Geography

FACULTY

*Year of initial appointment at Binghamton

Blumler, Mark, Assistant Professor, PhD, 1992, University of California at Berkeley: Biogeography, early agriculture, environmental history. (1991)*

Budin, Morris, Professor Emeritus, PhD, 1954, New School for Social Research: Statistical geography, urban planning analysis. (1964)

Butler, Joseph H., Professor Emeritus, PhD, 1960, Columbia University: Economic geography, water resources. (1963)

Frazier, John W., Professor and Director of Graduate Program, PhD, 1976, Kent State University: Urban geography, geographical theory, applications of geographic information systems. (1976)

Henry, Norah F., Associate Professor and Associate Dean for Administration, Harpur College of Arts and Sciences, PhD, 1976, Kent State University: Automated cartography, medical geography, social geography. (1976)

Hsu, Shin-yi, Professor, PhD, 1967, University of California at Los Angeles: Cartography, remote sensing and GIS, East Asia. (1970)

Margai, Florence, Assistant Professor and Associate Dean for Administration, Harpur College of Arts and Sciences, PhD, 1991, Kent State University: Spatial analysis, environmental planning, Africa. (1994)

Montz, Burrell E., Professor, PhD, 1980, University of Colorado: Natural hazards, resource management and planning. (1979)

Sheret, Gordon, Adjunct Lecturer, MA, 1997, Binghamton University: Geographic information systems. (1999)

Sweet, Robert, Adjunct Lecturer, MA., 1989, Binghamton University: Urban planning. (1992)

Tettey-Fio, Eugene, Assistant Professor and Director of Undergraduate Studies, PhD, 1996, Kent State University: GIS and advanced cartography, location allocation modelling. (1995)

Timofeeff, Nikolay P., Associate Professor Emeritus, PhD, 1967, Columbia University: Physical geography, quantitative geography, computer graphics. (1966)

Willis, Lucius S., Lecturer, MA, 1983, State University of New York at Binghamton: Geographic information systems. (1983)

UNDERGRADUATE PROGRAMS

The Geography Department offers students the opportunity to study a number of contemporary problems such as physical resource development, urban decay, business geography, pollution and other human problems. Geography stresses strategies for solving locational and environmental problems. Map design, computer mapping, GIS, statistics and the use of remotely sensed data are central to the field.

The department offers four tracks within its BA program. The general curriculum encourages interdisciplinary work; the analytic geography specialization emphasizes computers and related automated techniques used in geographic analysis; the urban planning track emphasizes the environmental, economic and institutional aspects of urban planning; the physical geography track emphasizes environmental analysis. All four tracks provide preparation for graduate work. The courses emphasize the problem approach, both theoretical and applied. Double majors are encouraged and special programs may be designed on request.

The Geography Department views the grade of D as passing but unsatisfactory. Courses passed with a grade of D, or P, do not fulfill requirements for the major.

Grievance procedure: resolution of student-faculty grievances should be worked out in accordance with the departmental grievance procedure, available from the department office.

Independent study courses (GEO G 497) will count toward the major tracks only with the approval of the director of undergraduate studies.

BA, Track 1: General Geography

GEO G 121. Physical Geography
GEO G 151. World Regional Geography
GEO G 261. Cartography
MATH 147. Statistics
Two cultural/regional courses
Four upper-division courses
TO TAL: 10 courses (40 hours). Credit is granted for equivalent courses.

BA, Track 2: Computer Applications in Human-Environmental Analysis

GEO G 103. Computer-Based Analysis in Geography
GEO G 261. Cartography
GEO G 361. Air Photo Interpretation
GEO G 432. Remote Sensing of the Environment
GEO G 463. Introduction to GIS
MATH 147. Statistics
CS 140 or 160. (preferred), Introduction to Computer Programming

Three courses to be selected from the following:

GEOG 221. (a course in physical geography) or GEOG 233. Urban Geography
GEOG 459. East Asia Settlements
GEOG 476. Environmental Analysis
GEOG 481. Special Topics (that are techniques-oriented)
GEOG 482. Applied Urban Research
GEOG 495. Internship
GEOG 497. Independent Study
GEOG 499. Honors Thesis
TOTAL: 10 courses (40 hours). Credit is granted for equivalent courses.

BA, Track 3: Urban and Regional Planning
GEOG 121. Physical Geography
GEOG 261. Cartography
MATH 147. Statistics
GEOG 233. Urban Geography
One cultural/regional course
Two urban/economic courses
One physical/environmental course
One mapping course
One applications course
TOTAL: 10 courses (40 hours). Credit is granted for equivalent courses.

BA, Track 4: Physical and Environmental Geography
GEOG 121. Physical Geography
GEOG 261. Cartography
MATH 147. Statistics
One regional/cultural course
Two courses from mapping and applications categories
TOTAL: 10 courses (40 hours). Credit is granted for equivalent courses.

Honors in Geography
Four credit hours are permitted for those geography majors interested in writing an honors thesis. Students must be declared geography majors, have a 3.5 grade-point average for geography courses attempted and be in the final year of undergraduate studies. Not more than one semester (total) in researching, writing and editing of the thesis is permitted. Requirements and guidelines are available in the Geography Department office.

Requirements for Geography Minors

CARTOGRAPHY
The six courses required for this minor are:
1. GEOG 261.
2. one course from: GEOG 101, 121, 151.
3. any four courses from: GEOG 361, 363, 463, 465 and 475.

ENVIRONMENTAL RESOURCE MANAGEMENT
The six courses required for this minor are:
1. GEOG 121, 151, 232.
2. any three courses from: GEOG 323, 330, 339, 341, 361, 421, 422 and 423.

PHYSICAL GEOGRAPHY
The six courses required for the minor are:
1. GEOG 121, 151, 261.
2. any three courses from: GEOG 321, 323, 325, 341, 361, 421, 422 and 423.

Joint Program: Geography BA/Master of Landscape Architecture
Geography majors are eligible for participation in a special joint program between Binghamton University and SUNY College of Environmental Science and Forestry in Syracuse. The program permits students to take the final year of undergraduate education in Syracuse while beginning the master of landscape architecture program. The undergraduate degree in geography is granted by Binghamton University; the MLA is granted by SUNY College of Environmental Science and Forestry. Contact Professor Eugene Tettey-Fio for details.

GRADUATE PROGRAMS
The department's master of arts program in geography educates qualified students for work toward the PhD degree, and for professional careers in government service, industry and regional or urban planning. There is a thesis option for each of the four tracks. Each track requires a total of 40 credits, as well as oral and written comprehensive examinations.

Admission
Undergraduate specialization in geography is not required. However, students lacking a suitable background in geography are required to take appropriate undergraduate work beyond course requirements for the MA degree. The deficiencies to be made up are determined by the department. All applicants are required to submit scores
of the Graduate Record Examination aptitude tests.

**MA, Track 1: General Geography**

The program provides disciplinary foundation along classical liberal arts lines that can lead to interdisciplinary work in scholarly areas such as conservation, environmental management, economic development and international studies. A total of 40 credits is required.

**Required:**
GEOG 500. Geographical Theory
GEOG 531. Advanced Geographic Field Study

**Select two of the following:**
GEOG 573. Seminar in Physical Geography
GEOG 575. Resource Management
GEOG 581. Applied Urban Research
GEOG 599. Thesis

Plus five electives, no more than three in any one area:

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Electives are to be approved by adviser.

Language requirement: a foreign language.

**MA, Track 2: Cartography and Geographical Information Systems**

This track educates students as geographical spatial analysts, with emphasis on cartography, remote sensing and geographic information systems. Among the essential components of the program are theory, research methods and advanced statistics. The objective of this track is career preparation in the specified area. To fulfill this goal, practical experience obtained from internships and field research is integrated into the formal curriculum. This track also provides the option of pursuing the PhD degree at many institutions. A total of 40 credits is required.

Prerequisites include elementary statistics and GEOG 261. Cartography, or their equivalents.

**Required:**
GEOG 500. Geographical Theory
GEOG 502. Introduction to Geographical Information Systems and Computer Mapping (GIS I)

GEOG 531. Advanced Geographic Field Study
GEOG 533. Advanced Statistical Techniques for Geographical and Spatial Analysis I
GEOG 545. Geographic Information Systems II
GEOG 564. Computer Cartography

Select three of the following:**
GEOG 532. Remote Sensing of the Environment
GEOG 550. Photogrammetry
GEOG 555. Geographic Information Systems III
GEOG 566. Advanced Statistical Techniques for Geographical and Spatial Analysis II
GEOG 598. Internship in Geography, Cartography and Planning

Select one of the following (substitution is at the discretion of the director of graduate studies):
GEOG 570. Urban Planning Seminar
GEOG 574. Economic Geography Seminar
GEOG 597. Independent Study (in Cartography or GIS)
GEOG 599. Thesis Research

Language requirement: approved computer or foreign language.

*GEOG 502 must be taken before GEOG 564 and GEOG 545 before GEOG 555.

**Any three computer science graduate courses may be substituted for three of the four geography courses to be selected for completion of track.

**MA, Track 3: Physical Environmental Systems**

The program educates students in physical environmental systems, with particular emphasis on the integration of the environmental and institutional aspects of planning. Among the essential components of this concentration are geographic techniques, geomorphology, environmental concerns, community involvement and practical experience through internship programs. As with Track 2, graduates from this program might work for planning agencies or pursue an advanced degree. A total of 40 credits is required.

Prerequisite: elementary statistics or equivalent.

**Required:**
GEOG 500. Geographical Theory
GEOG 531. Advanced Geographic Field Study
GEOG 533. Advanced Statistical Techniques for Geographical and Spatial Analysis I
GEOG 573. Seminar in Physical Geography
GEOG 574. Economic Geography Seminar
GEOG 576. Advanced Environmental Analysis
Select four of the following:
GEOG 502. Introduction to Geographical Information Systems and Computer Mapping (GISl)
GEOG 509. Conservation of Natural Resources
GEOG 522. Biogeography
GEOG 523. Soils and Environment
GEOG 530. Natural Hazards
GEOG 542. Water Resource Planning and Management
GEOG 545. Geographic Information Systems II
GEOG 566. Advanced Statistical Techniques for Geographical and Spatial Analysis II
GEOG 575. Resource Management
GEOG 598. Internship in Geography
GEOG 599. Thesis Research

Language requirement: approved computer language.

MA, Track 4: Urban Planning

This program encompasses urban analysis and planning, with emphasis on the integration of the institutional, environmental and urban-economic aspects of both public and private planning. Essential components of the program are geographic techniques, urban development, community involvement, seminars in urban planning and practical experience through internship programs. As with Track 2, graduates from this program might work for planning agencies or pursue an advanced degree. A total of 40 credits is required.

Prerequisite: elementary statistics or equivalent.

Required:
GEOG 500. Geographical Theory
GEOG 502. Introduction to Geographical Information Systems and Computer Mapping (GIS I)
GEOG 531. Advanced Geographic Field Study
GEOG 533. Advanced Statistical Techniques for Geographical and Spatial Analysis I
GEOG 508. Urban Planning Seminar I
GEOG 535. Urban Planning Seminar II
GEOG 574. Seminar in Economic Geography

Select three of the following:
GEOG 542. Water Resources Planning and Management
GEOG 564. Computer Cartography
GEOG 566. Advanced Statistical Techniques for Geographical and Spatial Analysis II
GEOG 573. Seminar in Physical Geography
GEOG 576. Advanced Environmental Analysis
GEOG 581. Applied Urban Research

GEOG 595. Research and Colloquium
GEOG 598. Internship in Geography, Cartography and Planning
GEOG 599. Thesis Research

Language requirement: approved computer language.

COURSE OFFERINGS/UNDERGRADUATE

Note: Unless otherwise noted, all undergraduate courses carry 4 credits and are offered every year.

Introductory/Service
Note: None of these can count toward the major.

GEOG 101. INTRODUCTION TO GEOGRAPHY: PEOPLE, LAND AND SPACE
Concepts basic to geographic inquiry, such as areal differentiation, environmental linkages, central place, human-environmental interaction, spatial organization, spatial interaction, spatial behavior. Problems of urban areas, population trends, economic development, human-land relationships.

GEOG 120. WEATHER AND CLIMATE 2 credits
A systematic study of processes that govern variations in atmospheric conditions over time and space. Elements of heat exchange, moisture exchange and dynamics of air movement examined in relation to causes for various climatic patterns on earth. Elements of applied climatology related to specific problems such as irrigation needs, wind erosion of soils, acid rain, water pollution, flood and storm prediction.

Core

GEOG 121. PHYSICAL GEOGRAPHY

GEOG 261. CARTOGRAPHY
Map compilation, map design and reproduction. Cartographic methods for mapping discontinuous and continuous areal data.

Cultural/Regional

GEOG 151. WORLD REGIONAL GEOGRAPHY
The world is partitioned into major regions or realms for comparison. The geographic similarities and differences between them are examined. The central theme is the interrelationship between nature, society and location. The roles of human institutions and how they vary and affect each other across the world are discussed.
GEOG 211. CULTURAL GEOGRAPHY: SOCIETY, ENVIRONMENT AND CHANGE
Ecological/spatial expressions and processes of culture. Interrelationship between human and physical environments.

GEOG 212. HISTORICAL GEOGRAPHY OF THE UNITED STATES
A synthesis of the historical geography of the United States, beginning in the colonial era but with emphasis on the period after 1776. Specific topics include: migration to and within North America; the migrants’ experience and creation of space and place in the New World; European and Native American interaction; land tenure, landscape, ecology, agriculture and rural settlements; and the geographic patterns of urban, economic and industrial development.

GEOG 253. PEOPLE, SPACE AND ENVIRONMENT IN LATIN AMERICA

GEOG 255. AFRICA: PEOPLE, ENVIRONMENT AND SPACE
Systematic study of environmental processes (landforms, climate, etc.) and their effect on development of Africa. Parameters of change, contemporary environmental problems in Africa. Population patterns, projections, policies, conservation practices.

GEOG 257. GEOGRAPHY OF THE MIDDLE EAST
Physical, environmental, social, historical and regional geography of the Middle East. Emphasis on the diversity of peoples in the region, and their interactions with environment, with each other and with the peoples of other regions, both historically and today.

GEOG 259 (also MDVL 279J). EASTERN ASIA: LAND AND PEOPLE
Systematic study of landforms, climate, their effect on development of early regional cultures in China and Japan; population, rural and urban settlements in relation to natural resource management. Natural disasters and coping process; regional planning in modern China.

GEOG 459 (also MDVL 459). SETTLEMENT OF EAST ASIANS IN THE U.S.
Designed as a follow-up course to GEOG 259 with emphasis on East Asian settlements in the U.S. from a migration perspective. Numbers of major metropolitan regions will be selected for population and socio-economic mapping. Lectures and field exercise; independent study. Three lectures, one three-hour laboratory per week. Prerequisites: GEOG 121 or introductory geology.

GEOG 337. NATURAL RESOURCE CONSERVATION: THEORY, POLICIES AND PRACTICES
Historic and contemporary examination of geographic, economic, environmental, cultural factors relating to natural resource use and management. Specific resources such as minerals, soil, water as related to conservation policy, practice, theory. Lectures and discussion. Prerequisite: GEOG 121 or 232.

GEOG 339 (also ENVI 339). ENVIRONMENTAL MANAGEMENT
Geographic, environmental, economic and cultural determinants of resource management. Policy goals and decision-making elements influencing management of environmental and natural resources. Management policy, practice and theory. Prerequisites: any one of GEOG 121, 232, 233 or 235, or ENVI 101 and 201.

GEOG 341. WATER RESOURCE PLANNING AND MANAGEMENT

GEOG 421. ADVANCED PHYSICAL GEOGRAPHY SEMINAR
Detailed study of selected aspects of landforms, climates, soils. Field measurement techniques, qualitative record
Urban/Economic

**GEOG 422 (also BIO L 368). BIO GEOGRAPHY**

Ecological principles applied to the study of past, present and future distribution patterns of living organisms. Effects of earth history, spatial pattern, plate tectonics, climate and climate change and human impacts on biota. Prerequisite: GEOG 121 or junior standing.

**GEOG 476. ENVIRONMENTAL ANALYSIS**

Problem-solving skills in environmental management based on research design, spatial analysis and modeling. Topics include hazards and risk management; attitudinal and behavior analysis; waste management; environmental equity; and valuation of environmental goods. Prerequisite: any one of GEOG 121, 235, 337, 339 or ENVI 101, 102; junior standing.

**GEOG 477. COMPUTER CARTOGRAPHY**

Principles of digital mapping. Topics include: the character of geographic data in a digital environment; automated generalization of data; topological models and operations (ARC/node, quad-tree, DLG, etc.); digital terrain models; geographic data exchange formats (ARC/generate, DXF, MBI, etc.); interface design; structure of commercial GIS software; graphics libraries and their application to mapping. Projects in C. Prerequisites: GEOG 261 and CS 140 (Pascal) or 160 (C, preferred), or their equivalents; and junior standing.

Applications

**GEOG 495. INTERNSHIP IN GEOGRAPHY: PLANNING**

Internship in agencies such as planning and engineering departments, consulting firms. Prerequisites: two upper-level geography courses and consent of instructor.

Research

**GEOG 497. INDEPENDENT STUDY**

Meets special needs and interests of advanced students on tutorial or seminar basis. Prerequisites: consent of instructor and department chair.

**GEOG 499. HONORS THESIS**

Special urban research topics.

Mapping

**GEOG 361. AERIAL PHOTO INTERPRETATION**

Elementary photogrammetry; linear, area, height measurements on vertical photos. Interpreting of agricultural land use patterns, urban-industrial settings and landforms. Applications in regional planning, forestry, environmental pollution, etc., pursued by students. Prerequisite: GEOG 232, 233, 235 or ECON 360 or 362.

**GEOG 445. URBAN PLANNING ANALYSIS II**

Continuation of study of analytical techniques introduced in GEOG 345. Urban renewal, reorganization of local services, planning for leisure and recreation, transportation, zoning, overall plan and methods of evaluation. Prerequisite: GEOG 345.

**GEOG 481. SPECIAL TOPICS GEOGRAPHY**

Special urban research topics.

**GEOG 463. INTRODUCTION TO GEOGRAPHICAL INFORMATION SYSTEMS AND COMPUTER MAPPING**

Fundamentals of geographic information systems (GIS), from data acquisition to final reports and maps, with particular emphasis on their role in geographic analysis. Projects cover environmental topics (with IDRISI) and urban-economic topics (with MapInfo). ARC/INFO will be introduced. Prerequisites: GEOG 261 and declaration of a major or minor in geography.

**GEOG 465. REMOTE SENSING**

Fundamentals of remote sensing, various satellites and methods of data acquisition and processing, applications in land use mapping. Prerequisite: GEOG 361 or permission.
analysis and forecasting, uses of planning data, regional analysis and balances, labor force policies, role of models in planning and cost-benefit analysis.

GEOG 509. CONSERVATION OF NATURAL RESOURCES
Historic and contemporary analysis of trends in conservation thought and practice. Geographic, environmental, cultural, economic factors relating to natural resource use and management. Specific resources such as minerals, soil, water as related to conservation policy, practice, need.

GEOG 511 (also GEO 511), ADVANCED GEOMORPHOLOGY
Fall
Application of surface processes in solving problems of environmental and human significance. Course will emphasize a case-study approach, using examples of effects from landslides, surface hydrology, coastal zone preferences, subsidience.

GEOG 512 (also GEO 512), ADVANCED GEOMORPHOLOGY II—GLACIAL every other spring
Historical and geological importance of glaciation periods. Analysis of vast landform changes created by glacial, periglacial, glaciofluvial processes. Reference paper, independent study project, field trips. Two lectures, one three-hour laboratory per week.

GEOG 516 (also GEO 516), HYDROGEOLOGY spring
A survey of hydrogeology: hydrologic cycle; properties of rocks and soils; fluid flow in porous media (Darcy’s Law, diffusion equation); hydrological boundary conditions, numerical techniques; groundwater chemistry; case studies. Prerequisites: calculus and introductory geology, or consent of instructor.

GEOG 522. BIOGEOGRAPHY
Interrelationships between physical geography and ecology. Study and explanation of distribution patterns of living organisms.

GEOG 523. SOILS AND ENVIRONMENT
Study of basic properties of soils and pedogenic processes operating in environments. Survey of major types of soils and their world distributions, uses of soils, their basis of land capability assessment. Material presented in a structured modular format, highlighting the complexity of soils, their interaction with physical and environmental systems. Local field trips will consist of examining and mapping soil development, collecting field measurements and samples, and performing mechanical and chemical tests.

GEOG 530. NATURAL HAZARDS
Analysis of physical, geographic, political and perceptual aspects of natural hazards. Evaluation of physical environments in which natural hazards occur, land use and development patterns in hazardous areas, tools and methods for evaluating hazardousness and vulnerability. Prerequisite: GEOG 121 or ENVI 201.

GEOG 531, ADVANCED GEOGRAPHIC FIELD STUDY
Application of field research techniques in geography to analysis and evaluation of human use of physical environment. Field research problems requiring reconnaissance, intensive and multiple data gathering techniques, quantitative and nonquantitative analytic methods. Written research reports.

GEOG 532. REMOTE SENSING OF THE ENVIRONMENT
Remote electromagnetic sensing, including photographic infrared and radar imagery. Geographic research through manual and automated analysis of physical and cultural data. Prerequisite: consent of instructor.

GEOG 533. ADVANCED STATISTICAL TECHNIQUES FOR GEOPHYSICAL AND SPATIAL ANALYSIS I
Multivariate analysis that includes correlation and regression analysis, analysis of variance, chi-square tests. Prerequisite: introductory course in statistics.

GEOG 535. URBAN PLANNING SEMINAR II
Planning commercial development, industrial location planning, planning housing development, public and private sectors, planning reorganization of public services, transportation, urban renewal and zoning.

GEOG 536. LAND USE ANALYSIS
Analysis of urban, suburban and rural land and water use as basis for spatial planning, resource and environmental management. Application of remote sensing, air photo interpretation, surveying, field techniques, other tools to land use problems. Classification methods and cartographic representation. Field experience. Prerequisite: prior or concurrent courses in physical, economic and urban geography and remote sensing.

GEOG 542. WATER RESOURCE PLANNING AND MANAGEMENT
Hydrologic, engineering, economic, ecological and institutional aspects of water planning and management. Urban industrial water quality, flood plain management and river basin planning. Governmental and private water decision-making systems and processes.

GEOG 544. SAMPLING AND MEASUREMENT OF ELEMENTS OF THE PHYSICAL ENVIRONMENT
Field measurement, variable selection, numerical taxonomy, computer mapping of physical land systems. Sampling techniques, variable ordination and coding, measurement procedures, data bank structure and retrieval, variable association, clustering and computer mapping of soils, topography, vegetation and microclimate. Prerequisite: GEOG 501 or consent of instructor.

GEOG 545. GEOGRAPHIC INFORMATION SYSTEMS II
This course focuses on theoretical and applied issues in desktop Geographical Information Systems. The data acquisition, portrayal and analysis functions of GIS are explored through research topics. Desktop GIS and ARC/INFO UNIX are applied in a laboratory and project basis. Prerequisites: GEOG 261 and 502; limited to geography students; permission of instructor.

GEOG 550. PHOTOGRAMMETRY
Systematic study of measuring data recorded on photographs; geometric relationship between physical objects and their images. Geometry of aerial photography, its relationship with terrain height, depression angle, flight height, other camera parameters. Emphasis on numerical solutions rather than instrument solutions. Relationship with modern remote sensing, traditional photo interpretation. Available to undergraduates by petition.

GEOG 555. GEOGRAPHIC INFORMATION SYSTEMS III
Emerging theories of GIS; GIS and the quantitative revolution; policy issues of GIS; increasing role of GIS in society; issues of mathematical examination of spatial analysis and
GIS; advanced and new research areas; diffusion of GIS and component areas across world; GIS and educational training.

**GEOG 564. COMPUTER CARTOGRAPHY**
Principles of digital mapping. Topics covered include: the character of geographic data in a digital environment; automated generalization of data; topological models and operations (ARC/node, quad—tree, DLG, etc.); digital terrain models; geographic data exchange formats (ARC/generate, DXF, MBI, etc.); interface design; structure of commercial GIS software; graphics libraries and their application to mapping. Projects in C. Prerequisite: GEOG 261.

**GEOG 566. ADVANCED STATISTICAL TECHNIQUES FOR GEOGRAPHIC AND SPATIAL ANALYSIS II**
Advanced variance analysis, covariance analysis, future analysis, survey sampling techniques.

**GEOG 569. ADVANCED CARTOGRAPHY**

**GEOG 573. SEMINAR IN PHYSICAL GEOGRAPHY**
Processes shaping physical environmental base for human use. Techniques of sampling and inventorying aspects of soils and climate. Students prepare climatic and soil maps both at micro and macro scales, perform mechanical analyses of soils, use both heat and water budgets quantitatively. Prerequisite: physical geography.

**GEOG 574. ECONOMIC GEOGRAPHY SEMINAR**
Intensive study of selected problems in economic geography.

**GEOG 575. RESOURCE MANAGEMENT**
Decision-making methods used by administrators of public agencies concerned with environmental issues. Public policy objectives and administration; alternative environmental management systems; implications of alternative methods of control; applied administrative methods for directing operations.

**GEOG 576. ADVANCED ENVIRONMENTAL ANALYSIS**
An analytical examination of selected environmental problems and issues. Fundamental aspects of planning including research design, analysis, and implementation of environmental policies will be covered.

**GEOG 581. SPECIAL TOPICS—GEOGRAPHY**
Design and execution of a contemporary urban/environmental/policy research problem. Requires directed reading, discussion in seminar format and written analysis.

**GEOG 591. SEMINAR IN TEACHING METHODS IN GEOGRAPHY**
1-4 credits
Philosophy of teaching, course preparation and presentation, source materials, tools, problems associated with college teaching. Graduate students only. One hour per week, one credit hour.

**GEOG 595. RESEARCH AND COLLOQUIUM**
Geography faculty provides topic(s); research team of faculty and students completes project and presents findings in Geography Colloquium Series. Examination and attempted solution of geographical problems that exist in Binghamton SM SA. Applied problems include monitoring of environmental systems, transportation planning and urban planning. Students apply geographical and planning theory and techniques obtained in other courses and work closely with faculty members. Community experts invited to participate where appropriate.

**GEOG 596. SPECIAL TOPICS—GEOGRAPHY**
Design and execution of a contemporary urban/environmental/policy research problem. Requires directed reading, discussion in seminar format and written analysis.

**GEOG 597. INDEPENDENT STUDY**
variable credit
Research under direction of faculty member. Consent of instructor and chairperson required.

**GEOG 598. INTERNSHIP IN GEOGRAPHY—CARTOGRAPHY AND PLANNING**
One formal meeting per week with instructor, plus eight hours of interning in an agency. Students undertake real-world problems approved by agency and faculty member. Evaluation on basis of project performance at agency, judged by agency sponsor and faculty. Consent of instructor required.

**GEOG 599. THESIS RESEARCH**
1-4 credits

**GEOG 700. CONTINUOUS REGISTRATION**
1 credit/semester
Required for maintenance of matriculated status in graduate program. No credit toward graduate degree requirements.

**GEOG 707. RESEARCH SKILLS**
1-4 credits
Development of research skills required within graduate programs. May not be applied toward course credits for any graduate degree. Prerequisite: approval of relevant graduate program directors or department chairs.