GEOGRAPHY (GEOG)

GEOG 1280 Introduction to Human Geography 3 cr
This course studies aspects of the human world: population, settlement and resources. Not to be held with GEOG 1200 or GEOG 1201, or GEOG 1281.
Equiv To: GEOG 1281
Mutually Exclusive: GEOG 1200, GEOG 1201
Attributes: Recommended Intro Courses

GEOG 1290 Introduction to Physical Geography 3 cr
This course studies aspects of our physical environment: climate, landforms, soils and vegetation. Not to be held with GEOG 1291 or GEOG 1200 or GEOG 1201.
Equiv To: GEOG 1291
Mutually Exclusive: GEOG 1200, GEOG 1201
Attributes: Recommended Intro Courses

GEOG 1700 Social Justice in the 21st Century: Global Political Economy and Environmental Change 3 cr
Introduces students to political economy and cultural geography through the close analysis of contemporary world events, including but not limited to instances of violent conflict, environmental change, international negotiations, political processes and events, social movements, and policy developments. A multimedia approach will advance students' understanding of geopolitical events from political economy and spatial perspectives. Specific content of the course will change year-by-year in response to developments in national and world politics. Also offered by the Faculty of Arts as GPE 1700. Students may not hold credit for both GPE 1700 and GEOG 1700.
Equiv To: GPE 1700
Attributes: Recommended Intro Courses

GEOG 2200 Introduction to Thematic Cartography (TS) 3 cr
(Lab Required) An introduction to the principles of map compilation and reproduction, including analysis and cartographic display of spatially referenced data. Emphasis will be placed on cartographic data manipulation, generalization, and symbolization, map design, visualization and communication. Not to be held with GEOG 2221.
PR/CR: A minimum grade of C is required unless otherwise indicated.
Prerequisite: a minimum of three credit hours from Geography courses numbered at the 1000 level, or permission of department head.

GEOG 2272 Natural Hazards (PS) 3 cr
Environmental hazards to human settlement and economy are examined with particular attention to meteorological, soil erosion, mass wasting, earthquake and volcanic phenomena. Not to be held with GEOG 2440.
PR/CR: A minimum grade of C is required unless otherwise indicated.
Prerequisite: one of GEOG 1290, GEOL 1340, or GEOL 1410,GEOG 1291, GEOG 1200, GEOG 1201, GEOL 1360 or permission of department head.
Mutually Exclusive: GEOG 2440

GEOG 2300 Atmospheric Thermodynamics, Clouds and Precipitation (PS) 3 cr
Critical thermodynamic processes are discussed that are associated with the Earth's atmosphere including dry and moist processes, phases of water, stability, cloud development and precipitation processes.
PR/CR: A minimum grade of C is required unless otherwise indicated.
Prerequisites: (one of GEOG 1290, GEOG 1291, GEOG 1200 or GEOG 1201), and (one of MATH 1230, MATH 1500, MATH 1501, MATH 1510, MATH 1520 or MATH 1530) or permission of department head or instructor,

GEOG 2310 Introduction to Process Hydrology (PS) 3 cr
This course introduces students to the near-surface components of the hydrological cycle, including the processes of precipitation, evaporation, water-biosphere interactions, infiltration, overland and stream flow.
PR/CR: A minimum grade of C is required unless otherwise indicated.
Prerequisites: (one of GEOG 1290, GEOG 1291,GEOG 1200 or GEOG 1201) and (one of PHYS 1020, PHYS 1021, PHYS 1050, PHYS 1051, MATH 1230, MATH 1500, MATH 1501, MATH 1510, MATH 1520 or MATH 1530) or permission of department head or instructor.

GEOG 2330 Place, Populations and Mobility: Geographic Perspectives (HS) 3 cr
An examination of the factors controlling the number and distribution of human population. Variations in fertility, mortality and mobility will be analyzed and the causes and consequences reviewed. Not to be held with GEOG 2480.
PR/CR: A minimum grade of C is required unless otherwise indicated.
Prerequisite: three credit hours from Geography courses numbered at the 1000 level, or permission of department head.
Mutually Exclusive: GEOG 2480, GEOG 2481

GEOG 2372 Geography of Tourism (HS) 3 cr
This course examines the social, economic and environmental dimensions of tourism and recreation. Historical and contemporary experiences from around the world will be studied. Not to be held with GEOG 2410.
PR/CR: A minimum grade of C is required unless otherwise indicated.
Prerequisite: (GEOG 1200) or GEOG 1280, or permission of department head.
Mutually Exclusive: GEOG 2410

GEOG 2520 Geography of Natural Resources (HS) 3 cr
An introduction to the basic concepts of the subject and the distribution of resources. Stress will be placed on Canadian resources and resource requirements but examples from other resource systems will also be used.
PR/CR: A minimum grade of C is required unless otherwise indicated.
Prerequisite: a minimum of three credit hours from Geography courses numbered at the 1000 level, or permission of department head.

GEOG 2540 Weather and Climate (PS) 3 cr
This half-course examines the nature, controls, and observations of weather and the variation of climate in time and space.
PR/CR: A minimum grade of C is required unless otherwise indicated.
Prerequisite: a minimum of three credit hours from Geography courses numbered at the 1000 level, or permission of department head.
Equiv To: GEOG 2541

GEOG 2550 Geomorphology (PS) 3 cr
This half-course surveys a broad array of landforms in the world and the geomorphic processes responsible for their creation. Attention is strongly focused on those landform processes originating at the earth's surface.
PR/CR: A minimum grade of C is required unless otherwise indicated.
Prerequisite: (GEOG 1200) or GEOG 1201, or GEOG 1290 or GEOG 1291, or permission of department head.
Equiv To: GEOG 2551

GEOG 2570 Geography of Canada (A) 3 cr
A regional study of Canada in which the major regions of Canada are studied with respect to geographical patterns of their physical environment, settlement, culture, economic activity, and land use. Not to be held with GEOG 2560, GEOG 2561 or GEOG 3431.
PR/CR: A minimum grade of C is required unless otherwise indicated.
Prerequisite: a minimum of three credit hours from Geography courses numbered at the 1000 level, or permission of department head.
Equiv To: GEOG 3431
Mutually Exclusive: GEOG 2560

GEOG 2580 Geography of the United States (A) 3 cr
A regional study of the United States in which the major regions of the United States are studied with respect to geographical patterns of their physical environment, settlement, culture, economic activity, and land use. Not to be held with GEOG 2560, GEOG 2561.
PR/CR: A minimum grade of C is required unless otherwise indicated.
Prerequisite: a minimum of three credit hours from Geography courses numbered at the 1000 level, or permission of department head.
Mutually Exclusive: GEOG 2560

GEOG 2630 Geography of Culture and Environment (HS) 3 cr
An introduction to the cultural geographic study of environment, focusing on the evolution of landscape, the creation of regions, and human relationships with nature.
PR/CR: A minimum grade of C is required unless otherwise indicated.
Prerequisite: (GEOG 1200) or GEOG 1201, or GEOG 1280 or GEOG 1281, or permission of department head.

GEOG 2640 Geography of Culture and Inequality (HS) 3 cr
An introduction to the study of cultural geography, with a specific focus on relationships of inequality and attempts to overcome them. Topics examined include globalization, landscapes and the environment, public space, gender and sexuality, colonialism and imperialism, and mobility.
PR/CR: A minimum grade of C is required unless otherwise indicated.
Prerequisite: GEOG 1280 or GEOG 1281, GEOG 1700 or GPE 1700, or permission of the instructor.

GEOG 2700 Introduction to Arctic System Science 3 cr
This course introduces students to the various components of the Arctic system, including the terrestrial and marine environments, polar atmosphere, biological and chemical oceanography.
PR/CR: A minimum grade of C is required unless otherwise indicated.
Prerequisite: GEOG 1290 or (GEOG 1291), or GEOG 1200 or (GEOG 1201) or ENVR 1000 or GEOL 1340.

GEOG 2870 Introduction to Economic Geography (HS) 3 cr
This course introduces the field of economic geography, paying particular attention to the historical, environmental and spatial dimensions that shape the global economy and current economic order, including: wealth and poverty, production patterns and community chains, consumption and retail processes; natural resources; the state's role in economic governance; global labour; and the ways in which economic structures and processes shape gender and ethnicity. Course materials will be global in scope but will provide both a macro- and micro-economic perspective. May not be held with the former GEOG 2210 or GEOG 2211.
PR/CR: A minimum grade of C is required unless otherwise indicated.
Prerequisite: Geography at the 1000 level.
Mutually Exclusive: GEOG 2210, GEOG 2211

GEOG 2900 Geography of Canadian Prairie Landscapes (A) 3 cr
This course introduces students to the various geographical themes, concepts and processes within the context of the natural and anthropogenic development of the Canadian prairie region. It traces the evolution of the prairie landscape. It will focus on academic writing in the discipline. Not to be held with GEOG 2450.
PR/CR: A minimum grade of C is required unless otherwise indicated.
Prerequisite: a minimum of three credit hours from Geography courses numbered at the 1000 level, or permission of department head.
Mutually Exclusive: GEOG 2450
Attributes: Written English Requirement

GEOG 2930 Introduction to Oceanography 3 cr
This course provides an introduction to the physical, chemical, biological and geological processes in the world oceans and their interactions with the overall Earth system. This course is interdisciplinary, applying geological, chemical and biological processes to the study of the world's oceans.
PR/CR: A minimum grade of C is required unless otherwise indicated.
Prerequisite: GEOG 1290 (or GEOG 1291) or GEOG 1200 (or GEOG 1201) or ENVR 1000 or GEOL 1340.

GEOG 3200 Introduction to Remote Sensing (TS) 3 cr
(Lab Required) The course is an introduction to the principles of optical, active and passive microwave remote sensing. A review of satellite and sensors and their geographic applications will be presented, along with digital image analysis techniques. Laboratory assignments will provide hands-on experience in dealing with remote sensing data.
PR/CR: A minimum grade of C is required unless otherwise indicated.
Prerequisites: (one of GEOG 1200, GEOG 1201, GEOG 1290 or GEOG 1291) and (one of PHYS 1020, PHYS 1021, PHYS 1050, PHYS 1051, MATH 1230, MATH 1300, MATH 1301, MATH 1310, MATH 1500, MATH 1501, MATH 1510 or MATH 1520) or permission of department head.

GEOG 3272 Social Vulnerability to Natural Hazards (HS) 3 cr
This course examines differing social vulnerability to natural hazards, before, during and after disasters, including class, gender, age, health, language, and ethnicity.
PR/CR: A minimum grade of C is required unless otherwise indicated.
Prerequisites: a minimum of three credit hours from Geography courses numbered at the 1000 level, or GPE 1700 or GEOL 1340 or GEOL 1410 or permission of department head.

GEOG 3310 Atmospheric Dynamics, Storms and Radar (PS) 3 cr
The course covers the critical dynamic processes that are associated with the Earth's atmosphere including forces that control wind, the kinematics of the wind field, general circulation, hodographs, thermal wind, laws of motion, mid-latitude circulations, convective storms and the utility of weather radar.
PR/CR: A minimum grade of C is required unless otherwise indicated.
Prerequisite: GEOG 2300, or permission of department head.

GEOG 3320 Introduction to Microclimates and Micrometeorology (PS) 3 cr
This course introduces the concept of energy balance climatology and examines relationships among climate, microclimate, and environments of the Earth's surface and human-made environments. Studies include bioclimates and hydroclimates.
PR/CR: A minimum grade of C is required unless otherwise indicated.
Prerequisites: (GEOG 2310), and (GEOG 2300), or permission of department head.

GEOG 3340 Migration and Mobility in a Globalized World 3 cr
This course surveys the geographic dimensions of migration and mobility of populations, with emphasis of contemporary events.
PR/CR: A minimum grade of C is required unless otherwise indicated.
Prerequisites: GEOG 2330 or (GEOG 2480), or permission of department head.

GEOG 3390 Introduction to Climate Change and Its Causes (PS) 3 cr
The primary objective of this course is to provide students with a general understanding of the physical and astronomical factors that drive global climate change. Focus will be given to current and future climate change in the context of observations and modeling. Not to be held with GEOG 3610.
PR/CR: A minimum grade of C is required unless otherwise indicated.
Prerequisite: a minimum of three credit hours from Geography or Environment courses, or permission of department head.
Mutually Exclusive: GEOG 3610

GEOG 3460 Urban Geography (HS) 6 cr
The course studies the processes and trends of urbanization; the classification of cities; central-place theory; cities as systems; land-use patterns; social forces and factorial ecology; and urban transport problems.
PR/CR: A minimum grade of C is required unless otherwise indicated.
Prerequisite: (GEOG 1200) or GEOG 1201, or GEOG 1280 or GEOG 1281, or permission of department head.

GEOG 3640 Social Geography of the Environment (HS) 3 cr
This course provides an intermediate-level assessment of current geographical approaches to society and environment. Students are exposed to critical realist, social constructionist, Marxist, feminist and post-Colonial traditions as they are applied to environmental and social justice, globalization and public health. It includes discussion and a community-based learning project.
PR/CR: A minimum grade of C is required unless otherwise indicated.
Prerequisite: (GEOG 1200 or GEOG 1201) or GEOG 1280 or GEOG 1281, or permission of department head.

GEOG 3730 Geographic Information Systems (TS) 3 cr
(Lab Required) Weekly two-hour lab. The course introduces students to the evolving science, technology and applications of Geographic Information Systems (GIS). Related geospatial technologies such as Global Navigation Satellite Systems and Remote Sensing, as well as the field of Geomatics will be introduced. Not to be held with GEOG 2250.
PR/CR: A minimum grade of C is required unless otherwise indicated.
Prerequisite: a minimum of three credit hours from Geography, Geology or Environment courses numbered at the 1000 and/or 2000 level, or permission of instructor or department head.
Equiv To: GEOG 2250

GEOG 3740 Field Studies in Geography (A,TS) 6 cr
A field course designed to introduce students to either a detailed area study or to field techniques employed for specific geographic enquiry.
PR/CR: A minimum grade of C is required unless otherwise indicated.
Prerequisite: Permission of department head.

GEOG 3750 Field Studies in Geography (A,TS) 3 cr
A field course designed to introduce students to either a detailed area study or to field techniques employed for specific geographic enquiry.
PR/CR: A minimum grade of C is required unless otherwise indicated.
Prerequisite: a minimum of three credit hours from Geography courses numbered at the 1000 level, or permission of department head.

GEOG 3760 Special Topics in Geography 6 cr
This course will vary from year to year depending on the needs of students and the interests of instructors.
PR/CR: A minimum grade of C is required unless otherwise indicated.
Prerequisite: Permission of department head.
Equiv To: GEOG 3761

GEOG 3770 Special Topics in Geography 3 cr
This course will vary from year to year depending on the needs of students and the interests of instructors.
PR/CR: A minimum grade of C is required unless otherwise indicated.
Prerequisite: Permission of department head.
Mutually Exclusive: GEOG 3822

GEOG 3810 Quantitative Research Methods in Geography (TS) 3 cr
This course focuses on the quantitative analytical methods available for the interpretation on physical and human geography applications. May not be held with the former GEOG 3680.
PR/CR: A minimum grade of C is required unless otherwise indicated.
Prerequisites: ENVR 2810 or the former GEOG 2530 or STAT 1000 or STAT 1001 or STAT 1150, or permission of department head.
Mutually Exclusive: GEOG 3680
Attributes: Mathematics Requirement

GEOG 3822 The Meaning of Maps 3 cr
This course examines mapping theory and practice in order to reveal the meaning of maps including how maps construct knowledge, exercise power, and can promote social change. Using maps from a variety of sources, students will develop a solid foundation in the literature and gain experience in understanding and analyzing maps and other forms of geospatial representations such as Geographic Information Systems and remote sensing. May not be held with GEOG 3770 when titled "Critical Cartography."
PR/CR: A minimum grade of C is required unless otherwise indicated.
Prerequisite: Permission of instructor or department head.
Mutually Exclusive: GEOG 3770

GEOG 3850 Sustainable Manitoba (A) 3 cr
This course approaches local sustainability issues from an interdisciplinary perspective. By looking at the ecological, social and economic aspects from a variety of discipline perspectives, a fuller understanding of sustainability is achieved. The broad range of perspectives is achieved through participation of guest speakers from other faculties and outside of the university as well as excursion outside the classroom. Not to be held with ENVR 3850.
PR/CR: A minimum grade of C is required unless otherwise indicated.
Prerequisite: 60 credit hours of course work, or permission of department head.
Equiv To: ENVR 3850

GEOG 3860 Animal Geographies (HS) 3 cr
This course presents a variety of topics concerning the interactions between humans and animals, how humans influence and use animals, and the many roles animals play in human lives and environments. Animal Geographies lies at a meeting point between physical and human geography, where we must consider the blurring boundaries between what it means to be animal/human, and the implications of how animals are used and represented. A wide variety of perspectives, beliefs, and points of view will be explored.
PR/CR: A minimum grade of C is required unless otherwise indicated.
Prerequisite: Permission of department head.

GEOG 3870 Food Geographies 3 cr
This course provides a critical examination of the geographies of food at a variety of scales, from the body to the global. The course focuses on themes in three interconnected areas: 1) food production and the global food system from farm to plate including agribusiness and alternative food production and distribution models; 2) food consumption habits and beliefs and foodways as geographically contingent material culture; and 3) food (in) security and its relationship to health and wellbeing. This course is cross-listed as HNSC 3870.May not be held with HNSC 3870.
PR/CR: A minimum grade of C is required unless otherwise indicated.
Prerequisite: GEOG 1280 or GEOG 1281 or HNSC 1200 or GEOG 1200, or permission of department head.
Equiv To: HNSC 3870

GEOG 3890 Geography and Wellness (HS) 3 cr
This course explores how human environment relations influence our mental, emotional, and physical wellbeing. Students will delve into current research in health and wellness geography and related disciplines, particularly focusing on: therapeutic landscapes, ecological loss and grief, sacred spaces, and environmental influences on mental wellbeing. Also offered as ENVR 3890. May not be held with ENVR 3890.
PR/CR: A minimum grade of C is required unless otherwise indicated.
Prerequisites: ENVR 1000 or GEOG 1200 or GEOG 1280 or GEOG 1700 or GPE 1700 or permission of the department head.
Equiv To: ENVR 3890

GEOG 3920 Biological Oceanography 1: Lower Trophic Levels 3 cr
In this course, students will gain a background on the study of biological oceanography. Biological oceanography is a very active and important field of study worldwide due to the spatial coverage and biological activity of the world's oceans. This course examines the interaction of marine organisms with other biological life, as well as with the physical environment.
PR/CR: A minimum grade of C is required unless otherwise indicated.
Prerequisite: GEOG 2930 and BIOL 1030.

GEOG 4050 Ecosystem Management 3 cr
This course will provide students with an understanding of the practical applications of ecological science, environmental policy, and resource management approaches in the large-scale planning of landscapes. The course will review ecological principles and trace the historical development of the ecosystem concept. Comparisons are made to other possible environmental management approaches. The synthesis of major elements and concepts will be reinforced through case studies on the Manitoba landscape, with an emphasis on practical learning by students through field seminars and group discussions. Not to be held with ENVR 4050.
PR/CR: A minimum grade of C is required unless otherwise indicated.
Prerequisite: Permission of department head.
Equiv To: ENVR 4050

GEOG 4060 Biogeography 3 cr
This course will provide students with a general understanding of the historical, ecological, analytical, and conservation aspects of biogeography. The course will also have a dual focus on the principles and concepts of reasons for the distribution of plants and animals worldwide, as well as incorporating discussion on as many local (Manitoba, Canada, North America) examples as possible. Not to be held with ENVR 4060.
PR/CR: A minimum grade of C is required unless otherwise indicated.
Prerequisite: Permission of department head.
Equiv To: ENVR 4060

GEOG 4200 Advanced Methods in Remote Sensing 3 cr
(Lab Required) Provides instruction in the current theory and application of remote sensing technology to Earth system Science. Emphasis will be placed on the processing and interpretation of remote sensing imagery and the integration of remote sensing data with other spatial data.
PR/CR: A minimum grade of C is required unless otherwise indicated.
Prerequisite: GEOG 3200, or permission of department head.

GEOG 4260 Sacred Lands 3 cr
Students will increase their understanding of the importance and significance of Sacred Lands and Sacred Spaces to International Indigenous Peoples. Experiential learning, seminars, and a field component may be included. Not to be held with NATV 4260.
PR/CR: A minimum grade of C is required unless otherwise indicated.
Prerequisite: Permission of department head.
Equiv To: NATV 4260

GEOG 4280 Gender and the Human Environment 3 cr
This upper-level seminar course will develop in students a depth and breadth of understanding appropriate to the honours undergraduate/graduate level in the area of gender geography scholarship. From critical social science theoretical positions, this course asks students to examine what we can learn about how humans live on the earth if we see them as gendered. Just as we may also understand humans and their interactions in and with spaces, places and environments through the lenses of race, ethnicity, class, age and/or combinations of these categories with gender.
PR/CR: A minimum grade of C is required unless otherwise indicated.
Prerequisite: a minimum of six credit hours in Geography, or permission of department head.

GEOG 4290 Geographies of Health and Health Care 3 cr
This course provides an introduction to and critical examination of the geographies of health and healthcare. Topics include perceptions and determinations of health and health care; health care delivery, focusing on spatial patterns and inequities; and the relationship between environment and health, particularly impacts of environmental contamination.
PR/CR: A minimum grade of C is required unless otherwise indicated.
Prerequisite: Permission of department head.

GEOG 4300 Synoptic Meteorology and Weather Analysis 3 cr
Applied aspects of meteorology are described in terms of weather analysis and forecasting techniques for synoptic-scales and meso-scales using various meteorological tools. An introduction to severe weather forecasting techniques will also be described.
PR/CR: A minimum grade of C is required unless otherwise indicated.
Prerequisite: GEOG 3310, or permission of department head.

GEOG 4310 Boundary-Layer Climatology and Micrometeorology 3 cr
A seminar course on advanced topics in microclimatology and micrometeorology.
PR/CR: A minimum grade of C is required unless otherwise indicated.
Prerequisite: GEOG 3320, or permission of department head.

GEOG 4330 Concepts in Atmospheric Modeling 3 cr
This course will primarily focus on numerical modeling applications and techniques of the Earth's atmosphere with an emphasis on weather prediction. This includes understanding basic modeling terminology, numerical schemes, structure of models, types of models, what is required to run a model, and an introduction to data assimilation and ensemble techniques to weather prediction. Not to be held with GEOG 4320.
PR/CR: A minimum grade of C is required unless otherwise indicated.
Prerequisite: GEOG 3310 or GEOG 3320, or permission of department head.
Equiv To: GEOG 4320

GEOG 4350 Parks and Protected Areas Planning and Management: Field Studies 6 cr
The course is taught in two segments, an on-campus component and field study component taking place in Banff National Park. The on-campus component examines the historical development of the concept of parks and protected areas, the role of interpretation, management and research in the parks and emerging issues in the management of parks and protected areas. In addition, during the on-campus component planning for the field will take place. The field segment will focus on a wide variety of management issues with particular attention to Banff National Park. Emerging issues and trends will be examined and past management responses evaluated. There will be opportunities for students to investigate specific management issues of interest to them and to participate in current research being conducted in the park. This course is also offered in the Faculty of Kinesiology and Recreation Management as REC 4350.
PR/CR: A minimum grade of C is required unless otherwise indicated.
Prerequisite: Permission of department head.
Equiv To: REC 4350

GEOG 4390 Global Climate Change 3 cr
Students will be introduced to the complexities of climate changes through a series of introductory lectures and reading assignments that focus on recent scientific publications and review articles (mathematical skills are not required). Both sides of the climate change debate will be addressed in weekly assignments, and students will defend their conclusions in classroom discussion. Each student will take on a project in some aspect of climate change -- glaciers, sea ice, temperature trends, precipitation, agriculture, animal migration, aerosols, or a regional impact.
PR/CR: A minimum grade of C is required unless otherwise indicated.
Prerequisite: GEOG 3390 (or GEOG 3610), or permission of department head.

GEOG 4560 Techniques in Climatology 3 cr
This course will examine field and analysis techniques that form the basis of climatological research, with particular emphasis on contemporary research in the areas of microclimatology and micrometeorology. Techniques for the examination of biophysical and biogeochemical processes driving the surface exchanges of heat, water and greenhouse gases form an important component of this course. The aim of the course is to prepare the student for independent research in applied climatology and meteorology, including the affiliated fields of ecology, hydrology, oceanography, as well as other fields of atmospheric science.
PR/CR: A minimum grade of C is required unless otherwise indicated.
Prerequisite: GEOG 3320, or permission of department head or instructor.

GEOG 4650 Models in Regional Analysis 3 cr
Emphasis is placed on the use of regression techniques in regional analysis including the classical ordinary least squares methods and two-stage least squares. Migration and industrial location models are developed and calibrated using these techniques.
PR/CR: A minimum grade of C is required unless otherwise indicated.
Prerequisite: Permission of department head.

GEOG 4660 Honours Thesis 6 cr
This course involves the production of a thesis under the supervision of a department faculty member.
PR/CR: A minimum grade of C is required unless otherwise indicated.
Prerequisite: Permission of department head.

GEOG 4670 Selected Issues 3 cr
Intensive study of selected geographic issues.
PR/CR: A minimum grade of C is required unless otherwise indicated.
Prerequisite: Prearranged written consent of an individual instructor and permission of department head.
Mutually Exclusive: ENVR 4800, GEOG 4800

GEOG 4750 Understanding Contemporary Environmentalism: Power and Discourse 3 cr
This course will provide students with an advanced understanding of the relationships between nature and society by examining the rise of environmentalism through the past 50 years. Special attention will be paid to recent developments within the field of environmentalism and to theoretical work in the field of political ecology.
PR/CR: A minimum grade of C is required unless otherwise indicated.
Prerequisite: Permission of the Instructor,

GEOG 4780 Storms-Mesoscale 3 cr
This course focuses on a range of storms and mesoscale phenomena in the summer or winter. These include thunderstorms, tornadoes, squall lines, lightning, low level jets, gust fronts, blizzards, freezing rain, orographic storm, and polar lows. The emphasis is on the physical mechanisms leading to these events and it also examines how they may change in our changing climate. Not to be held for credit with GEOG 7780.
PR/CR: A minimum grade of C is required unless otherwise indicated.
Prerequisite: GEOG 3310 or permission of department head.
Equiv To: GEOG 7780

GEOG 4800 Climate and Society 3 cr
This course takes an interdisciplinary approach to explore the social causes, consequences, and necessary responses to climate change including adaptation and mitigation. It identifies key concepts and analytic approaches that assist with identifying the social, economic, political, and cultural processes that both drive climate change and influence responses. In particular, it engages with human environment relationships and the role of diverse values, identities, knowledge systems and emotions, and the differential amounts of power held across social groups. Examples will be drawn from the global North and South and at multiple scales from the local to global. May not be held with ENVR 4800 or ENVR 4000 when titled “Climate and Society” or GEOG 4670 when titled "Climate and Society."
PR/CR: A minimum grade of C is required unless otherwise indicated.
Prerequisite: 3 credit hours of 2000- or 3000- or 4000- level GEOG or ENVR, or permission of the instructor.
Equiv To: ENVR 4800
Mutually Exclusive: ENVR 4000, GEOG 4670

GEOG 4872 Advanced Methods in Geomatics 3 cr
This course focuses on the theory and application of geomatics in spatial problem solving in geography and the environment. The use of geomatics' technologies including GIS, Earth observation and spatial numerical methods will be covered. Students will learn the theoretical underpinning of spatial statistical concepts and will experiment with data exploration, inference and hypothesis testing. Lab assignments will provide practical experience with GIS and other geomatics software as well as CRAN-R. Not to be held with ENVR 4872, GEOG 4590 or GEOG 4720.
PR/CR: A minimum grade of C is required unless otherwise indicated.
Prerequisite: GEOG 3730 or permission of Instructor.
Equiv To: ENVR 4872, GEOG 4590, GEOG 4720

GEOG 4930 Oceanography: Chemical 3 cr
This course deals with the sources, distribution, and transformation of chemical constituents of the oceans, and the processes that control them. The emphasis will be given to biologically or climatically significant elements such as carbon, nitrogen, phosphorus, iron and mercury in the Arctic Ocean.
PR/CR: A minimum grade of C is required unless otherwise indicated.
Prerequisite: ENVR 2550 and GEOG 2930 or permission by department head.

GEOG 4940 Arctic Sea Ice 3 cr
This course aims to (i) provide students with a strong background on the importance and current knowledge of Arctic sea ice and (ii) train students on current field techniques used in research pertaining to sea ice-related investigations. To attain these goals, the course will combine field safety training, classroom lectures and assignments, and direct field experience through a field trip pertaining to physical and biogeochemical processes of the snow-covered sea-ice environment.
PR/CR: A minimum grade of C is required unless otherwise indicated.
Prerequisite: permission of the instructor.

GEOG 4960 Oceanography: Biological II Higher Trophic Levels 3 cr
This course will examine the oceanographic-biological coupling occurring in the Arctic region, focusing on environmental conditions related to higher trophic levels and impacts of climate change. This course will extend the learning of the 3000-level course that examines biological oceanography, which focuses on the environmental factors that control primary production and lower trophic levels in the world's oceans.
PR/CR: A minimum grade of C is required unless otherwise indicated.
Prerequisite: GEOG 3920 and a 2000- level BIOL course or permission of instructor.