

GEIS: POSTGRADUATE CERTIFICATE PROGRAM IN GEOGRAPHIC INFORMATION SCIENCE (GIScience)

**Department of Earth and Environmental Studies
Montclair State University**

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ROUGH GUIDE

<http://www.csam.montclair.edu/earth/gisci.html> • <http://earth.montclair.edu/gisci.html>

1. Program objective

This objective of this program is to provide advanced training in the Geographic Information Sciences, specifically, the application of Geographic Information Systems and Remote Sensing toward analysis and problem solving in diverse environmental, landscape, and urban contexts.

2. Academic Program

The academic program consists of completion of three courses out of five, for a total of 9 semester hours, plus a short specialized workshop, in the following structure:

- Complete the following two courses:
 - ENVR/GEOS 455 Fundamentals of Remote Sensing of the Environment (3 sem. hrs)
 - EUGS/GEOS 450 Geographic Information Systems (3 sem. hrs)
- Complete one of the following three courses
 - ENVR 655 Advanced Remote Sensing of the Environment (3 sem. hrs)
 - ENVR 680 Spatial Analysis (3 sem. hrs)
 - EUGS 770 Advanced Geographic Information Systems (3 sem. hrs)
- Complete a short workshop on a specialized topic, offered by the program. A short workshop entails hands-on practical training on a focused topic (e.g., Real Estate GIS, Remote Sensing for Vegetation Mapping, Land Cover Classification of Remote Sensing Data, GIS Tools in Water Quality Management, Urban Climatology, and others), lasting a week of concentrated exposure to the concepts and procedures. These would be offered during the Winter Break or Summer sessions. (EUGS 504 Pro-Seminar may be designated for such a workshop if college credit is useful to the participants.)

Currently, this sequence of courses is offered on a rotation that completes every two years. GEOS/EUGS 470 and GEOS/ENVR 455 are prerequisite to the advanced courses. With increased enrollment, we intend to offer the sequence more frequently, on a one year or one year + summer cycle.

3. Faculty

Existing faculty who will teach courses for this certificate:

Dr. Mark Chopping
Dr. Danlin Yu

These faculty possess advanced knowledge and expertise in numerous aspects of GIScience, with nationally known reputations (including work with major federal agencies including NASA, the USDA, and HUD as well as major municipal governments). Dr. Chopping is principal investigator funded through the NASA Earth Observing System, a member of the NASA MISR and Land Cover Land Use Change (LCLUC) science teams, and active in research in the North American Carbon Program. Dr. Yu's research is at the cutting edge of spatial statistics and the application of these advanced techniques to problems in urban and peri-urban geography. Dr. Robert Taylor, Dr. Harbans Singh, Dr. Huan Feng, and Dr. Gregory Pope have taught courses in GIScience previously, or have taught other courses incorporating GIS and remote sensing in assignments and investigations, and could take part in the certificate program as needed. New faculty often possess GIScience literacy, and may contribute to this program.

4. Program support

The department maintains a dedicated computer laboratory classroom, as well as a research computer facility (the Environmental Modeling Center and Remote Sensing Laboratories). The department updates current software and hardware in these labs with direct support of the department budget, student laboratory fees, user fees, and external grants. The labs hold the most up to date PC and Sun workstations, large format plotters and scanners, and field equipment such as GPS receivers. The labs maintain the software most utilized in the field: ESRI ArcGIS (ArcInfo licence), Leica Geosystems ERDAS Imagine, and IDL. Expanded storage and server capacity is afforded through the college's Center for Computing and Visualization.

5. Need for the program

Geographic Information Science (GIScience) is the study of both the fundamental theories and applications that drive the increasingly popular Geographic Information Systems (GIS) and other geographic information technologies such as Remote Sensing (RS) using data and imagery from airborne and satellite platforms, spatial statistics and analysis, field surveys using Global Positioning Systems, GeoSimulation and GeoComputation. From a technical aspect, it involves the use of sensor, space, and computer technologies to acquire, process, store, manipulate, retrieve, synthesize, and – most importantly – analyze spatial information (anything that can be mapped). Geographic Information Science has been identified as “one of the three most important emerging and evolving industries” by the US Bureau of Labor¹.

¹ Gewin, V., 2004. Mapping opportunities. *Nature* 427(22): 376-377, see also: <http://www.careervoyages.gov/geospatialtechnology-main.cfm>