerequisite: None.
Schedule Type: Lecture
Contact Hours: 3 lecture
Grade Mode: Standard Letter
Attributes: Diversity Global
GEOG 37095 SPECIAL TOPICS IN REGIONAL GEOGRAPHY 3 Credit Hours
(Repeatable for a maximum of 3 times) Special topics course in a specific region of the world.
Prerequisite: none.
Schedule Type: Lecture
Contact Hours: 3 lecture
Grade Mode: Standard Letter

GEOG 39002 STATISTICAL METHODS IN GEOGRAPHY 3 Credit Hours
Explores probability theory, spatial statistics, estimation procedures, hypothesis testing, spatial sampling, methods of areal association and regression analysis. Geographic applications are emphasized.
Prerequisite: MATH 11009 or MATH 11010 or MATH 10041.
Schedule Type: Lecture
Contact Hours: 3 lecture
Grade Mode: Standard Letter

GEOG 40093 VARIABLE TITLE WORKSHOP IN GEOGRAPHY 1-6 Credit Hours
(Repeatable for credit)S/u graded.
Prerequisite: Permission.
Schedule Type: Workshop
Contact Hours: 1-6 other
Grade Mode: Satisfactory/Unsatisfactory

GEOG 40191 SEMINAR IN GEOGRAPHY (ELR) (WIC) 3 Credit Hours
(Repeatable for a maximum of 6 credit hours)Advanced study of the historical development of geography and of contemporary issues in the field. Emphasis on methods of geographic investigation and presentation of results.
Prerequisite: Junior standing and geography (GEOG) major.
Schedule Type: Seminar
Contact Hours: 3 other
Grade Mode: Standard Letter
Attributes: Experiential Learning Requirement, Writing Intensive Course

GEOG 40192 PRACTICUM IN GEOGRAPHY (ELR) 1-3 Credit Hours
(Repeatable for credit)Practical experience in using or teaching geographic techniques and/or problem-solving. Faculty supervised.
Prerequisite: Permission.
Schedule Type: Practicum or Internship
Contact Hours: 1-3 other
Grade Mode: Satisfactory/Unsatisfactory-IP
Attributes: Experiential Learning Requirement

GEOG 40195 SPECIAL TOPICS IN GEOGRAPHY 1-3 Credit Hours
(Repeatable for credit) (Cross-listed with GEOG 50195 and GEOG 70195) Study of natural disasters, the physical causes of the hazards associated with the disasters, their effects on humans and societies, spatial and temporal distributions, and strategies to reduce the occurrences of disasters. Natural disasters include hurricanes, tornadoes, floods, landslides, heat waves, wildfire, blizzards, earthquakes, tsunami, and volcanoes. Mitigation for disasters and responses to disasters are studied across economically developing nations and developed nations. Taught through the analysis of numerous case studies of natural disasters.
Prerequisite: none.
Schedule Type: Lecture
Contact Hours: 3 lecture
Grade Mode: Standard Letter

GEOG 40292 FIELD EXPERIENCE IN GEOGRAPHY (ELR) 1-6 Credit Hours
(Repeatable for credit) (Cross-listed with GEOG 50292 and GEOG 70292) Examination of geographic landscapes in the field.
Prerequisite: special approval.
Schedule Type: Field Experience
Contact Hours: 12-72 other
Grade Mode: Satisfactory/Unsatisfactory
Attributes: Experiential Learning Requirement

GEOG 40392 PRACTICUM IN EMERGING GEOGRAPHIC TRENDS (ELR) 1-6 Credit Hours
(Repeatable for credit) Examination of newly emerging geographic topics and techniques.
Prerequisite: special approval.
Schedule Type: Practicum or Internship
Contact Hours: 1-6 other
Grade Mode: Satisfactory/Unsatisfactory
Attributes: Experiential Learning Requirement

GEOG 40492 STUDY AWAY IN GEOGRAPHY (ELR) 1-3 Credit Hours
(Repeatable 6 times for credit) Examination of geographic landscapes in the field.
Prerequisite: None.
Schedule Type: Field Experience
Contact Hours: 3-9 other
Grade Mode: Standard Letter
Attributes: Experiential Learning Requirement

GEOG 40996 INDIVIDUAL INVESTIGATION IN GEOGRAPHY 1-3 Credit Hours
(Repeatable for credit)Individual undergraduate investigation or research on specific geographical problems.
Prerequisite: Permission.
Schedule Type: Individual Investigation
Contact Hours: 1-3 other
Grade Mode: Standard Letter-IP

GEOG 41050 POLAR AND ALPINE ENVIRONMENTS 3 Credit Hours
(Cross-listed with GEOG 51050 and GEOG 71050) The geographic features of the Earth's cold treeless regions are examined including climate, soils, glaciers, permafrost, plant and animal life and human activities.
Prerequisite: GEOG 21062.
Schedule Type: Lecture
Contact Hours: 3 lecture
Grade Mode: Standard Letter

GEOG 41051 NATURAL DISASTERS AND SOCIETY 3 Credit Hours
Study of natural disasters, the physical causes of the hazards associated with the disasters, their effects on humans and societies, spatial and temporal distributions, and strategies to reduce the occurrences of disasters. Natural disasters include hurricanes, tornadoes, floods, landslides, heat waves, wildfire, blizzards, earthquakes, tsunami, and volcanoes. Mitigation for disasters and responses to disasters are studied across economically developing nations and developed nations. Taught through the analysis of numerous case studies of natural disasters.
Prerequisite: none.
Schedule Type: Lecture
Contact Hours: 3 lecture
Grade Mode: Standard Letter

GEOG 41052 GLACIERS AND GLACIATION 3 Credit Hours
(Cross-listed with GEOL 44052, 54052 and 74052) Examination of how glacial ice masses change the shape of the Earth's surface, how they are integral to climate and sea level change, and how they pose high risk hazards.
Prerequisite: GEOG 21062 or GEOL 11040.
Schedule Type: Lecture
Contact Hours: 3 lecture
Grade Mode: Standard Letter
GEOG 41065  APPLIED CLIMATOLOGY  3 Credit Hours
Aimed at providing a full appreciation for the range of applicability of climate data to real-world problems. There are three overarching goals of the course: To provide a broad overview of what weather and climate information is out there and how we synthesize weather and climate information for use in applied work; to enable a thorough appreciation for the breadth of disciplines in which applied climatology plays a role; and to provide real-world experience of working through an applied climatological problem, via the final project.
Prerequisite: GEOG 31062 or 31064.
Schedule Type: Lecture
Contact Hours: 3 lecture
Grade Mode: Standard Letter

GEOG 41066  CLIMATE CHANGE AND ITS IMPACT  3 Credit Hours
(Cross-listed with GEOG 51066 and GEOG 71066) Examination of the evidence and causes of climate change and how these data are assessed. Past, present and future impacts of climate change and variability are discussed along with policy implications.
Prerequisite: None.
Schedule Type: Lecture
Contact Hours: 3 lecture
Grade Mode: Standard Letter

GEOG 41073  CONSERVATION OF NATURAL RESOURCES  3 Credit Hours
(Cross-listed with GEOG 51073 and GEOG 71073) Evaluation of past and current problems associated with the management of natural resources and the environments associated with their utilization.
Prerequisite: None.
Schedule Type: Lecture
Contact Hours: 3 lecture
Grade Mode: Standard Letter

GEOG 41074  RESOURCE GEOGRAPHY  3 Credit Hours
Culture-technology and distance in relation to resource adequacy and management concepts for societal decisions about common property and situations with external economies.
Prerequisite: Junior standing.
Schedule Type: Lecture
Contact Hours: 3 lecture
Grade Mode: Standard Letter

GEOG 41082  GEOGRAPHY OF SOILS  3 Credit Hours
An edaphological approach to soils including morphology, formation, classification, geographical distribution and utilization. Field work required.
Prerequisite: GEOG 21062 or GEOL 11040.
Schedule Type: Lecture
Contact Hours: 3 lecture
Grade Mode: Standard Letter

GEOG 41195  SPECIAL TOPICS IN ENVIRONMENTAL GEOGRAPHY  1-3 Credit Hours
(Repeatable for a maximum of 10 times) (Cross-listed with GEOG 51195 and GEOG 71195) Special topics in environmental geography.
Prerequisite: none.
Schedule Type: Lecture
Contact Hours: 1-3 lecture
Grade Mode: Standard Letter

GEOG 42040  TOURISM DEVELOPMENT AND RECREATIONAL TRAVEL  3 Credit Hours
(Cross-listed with RPTM 46000) Investigation of travel and tourism development using an interdisciplinary social science approach.
Prerequisite: RPTM 36060.
Schedule Type: Lecture
Contact Hours: 3 lecture
Grade Mode: Standard Letter

GEOG 42053  GEOGRAPHIES OF MEMORY AND HERITAGE  3 Credit Hours
(Cross-listed with GEOG 52053 and GEOG 72053) Gives students a working knowledge in, and ability to understand and analyze, the intersection of memory and landscape as a tangible re-presentation of the human past, oftentimes used as a tangible expression of cultural or political power. To this end the course focuses on memorialization, preservation, and tourism concepts and themes.
Prerequisite: junior standing.
Schedule Type: Lecture
Contact Hours: 3 lecture
Grade Mode: Standard Letter

GEOG 42064  HISTORICAL GEOGRAPHY OF THE UNITED STATES AND CANADA  3 Credit Hours
(Cross-listed with GEOG 52064 and GEOG 72064) Regional origins and growth, evolution of spatial organization, changing evaluation of environments, and past geographies in United States and Canada from pre-Colonial times on.
Prerequisite: GEOG 17064.
Schedule Type: Lecture
Contact Hours: 3 lecture
Grade Mode: Standard Letter

GEOG 42070  SEMINAR IN ETHNIC, LIFESTYLE AND NATIONAL COMMUNITIES  3 Credit Hours
(Slashed with GEOG 52070 and GEOG 72070) Covers the geographies of ethnic identity and nationalism, national identity and territory, borderlands and diasporas, national separatism and the variety of ways in which cultural difference asserts itself.
Prerequisite: Junior standing; and special approval.
Schedule Type: Seminar
Contact Hours: 3 other
Grade Mode: Standard Letter

GEOG 42195  SPECIAL TOPICS IN SOCIAL GEOGRAPHY  1-3 Credit Hours
(Repeatable for a maximum of 10 times) (Cross-listed with GEOG 52195 and 72195) Special topics in social geography.
Prerequisite: none.
Schedule Type: Lecture
Contact Hours: 1-3 lecture
Grade Mode: Standard Letter
GEOG 44010 GEOGRAPHY OF THE GLOBAL ECONOMY (WIC) 3 Credit Hours
Geographic analysis of the increasing interconnectedness of economic activity. The social, technological and political changes associated with globalization are also discussed.
Prerequisite: GEOG 34070 or ECON 22061.
Schedule Type: Lecture
Contact Hours: 3 lecture
Grade Mode: Standard Letter
Attributes: Writing Intensive Course

GEOG 44070 SPATIAL ANALYSIS AND LOCATION THEORY 3 Credit Hours
(Cross-listed with GEOG 54070 and GEOG 74070) Classical theories for location of economic activities and contemporary approach of spatial analysis, spatial organization of economic systems behavioral models in economic geography spatial allocation problems.
Prerequisite: None.
Schedule Type: Lecture
Contact Hours: 3 lecture
Grade Mode: Standard Letter

GEOG 45085 URBAN TRANSPORTATION 3 Credit Hours
(Cross-listed with GEOG 55085 and GEOG 75085) Spatial analysis of urban transportation, travel behavior, modes. Trip generation and distribution models, transportation planning, urban transportation problems.
Prerequisite: none.
Schedule Type: Lecture
Contact Hours: 3 lecture
Grade Mode: Standard Letter

GEOG 46070 URBAN AND REGIONAL PLANNING 3 Credit Hours
(Cross-listed with GEOG 56070 and GEOG 76070) Analysis of geographical aspects of planning for cities and regions.
Prerequisite: none.
Schedule Type: Lecture
Contact Hours: 3 lecture
Grade Mode: Standard Letter

GEOG 46080 URBAN SUSTAINABILITY 3 Credit Hours
(looked with GEOG 56080 and GEOG 76080) Provides an introduction to interdisciplinary perspectives on urban sustainability, focusing on environmental challenges caused by urbanization and the innovative ways urban dwellers seek to address those challenges. It provides the background on relevant disciplinary perspectives and their application to environmental challenge domains.
Prerequisite: None.
Schedule Type: Lecture, Seminar
Contact Hours: 3 lecture
Grade Mode: Standard Letter

GEOG 46081 SEMINAR IN URBAN GEOGRAPHY 3 Credit Hours
(looked with GEOG 56081 and GEOG 76081) Theoretical explanations of urban spatial patterns. Application of contemporary theories concepts and methods to selected urban geographic problems.
Prerequisite: Junior standing; and special approval.
Schedule Type: Seminar
Contact Hours: 3 other
Grade Mode: Standard Letter

GEOG 46092 INTERNSHIP IN GEOGRAPHY AND PLANNING (ELR) 3-6 Credit Hours
(Repeatable for credit) (Cross-listed with GEOG 56092) Pre-professional work experience in local, regional and environmental planning agencies and in business designed to utilize and develop academic skills.
Prerequisite: Controlled registration admission competitive based on student's skills and interests and on number of positions available.
Schedule Type: Practicum or Internship
Contact Hours: 3-6 other
Grade Mode: Standard Letter
Attributes: Experiential Learning Requirement

GEOG 49070 GEOGRAPHIC INFORMATION SCIENCE 4 Credit Hours
(Cross-listed with GEOG 59070 and GEOG 79070) Introduction to theories and methods for geographic data processing, including data capture and input data storage and management and data analysis and displays. Emphasis is on laboratory exercises using GIS software packages for real world applications. Non-geographers should contact the Department of Geography to discuss the course prerequisites.
Prerequisite: GEOG 29160.
Schedule Type: Combined Lecture and Lab
Contact Hours: 3 lecture, 2 lab
Grade Mode: Standard Letter

GEOG 49072 GEOGRAPHIC INFORMATION SCIENCE AND HEALTH 3 Credit Hours
(Cross-listed with GEOG 59072 and GEOG 79072) Geographic theory and methods serve as the connection among disparate disciplines focused on how and why "health" varies between regions, cities, and neighborhoods. This course examines how geospatial technologies, especially GIS, have become an important health analysis tool.
Prerequisite: none.
Schedule Type: Lecture
Contact Hours: 3 lecture
Grade Mode: Standard Letter

GEOG 49075 GEOGRAPHIC INFORMATION SCIENCE: URBAN AND ECONOMIC APPLICATIONS 3 Credit Hours
(Cross-listed with GEOG 59075 and GEOG 79075) Urban and economic applications and analyses of spatial data, especially theoretical and conceptual issues including the possibilities and concerns associated with GIS, ethical considerations, and the various forms of data collection, visualization, analysis and dissemination.
Prerequisite: GEOG 49070.
Schedule Type: Lecture
Contact Hours: 3 lecture
Grade Mode: Standard Letter

GEOG 49076 SPATIAL PROGRAMMING 3 Credit Hours
(Cross-listed with GEOG 59076 and GEOG 79076) Examination of the design, development and use of geographic information technologies with computer programming to model, process and visualize geographic phenomena.
Prerequisite: GEOG 49070.
Schedule Type: Lecture
Contact Hours: 3 lecture
Grade Mode: Standard Letter
GEOG 49078  GEOGRAPHIC INFORMATION SCIENCE AND ENVIRONMENTAL HAZARDS  3 Credit Hours
(Slashed with GEOG 59078 and GEOG 79078) The study and management of natural hazards are inherently reliant on both physical and human processes and spatial patterns. Given the many variables involved and the variety of scales at which they operate, use of Geographic Information Systems (GIS) has become standard practice in research on hazards and in their management by government agencies at all levels. Exposes students to a wide array of spatial data that is used in these activities, as well as standard mapping and spatial analysis procedures and forms of data dissemination.
Prerequisite: GEOG 49070.
Schedule Type: Lecture
Contact Hours: 3 lecture
Grade Mode: Standard Letter

GEOG 49080  ADVANCED GEOGRAPHIC INFORMATION SCIENCE  3 Credit Hours
Advanced theories and techniques for handling geographic information systems, including 2D and 3D processing of geographic information, detection and analysis of geographic patterns, 2D and 3D mapping of geographic information, modeling of geographic processes, and an overview of GIS programming tools.
Prerequisite: GEOG 49070.
Schedule Type: Lecture
Contact Hours: 3 lecture
Grade Mode: Standard Letter

GEOG 49085  WEB AND MOBILE GEOGRAPHIC INFORMATION SCIENCE  3 Credit Hours
(Slashed with GEOG 59085 and GEOG 79085) Explores how web and mobile phones present opportunities and challenges to the field of geographic information science (GIS). This includes the examination of the use, design and development of cyberinfrastructure-enabled GIS emphasizing web- and mobile-based interfaces and technologies. GIS experience recommended.
Prerequisite: None.
Schedule Type: Lecture
Contact Hours: 3 lecture
Grade Mode: Standard Letter

GEOG 49098  RESEARCH IN GEOGRAPHIC INFORMATION TECHNOLOGY (ELR)  1-3 Credit Hours
(Repeatable for credit) Individual research on a topic in geographic information technology.
Prerequisite: Special approval.
Schedule Type: Research
Contact Hours: 1-3 other
Grade Mode: Standard Letter-IP
Attributes: Experiential Learning Requirement

GEOG 49162  CARTOGRAPHY AND GEOVISUALIZATION  3 Credit Hours
(Slashed with GEOG 59162 and GEOG 79162) Study of the design and production of dynamic, interactive, multimedia web-based mapping. Data acquisition and processing, symbolization, composition, text and color utilization.
Prerequisite: GEOG 49070.
Corequisite: GEOG 49163.
Schedule Type: Lecture
Contact Hours: 3 lecture
Grade Mode: Standard Letter

GEOG 49163  CARTOGRAPHY AND GEOVISUALIZATION LABORATORY  1 Credit Hour
(Cross-listed with GEOG 59163 and GEOG 79163) Practical experience in the techniques of data acquisition and processing for dynamic, multimedia, and online map production and geovisualizations.
Prerequisite: GEOG 49070.
Corequisite: GEOG 49162.
Schedule Type: Laboratory
Contact Hours: 2 lab
Grade Mode: Standard Letter

GEOG 49165  GEOMAPPING  3 Credit Hours
(Cross-listed with GEOG 59165 and GEOG 79165) Information theory, data collection, automated mapping systems. Representation of surfaces lines and points, geographic data structures and applications. Mapping by line printer, interactive terminals.
Prerequisite: GEOG 39082 or GEOG 39161.
Schedule Type: Lecture
Contact Hours: 3 lecture
Grade Mode: Standard Letter

GEOG 49170  RESEARCH IN CARTOGRAPHY AND GEOGRAPHIC INFORMATION SCIENCE  1-3 Credit Hours
(Repeatable for a maximum of 10 times) (Cross-listed with GEOG 59170 and GEOG 79170) Information theory, data collection, automated mapping systems. Representation of surfaces lines and points, geographic data structures and applications. Mapping by line printer, interactive terminals.
Prerequisite: none.
Schedule Type: Lecture
Contact Hours: 1-3 lecture
Grade Mode: Standard Letter

GEOG 49195  SPECIAL TOPICS IN GEOGRAPHIC INFORMATION SCIENCE  1-3 Credit Hours
(Repeatable for credit) (Cross-listed with GEOG 40195 and GEOG 70195) Special topics in geographic information sciences.
Prerequisite: none.
Schedule Type: Lecture
Contact Hours: 1-3 other
Grade Mode: Standard Letter
Attributes: Experiential Learning Requirement

GEOG 49230  REMOTE SENSING  3 Credit Hours
(Cross-listed with GEOL 52030 and GEOL 72030) Computer analysis of multispectral satellite datasets. Applications in Terrestrial Earth Science are emphasized.
Prerequisite: Special approval.
Schedule Type: Lecture
Contact Hours: 3 lecture
Grade Mode: Standard Letter

GEOG 50093  VARIABLE TITLE WORKSHOP IN GEOGRAPHY  1-5 Credit Hours
(Repeatable for credit) Variable title workshop in geography.
Prerequisite: Graduate standing.
Schedule Type: Workshop
Contact Hours: 1-5 other
Grade Mode: Satisfactory/Unsatisfactory-IP

GEOG 50195  SPECIAL TOPICS IN GEOGRAPHY  1-3 Credit Hours
(Repeatable for credit) (Cross-listed with GEOG 40195 and GEOG 70195) Topics vary according to research interest of person teaching the course.
Prerequisite: Graduate standing.
Schedule Type: Lecture
Contact Hours: 1-3 lecture
Grade Mode: Standard Letter
GEOG 50292  FIELD EXPERIENCE IN GEOGRAPHY  1-6 Credit Hours
(Repeatable for credit) (Cross-listed with GEOG 40292 and GEOG 70292) Examination of geographic landscapes in the field.
Prerequisite: Special approval and graduate standing.
Schedule Type: Field Experience
Contact Hours: 12-72 other
Grade Mode: Satisfactory/Unsatisfactory

GEOG 50392  PRACTICUM IN EMERGING GEOGRAPHIC TRENDS  1-6 Credit Hours
(Repeatable for credit) Examination of newly emerging geographic topics and techniques.
Prerequisite: Special approval and graduate standing.
Schedule Type: Practicum or Internship
Contact Hours: 1-6 other
Grade Mode: Satisfactory/Unsatisfactory

GEOG 50492  STUDY AWAY IN GEOGRAPHY  1-3 Credit Hours
(Repeatable 6 times for credit) Examination of geographic landscapes in the field.
Prerequisite: None.
Schedule Type: Field Experience
Contact Hours: 3-9 other
Grade Mode: Standard Letter

GEOG 51050  POLAR AND ALPINE ENVIRONMENTS  3 Credit Hours
(Cross-listed with GEOG 41050 and GEOG 71050) The geographic features of the earth's cold treeless regions are examined including climate, soils, glaciers, permafrost, plant and animal life and human activities.
Prerequisite: GEOG 21062 and graduate standing.
Schedule Type: Lecture
Contact Hours: 3 lecture
Grade Mode: Standard Letter

GEOG 51051  NATURAL DISASTERS AND SOCIETY  3 Credit Hours
Study of natural disasters, the physical causes of the hazards associated with the disasters, their effects on humans and societies, spatial and temporal distributions, and strategies to reduce the occurrences of disasters. Natural disasters include hurricanes, tornadoes, floods, landslides, heat waves, wildfire, blizzards, earthquakes, tsunami, and volcanoes. Mitigation for disasters and responses to disasters are studied across economically developing nations and developed nations. Taught through the analysis of numerous case studies of natural disasters.
Prerequisite: graduate standing.
Schedule Type: Lecture
Contact Hours: 3 lecture
Grade Mode: Standard Letter

GEOG 51052  GLACIERS AND GLACIATION  3 Credit Hours
(Cross-listed with GEOL 44052, 54052 and 74052) Examination of how glacial ice masses change the shape of the earth's surface, how they are integral to climate and sea level change and how they pose high risk hazards.
Prerequisite: Graduate standing.
Schedule Type: Lecture
Contact Hours: 3 lecture
Grade Mode: Standard Letter

GEOG 51053  CONSERVATION OF OUR NATURAL RESOURCES  3 Credit Hours
(Cross-listed with GEOG 41073 and GEOG 71073) Evaluation of past and current problems associated with the management of natural resources and the environments associated with their utilization.
Prerequisite: Graduate standing.
Schedule Type: Lecture
Contact Hours: 3 lecture
Grade Mode: Standard Letter

GEOG 51054  RESOURCE GEOGRAPHY  3 Credit Hours
(Cross-listed with GEOG 41082 and GEOG 71082) Study and analysis of different soil types in their relation to geographic factors.
Prerequisite: Graduate standing.
Schedule Type: Lecture
Contact Hours: 3 lecture
Grade Mode: Standard Letter

GEOG 51055  APPLIED CLIMATOLOGY  3 Credit Hours
Aimed at providing a full appreciation for the range of applicability of climate data to real-world problems. There are three overarching goals of the course: To provide a broad overview of what weather and climate information is out there and how we synthesize weather and climate information for use in applied work; to enable a thorough appreciation for the breadth of disciplines in which applied climatology plays a role; and to provide real-world experience of working through an applied climatological problem, via the final project.
Prerequisite: graduate standing.
Schedule Type: Lecture
Contact Hours: 3 lecture
Grade Mode: Standard Letter

GEOG 51056  CLIMATE CHANGE AND ITS IMPACTS  3 Credit Hours
(Cross-listed with GEOG 41066 and GEOG 71066) Examination of the evidence and causes of climate change and how these data are assessed. Past, present and future impacts of climate change and variability are discussed along with policy implications.
Prerequisite: Graduate standing.
Schedule Type: Lecture
Contact Hours: 3 lecture
Grade Mode: Standard Letter

GEOG 51057  SPECIAL TOPICS IN ENVIRONMENTAL GEOGRAPHY  1-3 Credit Hours
(Repeatable for a maximum of 10 times) (Cross-listed with GEOG 41195 and GEOG 71195) Special topics in environmental geography.
Prerequisite: graduate standing.
Schedule Type: Lecture
Contact Hours: 1-3 lecture
Grade Mode: Standard Letter
GEOG 52052  MEDICAL GEOGRAPHY  3 Credit Hours
(Cross-listed with GEOG 42052 and GEOG 72052) Examines the geographic patterns of morbidity and mortality, environmental correlates of major diseases and disease diffusion. Locational and accessibility issues of health care are discussed.
Prerequisite: Graduate standing.
Schedule Type: Lecture
Contact Hours: 3 lecture
Grade Mode: Standard Letter

GEOG 52053  GEOGRAPHIES OF MEMORY AND HERITAGE  3 Credit Hours
(Cross-listed with GEOG 42053 and GEOG 72053) Gives students a working knowledge in, and ability to understand and analyze, the intersection of memory and landscape as a tangible re-presentation of the human past, oftentimes used as a tangible expression of cultural or political power. To this end the course focuses on memorialization, preservation, and tourism concepts and themes.
Prerequisite: graduate standing.
Schedule Type: Lecture
Contact Hours: 3 lecture
Grade Mode: Standard Letter

GEOG 52064  HISTORICAL GEOGRAPHY OF THE UNITED STATES AND CANADA  3 Credit Hours
(Cross-listed with GEOG 42064 and GEOG 72064) Study of regional origins, growth evolution of spatial organization changing evaluation of environments and selective geographies in United States and Canada from precolonial times to present.
Prerequisite: Graduate standing.
Schedule Type: Lecture
Contact Hours: 3 lecture
Grade Mode: Standard Letter

GEOG 52070  SEMINAR IN ETHNIC, LIFESTYLE AND NATIONAL COMMUNITIES  3 Credit Hours
(Slashed with GEOG 42070 and GEOG 72070) Covers the geographies of ethnic identity and nationalism, national identity and territory, borderlands and diasporas, national separatism and the variety of ways in which cultural difference asserts itself.
Prerequisite: Graduate standing.
Schedule Type: Seminar
Contact Hours: 3 lecture
Grade Mode: Standard Letter

GEOG 52195  SPECIAL TOPICS IN SOCIAL GEOGRAPHY  1-3 Credit Hours
(Repeatable for a maximum of 10 times) (Cross-listed with GEOG 42195 and GEOG 72195) Special topics in social geography.
Prerequisite: graduate standing.
Schedule Type: Lecture
Contact Hours: 1-3 lecture
Grade Mode: Standard Letter

GEOG 54010  GEOGRAPHY OF THE GLOBAL ECONOMY  3 Credit Hours
(Cross-listed with GEOG 44010 and GEOG 74010) Geographic analysis of the increasing interconnectedness of economic activity. The social, technological and political changes associated with globalization are also discussed.
Prerequisite: graduate standing.
Schedule Type: Lecture
Contact Hours: 3 lecture
Grade Mode: Standard Letter

GEOG 54070  SPATIAL ANALYSIS AND LOCATION THEORY  3 Credit Hours
(Cross-listed with GEOG 44070 and GEOG 74070) Classical theories for location of economic activities and contemporary approach of spatial analysis, spatial organization of economic systems behavioral models in economic geography and spatial allocation problems.
Prerequisite: Graduate standing.
Schedule Type: Lecture
Contact Hours: 3 lecture
Grade Mode: Standard Letter

GEOG 55085  URBAN TRANSPORTATION  3 Credit Hours
(Cross-listed with GEOG 45085 and GEOG 75085) Spatial interaction patterns in urban environments. Travel behavior, commodity flows, traffic patterns and urban transportation systems. Urban transportation problems. Theoretical developments and techniques of analysis in urban transportation.
Prerequisite: Graduate standing.
Schedule Type: Lecture
Contact Hours: 3 lecture
Grade Mode: Standard Letter

GEOG 56070  URBAN AND REGIONAL PLANNING  3 Credit Hours
(Cross-listed with GEOG 46070 and GEOG 76070) Analysis of the geographical aspects of planning for cities and regions.
Prerequisite: Graduate standing.
Schedule Type: Lecture
Contact Hours: 3 lecture
Grade Mode: Standard Letter

GEOG 56080  URBAN SUSTAINABILITY  3 Credit Hours
(Slashed with GEOG 46080 and GEOG 76080) Provides an introduction to interdisciplinary perspectives on urban sustainability, focusing on environmental challenges caused by urbanization and the innovative ways urban dwellers seek to address those challenges. It provides background on relevant disciplinary perspectives and their application to environmental challenge domains.
Prerequisite: Graduate standing.
Schedule Type: Lecture, Seminar
Contact Hours: 3 lecture
Grade Mode: Standard Letter

GEOG 56081  SEMINAR IN URBAN GEOGRAPHY  3 Credit Hours
(Slashed with GEOG 46081 and GEOG 76081) Theoretical explanations of urban spatial patterns. Application of contemporary theories concepts and methods to selected urban geographic problems.
Prerequisite: Graduate standing.
Schedule Type: Seminar
Contact Hours: 3 other
Grade Mode: Standard Letter

GEOG 56092  INTERNSHIP IN GEOGRAPHY AND PLANNING  3-6 Credit Hours
(Repeatable for credit) (Cross-listed with GEOG 46092) Preprofessional work experience in local, regional and environmental planning agencies and private business designed to utilize and develop academic skills.
Prerequisite: Special approval and graduate standing.
Schedule Type: Practicum or Internship
Contact Hours: 3-6 other
Grade Mode: Standard Letter
GEOG 59070  GEOGRAPHIC INFORMATION SCIENCE  4 Credit Hours
(Cross-listed with GEOG 49070 and GEOG 79070) Introduction to theories and methods for geographic data processing, including data capture and input, data storage and management, and data analysis and displays. Emphasis is on laboratory exercises using GIS software packages for real world applications.
Prerequisite: Graduate standing.
Schedule Type: Combined Lecture and Lab
Contact Hours: 3 lecture, 2 lab
Grade Mode: Standard Letter

GEOG 59072  GEOGRAPHIC INFORMATION SCIENCE AND HEALTH  3 Credit Hours
Geographic theory and methods serve as the connection among disparate disciplines focused on how and why "health" varies between regions, cities, and neighborhoods. Examines how geospatial technologies, especially GIS, have become an important health analysis tool.
Prerequisite: graduate standing.
Schedule Type: Lecture
Contact Hours: 3 lecture
Grade Mode: Standard Letter

GEOG 59075  GEOGRAPHIC INFORMATION SCIENCE: URBAN AND ECONOMIC APPLICATIONS  3 Credit Hours
Urban and economic applications and analyses of spatial data, especially theoretical and conceptual issues including the possibilities and concerns associated with GIS, ethical considerations, and the various forms of data collection, visualization, analysis, and dissemination.
Prerequisite: GEOG 49070 or GEOG 59070; and graduate standing.
Schedule Type: Lecture
Contact Hours: 3 lecture
Grade Mode: Standard Letter

GEOG 59076  SPATIAL PROGRAMMING  3 Credit Hours
(Cross-listed with GEOG 49076 and GEOG 79076) Examination of the design, development and use of geographic information technologies with computer programming to model, process and visualize geographic phenomena.
Prerequisite: GEOG 59070 and graduate standing.
Schedule Type: Lecture
Contact Hours: 3 lecture
Grade Mode: Standard Letter

GEOG 59078  GEOGRAPHIC INFORMATION SCIENCE AND ENVIRONMENTAL HAZARDS  3 Credit Hours
(Slashed with GEOG 49078 and GEOG 79078) The study and management of natural hazards are inherently reliant on both physical and human processes and spatial patterns. Given the many variables involved and the variety of scales at which they operate, use of Geographic Information Systems (GIS) has become standard practice in research on hazards and in their management by government agencies at all levels. Exposes students to a wide array of spatial data that is used in these activities, as well as standard mapping and spatial analysis procedures and forms of data dissemination.
Prerequisite: GEOG 49070 or 59070; and graduate standing.
Schedule Type: Lecture
Contact Hours: 3 lecture
Grade Mode: Standard Letter

GEOG 59080  ADVANCED GEOGRAPHIC INFORMATION SCIENCE  3 Credit Hours
(Cross-listed with GEOG 49080 and GEOG 79080) Advanced theories and techniques for handling geographic information systems, including 2D and 3D processing of geographic information, detection and analysis of geographic patterns, 2D and 3D mapping of geographic information, modeling of geographic processes and an overview of GIS programming tools.
Prerequisite: GEOG 4/59070 and graduate standing.
Schedule Type: Lecture
Contact Hours: 3 lecture
Grade Mode: Standard Letter

GEOG 59085  WEB AND MOBILE GEOGRAPHIC INFORMATION SCIENCE  3 Credit Hours
(Slashed with GEOG 49085 and GEOG 79085) Explores how web and mobile phones present opportunities and challenges to the field of geographic information science (GIS). This includes the examination of the use, design and development of cyberinfrastructure-enabled GIS emphasizing web- and mobile-based interfaces and technologies. GIS experience recommended.
Prerequisite: Graduate standing.
Schedule Type: Lecture
Contact Hours: 3 lecture
Grade Mode: Standard Letter

GEOG 59162  CARTOGRAPHY AND GEOVISUALIZATION  3 Credit Hours
(Slashed with GEOG 49162 and GEOG 79162) Study of the design and production of dynamic, interactive, multimedia web-based mapping. Data acquisition and processing, symbolization, composition, text and color utilization.
Prerequisite: GEOG 49070 or GEOG 59070; and graduate standing.
Corequisite: GEOG 59163.
Schedule Type: Lecture
Contact Hours: 3 lecture
Grade Mode: Standard Letter

GEOG 59163  CARTOGRAPHY AND GEOVISUALIZATION LABORATORY  1 Credit Hour
(Cross-listed with GEOG 49163 and GEOG 79163) Practical experience in the techniques of data acquisition and processing for dynamic, multimedia, and online map production and geovisualizations.
Prerequisite: GEOG 49070 or 59070; and graduate standing.
Corequisite: GEOG 59162.
Schedule Type: Laboratory
Contact Hours: 2 lab
Grade Mode: Standard Letter

GEOG 59165  GEOMAPPING  3 Credit Hours
(Cross-listed with GEOG 49165 and GEOG 79165) Information theory, data collection, automated mapping systems, representation of surfaces, lines and points, geographic data structures and applications. Mapping by line printer, plotters and interactive terminals.
Prerequisite: Graduate standing.
Schedule Type: Lecture
Contact Hours: 3 lecture
Grade Mode: Standard Letter
<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credit Hours</th>
<th>Grade Mode</th>
<th>Contact Hours</th>
<th>Schedule Type</th>
<th>Prerequisite</th>
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<tbody>
<tr>
<td>GEOG 59195</td>
<td>SPECIAL TOPICS IN GEOGRAPHIC INFORMATION SCIENCE</td>
<td>1-3</td>
<td>Credit Hours</td>
<td>Graduate standing</td>
<td>Lecture</td>
<td>Cross-listed with GEOG 49195 and GEOG 79195. Special topics in geographic information sciences.</td>
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<tr>
<td>GEOG 59230</td>
<td>REMOTE SENSING</td>
<td>3</td>
<td>Credit Hours</td>
<td>Graduate standing</td>
<td>Lecture</td>
<td>Cross-listed with GEOG 49230 and GEOG 79230 and GEOL 42030 and GEOL 52030 and GEOL 72030. Computer analysis of multispectral satellite datasets. Applications in Terrestrial Earth Science are emphasized.</td>
</tr>
<tr>
<td>GEOG 60191</td>
<td>SEMINAR IN TOPICAL GEOGRAPHY</td>
<td>3</td>
<td>Credit Hours</td>
<td>Graduate standing</td>
<td>Lecture</td>
<td>Cross-listed with GEOG 70191. Seminar in one of the major topical fields in geography offered by title in given semester.</td>
</tr>
<tr>
<td>GEOG 60199</td>
<td>THESIS I</td>
<td>2-6</td>
<td>Credit Hours</td>
<td>Graduate standing</td>
<td>Research</td>
<td>Graduate students must register for a total of 6 hours, 2 to 6 hours in single semester distributed over several semesters if desired.</td>
</tr>
<tr>
<td>GEOG 60299</td>
<td>THESIS II</td>
<td>2</td>
<td>Credit Hours</td>
<td>Graduate standing</td>
<td>Research</td>
<td>Graduate students must continue registration each semester until all degree requirements are met.</td>
</tr>
<tr>
<td>GEOG 60800</td>
<td>SEMINAR IN THE DEVELOPMENT OF GEOGRAPHIC THOUGHT</td>
<td>3</td>
<td>Credit Hours</td>
<td>Graduate standing</td>
<td>Lecture</td>
<td>Cross-listed with GEOG 70800. Development of geographic knowledge and concepts with emphasis on recent development. Critical analysis of writings of representative geographers and scientists in related fields.</td>
</tr>
<tr>
<td>GEOG 60900</td>
<td>QUALITATIVE RESEARCH METHODS IN GEOGRAPHY</td>
<td>3</td>
<td>Credit Hours</td>
<td>Graduate standing</td>
<td>Lecture</td>
<td>Cross-listed with GEOG 70900. Introduces qualitative methods and research applications, along with methodological considerations of these approaches. Students consider the epistemology of qualitative research and learn the mechanics of conducting this research in the field. In class, these methods are put into practice and the results are put into writing.</td>
</tr>
<tr>
<td>GEOG 60996</td>
<td>RESEARCH IN GEOGRAPHY</td>
<td>1-3</td>
<td>Credit Hours</td>
<td>Special approval and graduate standing</td>
<td>Research</td>
<td>Repeatable for credit. (Individual research problems in geography.</td>
</tr>
<tr>
<td>GEOG 60998</td>
<td>RESEARCH</td>
<td>1-15</td>
<td>Credit Hours</td>
<td>Graduate standing</td>
<td>Research</td>
<td>Repeatable for credit. Research or individual investigation for master's level graduate students. Credits earned may be applied toward meeting degree requirements if the department approves.</td>
</tr>
<tr>
<td>GEOG 62062</td>
<td>BEHAVIORAL GEOGRAPHY</td>
<td>3</td>
<td>Credit Hours</td>
<td>Graduate standing</td>
<td>Lecture</td>
<td>Focuses on spatial perception, cognition and behavior. How we collect and process spatial information, behavior in space, locate space and interact in space.</td>
</tr>
<tr>
<td>GEOG 67091</td>
<td>SEMINAR IN REGIONAL GEOGRAPHY</td>
<td>3</td>
<td>Credit Hours</td>
<td>Graduate standing</td>
<td>Lecture</td>
<td>Cross-listed with GEOG 77091. Seminar on one of the major regions of world offered by title in given semester.</td>
</tr>
<tr>
<td>GEOG 69004</td>
<td>QUANTITATIVE METHODS IN GEOGRAPHY</td>
<td>3</td>
<td>Credit Hours</td>
<td>Graduate standing</td>
<td>Lecture</td>
<td>Slashed with GEOG 79004. Explores explores the methods and applications of some of the most common statistics found in geographic work. It explores probability theory, spatial statistics, estimation procedures, hypothesis testing, spatial sampling, methods of areal association, correlation and regression analysis, and principal components analysis. Theory and execution of these methods are equally emphasized, and applications to geographic problems are examined within each theme.</td>
</tr>
<tr>
<td>GEOG 69007</td>
<td>SPATIOTEMPORAL ANALYTICS</td>
<td>3</td>
<td>Credit Hours</td>
<td>Graduate standing</td>
<td>Lecture</td>
<td>Slashed with GEOG 79007. Equips students with essential spatiotemporal thinking and technical skills in mapping, analyzing, visualizing, communicating, and simulating the spatiotemporal data. ArcGIS and free packages in R and Netlogo will be used in the instruction.</td>
</tr>
</tbody>
</table>
GEOG 69073 GEOGRAPHIC INFORMATION SCIENCE: GLOBAL HEALTH 3 Credit Hours
Emerging and re-emerging diseases in non-developed countries pose one of the greatest health challenges of current times. Geospatial approaches often provide one of the only information sources in data poor and challenging environments. This course will expose students to these health issues and disease environments through varied case studies, while simultaneously highlighting the geospatial methods and approaches used to understand and combat disease.
Prerequisite: Graduate standing.
Schedule Type: Lecture
Contact Hours: 3 lecture
Grade Mode: Standard Letter

GEOG 69074 GEOGRAPHIC INFORMATION SCIENCE: SPATIAL ANALYSIS FOR HEALTH GEOGRAPHY 3 Credit Hours
Spatial analysis is used to verify patterns and associations in health data maps. These results can then be used to further hone the scientific question, or help design an intervention strategy. This course will introduce spatial analytical approaches used by health researchers and practitioners in the exploratory investigation of health data. Students will also be exposed to new mobile technologies that can be used to enrich more traditional spatial data sources.
Prerequisite: GEOG 59070 or GEOG 59072; and graduate standing.
Schedule Type: Lecture
Contact Hours: 3 lecture
Grade Mode: Standard Letter

GEOG 69079 ENVIRONMENTAL GEOGRAPHIC INFORMATION SCIENCE 3 Credit Hours
GPS and environmental spatial data are commonly used in a variety of management and assessment plans in fields related to environmental science to achieve effective decision making and environmental resource management. This course will focus on techniques used to process, manage, visualize, and analyze environmental data using GIS. Students will learn how to collect and process GPS and online sources of geospatial data and how to employ techniques such as suitability modeling, measuring distributions, and calculating landscape metrics.
Prerequisite: GEOG 59070; and graduate standing.
Schedule Type: Lecture
Contact Hours: 3 lecture
Grade Mode: Standard Letter

GEOG 69082 CYBERGIS 3 Credit Hours
(Slashed with GEOG 79082) Explores cyberinfrastructure-enabled geographic information systems (i.e. cyberGIS) and related technologies including a broad introduction to the use, design, and development of cyberinfrastructure, spatial data infrastructures, geographic information services, and web-enabled mapping technologies. Situates CyberGIS in the broader context of geographic information science focusing on the how synthesizing computational thinking and spatial thinking influence methodological approaches.
Prerequisite: Graduate standing.
Schedule Type: Lecture
Contact Hours: 3 lecture
Grade Mode: Standard Letter

GEOG 69083 GEODATABASES 3 Credit Hours
Essential concepts and skills needed to efficiently create a geodatabase, add data to it, and realistically model the real-world spatial relationships inherent to the data. Students will learn about geodatabase features that help ensure data integrity over time and about storing and managing geographic data.
Prerequisite: GEOG 59070; and graduate standing.
Schedule Type: Lecture
Contact Hours: 3 lecture
Grade Mode: Standard Letter

GEOG 69164 CARTOGRAPHIC DESIGN 4 Credit Hours
Introduces students to the principles of map design and the art of map construction. Students will become familiar with the cartographic process, especially as they apply basic mapping concepts such as scale, projections, typography, generalization, symbols, color scheme, and classification to the design and production of thematic maps. Students will also learn how to describe and manipulate spatial data and how to select an appropriate map type for a given task and data set. This course builds on students' experiences with GIS to focus on the design needed to disseminate information beyond users of the software and produce effective print and web maps. Class exercises will provide hands-on experience in using GIS and graphic software packages. Principles and experiences learned in class will equip students with the fundamental skills necessary to effectively communicate geographic information through maps.
Prerequisite: Graduate standing.
Schedule Type: Combined Lecture and Lab
Contact Hours: 3 lecture, 2 lab
Grade Mode: Standard Letter

GEOG 69231 ENVIRONMENTAL REMOTE SENSING 3 Credit Hours
Introduction to the basic principles of environmental remote sensing, including the electromagnetic spectrum, spectral properties of Earth objects, aerial photograph analysis and interpretation and satellite image analysis and interpretation. Special focus will be on environmental applications, especially as they pertain to understanding vegetation, water, and land use mapping and impacts.
Prerequisite: Graduate standing.
Schedule Type: Lecture
Contact Hours: 3 lecture
Grade Mode: Standard Letter

GEOG 69392 PRACTICUM IN GEOGRAPHIC INFORMATION SCIENCE 6 Credit Hours
Culminating experience for students in the MGISC program. It will be taken in place of two CarouselSpecialist courses on the schedule for the student's final semester. It is designed to provide practical experience in the application of MGISC course content in real-world professional settings. Students will select a professional project in consultation with their employer and program faculty and then will design, implement, and report on their activities in a culminating professional paper.
Prerequisite: GEOG 59070 and GEOG 59080 and GEOG 69164; and two additional graduate-level GEOG courses; and graduate standing.
Schedule Type: Practicum or Internship
Contact Hours: 18 other
Grade Mode: Standard Letter
GEOG 69701 RESEARCH AND PRESENTATION OF GEOGRAPHIC DATA 3 Credit Hours
Critical discussion of techniques of geographic research and presentation of research papers.
Prerequisite: Graduate standing.
Schedule Type: Seminar
Contact Hours: 3 other
Grade Mode: Standard Letter

GEOG 70093 VARIABLE TITLE WORKSHOP IN GEOGRAPHY 1-5 Credit Hours
(Repeatable for credit) Variable title workshop in geography.
Prerequisite: Doctoral standing.
Schedule Type: Workshop
Contact Hours: 1-5 other
Grade Mode: Satisfactory/Unsatisfactory-IP

GEOG 70191 SEMINAR IN TOPICAL GEOGRAPHY 3 Credit Hours
(Repeatable for credit) Seminar in one of the major topical fields in geography offered by title in given semester.
Prerequisite: Doctoral standing.
Schedule Type: Seminar
Contact Hours: 3 other
Grade Mode: Standard Letter

GEOG 70195 SPECIAL TOPICS IN GEOGRAPHY 1-3 Credit Hours
(Repeatable for credit) Special topics in geography.
Prerequisite: Doctoral standing.
Schedule Type: Lecture
Contact Hours: 1-3 lecture
Grade Mode: Standard Letter

GEOG 70292 FIELD EXPERIENCE IN GEOGRAPHY 1-6 Credit Hours
(Repeatable for credit) Examination of geographic landscapes in the field.
Prerequisite: Doctoral standing and special approval.
Schedule Type: Field Experience
Contact Hours: 1-6 other
Grade Mode: Satisfactory/Unsatisfactory

GEOG 70392 PRACTICUM IN EMERGING GEOGRAPHIC TRENDS 1-6 Credit Hours
(Repeatable for credit) Examination of newly emerging geographic topics and techniques.
Prerequisite: Special approval and doctoral standing.
Schedule Type: Practicum or Internship
Contact Hours: 1-6 other
Grade Mode: Satisfactory/Unsatisfactory

GEOG 70492 STUDY AWAY IN GEOGRAPHY 1-3 Credit Hours
(Repeatable 6 times for credit) Examination of geographic landscapes in the field.
Prerequisite: None.
Schedule Type: Field Experience
Contact Hours: 3-9 other
Grade Mode: Standard Letter

GEOG 70800 SEMINAR IN THE DEVELOPMENT OF GEOGRAPHIC THOUGHT 3 Credit Hours
(Cross-listed with GEOG 60800) Development of geographic knowledge and concepts with emphasis on recent development. Critical analysis of writings of representative geographers and scientists in related fields.
Prerequisite: Doctoral standing.
Schedule Type: Seminar
Contact Hours: 3 other
Grade Mode: Standard Letter

GEOG 70900 QUALITATIVE RESEARCH METHODS IN GEOGRAPHY 3 Credit Hours
(Slash with GEOG 60900) Introduces qualitative methods and research applications, along with methodological considerations of these approaches. Students consider the epistemology of qualitative research and learn the mechanics of conducting this research in the field. In class, these methods are put into practice and the results are put into writing.
Prerequisite: Doctoral standing.
Schedule Type: Lecture
Contact Hours: 3 lecture
Grade Mode: Standard Letter

GEOG 71050 POLAR AND ALPINE ENVIRONMENTS 3 Credit Hours
(Cross-listed with GEOG 41050 and GEOG 51050) The geographic features of the Earth's cold treeless regions are examined including climate, soils, glaciers, permafrost, plant and animal life and human activities.
Prerequisite: GEOG 21062 and doctoral standing.
Schedule Type: Lecture
Contact Hours: 3 lecture
Grade Mode: Standard Letter

GEOG 71051 NATURAL DISASTERS AND SOCIETY 3 Credit Hours
Study of natural disasters, the hazards associated with the disasters, their effects on humans and societies, spatial and temporal distributions, and strategies to reduce the occurrences of disasters. Natural disasters include hurricanes, tornadoes, floods, landslides, heat waves, wildfire, blizzards, earthquakes, tsunami and volcanoes. Mitigation for disasters and responses to disasters are studied across economically developing nations and developed nations. Taught through the analysis of numerous case studies of natural disasters.
Prerequisite: Doctoral standing.
Schedule Type: Lecture
Contact Hours: 3 lecture
Grade Mode: Standard Letter

GEOG 71052 GLACIERS AND GLACIATION 3 Credit Hours
(Cross-listed with GEOL 44052, 54052 and 74052) Examination of how glacial ice masses change the shape of the earth's surface, how they are integral to climate and sea level change and how they pose high risk hazards.
Prerequisite: Doctoral standing.
Schedule Type: Lecture
Contact Hours: 3 lecture
Grade Mode: Standard Letter

GEOG 71065 APPLIED CLIMATOLOGY 3 Credit Hours
Aimed at providing a full appreciation for the range of applicability of climate data to real-world problems. There are three overarching goals of the course: To provide a broad overview of what weather and climate information is out there and how we synthesize weather and climate information for use in applied work; to enable a thorough appreciation for the breadth of disciplines in which applied climatology plays a role; and to provide real-world experience of working through an applied climatological problem, via the final project.
Prerequisite: Doctoral standing.
Schedule Type: Lecture
Contact Hours: 3 lecture
Grade Mode: Standard Letter
GEOG 71066 CLIMATE CHANGE AND ITS IMPACTS 3 Credit Hours
(Cross-listed with GEOG 41066 and GEOG 51066) Examination of the evidence and causes of climate change and how these data are assessed. Past, present and future impacts of climate change and variability are discussed along with policy implications.
Prerequisite: Doctoral standing.
Schedule Type: Lecture
Contact Hours: 3 lecture
Grade Mode: Standard Letter

GEOG 71073 CONSERVATION OF OUR NATURAL RESOURCES 3 Credit Hours
(Cross-listed with GEOG 41073 and GEOG 51073) Evaluation of past and current problems associated with the management of natural resources and the environments associated with their utilization.
Prerequisite: Doctoral standing.
Schedule Type: Lecture
Contact Hours: 3 lecture
Grade Mode: Standard Letter

GEOG 71074 RESOURCE GEOGRAPHY 3 Credit Hours
Cultural attitudes, conceptual approaches and techniques in resource geography; analysis of selected resource issues at various areal scales.
Prerequisite: Doctoral standing.
Schedule Type: Lecture
Contact Hours: 3 lecture
Grade Mode: Standard Letter

GEOG 71082 GEOGRAPHY OF SOILS 3 Credit Hours
(Cross-listed with GEOG 41082 and GEOG 51082) Study and analysis of different soil types in their relation to geographic factors.
Prerequisite: Doctoral standing.
Schedule Type: Lecture
Contact Hours: 3 lecture
Grade Mode: Standard Letter

GEOG 71195 SPECIAL TOPICS IN ENVIRONMENTAL GEOGRAPHY 1-3 Credit Hours
(Repeatable for a maximum of 10 times) (Cross-listed with GEOG 41195 and GEOG 51195) Special topics in environmental geography.
Prerequisite: doctoral standing.
Schedule Type: Lecture
Contact Hours: 1-3 lecture
Grade Mode: Standard Letter

GEOG 72052 MEDICAL GEOGRAPHY 3 Credit Hours
(Cross-listed with GEOG 42052 and GEOG 52052) Examines the geographic patterns of morbidity and mortality, environmental correlates of major diseases and disease diffusion. Locational and accessibility issues of health care are discussed.
Prerequisite: Doctoral standing.
Schedule Type: Lecture
Contact Hours: 3 lecture
Grade Mode: Standard Letter

GEOG 72053 GEOGRAPHIES OF MEMORY AND HERITAGE 3 Credit Hours
(Cross-listed with GEOG 42053 and GEOG 52053) Gives students a working knowledge in, and ability to understand and analyze, the intersection of memory and landscape as a tangible re-presentation of the human past, oftentimes used as a tangible expression of cultural or political power. To this end the course focuses on memorialization, preservation, and tourism concepts and themes.
Prerequisite: doctoral standing.
Schedule Type: Lecture
Contact Hours: 3 lecture
Grade Mode: Standard Letter

GEOG 72062 BEHAVIORAL GEOGRAPHY 3 Credit Hours
Focuses on spatial perception, cognition and behavior. How we collect and process spatial information behavior in space, locate space and interact in space.
Prerequisite: Doctoral standing.
Schedule Type: Lecture
Contact Hours: 3 lecture
Grade Mode: Standard Letter

GEOG 72064 HISTORICAL GEOGRAPHY OF THE UNITED STATES AND CANADA 3 Credit Hours
(Cross-listed with GEOG 42064 and GEOG 52064) Study of regional origins, growth, evolution of spatial organization, changing evaluation of environments and selective geographies in United States and Canada from pre-colonial times to present.
Prerequisite: Doctoral standing.
Schedule Type: Lecture
Contact Hours: 3 lecture
Grade Mode: Standard Letter

GEOG 72070 SEMINAR IN ETHNIC, LIFESTYLE AND NATIONAL COMMUNITIES 3 Credit Hours
(Slashed with GEOG 42070) Covers the geographies of ethnic identity and nationalism, national identity and territory, borderlands and diasporas, national separatism and the variety of ways in which cultural difference asserts itself.
Prerequisite: Doctoral standing.
Schedule Type: Seminar
Contact Hours: 3 lecture
Grade Mode: Standard Letter

GEOG 72195 SPECIAL TOPICS IN SOCIAL GEOGRAPHY 1-3 Credit Hours
(Repeatable for a maximum of 10 times) (Cross-listed with GEOG 42195 and GEOG 52195) Special topics in social geography.
Prerequisite: doctoral standing.
Schedule Type: Lecture
Contact Hours: 1-3 lecture
Grade Mode: Standard Letter

GEOG 74010 GEOGRAPHY OF THE GLOBAL ECONOMY 3 Credit Hours
(Cross-listed with GEOG 44010 and GEOG 54010) Geographic analysis of the increasing interconnectedness of economic activity. The social, technological and political changes associated with globalization are also discussed.
Prerequisite: doctoral standing.
Schedule Type: Lecture
Contact Hours: 3 lecture
Grade Mode: Standard Letter
GEOG 74070  SPATIAL ANALYSIS AND LOCATION THEORY  3 Credit Hours
(Cross-listed with GEOG 44070 and GEOG 54070) Classical theories for
location of economic activities and contemporary approach of spatial
analysis, spatial organization of economic systems, behavioral models in
economic geography and spatial allocation problems.
Prerequisite: Doctoral standing.
Schedule Type: Lecture
Contact Hours: 3 lecture
Grade Mode: Standard Letter

GEOG 75085  URBAN TRANSPORTATION  3 Credit Hours
(Cross-listed with GEOG 45085 and GEOG 55085) Spatial interaction
patterns in urban environments. Travel behavior, commodity flows,
traffic patterns and urban transportation systems. Urban transportation
problems. Theoretical developments and techniques of analysis in urban
transportation.
Prerequisite: Doctoral standing.
Schedule Type: Lecture
Contact Hours: 3 lecture
Grade Mode: Standard Letter

GEOG 76070  URBAN AND REGIONAL PLANNING  3 Credit Hours
(Cross-listed with GEOG 46070 and GEOG 56070) Analysis of the
geographical aspects of planning for cities and regions.
Prerequisite: Doctoral standing.
Schedule Type: Lecture
Contact Hours: 3 lecture
Grade Mode: Standard Letter

GEOG 76080  URBAN SUSTAINABILITY  3 Credit Hours
(Cross-listed with GEOG 46080 and GEOG 56080) Provides an introduction
to interdisciplinary perspectives on urban sustainability, focusing on
environmental challenges caused by urbanization and the innovative
ways urban dwellers seek to address those challenges. It provides
background on relevant disciplinary perspectives and their application to
environmental challenge domains.
Prerequisite: Doctoral standing.
Schedule Type: Lecture, Seminar
Contact Hours: 3 lecture
Grade Mode: Standard Letter

GEOG 76081  SEMINAR IN URBAN GEOGRAPHY  3 Credit Hours
(Slashed with GEOG 46081 and GEOG 56081) Theoretical explanations
of urban spatial patterns. Application of contemporary theories concepts
and methods to selected urban geographic problems.
Prerequisite: Doctoral standing.
Schedule Type: Seminar
Contact Hours: 3 other
Grade Mode: Standard Letter

GEOG 77091  SEMINAR IN REGIONAL GEOGRAPHY  3 Credit Hours
(Repeatable for credit) (Cross-listed with GEOG 67091) Seminar on one of
the major regions of world offered by title in given semester.
Prerequisite: Doctoral standing.
Schedule Type: Seminar
Contact Hours: 3 other
Grade Mode: Standard Letter

GEOG 79004  QUANTITATIVE METHODS IN GEOGRAPHY  3 Credit Hours
(Slashed with GEOG 69004) Explores the methods and applications
of some of the most common statistics found in geographic work. It
explores probability theory, spatial statistics, estimation procedures,
hypothesis testing, spatial sampling, methods of areal association,
correlation and regression analysis, and principal components analysis.
Theory and execution of these methods are equally emphasized, and
applications to geographic problems are examined within each theme.
Prerequisite: Doctoral standing.
Schedule Type: Lecture
Contact Hours: 3 lecture
Grade Mode: Standard Letter

GEOG 79070  GEOGRAPHIC INFORMATION SCIENCE  4 Credit Hours
(Cross-listed with GEOG 49070 and GEOG 59070) Introduction to theories
and methods for geographic data processing, including data capture and
input data storage and management and data analysis and displays.
Emphasis is on laboratory exercises using GIS software packages for real
world applications.
Prerequisite: Doctoral standing.
Schedule Type: Combined Lecture and Lab
Contact Hours: 3 lecture, 2 lab
Grade Mode: Standard Letter

GEOG 79072  GEOGRAPHIC INFORMATION SCIENCE AND HEALTH  3 Credit Hours
Geographic theory and methods serve as the connection among
disparate disciplines focused on how and why “health” varies between
regions, cities, and neighborhoods. This course examines how geospatial
technologies, especially GIS, have become an important health analysis
tool.
Prerequisite: doctoral standing.
Schedule Type: Lecture
Contact Hours: 3 lecture
Grade Mode: Standard Letter

GEOG 79075  GEOGRAPHIC INFORMATION SCIENCE: URBAN AND
ECONOMIC APPLICATIONS  3 Credit Hours
(Cross-listed with GEOG 49075 and GEOG 59075) Urban and economic
applications and analyses of spatial data, especially theoretical and
conceptual issues including the possibilities and concerns associated
with GIS, ethical considerations, and the various forms of data collection,
visualization, analysis and dissemination.
Prerequisite: GEOG 49070 or 59070; and doctoral standing.
Schedule Type: Lecture
Contact Hours: 3 lecture
Grade Mode: Standard Letter

GEOG 79076  SPATIAL PROGRAMMING  3 Credit Hours
(Cross-listed with GEOG 49076 and GEOG 59076) Examination of the
design, development and use of geographic information technologies
with computer programming to model process and visualize geographic
phenomena.
Prerequisite: GEOG 79070 and doctoral standing.
Schedule Type: Lecture
Contact Hours: 3 lecture
Grade Mode: Standard Letter
GEOG 79078  GEOGRAPHIC INFORMATION SCIENCE AND ENVIRONMENTAL HAZARDS  3 Credit Hours
(Slashed with GEOG 49078 and GEOG 59078) The study and management of natural hazards are inherently reliant on both physical and human processes and spatial patterns. Given the many variables involved and the variety of scales at which they operate, use of Geographic Information Systems (GIS) has become standard practice in research on hazards and in their management by government agencies at all levels. Exposes students to a wide array of spatial data that is used in these activities, as well as standard mapping and spatial analysis procedures and forms of data dissemination.
Prerequisite: GEOG 49070 or 59070 or 79070; and doctoral standing.
Schedule Type: Lecture
Contact Hours: 3 lecture
Grade Mode: Standard Letter

GEOG 79080  ADVANCED GEOGRAPHIC INFORMATION SCIENCE  3 Credit Hours
(Cross-listed with GEOG 49080 and GEOG 59080) Advanced theories and techniques for handling geographic information systems, including 2D and 3D processing of geographic information, detection and analysis of geographic patterns, 2D and 3D mapping of geographic information, modeling of geographic processes and an overview of GIS programming tools.
Prerequisite: GEOG 4/5/79070 and doctoral standing.
Schedule Type: Lecture
Contact Hours: 3 lecture
Grade Mode: Standard Letter

GEOG 79082  CYBERGIS  3 Credit Hours
(Slashed with GEOG 69082) Explores cyberinfrastructure-enabled geographic information systems (i.e. cyberGIS) and related technologies including a broad introduction to the use, design, and development of cyberinfrastructure, spatial data infrastructures, geographic information services, and web-enabled mapping technologies. Situates cyberGIS in the broader context of geographic information science focusing on the how synthesizing computational thinking and spatial thinking influence methodological approaches.
Prerequisite: Doctoral standing.
Schedule Type: Lecture
Contact Hours: 3 lecture
Grade Mode: Standard Letter

GEOG 79085  WEB AND MOBILE GEOGRAPHIC INFORMATION SCIENCE  3 Credit Hours
(Slashed with GEOG 49085 and 59085) Explores how web and mobile phones present opportunities and challenges to the field of geographic information science (GIS). This includes the examination of the use, design and development of cyberinfrastructure-enabled GIS emphasizing web- and mobile-based interfaces and technologies. GIS experience recommended.
Prerequisite: Doctoral standing.
Schedule Type: Lecture
Contact Hours: 3 lecture
Grade Mode: Standard Letter

GEOG 79162  CARTOGRAPHY AND GEOVISUALIZATION  3 Credit Hours
(Slashed with GEOG 49162 and GEOG 59162) Study of the design and production of dynamic, interactive, multimedia web-based mapping. Data acquisition and processing, symbolization, composition, text and color utilization.
Prerequisite: GEOG 49070 or GEOG 59070 or GEOG 79070; and doctoral standing.
Corequisite: GEOG 79163.
Schedule Type: Lecture
Contact Hours: 3 lecture
Grade Mode: Standard Letter

GEOG 79163  CARTOGRAPHY AND GEOVISUALIZATION LABORATORY  1 Credit Hour
(Cross-listed with GEOG 49163 and GEOG 59163) Practical experience in the techniques of data acquisition and processing for dynamic, multimedia, and online map production and geovisualizations.
Prerequisite: GEOG 49070 or 59070 or 79070; and doctoral standing.
Corequisite: GEOG 79162.
Schedule Type: Laboratory
Contact Hours: 2 lab
Grade Mode: Standard Letter

GEOG 79165  GEOMAPPING  3 Credit Hours
(Slashed with GEOG 49165 and GEOG 59165) Information theory, data collection, automated mapping systems, representation of surfaces, lines and points, geographic data structures and applications. Mapping by line printer plotters and interactive terminals.
Prerequisite: Doctoral standing.
Schedule Type: Lecture
Contact Hours: 3 lecture
Grade Mode: Standard Letter

GEOG 79195  SPECIAL TOPICS IN GEOGRAPHIC INFORMATION SCIENCE  1-3 Credit Hours
(Repeatable for a maximum of 10 times) (Cross-listed with GEOG 49195 and GEOG 59195). Special topics in geographic information sciences.
Prerequisite: doctoral standing.
Schedule Type: Lecture
Contact Hours: 1-3 lecture
Grade Mode: Standard Letter

GEOG 79230  REMOTE SENSING  3 Credit Hours
(Cross-listed with GEOG 49230 and GEOG 59230 and GEOL 42030 and GEOL 52030 and GEOL 72030) Computer analysis of multispectral satellite datasets. Applications in Terrestrial Earth Science are emphasized.
Prerequisite: doctoral standing.
Schedule Type: Lecture
Contact Hours: 3 lecture
Grade Mode: Standard Letter

GEOG 80199  DISSERTATION I  15 Credit Hours
(Repeatable for credit)Doctoral dissertation, for which registration in at least two semesters is required first of which will be semester in which dissertation work is begun and continuing until the completion of 30 hours.
Prerequisite: Special approval and doctoral standing.
Schedule Type: Dissertation
Contact Hours: 15 other
Grade Mode: Satisfactory/Unsatisfactory-IP
GEOG 80299  DISSERTATION II  15 Credit Hours  
(Repeatable for credit) Continuing registration required of doctoral 
students who have completed the initial 30 hours of dissertation and 
continuing until all degree requirements are met.  
Prerequisite: GEOG 80199 and doctoral standing.  
Schedule Type: Dissertation  
Contact Hours: 15 other  
Grade Mode: Satisfactory/Unsatisfactory-IP  

GEOG 80998  RESEARCH  1-15 Credit Hours  
(Repeatable for credit) Research or individual investigation for doctoral 
students who have not yet passed their candidacy examination. Credits 
evolved may be applied toward degree if department approves.  
Prerequisite: Doctoral standing.  
Schedule Type: Research  
Contact Hours: 1-15 other  
Grade Mode: Standard Letter-S/U  

GEOG 81091  RESEARCH IN PHYSICAL RESOURCES  2,3 Credit Hours  
(Repeatable for credit) Research on basic processes related to formation 
of physical environment. Investigation of significant variables in resource 
utilization relevant to regional planning and development.  
Prerequisite: Doctoral standing.  
Schedule Type: Research  
Contact Hours: 2-3 other  
Grade Mode: Standard Letter-IP  

GEOG 89092  GRADUATE FIELD CAMP  5 Credit Hours  
(Repeatable for credit) Field research problems involving individual 
investigation of specific urban or rural region.  
Prerequisite: Doctoral standing.  
Schedule Type: Field Experience  
Contact Hours: 3 other  
Grade Mode: Standard Letter  

GEOG 89098  RESEARCH IN CARTOGRAPHY  1-3 Credit Hours  
(Repeatable for credit) Investigations into function of map as medium 
of scientific expression; problem of map design in relation to human 
perception of graphically expressed spatial information.  
Prerequisite: Doctoral standing.  
Schedule Type: Research  
Contact Hours: 1-3 other  
Grade Mode: Standard Letter  

Environmental Studies (ENVS)

EDST 40095  SPECIAL TOPICS IN EDUCATIONAL STUDIES  1-3 Credit Hours  
(Course is repeatable) Selected topics in Educational Studies dependent 
upon interest.  
Prerequisite: none.  
Schedule Type: Lecture  
Contact Hours: 1-3 lecture  
Grade Mode: Standard Letter  

EDST 44003  SEMINAR IN EDUCATIONAL STUDIES  3 Credit Hours  
Directed discussion applying concepts from previous educational 
coursework and internships or prior work experience.  
Prerequisite: senior standing.  
Schedule Type: Seminar  
Contact Hours: 3 other  
Grade Mode: Standard Letter-IP  

EDST 44004  RESEARCH AND WRITINGS IN EDUCATIONAL STUDIES  
(WIC)  3 Credit Hours  
This course presents and integrates the role of professionals in the 
Education, Health and Human Services fields as they attempt to meet the 
needs of individuals in diverse environments.  
Prerequisite: senior standing and special approval.  
Schedule Type: Lecture  
Contact Hours: 3 lecture  
Grade Mode: Standard Letter-IP  
Attributes: Writing Intensive Course  

EDST 44092  PRACTICUM IN EDUCATIONAL STUDIES (ELR)  1-12 
Credit Hours  
(Course is repeatable for a maximum of 12 credit hours) Placement in a 
work site congruent with student's career aspirations.  
Prerequisite: Educational Studies (EDST) majors; and senior standing; 
and special approval.  
Schedule Type: Practicum or Internship  
Contact Hours: 1-12 other  
Grade Mode: Satisfactory/Unsatisfactory-IP  
Attributes: Experiential Learning Requirement  

EDST 44096  INDIVIDUAL INVESTIGATION IN EDUCATIONAL STUDIES 
PROGRAM  1-3 Credit Hours  
(Course is repeatable) Independent study completed under the 
supervision of a faculty member. Written approval of supervising faculty 
member required prior to registration.  
Prerequisite: special approval.  
Schedule Type: Individual Investigation  
Contact Hours: 1-3 other  
Grade Mode: Standard Letter-IP