

2010-2011 Course Catalog

The University Of Montana

Department of Geography

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Geography provides a broad-ranging perspective on humans as inhabitants and transformers of the face of the earth. The search for this understanding involves thorough study of the physical earth, its habitation by humans, and the resulting diversity of regions and places. Geographers study the physical earth by examining the interlocking systems of the natural environment, including climate, landforms, soils, and biota. Humans are studied by examining those diverse historical, cultural, social, economic, and political structures and processes which affect the location and spatial organization of population groups and their activities. Regions and places, whether described as nations, cities, ecological units, or landscapes, are studied by integrating and interpreting their physical and human relationships in an effort to better understand them and the problems that they face.

Geographers are often found working in business, industry, government, and education. Those in planning might be called upon to determine the most satisfactory location for a new school or an airport, or undertake the environmental or socioeconomic studies required for community and regional planning. Others enter fields such as environmental law, diplomacy, intelligence, and teaching. Graduates trained in cartography and

Geographical Information Systems find professional opportunities in map-making and spatial analysis. No academic discipline offers a greater range of employment opportunities.

The Department of Geography maintains particular strengths in each of the following major branches within the discipline: 1) physical geography (geomorphology, palaeo-environments, climate and global change); 2) human–environment interaction (environmental rehabilitation, water policy, and environmental hazards); 3) geography and society (geography of towns and settlements, economic geography, and migration and population change); 4) regional geography (with particular strengths in the geography of North America, Africa, Asia, and Europe); 5) geographical techniques (remote sensing, cartography and GIS, transport planning and GIS-T, field methods, quantitative and qualitative method).

The Department of Geography offers the Bachelor of Arts, Bachelor of Science, Master of Arts and Master of Sciences degrees in geography. For a B.A. in geography, options in physical geography, community and environmental planning; and cartography and GIS are available. Also offered are a minor in geography and a teaching major and minor in geography. The bachelor degree program provides a broad liberal education; it

qualifies graduates for a variety of professional jobs; and it prepares students who excel for graduate studies in geography, planning, cartography, or related fields. Graduate programs prepare candidates for a somewhat greater range of employment, including teaching in community and junior colleges, and for doctoral studies in geography and allied disciplines. In addition to a general degree in geography without option, students may pursue an option within the Master of Sciences program--community and environmental planning, or cartography and GIS. See the graduate catalog for more information concerning the M.A. and M.S. programs.

A certificate in GIS Sciences and Technologies, jointly offered by the Department of Geography, (College of Arts and Sciences), and the Department of Forest Management (College of Forestry and Conservation) is also available. This GIS certificate is a complement to an existing major or to a bachelor's degree already obtained. For details, please see the College of Arts and Sciences and the College of Forestry and Conservation sections of the catalog.

Special Degree Requirements

Refer to graduation requirements listed previously in the catalog. See index.

General Education Requirements for Geography Majors

Geography majors must meet the mathematical literacy requirement by taking M 115 (MATH 117). Students obtaining a geography degree without an option, may meet the university-wide symbolic system requirement either by taking one year of foreign language instruction (100-level or higher) or by taking M 115 (MATH 117) and STAT 216 (MATH 241). Students obtaining a degree in geography with an option must meet the university-wide symbolic system requirement by taking M 115 (MATH 117) and STAT 216 (MATH 241). The upper-division writing expectation must be met by successfully completing an upper-division writing course from the approved list in the Academic Policies and Procedures section of this catalog (see index), or by writing a senior thesis in geography.

Requirements for a Major in Geography

A major in geography requires a minimum of 36 (maximum of 60) credits. All geography majors take a 26-credit core consisting of the following courses: GPHY 121S (GEOG 101S), GPHY 111N (GEOG 102N), GPHY 112 (GEOG 105), GPHY 385 (GEOG 385), GPHY 381 (GEOG 387) and GPHY 382 (GEOG 389), GPHY 141S (GEOG 103S) or other regional course, three 300- or 400-level courses, one each from the systematic emphases of physical geography, human-environment interaction, and geography and society. Students who pursue a geography degree without option (general geography) elect a minimum of 10 (maximum of 34) additional credits in geography. Students who pursue an option in physical geography, in community and environmental planning, or in cartography and GIS also must meet the course requirements of the option (see below).

General Geography

The general geography degree (without option) is very flexible. In addition to meeting the core requirements for all geography majors, students may take a wide range of electives in geography (minimum 10, maximum 34 elective credits). Electives may be chosen from the fields of regional geography, geographic methods and techniques, or systematic geography (physical geography, human-environment interaction or geography and society).

Physical Geography Option

In addition to satisfying the general requirements for a degree in geography, a student pursuing the option in physical geography must complete a minimum of 24 additional credits as follows: six additional credits of upper-division coursework in physical geography, geology, hydrology, and/or ecology, and three credits of undergraduate thesis devoted to a theme in physical geography. Coursework and thesis topic should be determined in consultation with the student's advisor. In addition, a student must complete a course in applied calculus (M 162 (MATH 150) or equivalent) or an upper-division course in statistics (STAT 451 (MATH 444) or equivalent), and two two-course sequences in science (such as CHMY121N-123N (CHEM 151N-152N)), PHYS 121N-122N, BIOO 105N (BIOL 120N), BIOE 172N (BIOL 121N), or their equivalents).

Community and Environmental Planning Option

In addition to satisfying the general requirements for a degree in geography, the student desiring to achieve an option in community and environmental planning must complete a minimum of 13 additional credits as follows: GPHY 465 (GEOG 465), at least one of the following two courses: GPHY 468 (GEOG 468) or GPHY 486 (GEOG 486) (with corequisite laboratories GPHY 460 (GEOG 469) or GPHY 489 (GEOG 489)), plus four of the following five courses: GPHY 323S (GEOG 315S), GPHY 335 (GEOG 335), GPHY 421 (GEOG 412S), GPHY 432 (GEOG 432), GPHY 435 (GEOG 435). (These courses can be used to satisfy the 300- or 400-level core requirement in geography and society, and human-environment interaction.) An internship is strongly recommended.

Certificate in GIS Sciences and Technologies

The Certificate in GIS Sciences and Technologies is a complement to an existing major at The University of Montana or as a complement to a bachelor's degree obtained at another university. The purpose of the Certificate is to ensure the knowledge, understanding, and training necessary to acquire, process, analyze, and properly display geographical data.

Special Requirements for the Certificate

To earn a Certificate in GIS Sciences and Technologies, students must either complete or have completed an undergraduate degree and complete a minimum of twenty semester credit hours of course work including 11 to 13 required credits and 7 to 9 elective credits as described below. Students must achieve at least an overall grade point average of 3.0 for courses within the program in order to earn a certificate. The

certificate will be awarded upon the successful completion of all of the requirements of the certificate and the undergraduate degree.

General Requirements:

To earn the Certificate in GIS Sciences and Technologies, students must complete 11 to 13 required credits and 7 to 9 elective credits totaling a minimum of 20 credits as described below.

Required Courses(11-13 cr.):

- FOR 250 Geographic Information Systems Practicum - 2 cr.
- FOR 350 Geographic Information Systems and Applications - 3 cr.

or

- GPHY 381/382 (GEOG 387/389) Principles of Digital Cartography (3 cr.) & Digital Cartography Lab (1 cr.)
- FOR 351 Photogrammetry and Remote Sensing - 3cr

or

- GPHY 487 (GEOG 487) Remote Sensing & Raster GIS (3 cr.) & Lab (1 cr.)
- GPHY 488/489 (GEOG 488/489) Thematic Cartography and GIS (3 cr.) and Lab (1 cr.)

Advanced Elective Courses (7-9 cr.): (Although elective courses are organized by topical specialty, no specialization is necessary). Additional and experimental courses are offered intermittently; please see faculty or website for current semester offerings. Faculty may submit course syllabi to the GIS Certificate Committee for possible inclusion in the Certificate.

Raster GIS, Remote Sensing, and Image Analysis

- GPHY 587/589 (GEOG 587/589) Image Analysis & Modeling (3 cr.) and Cartography/GIS Lab (1 cr.)
- FOR 551 Digital Image Processing - 3 cr.

Vector GIS and Networks

- GPHY 486/489 (GEOG 483/489) Transport, Planning, and GIS 3 (3 cr.) and Cartography/GIS Lab (1 cr.)
- GPHY 588/589 (GEOG 588/589) Vector GIS (3 cr.) and Cartography/GIS Lab (1 cr.)
- GPHY 580 (GEOG 580) Seminar in GIS and Cartography

Data Management and Collection

- GPHY 468/469 (GEOG 468/469) Community and Regional Analysis (3 cr.) and Planning & Analysis Lab (1 cr.)
- FOR 505 Sampling Methods

GIS Applications

- GPHY 385 (GEOG 385) Field Techniques - 3 cr.
- GPHY 491 (GEOG 495) Digital Mapping & Design - 3 cr.
- GPHY 564 (GEOG 564) Planning Design - 3 cr.
- FOR 503 GIS: Methods and Applications I - 3 cr.
- FOR 504 GIS: Methods and Applications II - 3 cr.

Teacher Preparation in Geography

Students who want to be licensed to teach geography at the middle and high school level must complete the BA degree requirements in geography (general geography, no option required). They also must complete a teaching major or minor in a second field of their choice and the professional licensure program in the College of Education.

Students may also earn a teaching minor in geography. See the Department of Curriculum & Instruction for information about admission to the Teacher Education Program and completion of the licensure program.

Additional Information

Advisor

Every geography major will be assigned a geography faculty member to act as advisor. The advisor offers assistance in designing a program and in monitoring progress. In addition to guiding students toward meeting degree requirements, advisors also can direct students toward special opportunities, such as study abroad and field experiences, as well as scholarship and internship opportunities. All course substitutions must be approved by the advisor. The advisor also reviews and initials a student's application for graduation before the application is signed by the chairman.

International and Field Experience for Geographers

Students obtaining a degree in geography are strongly encouraged to explore study-abroad options and field experiences. Geography credits obtained through approved studies abroad will be applied toward the geography degree. With approval of the student's advisor, additional credits obtained through studies abroad and field experiences may count toward geography electives.

Suggested Course of Study

Geography major: General Geography without option:

First Year		A		S
GPHY 121S (GEOG 101S) Introduction to Human Geography	3		–	
GPHY 111N (GEOG 102N) Introduction to Physical Geography	–		3	
GPHY 112 (GEOG 105) Geography Laboratory	–		1	

M 095 (MATH 100) Intermediate Algebra	3		–	
M 115 (MATH 117) Probability and Linear Math	–		3	
WRIT 101 (ENEX 101) College Writing I	3		–	
Electives and General Education	6		8	
Total	15		15	
Second Year		A		S
GPHY 141S (GEOG 103S) Geography of World Regions or other regional geography course	3		–	
STAT 216 (MATH 241) or 100–level foreign language	0–5		3–5	
Electives and General Education	V		V	
Total	15		15	
Third Year		A		S
GPHY 385 (GEOG 385) Field Techniques	3		–	
GPHY 381 (GEOG 387) and 389 Principles of Digital Cartography and Laboratory	4		–	
Upper division courses in Geography & Society, Physical Geography and Human–Environment Interaction	3–6		3–6	
*Upper–division writing course	–		3	
Electives including study abroad/internship	2–5		6–9	
Total	15		15	
Fourth Year		A		S
Electives including study abroad/internship/ senior thesis	15		15	
Total	15		15	

Geography with option in Physical Geography

First Year		A		S
WRIT 101 (ENEX 101) College Writing I	3		–	
GPHY 121S (GEOG 101S) Introduction to Human Geography	3		–	
GPHY 111N (GEOG 102N) Introduction to Physical Geography	–		3	
GPHY 112 (GEOG 105) Geography Laboratory	–		1	
M 115 (MATH 117) Probability and Linear Math	3		–	
M 151 (MATH 121) Precalculus	–		3	
General Education and electives	6		8	
	15		15	
Second Year		A		S
GPHY 141S (GEOG 103S) Geography of World Regions or other regional geography course	–		3	
M 162 (MATH 150) Applied Calculus	4		–	
STAT 216 (MATH 241) Statistics	–		3	
Two 100–level science sequences	6		6	
General Education and electives	5		3	
	15		15	
Third Year		A		S
GPHY 385 (GEOG 385) Field Techniques	3		–	
GPHY 381 and 382 (GEOG 387 and 389) Principles of Digital Cartography and Laboratory	4		–	
Upper–division courses in Geography & Society	3		3	

and Human–Environment
Interaction

Upper–division courses in Physical Geography	3		3
Electives including study abroad/internship	2		9
	15		15

Fourth Year

A

S

GPHY 487 (GEOG 487) and 489 Raster GIS and Laboratory	4		–
Upper–division course in Physical Geography	3		–
Electives including study abroad/internship	8		15
	15		15

Geography with option in Community and Environmental Planning:

First Year: Same as General Geography

Second Year

A

S

GPHY 141S (GEOG 103S) Geography of World Regions, or other regional geography course	3		–
STAT 216 (MATH 241) Statistics	–		3
General Education and electives	12		12
	15		15

Third Year: Same as General Geography

Fourth Year

A

S

GPHY 465 (GEOG 465) Planning Principles and Processes	3		–
GPHY 468 and 469 (GEOG 468 and 469) Community & Regional Analysis and Laboratory or GPHY 486 and 489 (GEOG 486 and 489) Transport, Planning, and GIS and Laboratory	4		–
Upper–division courses in Geography & Society,	3		3

and Human–Environment Interaction

Electives including study abroad, internship/senior thesis	5	12
	15	15

Geography with option in Cartography and GIS:

First Year: Same as General Geography

Second Year		A		S
GPHY 141S (GEOG 103S) Geography of World Regions, or other regional geography course	3		–	
STAT 216 (MATH 241) Statistics	3		–	
CS 101 Introduction to Programming	–		3	
General Education and electives	9		12	
	15		15	

Third Year: Same as General Geography

Fourth Year		A		S
GPHY 487 and 489 (GEOG 487 and 489) Remote Sensing and Raster GIS & Image Analysis and Laboratory	3		–	
GPHY 488 and 489 (GEOG 488 and 489) Thematic Cartography and GIS Laboratory	–		4	
GPHY 468 and 469 (GEOG 468 and 469) Community & Regional Analysis and Laboratory or 484 Spatial Analysis in GIS	4		–	
GPHY 486 (GEOG 486) Transport, Planning and GIS and Laboratory or GPHY 485 and 489 (GEOG 485 and 489) Internet GIS and Laboratory	–		4	

Electives including study abroad/internship/ senior thesis	8	7
	15	15

Requirements for the Certificate in GIS Sciences and Technologies

To earn a certificate in GIS Sciences and Technologies, students must either complete or have completed an undergraduate degree and complete a minimum of 20 semester credit hours of course work, including 11 to 13 required credits and 7 to 9 elective credits as described below. Students must achieve at least an overall grade point average of 3.0 for courses within the program in order to earn a certificate. The certificate will be awarded upon the successful completion of all of the requirements of the certificate and the undergraduate degree. It is recommended that students complete the University's symbolic systems requirements before beginning this program, as these courses promote basic qualitative reasoning (M 115 (MATH 117), STAT 216 (MATH 241), FOR 201, SOCI 202 (SOC 202). CSCI 100 (CS 101), Introduction to Programming, is also strongly recommended.

Required Courses (11–13 cr.):

- FOR 303 Introduction to Geographic Information Systems, or
- GPHY 381 (GEOG 387) Principles of Digital Cartography and GPHY 382 (GEOG 389) Digital Cartography Lab
- FOR 351 Photogrammetry and Remote Sensing or GPHY 487 (GEOG 487) Remote Sensing and Raster GIS and GPHY 489 (GEOG 489) Cartography/GIS Lab
- GPHY 488 (GEOG 488) Thematic Cartography and GIS and GPHY 489 (GEOG 489)
- Cartography/GIS Lab

Elective Courses (7–9 cr.):

- Raster GIS, Remote Sensing, and Image Analysis
- GPHY 587 (GEOG 587) Digital Image Analysis and Modeling and GPHY 589 (GEOG 589) Cartography/GIS Lab FOR 551 Digital Image Processing
- Vector GIS and Networks
- GPHY 486 (GEOG 486) Transport Planning and GIS and GPHY 489 (GEOG 489) Cartography/GIS Lab
- GPHY 580 (GEOG 580) Seminar in GIS and Cartography
- GPHY 588 (GEOG 588) VECTOR GIS and GPHY 589 (GEOG 589) Cartography/GIS Lab
- Data Management and Collection
- GPHY 468 (GEOG 468) Community and Regional Analysis and GPHY 489 (GEOG 489) Cartography/GIS Lab
- FOR 505 Sampling Methods
- GIS Applications
- GPHY 385 (GEOG 385) Field Techniques
- GPHY 491 (GEOG 495) GIS in Geology
- GPHY 491 (GEOG 495) Planning Decision Support Systems

- GPHY 564 (GEOG 564) Planning Design
- FOR 503 GIS: methods and Applications I
- FOR 504 GIS: Methods and Applications II
- (Although elective courses are organized by topical specialty, no specialization is necessary)

Minor in Mountain Studies

Mountain studies is an interdisciplinary field of study focusing on the physical and human dimensions of mountain environments. Coursework in the minor emphasizes physical geography and mountain-society interactions, including a critical analysis of the processes of change and influence shaping local and regional mountain environments today. The minor in mountain studies takes advantage of existing faculty expertise and an array of courses to provide students with a science-based curriculum and global perspective. Students pursuing the minor in mountain studies will develop knowledge and skills appropriate for graduate study and for working with government and non-government agencies and groups.

Requirements

In addition to completing the requirements for a major in any discipline, students electing the minor in mountain studies must complete a minimum of 18 additional credits as follows:

1. Nine credits must be core courses:

- GPHY 144 (GEOG 138) Montana's Mountains (3 cr.)
- GPHY 214 (GEOG 222) Global Mountain Environments (3 cr.)
- GPHY 338 (GEOG 338) Mountains and Society (3 cr.)

2. Six credits must be selected from the following list of upper-division advanced mountain studies courses:

- BIOL 350 Rocky Mountain Flora (3 cr.)
- BIOL 451 Landscape Ecology of Mountain Ecosystems (3 cr.)
- BIOL 450 Alpine Ecology (3 cr.)
- FOR 495 Montana Wilderness Field Studies in Winter (3 cr.)
- GPHY 344 (GEOG 310) Crown of the Continent (3 cr.)
- GPHY 442 (GEOG 401) Regionalism and the Rocky Mountain West (3 cr.)
- GPHY 438 (GEOG 438) Mountains Field Study (3 cr.)
- GEO 425 (GEOS 425) Geology of the Pacific Northwest (3 cr.)
- GPHY 488 (GEOG 488) (Snow, Ice and Climate (3 cr.)

3. Three credits must be chosen from the following list of electives, or alternatively, from the advanced mountain studies course listing above.

- BIOC 101N (BIOL 201N) Survey Montana Wildlife & Habitats (3 cr.)
- FOR 330 Forest Ecology (3 cr.)
- FOR 385 Watershed Hydrology (3 cr.)
- GPHY 291 (GEOG 295) Mountain Cultures & Economies (3 cr.)
- GPHY 317 (GEOG 324) Geomorphology (3 cr.)

- GPHY 411 (GEOG 426N) Biogeography (3 cr.)
- GEO 107N (GEOS 103) Volcanoes, Earthquakes, and Other Natural Hazards (3 cr.)
- GEO 231 (GEOS 230) Field Methods and Maps (3 cr.)
- GEO 391 (GEOS 395) Appropriate Topics (3 cr.)
- GEO 433 (GEOS 430) Global Tectonics (3 cr.)
- RECM 482 Wilderness and Protected Area Management (3 cr.)

Requirements for a Minor in Geography

To earn a minor in Geography, the student must complete a minimum of 19-20 credits including: GPHY 121S and 111N (GEOG 101S and 102N; GPHY 141S (GEOG 103S) or other regional course; GPHY 112 (GEOG 105), GPHY 385 (GEOG 385) or GPHY 381 and 382 (GEOG 387 and 389); two upper-division systematic courses from the fields of geography and society, physical geography, and human-environment interaction.

Courses

U = for undergraduate credit only, UG = for undergraduate or graduate credit, G = for graduate credit. R after the credit indicates that the course may be repeated for credit to the maximum indicated after the R. Credits beyond this maximum do not count toward a degree.

Geography (GPHY)

U 111N (GEOG 102N) Introduction to Physical Geography 3 cr. Offered autumn and spring. Prereq., M 095D (MATH 100) or above, or appropriate score on mathematics placement examination. Introduction to the earth's major natural environmental systems, their spatial distribution and interrelationships, including weather and climate, vegetation and ecosystems, soils, landforms, and earth-surface processes.

U 121S (GEOG 101S) Introduction to Human Geography 3 cr. Offered autumn and spring. Introduction to Human Geography focuses upon the linkages between geography and society including analysis of regions, ethnic groups, urban landscapes, migration and population change, geopolitics, economics, and cultural differences.

U 122 (GEOG 105) Geography Laboratory 1 cr. Offered autumn and spring. Prereq. or coreq., a 100-level GPHY course. Introduction to concepts and techniques needed to understand and analyze the information contained in various types of maps, graphs, aerial photos, imagery, and other graphics and geographic data sets. This is prerequisite to GPHY 385 and 381 (GEOG 385 and 387).

U 141S (GEOG 103S) Geography of World Regions 3 cr. Offered autumn and spring. An overall view of how the lands and peoples of the world are organized into coherent geographical regions, how landscapes differ from region to region, and how the people differ in terms of their traits, beliefs, ways of life, and economic livelihood.

U 191 (GEOG 195) Special Topics Variable cr. (R-6) Offered intermittently. Experimental offerings of visiting professors, experimental offerings of new courses, or one-time offerings of current topics.

U 291 (GEOG 295) Special Topics Variable cr. (R-6) Offered intermittently. Experimental offerings of visiting professors, experimental offerings of new courses, or one-time offerings of current topics.

U 352 Himalayan Environment and development 3 cr. Offered summer only. Coreq., RECM/FOR/GPHY 353. Same as FOR/RECM 352. This course covers the contentious issues surrounding environment and development in the Himalaya using the Garhwal region of India as the example.

U 353 Tourism, Livelihoods and Sustainability in the Himalaya 3 cr. Offered summer only. Coreq. RECM/FOR/GPHY 352. Same as FOR/RECM 353. In this course we will explore the opportunities and challenges of development with particular reference to nature-based tourism and sustainability in an isolated but rapidly globalizing region of the Himalaya. Students will learn through extensive readings, class discussions, direct field experience (including living in a remote mountain village), meetings with development officials, sustainability activists and stakeholders in the region.

U 378 Preceptorship in Geography 1-3 cr. (R-6) Offered autumn and spring. Prereq., two of the following three: GPHY 121S (GEOG 101S), GPHY 111N (GEOG 102N), GPHY 141S (GEOG 103S); plus GPHY 112 (GEOG 105), and consent of instr. Assisting a faculty member by tutoring, conducting review sessions, helping students with research projects, and carrying out other class-related responsibilities. Open to juniors and seniors who apply to instructor for consent.

U 391 (GEOG 395) Special Topics Variable cr. (R-12) Offered intermittently. Experimental offerings of visiting professors, experimental offerings of new courses, or one-time offerings of current topics.

UG 491 (GEOG 495) Special Topics Variable cr. (R-9) Offered intermittently. Experimental offerings of visiting professors, experimental offerings of new courses, or one-time offerings of current topics.

U 492 (GEOG 498) Internship Variable cr. Offered every term. Prereq., consent of instr. Extended classroom experience which provides practical application of classroom learning during placements within governmental agencies or the business community. A maximum of 6 credits of Internship (192, 292, 392, 492) may count toward graduation.

UG 496 Independent Study Variable cr.(R-9) Offered every term. Prereq., consent of instr. Independent study in any subfield of geography.

U 499 Undergraduate Thesis 3 cr. (R-6) Offered autumn and spring. Prereq., senior standing or consent of instr. Independent research project in any geographical topic supervised by a faculty member, and leading to completion of the baccalaureate degree.

G 535 Seminar in Water Resources 3 cr. Offered autumn. Examines water resources issues and management approaches in the United States and internationally. Specific regional focus, issues, methods, and theoretical foundations to vary depending on instructor, their expertise, and student needs.

G 597 Professional Paper Variable cr.(R-6) Offered autumn and spring. Prereq., graduate standing in GPHY.

Earth Systems (ERTH)

UG 303N (GEOG 322N) Weather and Climate 3 cr. Offered autumn odd-numbered years. Prereq., GPHY 111N (GEOG 102N) or consent of instr. Origin, composition, structure, and dynamics of the atmosphere, gas and radiation laws, energy budget and balance, weather elements and North American weather systems.

Physical Geography

U 214 (GEOG 222) Mountain Environments 3 cr. The study of mountain environments and their physical processes around the globe: Andes, Appalachians, East African Mountains, European Alps, Hindu Kush-Himalaya-Karakoram, Pamir, Rocky Mountains, Southern Alps of New Zealand, Tien Shan, and others. Topics include mountain building, alpine glaciers, mountain geomorphology and climatology, mountain watersheds, mountain biogeography, and mountain hazards such as earthquakes and mass movements.

UG 317 (GEOG 324) Geomorphology 3 cr. Offered intermittently. Prereq., GPHY 111N (GEOG 102N) or equiv. Important landforms and landscapes, their biophysical processes, and their formative elements.

UG 411 (GEOG 426N) Biogeography 3 cr. Offered intermittently. Prereq., GPHY 111N (GEOG 102N) or equiv. Changing patterns of plant and animal distributions in space and time. Combination of historical and ecological approaches to biological species and communities. Study of external causes of plant and animal distributions, especially climatic change and human impacts.

UG 413 (GEOG 423) Soil Geomorphology 3 cr. Offered intermittently. Prereq., GPHY 111N (GEOG 102N) or FOR 210N or consent of instr. Morphology and classification of soils and their relationships to landforms and geomorphic processes.

UG 438 Mountains Field Study 3 cr. Prereq., junior or senior standing or graduate student. Examination of aspects of the study of mountain geography through a two-week field course based in a mountainous country and/or region. Possible areas of focus include, but are not limited to, the Northern Rocky Mountains, the Alps, the Himalaya, and the Andes.

G 525 Advanced Physical Geography 3 cr. (R-9) Offered intermittently. Prereq., consent of instr. Advanced topics in climate and global change, paleo-environments and biogeography, landform analysis, soils, and other selected topics. Topic titles will appear in the Class Schedule.

G 538 Mountain Studies Seminar 3 cr. Offered intermittently. Prereq., consent of instr. In-depth treatment of the physical and cultural geography of mountainous regions, including attention to the theory and methodology of mountain geography.

Human–Environment Interaction

U 335 Water Policy 3 cr. Offered autumn. Prereq., upper-division standing. Exploration of water resources issues facing the public, resource managers, and water users in the western United States today. Examines concepts, terms, and regulatory environment which provide the foundation for modern water management and policy.

UG 336 Exploration and Discovery 3 cr. Offered autumn intermittently. Emphasis on the evidence of language, genetics, material culture, and transoceanic plant and animal exchanges in assessing mobility and population distributions in prehistory; factors that motivate exploration; the history of navigation; the impacts of exploration upon science, society, economics, and government.

U 338 Mountains and Society 3 cr. Offered autumn. Physical and cultural aspects of the mountains of North and South America, Europe, Africa, and Asia. Emphasis on combining the physical landscape with an overview of the indigenous people who inhabit the worlds' heights.

UG 432 The Human Role in Environmental Change 3 cr. Offered autumn even-numbered years. Prereq., upper-division or graduate standing. Same as EVST 432. A systematic examination of the ways in which the major physical systems and ecosystems of the earth have been modified by human activity, and approaches to the rehabilitation of these systems.

UG 433 Cultural Ecology 3 cr. Offered spring. Examines issues related to culture and the natural environment. Topics include cultural origins and diversity, geography of religion, geolinguistics, plant and animal domestication, livelihood systems, folk and popular culture, ethnic geography, political patterns, demography, industries, urban genesis, and the transformation of environmental systems.

UG 434 Food and Famine 3 cr. Offered autumn intermittently. Exploration of the production, distribution, and consumption of food; the causes and consequences of hunger; and measures that might be taken to relieve hunger.

UG 435 Environmental Hazards and Planning 3 cr. Offered spring. Prereq., upper-division or graduate standing. Surveys the characteristics and impacts of selected natural and technological hazards. Emphasizes risk and vulnerability assessment procedures, mitigating measures to reduce damage, and strategies for planning community response.

Geography and Society

U 323S (GEOG 315S) Economic Geography of Rural Areas 3 cr. Offered spring odd-numbered years. Study of the location of economic activities, including agriculture, industry, and services. Focus on the changing nature of rural areas.

UG 421 (GEOG 412S) Towns and Rural Settlement 3 cr. Offered spring even-numbered years. Prereq., upper-division or graduate standing. The spatial, functional, and locational attributes of regional centers and towns within the context of patterns of rural settlement.

UG 423 (GEOG 415) Migration and Population Change 3 cr. Offered autumn odd-numbered years. Prereq., senior standing or graduate standing or consent of instr. Focus on internal migration and population change in the U.S., in particular in the Mountain West. Review of migration theories and empirical research; development of practical skills for conducting empirical research related to migration and population change.

UG 443 (GEOG 417) Cultural and Global Competence—Key Components for Success in Global Economy and Society 3 cr. Offered autumn. Prereq., upper-division or graduate standing. Designed to increase awareness of student's own culture and increase cross-cultural sensitivity. Understanding the perspectives of other cultures and

resolving possible conflicts. Examination of the role of perception, belief systems, social structures, and culture practices.

G 515 Advanced Human Geography 3 cr.(R-9) Offered intermittently. Prereq., consent of instr. Advanced topics in cultural and historical geography, gender issues, migration and population change, economic geography, urban and settlement geography, and other selected topics. Topic titles will appear in the Class Schedule.

Regional Geography

U 144 (GEOG 138) Montana's Mountains 3 cr. Prereq., freshman or sophomore standing or consent of instructor. A field-based course offered during winter session in the winter splendor of the North Fork of the Flathead River and Glacier National Park. Topics addressed include physical geography, geology, winter ecology, national park management, environmental history, and the changing economy of the region.

U 241S (GEOG 201S) Montana 3 cr. Offered autumn. The physical, cultural, economic, political, and historical geography of the state including Montana's mountains and the prairies.

U 243X (GEOG 207S) Africa 3 cr. Offered autumn even numbered years. A survey of the biophysical and cultural geography of Sub-Saharan Africa. Emphasis is on the region's cultural-historical development and current ecological, demographic, and economic patterns.

U 245X (GEOG 213S) The Middle East 3 cr. Offered autumn odd-numbered years. Same as AS and LS 213. A survey of the biophysical and cultural geography of Southwest Asia and North Africa. Emphasis on environmental change; prehistory; patterns of cultural and historical change; issues of socio-economic, religious, and political diversity; and the broader political significance of the region.

U 342 (GEOG 301) North America 3 cr. Offered intermittently. Physiographic regions of North America; highlights of historical geography blended with physical and cultural aspects of the continent. Lesser known places are explored.

U 344 (GEOG 310) Crown of the Continent 3 cr. The study of the geographical setting of the Crown of the Continent of North America, including the richness of physical geography, history, culture, and models of conservation. Examines ongoing research initiatives, impacts of climate change, regional transformations, and the relationship between people and this mountainous environment.

UG 347 (GEOG 308) Regional Geography (Multiple Regions) 3 cr. (R-9) Offered intermittently. Selected regions will be listed as appropriate in each Class Schedule.

U 348 (GEOG 307) Field Studies in Geography 3 cr. (R-12) Offered autumn and spring. Through extended backcountry travel, experiential examination of regional landforms, climate, hydrology, soils, and patterns of vegetation and wildlife. Local landscapes, natural-resource endowment, and societies with particular emphasis on human-environmental interaction. Geographical skills and techniques, including map reading and navigational skills. Offered by the Wild Rockies Field Institute as part of a semester-long, 12-credit field experience with corequisite courses in allied fields.

UG 442 (GEOG 401) Regionalism and the Rocky Mountain West 3 cr. Offered spring. Same as HSTA 462 (HIST 401). Investigation of regionalism as a concept and its future in the Rocky Mountain West. Regionalism as a geographical, economic, political, and cultural entity.

UG 444 (GEOG 410) High Asia 3 cr. Offered intermittently. A study of the geography and mountain-society interactions in High Asia. The course includes attention to the theory and methodology of mountain geography, with attention to physical and human systems and their interaction.

UG 445 (GEOG 408) Advanced Regional Geography 3 cr.(R-9) Offered intermittently. Prereq., consent of instr. In-depth treatment of a geographic region, a particular regional problem, or the methodology of regional geography. Topics vary.

Geographical Thought, Methods, Planning and GIS

U 381 (GEOG 387) Principles of Digital Cartography 3 cr.Offered autumn. Prereq., GPHY 112 (GEOG 105) or consent of instr.; coreq., GEOG 389. Concepts, principles, and methods of cartography as applied to computerized mapping and geographical information systems. Topics include history of cartography, basic geodesy, map projections, coordinate systems, map compilation, generalization, and design.

U 382 (GEOG 389) Digital Cartography Laboratory 1 cr. Offered autumn. Prereq., GPHY 112 (GEOG 105); coreq., GPHY 381 (GEOG 387). Laboratory to accompany GPHY 381 (GEOG 387).

UG 385 Field Techniques 3 cr.Offered autumn. Prereq., M 115 (MATH 117), GPHY 111N (GEOG 102N), and GPHY 112 (GEOG 105) or consent of instr. Field techniques used by geographers and planners in making field observations and in collecting data. One hour of lecture and four hours of field/laboratory-based work.

UG 465 Planning Principles and Processes 3 cr.Offered autumn. Prereq., upper-division or graduate standing. Surveys planning principles, practices and issues in urban and rural environments. Attention is devoted to Montana, state planning programs in the United States., and federal programs and policies that influence land-use planning. Emphasizes skills and techniques used in plan development and implementation.

UG 466 Environmental Planning 3 cr. Offered spring. Introduction to practice of environmental planning which includes elements of physical planning, planning design at the landscape scale, and conservation planning. Includes field visits and project-based work.

UG 467 Planning Decision Support Systems 3 cr. Offered spring even numbered years. Introduction to use of computer software tools for modeling and analyzing land use.

UG 468 Community and Regional Analysis 3 cr. Offered autumn. Prereq., M 115 (MATH 117) (or higher) or consent of instr. Coreq., GPHY 460 (GEOG 469).Socio-demographic analysis of communities and regions: population, employment, and spatial interaction. Hands-on course designed for future planners, GIS analysts, and others interested in socio-demographic change.

UG 469 Planning and Analysis Laboratory 1 cr. Offered autumn. Coreq., GPHY 468 (GEOG 468). Laboratory to accompany GPHY 468 (GEOG 468).

UG 486 (GEOG 483) Transport, Planning, and GIS 3 cr. Offered spring. Prereq., M 115 (MATH 117) or higher or consent of instr. Coreq., GPHY 489 (GEOG 489). A project-oriented course focusing on patterns and trends in urban passenger transportation, principles of transport planning, and modeling in GIS-T.

UG 482 (GEOG 484) Spatial Analysis and GIS 3 cr. Offered intermittently. Prereq., GPHY 381 (GEOG 387) and 389 and STAT 216 (MATH 241) (or higher) or consent of instr. Quantitative analysis of spatial data, including techniques for pattern analysis, classification, and interpolation within a GIS environment.

UG 485 Internet GIS 3 cr. Offered intermittently. Prereq., GPHY 381 (GEOG 387); coreq., GPHY 489 (GEOG 489). Principles and techniques for distributing GIS and mapping applications through the Internet.

UG 487 Remote Sensing and Raster GIS 3 cr. Offered autumn. Prereq., GPHY 381 (GEOG 387) and 389 and STAT 216 (MATH 241) (or higher) or consent of instr. Coreq., GPHY 489 (GEOG 489). Basic principles of remote sensing and analyzing images within a raster GIS. Review current data sources.

UG 488 Thematic Cartography and GIS 3 cr. Offered spring. Prereq., GPHY 381 (GEOG 387) or consent of instr.; coreq., GPHY 489 (GEOG 489). Communicating and analyzing topical information with maps. Choropleth maps, dot maps, proportional figure maps, isarithmic maps, and others. Includes computer mapping and GIS exercises.

UG 489 Cartography/GIS Laboratory 1 cr. (R-4) Offered autumn and spring. Coreq., GPHY 486 (GEOG 486), 485, 487 or 488. Lab to accompany cartography and GIS courses.

UG 497 (GEOG 471) Workshop in Teaching Geography 2-3 cr. Offered summer. Prereq., upper-division or graduate standing. Modern concepts and techniques in geography, with emphasis on their use in teaching geography in Montana schools. Students are required to prepare and present a teaching unit project.

G 500 Geography Graduate Colloquium 1 cr. (R-3) Offered autumn. Presentation of faculty and student research interests. Guest lecturers. Graded pass/not pass only. Enrollment required every autumn graduate students are in residence.

G 504 Introduction to Geographical Research 1 cr. Offered autumn. To be taken during first semester of graduate studies. Understanding of diverse research approaches in geography and development of a thesis topic. To be continued in spring in GPHY 505 (GEOG 505).

G 505 Research Design 2 cr. Offered spring. Prereq., graduate standing and GPHY 504 (GEOG 504). Preparation of a thesis proposal: research design, data collection, analysis, interpretation, and presentation. Recommended to be taken during the second semester of graduate studies.

G 520 Seminar in Geographical Thought 3 cr. Offered autumn. Geographical ideas, concepts, approaches, and techniques from ancient to modern times. Recommended to be taken during first semester of graduate studies.

G 550 Seminar in Geography 3 cr. (R-9) Offered intermittently. Prereq., consent of instr. Seminar topics in geography and society, human-environmental interaction, physical geography, regional geography, or geographical techniques.

G 560 Seminar in Planning 3 cr. Offered spring odd-numbered years. A critical analysis of land planning history, theory, approaches, and practice. Emphasis is on the United States and England.

G 561 Land Use Planning Law 3 cr. Offered autumn. Same as EVST 561 and LAW 687. Basic overview of the law of land-use planning including, background in the traditional governmental regulatory, proprietary, and fiscal land use tools. Examination of modern

techniques for land-use planning; consideration of constitutional limits of the authority of state and local governments. Focus on skills in interpreting, drafting, and applying state legislation and local ordinances.

G 562 Land Use Planning Clinic 1-6 cr. (R-6) Offered every term. Prereq. or coreq., GPHY 561 (GEOG 561). Same as EVST 562. Students assist local communities in long-range planning efforts and development of growth management plans as required by Montana law; ordinance drafting, development proposals, and land use issues.

G 564 Planning Design 3 cr. Offered spring even-numbered years. Prereq., graduate standing or qualified seniors. Analysis of land-use problems and design.

G 578 Preceptorship in Geography 1-3 cr. (R-6) Offered autumn and spring. Prereq., graduate standing, suitable coursework, and consent of instr. Assisting a faculty member by tutoring, helping students with research projects, and carrying out other class-related activities.

G 580 Seminar in GIS and Cartography 3 cr. (R-9) Offered spring. Prereq., consent of instr. Seminar topics in cartography and GIS. Applications to advanced studies in human and physical geography.

G 587 Digital Image Analysis and Modeling 3 cr. Offered spring. Prereq., GPHY 487 (GEOG 487) or FOR 351 or consent of instr.; coreq., GPHY 589 (GEOG 589). Advanced topics in image analysis (e.g., hyperspectral images and pattern-recognition-based classification) and foundations of simple raster-based models.

G 588 Vector GIS 3 cr. Offered autumn. Prereq., consent of instr.; coreq., GPHY 589 (GEOG 589). Applications of GIS in human geography. Mapping and map analysis methods employing census data, TIGER Files, city and county data bases, county surveyors maps, and others. Theory, concepts, and practices of GIS focusing on the vector data model.

G 589 Cartography/GIS Laboratory 1 cr. (R-4) Offered autumn and spring. Laboratory to accompany GPHY 587 or 588 (GEOG 587 or 588).

G 595 Special Topics Variable cr. (R-9) Offered intermittently. Prereq., consent of instr. Experimental offerings of visiting professors, experimental offerings of new courses, or one-time offerings of current topics.

G 596 Independent Study Variable cr. (R-9) Offered every term. Prereq., consent of instr. Independent research in geography or planning.

G 598 Internship Variable cr. (R-9) Offered every term. Prereq., consent of instr. Extended classroom experience which provides practical application of classroom learning during placements off campus.

G 599 Thesis Variable cr. (R-6) Offered every term. Prereq., consent of advisor.

Faculty

Professors

Jeffrey A. Gritzner, Ph.D., The University of Chicago, 1986

Christiane von Reichert, Ph.D., University of Idaho, 1992

Paul B. Wilson, Ph.D., University of Nebraska, 1972

Associate Professors

Sarah J. Halvorson, Ph.D., University of Colorado-Boulder, 2000

Ulrich Kamp, Ph.D., Technical University of Berlin, 1999

David D. Shively, Ph.D., Oregon State University, 1999

Assistant Professor

Anna Klene, Ph.D., University of Delaware, 2005

Lecturers and Adjuncts

Udo Fluck, Ph.D., The University of Montana, 2003 (Director, Multicultural Learning Solutions)

Richard Graetz, D.H.L. (Hon), The University of Montana, 2004

Thomas Sullivan, M.A., The University of Montana, 1995

Emeritus Professors

John M. Crowley, Ph.D., University of Minnesota, 1964

Evan Denney, Ph.D., University of Washington, 1970

John J. Donahue, Jr., Ph.D., Syracuse University, 1971

Chris Field, Ph.D., University of California, Los Angeles, 1966

Darshan S. Kang, Ph.D., University of Nebraska, 1975