

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

Department of Earth and Environmental Studies
Montclair State University

The Need For This Program

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

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. Former Nebraska senator Robert Kerrey recently (December 2006) stated in a conference keynote address that he regarded the work of GIS professionals “to be vital to the success and survival of mankind both here and abroad”². Grand predictions such as these are typical in this dynamic field. Professionals including municipal, county, regional and state planners, regional scientists, resource managers, earth and environmental scientists, forestry and agricultural experts, hydrologists, climatologists, engineers, business consultants, the military, and teachers (amongst others) all find increasing use for computer assisted processing of geographic information, including data and imagery acquired by airborne and satellite platforms. We see considerable demand for such professionals in our own region; a significant proportion (~50%) of job announcements posted on the department’s career web site mention GIScience as primary or secondary requirements for the position, and a number of recent graduates have found work in this field. Some 125 colleges and universities in the US have existing GIS Certificate programs. A list provided by the Urban and Regional Information Systems Association can be found at <http://www.urisa.org/career/colleges>. However, in New Jersey, the list includes only Richard Stockton College of New Jersey, Rowan College, and Rutgers University.

Bureau of Labor statistics indicate **“above average” job prospects** in the GISciences:

“...opportunities will be best for [professionals] who have a bachelor’s degree and strong technical skills [underline our emphasis]. Increasing demand for geographic data, as opposed to traditional surveying services, will mean better opportunities for

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

² Keynote address cited in “Senator Kerrey sees new opportunities for GIS”, *ArcNews* 28(3): 1, 5, Fall 2006.

cartographers and photogrammetrists who are involved in the development and use of geographic and land information systems.”³

Furthermore, a recent publication from the National Academies Press that provides the recommendations from the Committee on Beyond Mapping: The Challenges of New Technologies in the Geographic Information Sciences; The Mapping Science Committee; and the Board on Earth Sciences and Resources (Division on Earth and Life Studies) states:

“Digital mapping is about to change our world by documenting the real world, then integrating the information into our computers, phones, and lifestyles. Roll over, Mason and Dixon: spurred by space photography, global satellite positioning, mobile phones, search engines and new ways of marketing information for the World Wide Web, the ancient art of cartography is now on the cutting edge. —Levy 2004, p.78”⁴

and:

“ Geographic information systems (GIS), the Global Positioning System (GPS), remote sensing, and other information technologies have all changed the nature of work in the mapping sciences and in the professions, industries, and institutions that depend on them for basic research and education. Today, geographic information systems have become central to the ways thousands of government agencies, private companies, and not-for-profit organizations do business. However, the supply of GIS/GIScience professionals has not kept pace with the demand generated by growing needs for more and improved geographic information systems and for more robust geographic data.” ... Some of the report's recommendations include more collaboration among academic disciplines, private companies, and government agencies; the implementation of GIS/GIScience at all levels of education; and the development of a coherent, comprehensive research agenda for the mapping sciences. ... The overriding challenge for society with respect to GIS/GIScience is to ensure that the next generation of scientists and technicians is produced in large numbers and is well prepared to build on the impressive progress achieved during the last 30 years.” The committee offers five recommendations in response to that challenge; one of the recommendations closely concerning higher education follows:

“The country's colleges and universities must become more flexible if they hope to keep pace with the GIS/GIScience industry and with government programs. Industry and government have taken the lead in developing and implementing digital approaches to map production; academic institutions follow as much as they lead. Accordingly:

³ Bureau of Labor Statistics, 2006, *Occupational Outlook Handbook 2006-2007* edition, online at: <http://www.bls.gov/oco/home.htm>

⁴ *Beyond Mapping: Meeting National Needs Through Enhanced Geographic Information Science* (2006; Board on Earth Sciences and Resources, NAP), http://books.nap.edu/openbook.php?record_id=11687 with an executive summary at: http://www.nap.edu/execsumm_pdf/11687.pdf

- a. Academic institutions should reconsider their internal organization and reward structures to make them more responsive to emerging specialties like GIS/GIScience, and to reward (or at least not penalize) faculty members who pioneer innovative topics and who engage in collaborative work with government agencies and private firms. Where credit for enrollments impedes cross- and multidisciplinary education, credit-sharing mechanisms should be employed. Devising institutional arrangements that favor robust GIS/GIScience and the funds necessary to sustain it will yield large dividends in the form of ready employment for undergraduates and advanced-degree graduates.
- b. To meet the need for trained GIS/GIScience professionals as well as an informed citizenry, education programs in GIS/GIScience should be implemented at all levels of education....”⁴

In sum, the department sees a ready opportunity to address these needs, and we possess existing expertise to deliver skills-oriented education to current and future professionals in GIScience. We estimate that approximately half of the current undergraduate enrollment in the department (~20-25 students as of Fall 2006, those who have taken a course beyond the introductory course EUGS 270 Digital Mapping) would be eligible for continuing education in the field and would benefit from further training based on their potential career trajectories. Likewise, a number of existing graduate students would find interest in a postgraduate certificate to accompany their master’s degrees, based on enrollments in our advanced GIScience courses. Importantly, we see an untapped market of current professionals in environmental science, urban and regional planning, consultancies, and government, who already have degrees but would benefit from enhanced education in GIScience.

The New Jersey Geographic Information Network (NJGIN; <https://njgin.state.nj.us/>) maintains a list of registered geo-community members that currently stands at about 3,600. This includes professionals working in: federal agencies (e.g., USGS, US Army Corps of Engineers, NOAA, FEMA, USDA, Department of Labor); state agencies (e.g., NJ Department of Environmental Protection, NJ Search and Rescue, NJ Dept. of Education, New Jersey State Police, NJ Dept. of Law and Public Safety); county, city and township authorities (e.g., Monmouth County, Sussex County, City of Elizabeth, City of Newark, and many others); public utilities (e.g., PSE&G, Atlantic Electric, Williams Gas Pipeline - Transco); non-profits, community organizations and NGOs (e.g., Changing Planet, Passaic River Coalition, Bergen Save the Watershed Action Network, Great Swamp Watershed Association, The Nature Conservancy, Flat Rock Brook Nature Association); engineering and consulting firms (e.g., Hatch Mott MacDonald, Groundwater Environmental Services, Hydrotechnology Consultants Inc, Maser Consulting P.A, Langan Engineering); real estate concerns (e.g., North American Realty Advisory, NJ-HMFA, Property Data Services, Inc.); other commercial firms (T-Mobile); and institutions of higher education (e.g., Montclair State, Princeton University, Rutgers, Sussex County Community College, Salem Community College, Stony Brook University), amongst others.

⁴ Beyond Mapping: Meeting National Needs Through Enhanced Geographic Information Science (2006; Board on Earth Sciences and Resources, NAP), http://books.nap.edu/openbook.php?record_id=11687 with an executive summary at: http://www.nap.edu/execsumm_pdf/11687.pdf