

UG 430 Studies in Comparative Literature: Multicultural British Literature 3 cr. (R-9) Offered intermittently. Prereq., consent of instr. Same as LIT 430 (ENLT 430), LS 455 and MCLG 440. The study of important literary ideas, genres, trends and movements. Credit not allowed for the same topic in more than one course numbered 430, LS 455, MCLG 440, or MCLG 494.

Faculty

Professors

Robert Baker, Ph.D., Cornell University, 1997

Jill Bergman, Ph.D., University of Illinois, 1999 (Chair)

Heather Bruce, Ph.D., University of Utah, 1997

Kevin Canty, M.F.A., University of Arizona, 1993

Casey Charles, Ph.D., State University of New York, Buffalo, 1992

Beverly Ann Chin, Ph.D., University of Oregon, 1973

Debra Magpie Earling, M.F.A., Cornell University, 1991

John Glendening, Ph.D., Indiana University, 1992

Brady Harrison, Ph.D., University of Illinois, 1994

John Hunt, Ph.D., Stanford University, 1984 (Associate Chair)

Christopher J. Knight, Ph.D., New York University, 1982

Deirdre McNamer, M.F.A., The University of Montana, 1987

David L Moore, Ph.D., University of Washington, 1994

Greg Pape, M.F.A., University of Arizona, 1974

Thomas Russell, Ph.D., University of Kansas, 1981

Karen Volkman, M.F.A., Syracuse University, 1992

Associate Professors

Judy Blunt, M.F.A., The University of Montana, 1994

Nancy Cook, Ph.D., State University of New York, Buffalo, 1991

Louise Economides, Ph.D., Indiana University, 2003

Kathleen M. Kane, Ph.D., University of Texas, 1997

Ashby Kinch, Ph.D., University of Michigan, 2000

Joanna Klink, Ph.D., The John Hopkins University, 2000

Eric Reimer, Ph.D., University of Oregon, 2002

Kathleen J. Ryan, Ph.D., University of North Carolina, Greensboro, 2001

Prageeta Sharma, M.F.A., Brown University, 1995

Assistant Professors

Rob Browning, Ph.D., Indiana University, 2004 (visiting)

Quan Manh Ha, Ph.D., Texas Tech University, 2011

David Gates, B.A., University of Connecticut, 1972

Lecturers

David Gilcrest, Ph.D., University of Oregon, 1996

Sean O'Brien, Ph.D., University of Colorado, 1989

Traolach O'Riordain, Ph.D., National University of Ireland, Co. Cork, Ireland, 1994

Robert Stubblefield, M.F.A., University of Montana, 1994

Emeritus Professors

Richard R. Adler, Ph.D., University of Illinois, 1971

William Bevis, Ph.D., University of California, Berkeley, 1969

Jesse Bier, Ph.D., Princeton University, 1956

Bruce Bigley, Ph.D., Yale University, 1972

Gerry Brenner, Ph.D., University of Washington, 1965

Walter L. Brown, Ph.D., University of California

Merrel D. Clubb, Jr., Ph.D., University of Michigan, 1953

Phil Fandozzi, Ph.D., University of Hawaii, 1974

Earl Ganz, Ph.D., University of Utah, 1977

Robert B. Hausmann, Ph.D., University of Wisconsin, 1972

Walter N. King, Yale University, 1952

William Kittredge, M.F.A., University of Iowa, 1969

Michael W. McClintock, Ph.D., Cornell University, 1970

Jocelyn Siler, M.F.A., The University of Montana, 1977

Lois Welch, Ph.D., Occidental College, 1966

Emeritus Associate Professors

Robert B. Johnstone, Ph.D., University of Washington, 1970

Dexter Roberts, Ph.D. Stanford University, 1966

Veronica J. Stewart, Ph.D., State University of New York, Stony Brook, 1990

Environmental Studies

- Special Degree Requirements
- Suggested Course of Study
- Courses
- Faculty

Len Broberg, Director

The Environmental Studies Program (EVST) seeks to provide students with the literacy, skills and commitment needed to foster a healthy natural environment and to create a more sustainable, equitable, and peaceful world. To these ends, the EVST program educates and challenges students to become knowledgeable, motivated, and engaged in environmental affairs. We want our students to acquire the skills and awareness that will enable them to promote positive social change and to improve the environment and communities of Montana and thereby the lives of all Montanans. Our program is organized upon the following principles:

- -Environmental studies require an interdisciplinary approach that integrates the natural sciences, social sciences, and humanities.
- -Creating solutions to environmental problems requires enterprise and performance as well as reflection; therefore, an effective environmental education generates thinkers who can do as well as doers who can think.
- -It is important to provide both classroom and experiential learning opportunities in the arts and responsibilities of democratic citizenship, including communication, collaboration, and committed civic participation.
- -Students should be co-creators of their educational experience.

High School Preparation: Students in high school who are planning to major in environmental studies should take their schools' college preparatory curriculum. Courses in biology, chemistry, math through pre-calculus, and writing are recommended.

Special Degree Requirements

Refer to graduation requirements listed previously in the catalog (see index). For the Bachelor of Arts degree, every major in environmental studies will complete the following requirements:

Environmental Studies: ENSC 105N (EVST 101N), ENST 230H, 201, 225, ENSC 360, ENST 398 (EVST 167H, 201, 225, 360, 398), one of the following two courses: ENST 382 or 367 (EVST 302 or 367), one of the following two courses: ENST 335 L or 430 (EVST 305L or 430), one of the following two courses: ENST 489S or 487 (EVST 477S or 487), and at least 9 credits selected from 300 and/or 400 level courses offered by Environmental Studies (of which no more than 3 credits may be from EVST 382, 383 or 418 or ENST 395 in the current catalog).

Required courses outside Environmental Studies: BIOB 101N or BIOB 160N or BIOB 170N (BIOL 100N or 110N or 108N); CHMY 121N (CHEM 151N); STAT 216 (MATH 241), and one, 3 credit NAS course from among the following: NASX 105H, 231X, 303E, 304E, 354X, 340, 306X, or 488 (NAS 100H, 231, 303E, 301E, 324X, 329, 341, or 410) or NASX 201X, 235X (NASL 201X, 202L (NAS 201H, 202)), a two semester foreign language sequence, and one additional environmental science course from among the following: EARTH 303N/GPHY 322N, GEO 108N (GEOS 108N) (provided it was not used to satisfy the first requirement listed above), BIOB 170N, BIOC 335 (BIOL 108N, BIOL 350), NRSM 265 or 385 (FOR 265 or FOR 385). 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.

Focus Areas of Study for Undergraduates

All Focus Areas of Study require the completion of the general requirements of the EVST major. In addition, each Focus Area has additional special requirements below.

Sustainability Studies:

Sustainability is a major organizing theme within Environmental Studies. Students focusing on this area will increase their understanding of our earth's limited capacity to support all forms of life and to provide for the needs of human society.

Students will learn how to reduce our demands on the earth through increased resource efficiency and choosing simpler but more joyful lifestyles. Students have the opportunity to identify and develop more sustainable means of providing food, shelter, mobility and other necessities by working and innovating in the local community. Students complete 20 credits of advisor-approved courses and/or internships and may further focus their studies in these areas.

Sustainable Business: Students focus on creating and maintaining enterprises that meet social needs sustainably.

Students should take ENST 291 (EVST 210) or TASK 160S (BUS 160S); ACTG 201 & 202 (ACCT 201 & 202); MIS 257 (IS 257); ENST 476 or 487 (EVST 485 or 487); COMM 379; MGMT 457. Students should also intern with a local sustainable business or the Sustainable Business Council. Students interested in this focus area are encouraged to double major in Business Management and in addition to the core Business courses take some of these courses: MGMT 348, 430, 445, 446, 458. Faculty Advisor - Vicki Watson

Sustainable Energy: Students interested in sustainable energy should take ENST 204, 291, 480, and 494, (EVST 204, 210, 450, 460 and 470) and the energy related courses offered by the College of Technology. Students should arrange an energy related internship. Also recommended are ECNS 201S, 433 (ECON 111S, 440). Faculty advisors - Len Broberg and Josh Slotnick

Sustainable Food and Farming: Students focus on creating and maintaining sustainable food systems. Students must complete 6 supervised internship credits in the Program in Ecological Agriculture and Society (PEAS, EVST 390); ENST 430 and 480 (EVST 430 and 450). In addition, students must complete 9 more credits of advisor-approved courses or internships. These could include courses such as: ENSC 245N, (FOR 210N), ANSC 262 (FOR 362), NRSM 424 (FOR 424); NUTR 221N (HHP 236N); PHAR 324; ANTY 133H (ANTH 103H); GPHY 434 (GEOG 434). Faculty advisors Neva Hassanein and Josh Slotnick.

Sustaining Water Resources & Watersheds: Students focus on sustainable use of water resources and watersheds. Students must complete 20 credits of advisor-approved courses or internships. These could include courses such as BIOC 340, BIOE 428, BIOC 409, (BIOL 308, 366, 408)BIOL 415, BIOL 453, 454; CHMY 442 (CHEM 442); GPHY 335 (GEOG 335); GEO 260, 301, 320, 327, 460, 420 (GEOS 260, 301, 320, 327, 460, 480); ENSC 245N (FOR 210N), NRSM 385 & 386, 415, 455, 485 (FOR 385 & 386, 415, 455, 485). (Note: Some of these courses require prerequisites not in the environmental studies core requirements.) Students can also work with the UM Watershed Health Clinic. Faculty advisor - Vicki Watson

Environmental Justice: With this focus area students will develop the capacity for thoughtful active participation in the quest for environmental and social justice. Students gain in-depth understandings of a wide range of environmental injustices and the role of race, class, and gender in shaping quality of life, enjoyment of environmental amenities and access to natural resources both domestically and internationally. Students learn about the ways that business, government, financial institutions, and the labor and environmental movements can work toward a more just and sustainable society. Students must complete 21 credits including the following: ENST 489S, 487 (EVST 477S, 487), a 3 credit internship ENST 398 (EVST 398) and 12 credits of advisor-approved electives (contact Robin Saha for a list of recommended courses). Faculty advisors - Robin Saha and Dan Spencer.

Environmental Science: Students will develop sufficient science literacy to qualify as environmental scientists. Students should double major or minor in one of the scientific disciplines on campus and/or consult with the EVST science advisor to design a course of study that includes at least 40 credits in science & math. Faculty advisor - Vicki Watson.

Environmental Writing and Literature: Students focus on the careful reading of American Nature & Environmental Nonfiction Writing and the creative writing of their own work in the field. Students must complete ENST 335L and 373A (EVST 305L, 373A); at least one 3 credit course at the 200-level or above in ENCR or LIT or JOUR; at least either one, internship credit (*Camas* magazine, the Environmental Writing Institute, *Wild Mercy* Reading Series, or some other environmental publication); or one independent study credit ENST 492 (EVST 496), arranged with instructor in either original nature writing or in nature literature study. Faculty advisor - Phil Condon

Environmental Pre-Law: The Pre-Law focus area of study is designed to prepare students for law school and a career in environmentally oriented legal and policy matters. Students focusing on environmental law must consult with the pre-law faculty advisor within environmental studies (Len Broberg) to design a suitable pre-law program. The pre-law focus area is a flexible program that allows students to strengthen their background within their area of interest. Faculty advisor - Len Broberg

Suggested Course of Study

First Year

A S

BIOB 101N (BIOL 100N) Discover Biology	3	-
WRIT 101 (ENEX 101) Composition	(3)	(3)
ENSC 105N (EVST 101N) Environmental Science	3	-
ENST 230H (EVST 167H) Nature and Society	-	3
M 115 (MATH 117) Probability and Linear Mathematics	-	3
NASX 105H (NAS 100H) Introduction to Native American Studies	3	-
Elective and General Education	4-7	7-10
Total	16	16
Second Year		
	A	S
CHMY 121N (CHEM 151N) Intro to General Chemistry	3	-
ENST 201 (EVST 201) Environmental Information Resources	-	3
ENST 225 (EVST 225) Community and Environment	3	-
STAT 216 (MATH 241) Intro to Statistics	4	-
Foreign Language sequence	3-5	3-5
Electives, additional Environmental Science or Studies courses and/or General Education	-	7
Total	15	15
Third Year		
	A	S
ENST 367 (EVST 367) Env. Politics & Policy (or ENST 382 (EVST 302) Environmental Law)	(3)	(3)
ENSC 360 (EVST 360) Applied Ecology	3	-
ENST 335L (EVST 305L) The Environmental Vision (or ENST 430 (EVST 430) Culture & Agriculture)	(3)	(3)
Environmental Science or Studies upper-division course	3	3
Electives, additional Environmental Science or Studies courses and/or General Education	6	6
Total	15	15
Fourth Year		
	A	S
ENST 489S (EVST 477S) Environmental Justice Issues (or ENST 487 (EVST 487) Globalization Justice & Env)	(3)	(3)
Environmental Science or Studies upper-division course	(3)	(3)
ENST 398 (EVST 398) Cooperative Education/Intern	(3)	(3)
Electives, additional Environmental Science or Studies courses and/or General Education	6	6
Total	15	15

Requirements for a Minor

To earn a minor the student must complete 25 credits. The following courses must be completed: ENSC 105 (EVST 101N), ENST 230H, 225, (EVST 167H, 225) and one of these ecology courses: BIOE 172N (BIOL 121N), ENSC 360 (EVST 360), FORS 330 (FOR 330), or BIOE 370 (BIOL 340). The remaining credits can be from any other upper-division Environmental Science or Studies courses.

Courses

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

Environmental Science (ENSC)

U 105N (EVST 101N) Environmental Science 3 cr. Offered autumn. Provides students with opportunities to use class knowledge to make a difference; helps students build all of the following: scientific literacy; skills in critical thinking, research and self-instruction; provides an understanding of the scientific basis of environmental issues, policies and laws; encourages habits of sustainable living, scientifically-informed, active participation in social decisions, and service to their community and to the earth.

U 191 (EVST 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 360 (EVST 360) Applied Ecology 3 cr. Offered autumn. Prereq., BIOB 101N (BIOL 100N), CHMY 121N (CHEM 151N), ENST 201 (EVST 201), STAT 216 (MATH 241). Understanding the principles and concepts of ecology and how they inform real life decisions about human interactions with the environment. Emphasizes the science of sustainability and the conservation of watersheds and biodiversity.

G 501 (EVST 501) Scientific Approaches to Environmental Problems 3 cr. Offered autumn. Prereq., graduate standing in EVST or consent of instr. The strength and limitations of the scientific approach to investigating and solving selected environmental problems with an emphasis on the natural sciences.

G 540 (EVST 540) Watershed Conservation 3 cr. Offered autumn. Prereq., college ecology course or consent of instr. Integrates watershed science, policy, planning, action and organizing. The science component explores watershed connections, evaluating change and assessing watershed condition. The policy component explains the scientific basis of national, state and local laws, programs and agencies that affect watersheds. The planning and action component discusses developing watershed conservation plans and selecting actions likely to address problems without creating other problems. The organizing component covers how to help watershed communities make choices, resolve conflicts, build commitment and find funding. Students work individually or in teams to assist Montana groups in developing watershed CPR plans, initiating monitoring projects, and/or conducting education projects.

G 550 (EVST 550) Pollution Ecology 3 cr. Offered spring even-numbered years. Prereq., college ecology course or consent of instr. Examines sources, fate, and effects of pollutants on organisms and ecosystems; methods of measuring and predicting pollutant fate and effects, assessing and reducing risks, estimating ecosystem assimilation capacity; setting standards and restoring ecosystems damaged by pollution. Briefly examines some relevant laws and policies at the federal, state and local level.

G 551 (EVST 551) Environmental Field Study 1-3 cr. (R-3) Offered intermittently. Prereq. or coreq., ENSC 540 or 550 (EVST 540 or 550) or ENST 560 (EVST 560). Same as BIOB 551 (BIOL 551). Designing, executing and interpreting environmental field studies. Oriented to studies of aquatic systems and watersheds. Students will assist with a class project and may also pursue their own projects. Projects focus on the Clark Fork, Bitterroot and Blackfoot River basins.

Environmental Studies (ENST)

U 201 (EVST 201) Environmental Information Resources 3 cr. Offered spring. Students learn how to find, evaluate and use existing information to increase understanding of environmental issues and resolve controversies. Students will: research a subject, using a variety of sources (referred literature, government sources, internet sources, interviews); evaluate sources critically; write a literature review and give an oral presentation on their topic. Focus is on critical thinking and dealing with the information explosion.

U 204 (EVST 204) Sustainable Technology Applications 2 cr. (R-4) Offered intermittently autumn or spring. Prereq., ENST 230H (EVST 167H). Review of the concept of sustainability in the context of the current American economic system and the extant applications of sustainability principles to private enterprise.

U 225 (EVST 225) Community and Environment 3 cr. Offered autumn. Same as SOCI 225 (SOC 225). Exploration of the ways that communities address their environmental concerns. Introduction of relevant social science concepts.

U 230H (EVST 167H) Nature and Society 3 cr. Offered spring. The relationship between ideas about nature and the development of political and social ideas, institutions, and practices, primarily in western (Euro-American) society. Complements ethics offerings in philosophy aimed at environmental studies majors.

U 291 (EVST 295) 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 294 (EVST 294) Seminar 1-6 cr. (R-6) Offered intermittently.

U 335L (EVST 305L) The Environmental Vision 3 cr. Offered autumn. Provides background, overview, interpretations, and understanding of key concepts, themes, approaches, and forms in American nature and environmental nonfiction as well as that literature's response to and influence on environmental events, figures, and movements.

U 367 (EVST 367) Environmental Politics and Policies 3 cr. Offered autumn. Foundation in public lands history, bedrock environmental laws, policy processes and institutions. Research and analysis of current environmental and natural resource policy issues. Focus is domestic illustrated by case studies.

U 373A (EVST 373A) Nature Works 3 cr. Offered spring. Prereq., consent of instr. Writing workshop for the creation, critique, and revision of essays about the environment to include natural history, personal narrative, science interpretation, advocacy/editorial, place-based essay, and others. Examination of concepts, forms, and approaches to writing about

environmental concerns, awareness and sensitivity. Reading and responding to published work, primarily from the perspective of technique and approach.

U 377 (EVST 377) Rhetoric, Nature and Environmentalism 3 cr. Offered intermittently. Same as COMM 377. Survey of rhetorical texts that shape public understanding of nature and environmental issues. Analysis of a range of historical and contemporary environmental texts using theoretical concepts from the rhetorical tradition.

U 382 (EVST 302) Environmental Law 3 cr. Offered spring. Introduction to the history, law and theory of environmental regulation in the United States using public and private land regulation mechanisms as case studies. Basic principles of constitutional and administrative law relevant to environmental regulation, substantive public and private land use law and the history of environmental problems and their regulation.

U 391 (EVST 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.

U 395 (EVST 311) Field Studies: Environmental Studies 2-3 cr. (R-12) Offered every term. Via extended backcountry travel, experiential examination of cultural history and public lands management, and how those affect ecosystem integrity. Investigation of personal roles in and relationships with human and ecological communities. Offered by the Wild Rockies Field Institute.

U 396 (EVST 390) Practicum: Supervised Internship PEAS Variable cr. (R-8) Offered every term. Summer intensive, 6 cr. Students learn small scale sustainable vegetable farming in a hands-on work environment at the PEAS farm (15 minute bike ride from campus). Lectures, readings and reflection inform the work. Summer students also visit local farms on once-a-week field trips. PEAS is repeatable, as the curriculum changes across the season, and students can attend any semester, though the 6 credit summer intensive course is the heart of the program.

U 398 (EVST 398) Internship Variable cr. Offered autumn and spring. Prereq., six credits in EVST and consent of instr. Practical application of classroom learning through internship with governments, organizations or industry. A maximum of 6 credits of Internship (198, 298, 398, 498) may count toward graduation.

UG 420 (EVST 420) The U.S. Environmental Movement 3 cr. Offered Intermittently. Study of the environmental movement as a social movement. Examination of different approaches to environmental protection and restoration in view of the movement's historical roots and contemporary debates.

UG 430 (EVST 430) Culture and Agriculture 3 cr. Offered spring, from start of semester to mid-April. Surveys treatment of farmers and farming in the humanities. Course covers specific agricultural crops and their effect on social and environmental history, artistic commentary on agricultural life and farmer philosophy. Themes range from agriculturally influenced historical events to Wendell Berry's poetry to Albert Borgmann's philosophy.

U 476 (EVST 485) Environmental Citizenship 3 cr. Offered spring. Prereq., open to juniors and seniors only or by consent of instructor. Same as CCS 485. Develops environmental citizenship through student-initiated projects informed by principles of social marketing.

UG 480 (EVST 450) Food, Agriculture, and Environment 3 cr. Offered spring. Exploration of the premise that agricultural sustainability requires practices, policies, and social arrangements that balance concerns of environmental soundness, economic viability, and social justice among all sectors of society.

U 487 (EVST 487) Globalization, Justice, and the Environment 3 cr. Offered spring. Study of current trends in economic globalization and its effects on efforts to work for social justice and environmental sustainability, particularly in the Global South. Examination of different models and theories of globalization, analysis of ethical issues raised, and assessment of alternatives proposed.

UG 489S (EVST 477S) Environmental Justice Issues 3 cr. Offered autumn. Examination of social inequality in the distribution of environmental risks and in access to natural resources and environmental amenities.

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

U 492 (EVST 496) Independent Study 1-6 cr. (R-6) Offered autumn and spring.

UG 493 (EVST 410) Study Abroad: Environmental Justice in Latin America 3 cr. Offered summer. Two week travel seminar to one or more Latin American countries to examine Latin American perspectives on environmental justice and efforts toward sustainable development within the context of the global economy and U. S. foreign policy. Required one-credit seminar offered spring semester to provide background readings.

UG 494 (EVST 494) Seminar Variable cr. (R-6) Prereq., ENSC 105N (EVST 101N) or consent of instr. A seminar on a current environmental topic.

G 502 (EVST 502) Environmental Law for Non-Lawyers 3 cr. Offered intermittently. Prereq., graduate standing. Review of major substantive environmental laws with an emphasis on areas of citizen involvement in the legal process.

G 504 (EVST 504) Topics in Environmental Philosophy 3 cr. (R-9) Offered autumn and spring. Same as PHL 504 (PHIL 504). Critical study/discussion of current (as well as benchmark) texts and issues in environmental ethics, environmental politics, and the philosophy of ecology, Interdisciplinary; open to concerned students from all disciplines.

G 505 (EVST 505) The Literature of Nature Writing 3 cr. Offered spring. Study of nature, environmental, and place-based writing, from classical times to the present, with emphasis on the American tradition and its relationship to twenty-first century environmental concerns, challenges, and opportunities, and to the current practice of nature writing and natural history.

G 513 (EVST 513) Foundations of Natural Resource Conflict Resolution 3 cr. Offered autumn. Same as NRSM 513 (RSCN 513) and LAW 613. Examines the basic framework for preventing and resolving natural resource and environmental conflicts in America. Reviews the history of alternative approaches, emphasizes the theory and practice of collaboration, and considers future trends. This highly interactive course uses lectures, guest speakers, case studies, and simulations.

G 515 Environmental Negotiation & Mediation 3 cr. Same as NRSM 515 and COMM 515. This course prepares students to effectively engage in multiparty negotiation on natural resource and environmental issues. It is grounded in theory and provides an opportunity to develop practical skills in both negotiation and facilitation/mediation. Guest speakers, case studies, and simulations allow students to develop, test, and refine best practices. The course is face-paced, highly interactive, and serves as the second of three required courses in the Natural Resources Conflict Resolution Program.

G 520 (EVST 520) Environmental Organizing 3 cr. Offered spring. Developing understanding of and skills in community and environmental organizing. Emphasis on theory and practice of civic engagement and social change with a focus on developing and running campaigns and working in a group. Team projects.

G 521 (EVST 521) Foundations in Environmental Education 3 cr. Offered autumn. Prereq., graduate standing in environmental studies. Same as C&I 521. Problem-solving approaches to environmental education; problem identification, research and design and implementation of an educational approach to selected environmental issues.

G 531 (EVST 531) Citizen Participation in Environmental Decision Making 3 cr. Offered spring. Review of the modes and methods of citizen participation in governmental and corporate decision making. Review of the National and Montana Environmental Policy Act; administrative rule making and appeals, strategic planning, lobbying and corporate governance. Students complete a project with an outside group.

G 537 (EVST 537) Building Effective Environmental Organizations 3 cr. Offered intermittently. Prereq., graduate standing. Focus on the tasks and skills necessary to building and managing effective environmental organizations, particularly non-profit. Budgeting, fund-raising, grant-writing, attracting and utilizing volunteers, working with the media. Strategic approaches and how they are shaped by issue, context, and structure.

G 542 (EVST 542) Transboundary Environmental Issues 3 cr. Offered intermittently in autumn. Prereq., graduate standing in environmental studies program. Review of the political systems and administrative systems of each country relevant to

natural resource policy decision-making and ecological systems. Review pertinent literature, interact with stakeholders, and produce group reports.

G 548 (EVST 548) Supervision and Teaching in Environmental Education 3 cr. Offered intermittently. Prereq., ENST 521 (EVST 521) or EDU 521 (C&I 521). Design, selection and evaluation of materials for the teaching of environmental education.

G 555 (EVST 555) Research Methods for Social Change 3 cr. Offered spring. Introduction to qualitative methods of research design, data collection, and analysis. Emphasis on research that facilitates and documents social change processes. Hands-on research experience through fieldwork projects. Includes instruction on writing social science and on research ethics.

G 560 (EVST 560) Environmental Impact Analysis 3 cr. Offered spring odd-numbered years. Prereq., graduate standing in EVST or consent of instr. Covers legal and scientific aspects of the Environmental Impact Analysis (EIA) including: What is required by international, national and state law and regulations? How does one organize an effective interdisciplinary team research effort and public participation program? What scientific tools are used in EIA? How could EIA process be improved.

G 561 (EVST 561) Land Use Planning Law 3 cr. Offered autumn. Same as GPHY 561 (GEOG 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 authority of state and local governments. Focus on skills in interpreting, drafting and applying state legislation and local ordinances.

G 562 (EVST 562) Land Use Planning Clinic 2 cr. Offered every term. Prereq. or coreq., ENST 561 (EVST 561). Same as GPHY 562 (GEOG 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 563 (EVST 563) Environmental Law I 3 cr. Offered autumn. Prereq., graduate standing in EVST. Same as LAW 650. Philosophy and values underlying environmental regulation, basic introduction to administrative law, in-depth study of air and water pollution and the environmental policy acts.

G 564 (EVST 564) Environmental Law II 3 cr. Offered autumn. Prereq., graduate standing in EVST. Same as LAW 649. In-depth study of the laws addressing toxic substances and solid and hazardous waste, and the Endangered Species Act. Exploration of interaction between land use regulation and environmental law.

G 565 (EVST 565) Public Land and Resources Law 3 cr. Offered spring. Prereq., graduate standing in EVST and consent of instr. Same as LAW 654. Historical development of United States public land law, state-federal relations, and the roles of Congress, the executive and the courts; the law applying to specific public land resources: water, minerals, timber, range, and preservation.

G 566 (EVST 566) Advanced Public Land Law 2 cr. Offered spring. Prereq., graduate standing in EVST and consent of instr. Same as LAW 619. Collaborative work on practical problems arising in public land and resources law and individual research and writing projects.

G 567 (EVST 567) Water Law 3 cr. Offered spring. Same as LAW 663. Interstate water problems; federal/state powers; federal/Indian water rights/Montana water law.

G 573 (EVST 573) Environmental Writing 3 cr. Offered autumn. Prereq., graduate standing. Writing workshop designed to improve skills in writing on environmental topics for general audiences. Approaches include personal narrative, natural history, science interpretation, advocacy/argument, place-based essays. Includes analysis of published work from the perspective of technique and craft.

G 575 (EVST 575) Seminar in Rhetoric and Environmental Controversy 3 cr. Offered intermittently. Same as COMM 575. The study of how advocates use symbols to influence meaning and action in environmental controversies. Rhetorical concepts used to examine recurring strategies and tactics in specific controversies.

G 579 (EVST 579) Practicum in Natural Resources Conflict Resolution 3 cr. (R-4) Offered every semester. Same as

NRSM 579 (RSCN 579) and LAW 679. Prerequisite, ENST 513 (EVST 513) or consent of instructor. Designed as the capstone experience of the Natural Resources Conflict Resolution Program. Provides practical experience in multi-party collaboration and conflict resolution. Students may design their own project in consultation with the director of the NRCR Program, or participate in a project organized and convened by faculty. Projects may be conducted year-round.

G 590 (EVST 590) Supervised Internship PEAS Variable cr. (R-8) Spring and autumn, 2 cr.; Summer intensive, 3 cr. Students learn small scale sustainable vegetable farming in a hands-on work environment at the PEAS farm (15 minute bike ride from campus). Lectures, readings and reflection inform the work. Summer students also visit local farms on a once-a week field trips. PEAS is repeatable, as the curriculum changes across the season, and students can attend any semester, though the 3 credit (grad level) summer intensive course is the heart of the program.

G 593 (EVST 593) Professional Paper Variable cr. (R-6) Offered autumn and spring. Prereq., graduate standing in EVST.

G 594 (EVST 594) Graduate Seminar 3 cr. (R-15) Offered autumn and spring. Prereq., graduate standing in EVST or consent of instr. In-depth analysis of a current environmental topic. Different topics offered each semester.

G 595 (EVST 595) Special Topics Variable cr. (R-9) Offered autumn and spring. Prereq., graduate standing in EVST or consent of instr. Experimental offerings of visiting professors, experimental offerings of new courses, or one-time offerings of current topics.

G 596 (EVST 596) Independent Study Variable cr. (R-12) Offered autumn and spring. Prereq., graduate standing in EVST. Work on selected problems by individual students under direct faculty supervision.

G 597 (EVST 597) Research Variable cr. (R-12) Offered autumn and spring. Prereq., graduate standing in EVST. Directed individual graduate research and study appropriate to background and objectives of the student.

G 598 (EVST 598) Internship Variable cr. (R-8) Offered autumn and spring. Prereq., graduate standing in EVST. Practical application of classroom learning during placements off campus.

G 599 (EVST 599) Thesis Variable cr. (R-6) Offered autumn and spring. Prereq., graduate standing in EVST.

Faculty

Professors

Len Broberg, Ph.D., University of Oregon, 1995 (Director)

Phil Condon, M.F.A., M.S., The University of Montana, 1989, 2000

Neva Hassanein, Ph.D., University of Wisconsin, 1997

Vicki Watson, Ph.D., University of Wisconsin, 1981

Associate Professors

Fletcher Brown, Ph.D., Miami University, 1994

Robin Saha, Ph.D., University of Michigan, 2002

Daniel Spencer, Ph.D., Master of Divinity, Union Theological Seminary, New York, 1994, 1983

Emeritus Professor

Thomas M. Roy, M.A., University of Chicago, 1966

Lecturer

Joshua Slotnick, MPS, Cornell University, 1995; Certificate in Ecological Horticulture, University of California Santa Cruz, 1991

Department of Geography

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- Suggested Course of Study
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- Faculty

Sarah J. Halvorson, Chair

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 creating digital maps and doing spatial analysis for a wide array of government entities. 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, an option in community and environmental planning is available. For a B.S. in geography an option in physical geography is available. Also offered are a minor in geography and a teaching major and minor in geography. Several interdisciplinary minors are available to students: a minor in mountain studies, a minor in climate change and a minor in international development studies. 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, GIS, or related fields. Graduate programs prepare candidates for a relatively 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 M.S. program in the following areas: community and environmental planning, or cartography and GIS. See the Graduate School website 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 GIST certificate is a complement to an existing major or to a bachelor's degree already obtained. For details, please see below or the GIST website.

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) or an M or STAT course higher than 150. Students obtaining a B.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 choosing the CEP option must meet the university-wide symbolic system requirement by taking M 115 (MATH 117) and STAT 216 (MATH 241). Students obtaining a geography B.S. degree (with or without an option) must meet the symbolic systems requirement by taking M 115 and STAT 216 (Math 117 and Math 241), or just one of M 162, 181H, or STAT 451 (Math 150, 152H, or 444). Regular calculus (Math 152) is strongly recommended. The upper-division writing expectation for the B.A. (with or without option) 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. Those students completing the B.S. degree must select a science-based writing class for their writing course (GPHY 335 (GEOG 335), GEO 320 (GEOS 320), GEO 499 (GEOS 499), BIOO 470 (BIOL 304), BIOO 475 (BIOL 306), etc.) approved by their advisor or complete 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 B.S. degree or an option in physical geography, or in community and environmental planning, also must meet the course requirements of the option (see below).

General Geography B.A.

The general geography B.A. 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).

General Geography B.S.

The B.S. in Geography is designed to accommodate those students who are interested in pursuing more technical areas of study and work in the field of Geography, such as aspects of geospatial technologies, environmental planning, and physical geography. Those pursuing a geography B.S. degree (with or without an option) must complete 6-10 additional credits (a two-course sequence) of science coursework. The classes must be selected and approved by the student and advisor as appropriate to individual student goals (e.g., BIOO 105N (BIOL 120N), BIOE 172N (BIOL 121)).

Physical Geography Option

In addition to satisfying the general requirements for a B.S. degree in geography, a student pursuing the option in physical geography must complete additional requirements, including EARTH 303N (GEOG 322N), GPHY 317 (GEOG 324), and GPHY 411N (GEO 426N), though substitutions which broaden the students curriculum may be approved by their advisor. Also, students must complete an additional appropriate math course above the 150 level to complement the one used to fulfill their symbolic systems requirements (the second semester of Calculus is recommended), and the two-course sequence in science used to fulfill the B.S. requirement MUST be one of the following: CHMY121N-123N (CHEM 151N-152N), CHMY 141N-143N (CHEM 161N-162N), PHSX 205N-207N (PHYS 121N-122N), PHSX 215N-217N (PHYS 211N- 212N), or BIOO 105N (BIOL 120N), BIOE 172N (BIOL 121N)).

Community and Environmental Planning Option

In addition to satisfying the general requirements for a B.A. degree in geography, the student desiring to achieve an option in community and environmental planning must complete: 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.

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.

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.

General 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. Six credits must be core courses:

GPHY 214 Global Mountain Environments (3 cr.)

GPHY 338 Mountains and Society (3 cr.)

2. Six credits must be selected from the following list of region-specific mountain studies courses:

BIOO 101N Survey of Montana Wildlife & Habitats (3 cr.)

BIOO 335 Rocky Mountain Flora (3 cr.)

BIOL 342 Field Ecology (5 cr.) (summer field course at the Flathead Lake Biological Station)

BIOL 459 Alpine Ecology (3 cr.) (summer field course at the Flathead Lake Biological Station)

NRSM/GPHY 352 Himalayan Environment and Development (3 cr.)

NRSM/GPHY 353 Tourism and Sustainability in the Himalaya (3 cr.)

EVST/PTRM 418 Winter Wilderness Field Studies (3 cr.)

GPHY 138 Montana's Mountains (3 cr.)

GEO 231 Geosciences Field Methods (2 cr.)

GPHY 344 Crown of the Continent (3 cr.)

EVST/RSCN 382 Biogeography of Northwest Montana (3 cr.)

GPHY 442 Regionalism and the Rocky Mountain West (3 cr.)

GPHY 438 Mountain Field Study (3 cr.)

GPHY 444 High Asia (3 cr.)

3. Six credits must be selected from the following list of

upper-division advanced mountain studies courses:

BIOL 451 Landscape Ecology (3 cr.)

FORS 330 Forest Ecology (3 cr.)

NRSM 385 Watershed Hydrology (3 cr.)

GEO 391 Special Topics (3 cr.)

GEO 433 Global Tectonics (3 cr.)

PTRM 482 Wilderness and Protected Area Management (3 cr.)

GEO 488 Snow, Ice and Climate (3 cr.)

GPHY 317 Geomorphology (3 cr.)

GPHY 411 Biogeography (3 cr.)

GPHY 538 Mountain Studies Seminar (3 cr.) – a 3.0 GPA is required

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 digital 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.

Background Courses:

It is recommended that students complete the university symbolic systems requirements before beginning this program because these courses promote basic quantitative reasoning (M 115 (MATH 117), STAT 216 (MATH 241), FORS 201 (FOR 201), SOCI 202 (SOC 202)).

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.): All 3 of the following requirements must be fulfilled.

1. FORS 250 (FOR 250) Geographic Information Systems Practicum - 2 cr. autumn/spring and

FORS 350 (FOR 350) Geographic Information Systems and Applications - 3 cr. spring

OR

GPHY 381/382 (GEOG 387/389) Principles of Digital Cartography (3 cr.) & Digital Cartography Lab (1 cr.)- 4 cr. autumn, some spring

2. FORS 351 (FOR 351) Photogrammetry and Remote Sensing - 3 cr. spring

OR

GPHY 487/489 (GEOG 487/489) Remote Sensing & Raster GIS (3 cr.) & Lab (1 cr.)- 4 cr. autumn

3. GPHY 488/489 (GEOG 488/489) Thematic Cartography and GIS (3 cr.) and Lab (1 cr.) - 4 cr. spring

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

G GPHY 587/589 (GEOG 587/589) Image Analysis and Modeling (3 cr.) and Cartography/GIS Lab 91 cr.) - 4 cr. odd spring

G FORS 551 (FOR 551) Digital Image Processing - 3 cr. varies

Vector GIS and Networks

UG GPHY 486/489 (GEOG 483/489) Transport Planning and GIS (3 cr.) and Cartography/GIS Lab (1 cr.) - 4 cr. winter or spring

G GPHY 588/589 (GEOG 588/589) Vector GIS (3 cr.) and Cartography/GIS Lab (1 cr.) - 4 cr. autumn

G GPHY 580 (GEOG 580) Seminar in GIS and Cartography - 3 cr. spring

Data Management and Programming

UG GPHY 468/469 (GEOG 468/469) Community and Regional Analysis (3 cr.) and planning & Analysis Lab (1 cr.) - 4 cr. autumn

UG FORS 505 (FOR 505) Sampling Methods - 3 cr. spring

U CSCI 250 (CS 177) Computer Modeling for Science majors - 3 cr. autumn

GIS Applications

UG GPHY 385 (GEOG 385) Field Techniques - 3 cr. autumn, some spring

UG GPHY 467 (GEOG 467) Planning Decision Support Systems - 3 cr. some spring

UG GPHY 482/489 (GEOG 484/489) Spatial Analysis and GIS (3 cr.) & lab (1 cr.) - 4 cr. varies

UG GPHY 491 (GEOG 495) Digital Mapping & Design - 3 cr. autumn

GPHY 564 (GEOG 564) Planning Design - 3 cr. even spring

FORS 503 (FOR 503) GIS: Methods and Applications I - 3 cr. odd spring

FORS 504 (FOR 504) GIS: Methods and Applications II - 3 cr. odd autumn

WILD 562 (WBIO 562) Predictive Distribution Modeling - 3 cr.spring

Note: It is a standard of The University of Montana that G designated courses can be taken only by graduate students or undergraduate students who have senior standing with an accumulative GPA of 3.0 or higher, and permission of the instructors.

No more than 4 credits of Independent Study or Internships can be used towards the Certificate.

Teacher Preparation in Geography

Students who want to be licensed to teach geography at the middle and high school level must complete the B.A. 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 for Majors

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 chairperson.

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

B.A. in Geography (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 382 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	

B.S. in Geography (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 121 College Algebra	3	–	
M 122 College Trigonometry	–	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	–	

Approved Science Sequence in Chemistry, Physics, or Biology	3-5	3-5
M 451 and M 452 Statistical Methods I and II	3	3
Upper division course in Physical Geography	-	3
Electives and General Education	4-6	4-6
Total	15	15
Third Year		
	A	S
GPHY 385 (GEOG 385) Field Techniques	3	-
GPHY 381 (GEOG 387) and 382 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

B.A. in 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
Total	15	15
Third Year: Same as General Geography		
Fourth Year		
	A	S
GPHY 465 (GEOG 465) Planning Principles and Processes	3	-
GPHY 468 /469 (GEOG 468/469) Community & Regional Analysis and Laboratory or GPHY 486/489 (GEOG 486/489) Transport, Planning, and GIS and Laboratory	4	-
Upper-division courses in Geography & Society, and Human-Environment Interaction	3	3
Electives including study abroad, internship/senior thesis	5	12
Total	15	15

B.S. in Geography with option in Physical Geography:

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
Approved Science Sequence in Chemistry, Physics, or Biology	3-5	3-5
M 151 (MATH 121) Precalculus	-	4
WRIT 101 (ENEX 101) College Writing I	3	-
Electives and General Education	4	6
Total	15	15
Second Year		
	A	S
GPHY 141S (GEOG 103S) Geography of World Regions or other regional geography course	3	-
M 171 and 172 (MATH 152 and 153) Calculus I and II	4	4
Upper division course in Physical Geography	3	3
Electives and General Education	5	8
Total	15	15
Third Year		
	A	S
GPHY 385 (GEOG 385) Field Techniques	3	-
GPHY 381 (GEOG 387) and 382 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

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 095 (MATH 100) or above, or ALEKS placement ≥ 4 . 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 112 (GEOG 105) Introduction to Physical Geography Lab 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 GPHY 381 (GEOG 385 and 387).

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

U 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 may count toward graduation.

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

Earth Systems (ERTH)

U 303N (GEOG 322N) Weather and Climate 3 cr. Offered spring. 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 (GPHY)

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.

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

UG 411N (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 ENSC 245 (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 (GPHY)

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.

U 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. 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.

G 535 Seminar in Water Resources 3 cr. Offered intermittently. 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.

Geography and Society (GPHY)

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) Sustainable Cities 3 cr. Offered autumn odd-numbered years. Prereq., upper-division or graduate standing. A discussion of sustainability efforts in cities around the world. Topics include, for example, urban sprawl and smart growth, alternative energy, public transportation, integrated waste management, integrated water management, green architecture, and urban agriculture.

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 3 cr. Offered intermittently. 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 (GPHY)

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.

U 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 (GPHY)

U 381 (GEOG 387) Principles of Digital Cartography 3 cr. Offered autumn. Prereq., GPHY 112 (GEOG 105) or consent of instr.; coreq., GEOG 382. 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).

U 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 469 (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 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 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 487 Remote Sensing and Raster GIS 3 cr. Offered autumn. Prereq., GPHY 381 (GEOG 387) and 382 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 intermittently. 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 ENST 561 (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 ENST 562 (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 odd-numbered years. 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

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

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

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

Associate Professors

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

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

Lecturers and Adjuncts

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

Kevin G. McManigal, M.S., The University of Montana, 2011

Thomas J. Sullivan, Ph.D., Louisiana State University, 2010

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

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

Department of Geosciences

- ◌ Special Degree Requirements
- ◌ Suggested Course of Study
- ◌ Courses
- ◌ Faculty

Johnnie Moore, Chairman

[This section of the catalog was edited after the catalog was published. Updated October 22, 2012.](#)

Human impact on Earth systems and reliance on Earth's resources will increase as human population and economic production grows. These impacts are creating "global grand challenges": complex, globally important problems that require an interdisciplinary approach. The most pressing grand challenges over the next decade will be resource scarcity/depletion (especially water and petroleum), adaption to and mitigation of climate change and natural hazards, and environmental stewardship of highly stressed physical and biological Earth systems. As University of Montana Geoscientists, we address these challenges in our research and teaching. We develop the knowledge to find and extract mineral and water resources, solve problems caused by using those resources and develop models of the past, present and future Earth. Faculty, staff, graduate students, and undergraduate students are helping Montana and the World develop a sustainable future.

Our Vision:

We will build and teach a fundamental understanding of Earth processes to benefit humankind and sustain Earth systems.

Our Goals:

1. Conduct geoscience research, including obtaining extramural funding to perform essential and transformative research.
2. Disseminate research findings by publishing in peer-reviewed journals and presenting at national and international scientific conferences.
3. Teach students how to learn from known sources of information and create new knowledge from their own research.
4. Engage all graduate students and selected undergraduates in research and publication.
5. Produce graduates competent in their disciplines who can perform well in field, laboratory and computational settings, and who are prepared to serve as high-quality professionals in geoscience and related fields.
6. Provide opportunities for students to work and learn in other countries through international research and learning opportunities.
7. Educate the general student population about the nature of science and basic scientific principles through the study of Earth and its natural systems.
8. Engage the public with important geoscience issues through outreach and community education.

UM Geosciences in the National Context

With B.S., M.S. and Ph.D. degrees, UM Geosciences is one of 120 Ph.D. granting Geoscience departments. U.S. News & World Report ranks the UM Geosciences program with Universities like Florida State, Michigan Tech, University of Georgia, University of Pennsylvania, and University of South Carolina. We are ranked above schools like University of Idaho, University of Missouri, UNLV, and Notre Dame.

Employment

Geoscientists completing our program are employed by private industry, federal, state, and local governmental agencies, environmental consulting firms, non-profit organizations, and by schools needing Earth Science teachers. Jobs in geosciences are available at the B.S., M.S. and Ph.D. levels. The M.S. degree is considered the main working professional degree. The Ph.D. degree is required for positions at universities and with organizations specializing in research. However, there are ample opportunities for geoscience employment with the B.S. degree. Our graduates have a wide range of educational and employment opportunities. Over the last decade, 95% of our graduate program alumni are employed in Geosciences: 13% work for government, 23% for industry, 31% for consultancies and 2% for non-governmental organizations, 10% are teaching, and 17% went on for a Ph.D. UM Geosciences has exceptional placement rates compared to other universities in the country.

Undergraduate Degree Requirements

We offer three degree options/programs of study for the Bachelor of Science degree: Geosciences B.S., International Field Geosciences Joint B.S. with University of Cork (Ireland), and International Field Geosciences Dual B.S. with Potsdam University (Germany).

We also offer an Option in Earth Science Education (*see electronic catalog for detailed curriculum and course descriptions for each of these options*).

The Upper-division Writing Expectation must be met for all degree options by successfully completing an upper-division writing course from the approved list in the Academic Policies and Procedures section of this catalog or by completing GEO 499 (GEOS 499). See index.

Geosciences B.S.

This option is designed for students who seek post-graduate employment as a professional geoscientist or preparation for graduate study in geosciences. The following Geosciences core courses are required to earn this degree: GEO 101N (GEOS 100N), GEO 102N (GEOS 101N), GEO 211 (GEOS 200), GEO 226 (GEOS 226), GEO 228 (GEOS 228), and GEO 231 (GEOS 230).

At least 32 credits of Geosciences courses must be completed, including at least 6 courses of which a minimum of 18 are upper-division (300-400 level) credits.

In addition to completing the coursework in Geosciences, students must also complete a minimum of 30 credits in cognate sciences classes. Required are the following: PHSX 205N/206N-207N/208N or PHSX 215N/216N - 217N/218N (PHYS 111N/113N-112N/114N or PHYS 211N/213N-212N/214N); CHMY 141N/143N (CHEM 161N/162N); M 162/274 (MATH 150/158) or M 171/172 (MATH 152/153); plus 3 credits in Computer Science (modeling or programming).

Additional cognate science courses completed to meet the minimum sum of 30 credits may include additional courses in Chemistry, Computer Science, Math, and Physics above the listed minimum levels specified above. Biology 100N or above is also appropriate, but substitutions or other science courses must be approved by the student's advisor.

International Field Geosciences Joint B.S. Degree with University College of Cork (Ireland)

This option is designed specifically for students who seek to combine a rigorous education in the Geosciences with a year long international geosciences experience and an emphasis on field-based learning. It requires attending classes and living overseas. Students demonstrating a high level of performance at the University will be eligible for partial financial support as funds are available. Although most of the course work completed during the year abroad will take place at University College