

GEOGRAPHY

Department Office: 1006 North Building, (212) 772-5265/5266

Chair: Charles Heatwole, 1006 North Building, (212) 772-5265, cah@geo.hunter.cuny.edu

Graduate Adviser: Marianna Pavlovskaya, 1006 North Building, (212) 772-5320, mpavlov@geo.hunter.cuny.edu

Adolescence Education Advisers

Social Studies: Ines Miyares, 1006 North Building, (212) 772-5443, imiyares@geo.hunter.cuny.edu

Earth Science: Haydee Salmun, 1006 North Building, (212) 772-5224, hsalmun@geo.hunter.cuny.edu

Website: <http://www.geography.hunter.cuny.edu>

FACULTY

Sean Ahearn, Professor; PhD, Wisconsin (Madison); Geographical Information Systems, Remote Sensing, Digital Image Processing, Natural Resources, Habitat Studies

Saul B. Cohen, University Professor Emeritus and Regent of the State of New York; PhD, Harvard; Political Geography, Middle East, Geography and Psychology, International Development, Geographic Education

Allan Frei, Assistant Professor; PhD, Rutgers; Climatology, Global Climate Change, Environmental Modeling, Water Resources

Hongmian Gong, Assistant Professor; PhD, Georgia; Urban Geography, Geographic Information Systems, Quantitative Analysis, China

Charles A. Heatwole, Professor; PhD, Michigan State; Cultural Geography, Recreation Geography, Geography of Religion, Geographic Education

Mohamed Ibrahim, Assistant Professor; PhD, Alberta; Environmental Studies, Resource Management, Sustainable Development, Rural Water Supply, Sanitation and Hygiene, Africa

Ines Miyares, Associate Professor; PhD, Arizona State; Population, Migration, Ethnicity, Latin America, Caribbean, Geographic Education

Wenge Ni-Meister, Assistant Professor; PhD, Boston Univ; Remote Sensing, Biogeography, Land-Atmosphere Interaction, Climatology

Jeffrey P. Osleeb, Professor; PhD, SUNY (Buffalo); Economic Geography, Location Theory, Urban Geography, Transportation Planning, Geographic Information Systems; Executive Officer, PhD Program in Earth and Environmental Sciences, CUNY Graduate Center

Rupal Oza, Assistant Professor; PhD, Rutgers; Feminist Theory, Globalization, Gender Studies, Cultural Studies, South Asia; member of the Women's Studies Program

Marianna Pavlovskaya, Assistant Professor; PhD, Clark; Urban-social Geography, Geographic Information Systems, Gender Studies, Environmental Perception, Russia, Eastern Europe

Randy Rutberg, Assistant Professor; PhD, Columbia; Geochemistry, Oceanography, Paleoclimatology, Earth Systems Science

Haydee Salmun, Assistant Professor; PhD, Johns Hopkins; Coastal and Estuarine Environments, Land Surface and Climate Dynamics, Gender and Diversity in Science and Engineering

William Solecki, Professor; PhD, Rutgers; Urban Environmental Change and Management, Land Use/Land Cover Studies, Hazards, GIS Applications

Karl Szekielda, Assistant Professor; PhD, Marseille; Oceanography, Remote Sensing, Marine Resources; International Pollution Issues

GRADUATE WORK IN GEOGRAPHY

Diverse opportunities for advanced training are available. These include the master of arts degree in geography and the post-baccalaureate certificate program in Geographic Information Science (GIS). The Department of Geography participates with the School of Education in the Adolescence Education program leading to the MA degrees for the Preparation of Teachers of Earth Science (Grades 7-12) and the Teacher Education Program in Social Studies. At the doctoral level, the department is associated with the PhD Program in Earth and Environmental Sciences at the CUNY Graduate School and University Center.

MASTER OF ARTS IN GEOGRAPHY

The Department of Geography offers a master of arts in geography with emphasis on analytical geography. Courses are offered in human geography, physical geography, regional geography, and geographic techniques and methods. Concentrations are available in four areas: environmental studies, geographic information science, places and cultures, and urban geography studies. The program focuses on geographic skills as they are applied to human, physical and regional geography, and to environmental policy issues. It is designed for students and professionals with backgrounds in engineering, computer science, and social science as well as traditional geography.

An MA in geography from Hunter can lead to employment with corporations, local and national governments, international agencies, consultants and computer companies. The New York area is a center of corporate headquarters in the United States, and Hunter is close to this activity. Students wishing to continue graduate work at the PhD level will find themselves more than adequately prepared by this program, and well equipped with the research and technical skills necessary for advanced research.

The Department of Geography features two computer labs open 24/7, one for general under-

Degrees Offered

HEGIS

Geography	BA*	2206
Geography/Social Studies	BA*	2205
7-12 Teacher		
Environmental Studies	BA*	4999
Geography	MA	2206
Certificate Program in		2206
Geographic Information Science		
Teachers of Earth Science	MA	1917.01
7-12		
Teachers of Social Studies	MA	2201.01
7-12		

* See Hunter College Undergraduate Catalog 2002-2004, p. 95 for information about undergraduate courses and degree programs in geography.

graduate and graduate use and the other for advanced work and grant-related projects.

There are more than 35 Windows NT and UNIX workstations in the labs and over 65 in the department connected to a 100BaseT local area network. A full array of input and output devices are supported as well as numerous software programs, including all major GIS software packages.

The GeoSeminar Series, an integral part of the graduate program, allows students to meet and hear noted American and international scholars with expertise in various areas of geography, geology and cartography.

The Center for Advanced Research of Spatial Information (CARS) is a state-of-the-art geographic information science research laboratory. Funded in part by the City of New York, it maintains the New York City base map (NYCMap). The CARS Lab is involved in a number of New York City-related, State and Federal research projects as well as other projects where techniques of geographic information science and spatial analysis are used.

The Department of Geography has been authorized to establish a Center for Geographic Learning. In association with the Hunter College School of Education and the New York City Department of Education, this new center will address the issues of presenting concepts of geography and earth science to children in grades K-12. Students interested in geographic education, especially materials development and teacher workshops, should contact the department.

Admissions Requirements

For up-to-date information, contact the graduate adviser.

Admissions procedures are as established by the Hunter College Office of Graduate Admissions. Candidates must have a BA or BS or equivalent, an undergraduate GPA of at least a B minus, with a B in the major, and (normally) the completion of at least 18 credit hours in geography. A lack of a background in geography will not impede admission, but the student is expected to gain basic knowledge of geography prior to graduation in consultation with the student's adviser. It is recommended that students enter the program with knowledge of basic statistics. All students are required to take the Graduate Record Examination. Foreign students whose first language is not English must take the Test of English as a Foreign Language. Two letters of recommendation are required.

Requirements for the Degree

The master of arts consists of 31 or 36 graduate credits, depending on the program option chosen, selected from three types of courses:

GEOG, PGEOG and GTECH, GEOG classes cover systematic and regional geography, while **PGEOG** classes cover physical geography and environmental issues. **GTECH** courses cover geographic methods and techniques, and are divided into geographic information science, quantitative methods, remote sensing, cartography and computer applications. Classes vary in their structure from laboratory classes to lecture/discussions and seminars. Graduate courses outside of the **GEOG, GTECH** and **PGEOG** prefixes may be applied to the degree within the parameters listed below.

Students must complete a minimum of credits in one of the following options:

- A. Thesis Option:** A minimum of 31 credits consisting of:
1. A minimum of 30 credits of course work (exclusive of **GEOG 799**) consisting of:
 - a. **GEOG 701** and **GEOG 702** (4 credits).
 - b. A minimum of 14 additional credits selected from **GEOG, GTECH**, and **PGEOG** courses.*
 - c. A maximum of 12 credits selected from other than **GEOG, GTECH**, and **PGEOG** courses as approved by the graduate adviser.**
 2. One credit of **GEOG 799** leading to a thesis approved by the student's graduate advisers.
 3. A completed thesis.
 4. A formal presentation of the student's thesis research.
- B. Examination Option:** A minimum of 36 credits consisting of:
1. **GEOG 701** and **GEOG 702** (4 credits).
 2. A minimum of 20 additional credits selected from **GEOG, GTECH**, and **PGEOG** courses.*
 3. A maximum of 12 credits selected from other than **GEOG, GTECH**, and **PGEOG** courses as approved by the graduate adviser.**
 4. A passing grade on the comprehensive examination conducted by the student's graduate committee.
 5. A research paper of publishable quality prepared in the format of *The Professional Geographer* or its equivalent.
 6. A formal presentation of the student's research paper.

Students who are accepted into the program, who have already earned credits with a grade of B or higher as nonmatriculated students, may transfer only two (2) courses or eight (8) credits, whichever is greater, from nonmatriculated status to matriculated status. In exceptional situations, up to 12 credits earned as a nonmatriculated student may be transferred to matriculated status.

Although both options may prepare students for additional graduate work, the thesis option is recommended for those who might wish to pursue the PhD in geography or an allied field. The examination option is recommended for students seeking a terminal MA.

Language Requirement: A foreign language is not required for the MA in geography. However, students interested in regional studies or further graduate work are strongly encouraged to master a foreign language. Students emphasizing technical skills are strongly encouraged to master one or more computer programming languages.

Completion Time: Full-time students should be able to complete the master's degree within three-four semesters. To accommodate part-time and working students, many courses are offered in the evening.

Assistantships: A limited number of teaching and research assistantships are available from the department.

*Graduate students entering the program without a geography background will be required to take 6 credits in geography outside their principal area of concentration (**GEOG, PGEOG** or **GTECH**).

**Graduate students entering the program without a geography background will be limited to 6 credits taken outside the program. Students who were undergraduate majors in geography can appeal to the Graduate Committee to take more than 12 credits outside the program.

CERTIFICATE PROGRAM IN GEOGRAPHIC INFORMATION SCIENCE

This program offers advanced training in GIS to individuals who do not wish to pursue a master of arts degree. It is a non-degree program and students who apply to Hunter College only to get the GIS Certificate are nonmatriculated students. As such, they are not eligible for financial aid and they cannot apply for a student visa under current INS guidelines. However, a student may be enrolled concurrently in a degree-granting program and therefore meet these requirements.

The GIS Certificate is a 15-credit post-baccalaureate program. Students are required to take five graduate-level GIS classes: **GTECH 732** (Geographic Information Systems), a minimum of two core courses, and 0-2 elective courses. The core courses provide basic and advanced training in GIS programming, cartography and spatial analysis. Students who are interested in GIS development will be encouraged to take the two programming-oriented core classes (**GTECH 731** and **GTECH 733**); while students planning a career in GIS applications will be encouraged to take the core courses in cartography and spatial data analysis (**GTECH 705** and **GTECH 722**).

Note: Students may substitute up to 6 credits of comparable courses taken at other institutions with the approval of the graduate adviser.

Completion of the post-baccalaureate certificate program in GIS requires a minimum of 15 credits, which include:

Required Course (3 cr)

GTECH 732 3 cr
Geographic Information Systems

Core Courses (a minimum of two courses chosen from the following)

SEDF 703 3 cr
Social Foundations of Adolescence Education

GTECH 705 3 cr
Spatial Data Analysis

GTECH 722 3 cr
Automated Cartography

GTECH 731 4 cr
Computer Programming for Geographic Applications

GTECH 733 3 cr
GIS: Modeling and Problem Solving

Electives

GEOG 705.72 3 cr
GIS Law

GTECH 702 3 cr
Quantitative Methods in Geography

GTECH 711 4 cr
Principles of Photogrammetry and Air Photo Interpretation

GTECH 712 4 cr
Remote Sensing

GTECH 713 3 cr
Digital Image Processing

GTECH 721 4 cr
Advanced Cartography

GTECH 731 4 cr
Computer Programming for Geographic Applications

GTECH 733 3 cr
GIS: Modeling and Problem Solving

GTECH 785xx 3 cr
GIS Applications

Minimum GPA Requirement:

3.0 average or better on all core and elective courses. Additional elective courses may be added to this list or may be used as substitutes with the approval of the graduate adviser.

Admission Requirements

All applicants who are currently matriculated and in good standing in a graduate degree program at Hunter College and have satisfied the course prerequisites will automatically be admitted to the program. All other applicants must meet the following minimum requirements in order to be considered:

1. The student must hold a bachelor's degree from a regionally accredited institution, comparable in standard and content to a bachelor's degree from Hunter College.
2. The student must demonstrate the ability to pursue graduate work successfully. In general, the minimum requirements for consideration are a B-minus average in the undergraduate record as a whole and a B average in the major.

- The student must satisfy the course prerequisites for the certificate program: Mapping Science (**GTECH 710**) or equivalent, an introductory computer programming course and elementary statistics.

PROGRAM FOR TEACHERS OF ADOLESCENCE EDUCATION (Grades 7-12) — EARTH SCIENCE MASTER OF ARTS

This program is designed to serve individuals who do not have initial or provisional certification in the teaching of science. Matriculation is open to graduates of accredited institutions acceptable to Hunter College who hold baccalaureate degrees and have a grade point average of 2.8 or better in both their science courses and their overall undergraduate work.

Matriculation in this program also requires the following:

- A major of at least 30 credits in arts or sciences.*
- At least 21 credits in geology, physical geography, earth science, or environmental science, including geographic techniques.*
- A general liberal arts and sciences core that minimally includes the following: 6 credits in English, 6 credits in math, 6 credits in social studies, 6 credits in the arts, and 6 credits in a language other than English.*

Meeting these minimum requirements does not guarantee acceptance to the program, which is based, by necessity, on the limitations of space and resources.

Applicants who have an overall GPA between 2.5 and 2.79 and meet all other requirements for matriculation may be considered for admission to nonmatriculant status. Only students who demonstrate strong verbal skills in addition to other indices of ability to do graduate work will be admitted as nonmatriculants. Applicants will be required to provide an on-site writing sample (essay) and participate in a face-to-face interview. Academically relevant data, including scores on the General Aptitude Test of the Graduate Record Examination or on the Liberal Arts and Sciences Test of the NYS Teacher Certification Examination, should also be submitted in support of admission.

The Earth Science MA in Adolescence Education consists of a minimum of 16-17 credits in earth science and 22-23 credits in pedagogy.

Earth Science Course of Study (minimum of 16-17 credits)

PGEOG 705.63	3 cr
Earth Science Today	
GTECH 710	
Mapping Sciences	
PGEOG 630	3 cr
Science and Society	
PGEOG 660	4 cr
Challenging Concepts in Earth Science	

and:

One elective chosen from **600-** or **700-**level courses with a **PGEOG** or **GTECH** prefix (3-4 credits). Students who do not have a significant background in geology or earth science may be required to take a specific course upon the recommendation of the graduate adviser to fulfill this requirement.

* Students may be admitted conditionally with up to 12 credits of deficiencies and must fulfill specified deficiencies within their first three semesters. No student who is missing more than one course (3-4 credits) in the required sciences will be admitted to the program.

Courses taken to fulfill conditions do not count toward the master's degree.

Culminating Project in Earth Science students will be expected either to prepare a research proposal or to conduct a research project while enrolled in **PGEOG 660**, which serves as the capstone course in earth science.

In addition to the Earth Science course work, there are 22-23 credits of coursework and student teaching in pedagogy. See the School of Education section of this catalog (p. 85) for further information on admission, progress, and exit standards, as well as pedagogical sequence and the culminating experience of pedagogy.

PROGRAM FOR TEACHERS OF ADOLESCENCE EDUCATION (Grades 7-12) — SOCIAL STUDIES MASTER OF ARTS

The Department of Geography participates in the MA-TEP Program in Social Studies. See the history department portion of this catalog for information.

DOCTOR OF PHILOSOPHY

The Department of Geography participates in the PhD Program in Earth and Environmental Sciences based at the CUNY Graduate School and University Center. Students in this program may select Hunter College as their "home" college and geography as their specialty. For application forms and further information, write to: Executive Officer, PhD Program in Earth and Environmental Sciences, The Graduate School and University Center, The City University of New York, 365 Fifth Avenue, New York, NY 10016 or go to <http://web.gc.cuny.edu/Ees/home.html>

COURSE LISTINGS

Check with the department during middle of prior term for tentative course schedule including list of special topics.

GEOG 701 Geographic Thought and Theory
Identification of research trends; major schools of thought; scientific method and exceptionalism; reviews of current research.

45 hrs including conference, 3 cr evening/fall only

GEOG 702 Research Topics in Geography
Introduction to central research themes in geography and the current research being undertaken by department faculty.

15 hrs including conference, 1 cr fall only

GEOG 703 Location Theory and Spatial Analysis

Spatial interaction; diffusion; development; decision-making. Methods of spatial analysis; spatial modeling.

*prereq: GEOG 221 or 341 or equivalent
45 hrs including conference, 3 cr*

GEOG 704 Topics in Human Geography

Studies of specialized areas within human geography. May be repeated for credit as topics change.

45 hrs including conference, 3 cr

GEOG 705 Cultural and Social Geography

Review of recent work in cultural and social geography; emphasis on literature, critiques.

prereq: GEOG 347 and 341 or permission of instructor

45 hrs including conference, 3 cr

GEOG 705.72 GIS Law

This course in geographic information systems law will acquaint students with legal issues raised by GIS. The course is organized to confront legal issues in the order that they might arise during the life cycle of a typical GIS project.

prereq: one course in GIS or permission of the instructor

45 hrs including conference, 3 cr

GEOG 706 Latin Americanist Geography

Major paradigms, theories and methodologies in geographic research on Latin America including historical, cultural, social, economic, urban, physical, and environmental geography.

45 hrs including conference, 3 cr

GEOG 708 The Geographies of Urban Space

Critical perspectives on urban development and internal urban space from a geographic point of view. Issues of class, gender and ethnicity will be discussed as well as how people perceive and interact with their urban environment.

45 hrs including conference, 3 cr

GEOG 709 Geography of Selected World Regions

Intensive examination of physical and social geography of specific world regions. (Each semester one or two regions will be covered. Field courses may be offered during intersession periods.)

45 hrs including conference, 3 cr

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GEOG 709.57 Regional Geography of the New York Metropolitan Area

Geographic basis of the development and functioning of the NYC metropolitan area. Physical site and situation; spatial aspects of its political, social and economic structures.

45 hrs including conference, 3 cr

GEOG 710 Economic Geography

An investigation of the impacts of the interactions between people and the natural environment on economic, political and cultural endeavors. Theories of land use, transportation and location are employed to understand them; modeling is discussed.

45 hrs including conference, 3 cr

GEOG 711 Environmental Conservation

Interrelationship of natural systems; environmental crisis; environmental movement; specific problem areas.

45 hrs including conference, 3 cr

GEOG 712 Geography of Sustainable Development in Developing Countries

Analysis of factors that influence sustainable development, e.g., available resources, environment, population, food production, water supply in developing countries.

prereq: graduate standing and one course focusing on development of a developing region, or permission of instructor
45 hrs including conference, 3 cr

GEOG 713 Rural Water Supply in Developing Regions

Quality, problems, management, and sustainability of rural water supply and sanitation in developing countries.

prereq: graduate standing and one course focusing on development of a developing area, or permission of instructor
45 hrs including conference, 3 cr

GEOG 715 International Pollution Issues

Global environmental hazards are covered. Issues ranging from intergovernmental efforts to document pollution, to the policy needed to curtail pollution of the future will be addressed. A focus will be on transboundary air and water pollution.

45 hrs including conference, 3 cr

GEOG 721 Transportation Geography

A geographic study and modeling of transportation routes and their influences on the location of economic activity.

45 hrs including conference, 3 cr

GEOG 741 Population Geography

Theoretical and empirical analysis of spatial distribution of population. Particular emphasis is on processes and impacts of migration, residential mobility, and immigration.

45 hrs including conference, 3 cr

GEOG 742 International Migration and Ethnicity

Quantitative examination of historic and contemporary international migration patterns. Spatial demographic impacts of immigration policy in the United States with a focus on major urban centers. Comparative analysis of ethnic and racial minorities in the United States.

45 hrs including conference, 3 cr

GEOG 743 Urban Geographic Theory

Spatial analysis of functions of metropolitan areas. Social and economic characteristics of cities and suburbs. Land use and transportation patterns.

45 hrs including conference, 3 cr

GEOG 772 Field Work in Peru

Regional field study of the geography of Peru. Topics include physical, environmental, historical, cultural, urban, political, agricultural, religious, and economic geographies in various ecological zones. Taught in English. Acceptance into Hunter College Study Abroad Program and fee for transportation, accommodations required.

coreq: GEOG 709 and permission from the department
One month summer intersession in Peru, 3 cr

GEOG 791, 792, 793 Independent Research in Geography

Intensive individual research in geography under supervision of a member of the graduate faculty. May be repeated for a maximum of 6 credits with permission of the graduate adviser.

prereq: permission of the instructor or the graduate adviser
1, 2 or 3 cr

GEOG 799 Thesis Research in Geography

Open to students electing the thesis option only.

prereq: GEOG 701 and permission of the department
1-6 cr May be repeated for credit but only one credit may be applied to satisfy degree requirements

GTECH 701 Quantitative Methods I

Use of statistical methods for geographic problems; probability, sampling, hypothesis testing, correlation; lab exercises.

prereq: permission of the instructor
45 hrs including conference, 3 cr

GTECH 702 Quantitative Methods II

Multivariate analysis of spatial data; prediction, analysis and explanation of spatial and environmental phenomena; statistical software packages; lab exercises.

prereq: GTECH 701 or equivalent or permission of the instructor
45 hrs including conference, 3 cr

GTECH 703 Special Topics in Quantitative Methods

Advanced work on topics related to quantitative methods.

prereq: GTECH 701 and 702 or equivalent or permission from the department
45-75 hrs including conference, 2-4 cr

GTECH 704 Seminar in Spatial Modeling

Development of advanced spatial models; in-depth consideration of specific topics; statistical modeling, mathematical modeling, computer modeling, and simulation.

prereq: GTECH 701 or equivalent or permission of the instructor
45 hrs including conference, 3 cr

GTECH 705 Spatial Data Analysis

Methods for analyzing environmental and social spatial data sets. Topics include point pattern analysis, spatial clustering methods, spatial autocorrelation, and kriging.

prereq: One course in statistics. Either one course in mapping science or GIS, or permission of the instructor
60 hrs including conference (2 lectures, 2 labs), 3 cr

GTECH 710 Mapping Science

Survey of the principles of cartography, map design, geographic information science (GIS), air photograph interpretation and remote sensing; data analysis will be presented. The use of computers for geoscience applications will be stressed.

60 hrs including conference (2 lectures, 2 labs weekly), 3 cr
spring and fall

GTECH 711 Principles of Photogrammetry and Air Photo Interpretation

Use and interpretation of air photos as applied to agriculture, forestry, urbanization, planning; lab exercises.

prereq: GTECH 710 or equivalent
90 hrs including conference (2 lectures, 4 labs weekly), 4 cr

GTECH 712 Principles of Remote Sensing

Fundamentals of remote sensing; theory and techniques; applications, image analysis systems.

prereq: GTECH 710 or equivalent and one course in statistics
90 hrs including conference (2 lectures, 4 labs weekly), 4 cr

GTECH 713 Digital Image Processing

Quantitative processing of digital imagery; enhancement, information extraction, classification; algorithms, registration, rectification; lab exercises.

prereq: GTECH 712, multivariate stat, elem linear algebra
90 hrs including conference (2 lectures, 4 labs weekly), 4 cr

GTECH 714 Special Topics in Remote Sensing

Advanced work on topics in remote sensing; may be repeated for credit; lab work.

prereq and lecture/lab mix to vary with topic.
45-90 hrs including conference, 2-4 cr

GTECH 715 Seminar in Remote Sensing

Examination and discussion of current published research work in remote sensing. Topics to vary with instructor and student interest.

prereq: GTECH 712; GTECH 713 recommended
45 hrs including conference, 3 cr

GTECH 721 Advanced Cartography

Acquisition of professional-level skills in manual cartography; production and photographic methods; scribing; color separations; use of automated techniques; lab exercises.

prereq: GTECH 710 or equivalent
105 hrs including conference (1 lecture, 6 labs weekly), 4 cr

GTECH 722 Automated Cartography

Computer and other automated applications; theory and algorithms; production of computer-generated maps; lab exercises.

prereq: GTECH 710 or equivalent
75 hrs including conference (1 lecture, 4 labs weekly), 3 cr

GTECH 723 Seminar in Cartographic Research

Development of cartographic research methods by participation in research projects; reviews of current cartographic literature; library research techniques.

prereq: GTECH 721, 722, or 731
45 hrs including conference, 3 cr

GTECH 731 Computer Programming for Geographic Applications

Programming methods specific to geographic and cartographic applications; programming assignments; graphics. A programming language helpful but not required.

prereq: GTEC 710 or equivalent

90 hrs including conference (2 lectures, 4 labs weekly), 4 cr

GTECH 732 Introduction to Geographic Information Systems

An introduction to the principles of geographic information systems (GIS) including an overview of data structures, data types, methods of data analysis, and cartographic modeling. Comparison of GIS software packages. Laboratory exercises.

prereq: GTECH 710

45 hrs including conference, 3 cr

GTECH 733 Geographic Information Science: Modeling and Problem Solving

Theory and applications of Geographic Information Science (GIS). Data models and advanced techniques of GIS to solve problems through the analysis of research articles and the application of spatial models in the laboratory.

prereq: GTECH 731 or equivalent, and GTECH 732 and permission of the graduate adviser

45 hrs including conference, 3 cr

GTECH 751 Field Techniques in Geography

Observation and analysis of the physical geography, biogeography and geomorphology of selected areas. Field geographic techniques such as data collection and recording, ground-truthing of remotely sensed images, and the use of maps, compasses and GPS to navigate. Additional fee for transportation, room and food allowance required.

prereq: GTECH 710 or equivalent, any two additional GEOG, GEOL, P GEOG or GTECH courses, and permission of the instructor

45 hrs including conference, 3 cr

GTECH 785.xx GIS Applications

Selected topics in GIS applications to human and physical geographic problems.

prereq: GTECH 710 or equivalent and permission of the department

45 hrs including conference, 3 cr

P GEOG 630 Science and Society

A study of the interactions between technological and societal changes, with an emphasis on eliciting within the classroom productive oral and written critiques and debates concerning potentially controversial technological change. Focusing on present-day issues, students will learn various models for analyzing the impact scientific change has on society and how social change directs science.

45 hrs including conference, 3 cr

P GEOG 660 Challenging Concepts in Earth Science: Using Research to Identify Common Misconceptions and Assess Student Learning

Overview of research and theory related to misconceptions in the earth sciences. Students will be expected to develop a research proposal or to conduct the research in their own classrooms, and write a paper in the form of a journal article. The article will serve as the culminating project for the science portion of the MA-TEP degree.

45 hrs including conference, 3 cr

P GEOG 701 Special Topics in Physical Geography

Examination of one physical geography topic such as hydrology, climatology, soils; lab exercises.

45-75 hrs including conference, 2-4 cr

P GEOG 702 Seminar in Physical Geography

Team research in specific topic area of physical geography; individual research projects; may be repeated for credit.

prereq and topic to vary with instructor and student interest

45 hrs including conference, 3 cr

P GEOG 703 Coastal Dynamics

Quantitative focus on the dynamic processes affecting the coast and the resulting varied geomorphology. Map exercises; field work.

45 hrs including conference, 3 cr

P GEOG 704 Urban and Metropolitan Coasts

Physical and quantitative rationale for planning coastal constructions with emphasis on urban coasts.

*45 hrs including conference, 3 cr
spring only*

P GEOG 705 Topics in Earth Science

Studies of specialized areas within earth science. May be repeated for credit as topics change.

45 hrs including conference, 3 cr

P GEOG 705.63 Earth Science Today

A survey of the primary topics included in an earth science curriculum (grades 7-12). Laboratory methodology and demonstration techniques used to convey information about the earth's lithosphere, hydrosphere and atmosphere, as well as its place in the solar system, will be introduced.

45 hrs including conference, 3 cr

P GEOG 705.64 Introducing Earth Science at the Museum of Natural History

This course is composed of four modules aligned with the New York State standards for teachers of earth science (grades 7-12). Topics include the earth alive; climate through the ages; the air we breathe; the inevitable storm; New York—a city surrounded by water; and beyond earth—a search for life.

45 hrs including conference, 3 cr

P GEOG 705.65 The Oceans

A review of the basic concepts in oceanography, including physical properties and dynamics with emphasis placed on environmental aspects and the role of oceans in global climate change. Illustrations of the use of technology, especially satellite monitoring, will be shown.

45 hrs including conference, 3 cr

P GEOG 732 Global Climatic Change

Examination of the pre-Quaternary, Quaternary, post-glacial, historical and instrumentally recorded climates; greenhouse gases; aerosols; radiative forcing; processes and modeling; feedbacks; observed changes; detecting the greenhouse effect; sea level rise; effects on ecosystems.

prereq: a course in atmospheric, geological or environmental science.

*45 hrs including conference, 3 cr
fall only*

The following courses are part of the MA Teacher Education Program in Earth Sciences:

P GEOG 630 Science and Society**P GEOG 660 Challenging Concepts in Earth Science: Using Research to Identify Common Misconceptions and Assess Student Learning****P GEOG 705.63 Earth Science Today****P GEOG 705.64 Introducing Earth Science at the Museum of Natural History****GTECH 710 Mapping Science**

The following courses may be used as part of the MA Teacher Education Program in Social Studies:

GEOG 501 Principles of Geography

Introduction to human and physical geography. Open to students who have never had a college-level geography course.

prereq: graduate standing, member of the Teacher Education Program, and department permission

45 hours incl conference, 3 cr

GEOG 621 Geography of the United States

A regional analysis of the major features of the natural and cultural environment of the United States. Not open to students who have had a similar college-level course.

prereq: graduate standing, member of the Teacher Education Program, and department permission

45 hours incl conference, 3 cr

GEOG 621.51 Geography of New York State

An analysis of the major features of the natural and cultural environment of New York State. Topics include sequence settlement, land use, economic and social interrelationships with the natural environment, and environmental problems. Not open to students who have had a similar college-level course

prereq: graduate standing, member of the Teacher Education Program, and department permission

45 hours incl conference, 3 cr

GEOG 701 Geographic Thought and Theory**GEOG 704 Topics in Human Geography****GEOG 705 Cultural and Social Geography****GEOG 706 Latin Americanist Geography****GEOG 709 Geography of Selected World Regions****GEOG 712 Geography of Sustainable Development in Developing Countries****GEOG 741 Population Geography****GEOG 742 International Migration and Ethnicity**