

Geography and Environmental Systems

CHAIR

Eugene P. Parker
Associate Professor
Environmental conservation,
cultural ecology

ASSOCIATE PROFESSORS

Jeffrey B. Halverson
Tropical meteorology,
hurricanes and severe storms

Andrew J. Miller
Hydrology, geomorphology,
water resources

Erle C. Ellis
Biogeochemistry, landscape
ecology, managed ecosystems

CLINICAL ASSOCIATE PROFESSOR

DIRECTOR OF GEOGRAPHIC EDUCATION

Sari J. Bennett
Economic geography,
geographic education

ASSISTANT PROFESSORS

Dawn Biehler
Disease and health and urban
environmental geography

Mathew Baker
Watershed and riparian
ecology

Laura Lewis
Biogeography, agroecology,
crop evolution

Robert Neff
Human dimensions of global
change, urban geography,
environmental and social
justice

Chris M. Swan
Ecology, freshwater ecosys-
tems, insect ecology, stream
restoration

Junmei Tang
Geographic information
systems, remote sensing,
urban landscape ecology,
resource management,
environmental modeling

SENIOR LECTURER

Thomas D. Rabenhorst
Cartography, remote sensing

Karin E. Readell
Interdisciplinary science
education, plant biology, water
quality

ASSOCIATE STAFF DIRECTOR OF CARTO- GRAPHIC SERVICES LABORATORY

Joseph School
Cartography

ADJUNCT FACULTY

Scott Jeffrey
Physical geography, oceanog-
raphy

Michael R. Ratcliffe
Historical geography, popula-
tion, political geography

AFFILIATE ASSISTANT PRO- FESSORS [JCET]

Mark Bulmer
Geomorphology, volcanology,
terrestrial and planetary
remote sensing

Petya Entcheva Campbell
Remote sensing, forest
ecology

Ali Tokay
Cloud and precipitation
physics, severe storms

Huemmrich, Karl Fred
Using remote sensing to study
ecosystem structure and
function

AFFILIATE RESEARCH FACULTY

Peter Groffman
Environmental regulation of
microbes, water and air
quality, soil carbon storage

Steward T. A. Pickett
Urban ecosystems, plant
community succession

Richard V. Pouyat
Urban and suburban ecosys-
tems

PROFESSOR EMERITUS

Keith Harries
Social and crime geography

PROFESSOR EMERITUS

Roger N. Dubois
Geomorphology, coastal
morphology, fluvial morphology

Robert J. Earickson
Urban, social and medical
geography

curriculum and the research agenda of the department's faculty provide multiple opportunities for students to acquire both breadth and depth in their training and to engage in the study of problems whose importance is becoming more and more evident.

For students interested in environmental problems, natural resources and environmental conservation, a study of the impact of human activities on environmental systems includes elements of both physical and human geography. Physical geography investigates such matters as the development of landforms; patterns of climate, soils and vegetation; and interactions among these features of the physical environment. Human geography examines topics including the distribution of economic development, transportation, crime and urbanization; political, cultural and social geography; and spatial distributions of disease and health care.

Techniques and tools of spatial analysis that are widely used by geographers include cartography, remote sensing and geographic information systems, all of which involve extensive application of computer technology. The department's program is designed to prepare students for any of three principal post-graduation activities: graduate school, a career in business or government or a career in education. The department offers both bachelor of arts and bachelor of science degrees; majors are expected to complete the prescribed number of credits of course work within the department, as well as work in complementary disciplines. In addition, students in their junior and senior years are encouraged to gain practical experience through internships.

The department is home to a new degree program, a Bachelor of Science in Environmental Science, and is the administrative home for a campus-wide interdisciplinary degree, a Bachelor of Arts in Environmental Studies.

For updated and current information, visit our department Web site: www.umbc.edu/ges. Courses in this program are listed under GES.

The discipline of geography traditionally encompasses the study of spatial patterns in both the natural and cultural environment. The dynamic and interdisciplinary character of the field is becoming increasingly relevant for a range of societal and environmental problems, including those related to

urban and suburban economic development, poverty and crime, human health, water resources and water quality, land and soil resources, biodiversity, habitat loss and climate change. The department's name, Geography and Environmental Systems, highlights the importance of interactions between natural

environmental systems and social, political and economic systems. A rigorous background including courses in the natural sciences, mathematics and social sciences is also essential to the development of analytical skills and is, therefore, a required element of our degree programs. The undergraduate

For more information specific to those degrees, see environmental science and environmental studies. The department also offers minor programs in geography and in environmental geography and certificate programs in cartography and in geographic information science applications that are available to both majors and non-majors.

Career and Academic Paths

Graduates may find employment with companies seeking expertise in geographic information systems and remote sensing, cartography, planning, facility location, distribution and transportation problems, and environmental consulting and analysis. Public-sector employment opportunities include city and county planning and zoning agencies, the Census Bureau, teaching (including environmental education), law enforcement agencies, the U.S. Geological Survey, the Maryland Geological Survey, the Environmental Protection Agency, state environmental and natural resources management agencies, transportation planning, the Commerce Department, State Department, Peace Corps and CIA. Additional opportunities are sometimes available with non-profit organizations.

UMBC students who choose to seek advanced degrees after completing the bachelor's degree may choose from a range of programs in geography or in other disciplines, such as public policy, urban planning, earth and environmental sciences, and environmental engineering. Graduate programs attended by our students include those at University of California, Santa Barbara; Pennsylvania State University; Cal Tech; University of Georgia; The Johns Hopkins University; University of Arizona; University of Michigan; Duke and Louisiana State University.

Academic Advising

Students who decide to major in geography will meet regularly with a faculty advisor to determine what combination of courses, selected from within geography and environmental systems and from other disciplines, are best suited to meeting their goals. Those who plan to attend graduate school also are strongly encouraged to gain proficiency in statistical techniques. Students should consult with faculty advisors to ensure that their academic background includes appropriate prerequisites if they are interested in pursuing graduate degrees in other disciplines.

Major Programs

The department offers two major programs, a bachelor of arts (B.A.) and a bachelor of science (B.S.). The B.A. requires a minimum of 50 credits, including 47 credits in geography and environmental systems courses and three credits in writing.

Both degree programs require all students to complete the following 14 credits of core courses:

GES 102
Human Geography [3]

GES 110
Physical Geography [3]

GES 286
Exploring the Environment: A Geo-Spatial Perspective [4]

GES 386
Introduction to Geographic Information Systems [4]

In addition, all students must complete either GES 301: Quantitative Techniques or an outside statistics course to be selected from among the following:

STAT 121, 350, 351
or 355.

Note: Outside statistics courses will not count toward the minimum number of

departmental credits for completion of the major.

Bachelor of Arts (B.A.) in Geography

In addition to the core courses identified above, a minimum of 30 additional credits in other departmental electives is required for students who complete GES 301, or 33 additional credits for students who substitute an outside statistics course for GES 301. Distribution requirements are as follows:

- ◆ Four human geography courses, chosen from the sequences GES 32X-36X, 42X-46X [12] and sections of selected topics courses (GES 302 or 400) that are designated by department faculty as meeting the distribution requirement. At least one of these four courses must be at the 400 level.

- ◆ Two upper-division physical geography electives chosen from the following sequences:

GES 31X or 41X [6] or sections of special topics courses (GES 302 or 400) designated by department faculty as meeting the distribution requirement

- ◆ Four additional GES electives, with three being at the 300 level or above, and at least one of which must be a 400-level course [12]

- ◆ **AND** One geography and environmental systems techniques course at the 300 or 400 level in consultation with a faculty advisor. [3]

Internship and independent study do not count toward the minimum number of credits required for the B.A. degree.

All students, upon declaring the geography major, will be expected to take GES 286 and a statistics course the first semester each course is offered, following satisfaction of any prerequisites.

Before a candidate for the B.A. degree is permitted to take any 400-level course, the student must have completed both GES 102 and 110, as well as any other prerequisites specified in the Undergraduate Catalog.

Other courses

One 300-level writing course [3] or one 300- or 400-level course in a field supporting the student's major course of study [3 or 4], to be decided in consultation with the student's faculty advisor. Substitution of another course for the writing course requires demonstration of strong writing skills.

No course in which the student has earned a grade lower than "C" shall count toward the major requirements. No course taken on a P/F basis shall count toward the major.

Bachelor of Science (B.S.) in Geography

In addition to the core courses identified above, a minimum of 24 additional credits in other departmental electives is required for students who complete GES 301, or 27 additional credits for students who substitute an outside statistics course for GES 301.

Distribution requirements for these are as follows:

- ◆ Four physical geography/environmental science courses, chosen from the sequences: GES 110 or GES 120, GES 31X, 41X [3 or 4] and sections of selected topics courses (GES 302 or 400) that are designated by department faculty as meeting the distribution requirement.

- ◆ At least one of these four courses must be a 400-level course; no more than one of the four may be a 100-level course. **Note:** Either GES 111: Principles of Geology [3] **OR** GES 120: Environmental Science and Conservation [3] may be taken for credit

106 GEOGRAPHY AND ENVIRONMENTAL SYSTEMS

toward the degree requirements, but not both.

◆ **PLUS** Two upper-division electives chosen from the following sequences: GES 32X-36X, 42X-46X [6] OR sections of special topics courses (GES 302 or 400) designated by department faculty as meeting the distribution requirement.

◆ **PLUS** two additional electives, at least one of which must be a 400-level course [6]

Internship and independent study do not count toward the 41 credits within the department that are required for the B.S. degree.

Other courses

Six courses representing a minimum of 21 credits, including five courses in mathematics and natural sciences, to be selected in consultation with the student's faculty advisor, as follows:

MATH 151

Eight credits of two of the following:

BIOL 100, CHEM 101,
PHYS 111 or 121

One additional course to complete a year of study in either biology, chemistry, physics, or math and statistics, to be selected from the following list:

BIOL 301 [3]

CHEM 102 [3]

PHYS 112 OR 122 [4]

MATH 221 [3] OR 225 [3]

STAT 121 [4], 350 [4],
351 [3] or 355 [4]

One additional elective to be chosen from the same list, or CMSC 103. Only one course from the statistics sequence may be used to satisfy the requirements for the major.

Also required is one 300-level writing course [3] or one 300- or 400-level course in a field supporting the student's major course of study [3 or 4], to be decided in consultation with the student's faculty advisor. Substitution of another course for the writing course requires demonstration of strong writing skills.

A grade of "C" or better is required in each course needed to fulfill the B.S. requirements. No course taken on a P/F basis shall count toward the major.

Minor in Geography

To earn a minor in geography in conjunction with a bachelor of arts or science degree in another discipline, students must complete a minimum of 18 credits, with a "C" or higher required for minor course credit. No course taken on a P/F basis shall count toward the minor. Required courses include:

GES 102
Human Geography [3]

GES 110
Physical Geography [3]

PLUS Any four upper-division courses in geography and environmental systems, excepting internships or independent study. Summer and winter session courses of fewer than three credits will not count toward the total requirements.

Departmental Honors

Students who maintain a cumulative grade point average of at least 3.25 and a grade point average of at least 3.5 in the major are eligible to graduate with departmental honors after successful completion of GES 499: Honors Thesis. UMBC requires a total of nine credits in departmental honors courses for all students wishing to graduate with honors.

GES 499 accounts for three credits; the remaining six credits may be earned by completion of formally

designated honors courses or by arrangement with faculty to complete additional honors work in regular departmental courses. Eligibility to enroll in GES 499 requires senior standing, maintenance of the minimum grade point average through the end of the previous academic semester, completion of at least one 400-level course in a topic area related to the thesis research and permission of the student's faculty advisor. GES 499 is to be completed in addition to other 400-level courses required for the B.S. or B.A. degree in geography.

DEPARTMENT CERTIFICATES

Certificate in Geographic Information Science

The Certificate in Geographic Information Science is designed for students who want to supplement their major with an additional certification recognizing their proficiency in GIS, RS and cartographic techniques.

Geography/Social Studies Secondary Teaching Certification Program

The Department of Geography and Environmental Systems offers a program for majors who wish to become certified to teach geography/social studies at the secondary level. This program has been approved by the Maryland State Department of Education. Students must consult with a departmental advisor for information on the academic courses required for this program.

For the most up to date certificate information please go to the department Web site: www.umbc.edu/ges.

Evening Option

Evening courses are offered occasionally, but generally, no more than one to three evening courses are offered in a single semester. Required core courses are almost always offered during daytime hours only.

Special Opportunities

The department's cartography and geographic information systems (GIS) laboratories provide state-of-the-art facilities for students interested in analysis and presentation of spatial data. Faculty projects and special cooperative initiatives with government agencies provide opportunities for students to use these tools in answering vital research questions. Numerous internship opportunities are available for students who wish to pursue a practical work experience with local, state or federal government agencies; private corporations or non-profit organizations. Some, but not all, of these are paid internships. In addition, the department offers in-house internships for students enrolled in the cartography or geographic information science applications certificate programs. Advanced students also have the opportunity to work with faculty on a range of research projects in human geography, physical geography and environmental science. Several of our students also have won competitive awards to pursue their own independent research projects through the Provost's Undergraduate Research Initiative.