

# Geographic Information Systems (P.S.M.)

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## About The Program:

The Department of Geography and Urban Studies offers graduate work leading to the Professional Science Master's (P.S.M.) degree in Geographic Information Systems (GIS). The program combines advanced training in GIS core skills with professional development and business ethics to prepare students to enter the GIS workforce. Our courses introduce students to a variety of cutting-edge spatial analysis technology and mapping software. The Department of Geography and Urban Studies faculty have expertise in a range of GIS applications, including urban, health, environment, business, location analysis, geovisualization, and remote sensing. The program curriculum is informed by an advisory board of industry professionals and incorporates real-world experiences through project-based learning and an internship capstone requirement. Graduates are well prepared to pursue certification as a GIS professional (GISP).

**Career Options:** The program will train a workforce that is highly competent to meet the challenges faced by public, regulated, and private sector industries and also adaptable to the future needs of the industries. It provides access to a professional career, requiring both technical skills and professional development training in areas related to business, policy, and ethics. The program will enable students to match their specialized training in GIS with substantive fields that utilize such training, including criminology, epidemiology, national security, urban and regional planning, and the natural and environmental sciences.

**Areas of Specialization:** The program specializes in Geographic Information Systems and offers coursework in cartography, geospatial programming, spatial database design, spatial statistics, web mapping, geovisualization, and several applied areas. The Department offers students the opportunity to learn in research laboratory settings equipped with the latest technologies.

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## Requirements of Programs:

- **Total Credit Hours:** 30
- **Culminating Events:**

*GIS Capstone:*

The GIS Capstone course ([GUS 9187](#)) provides an experiential and industry-relevant learning experience for students matriculated in the GIS Professional Science Master's program at Temple. Students engage in a structured internship experience (140 hours during the term) identified with the guidance of P.S.M. faculty at Temple and a prospective employer. The student completes a GIS-oriented project during the internship that draws on the GIS science and professional skills developed through the P.S.M. curriculum.

## Core Courses

**Advanced Statistics for Urban Applications** – This course teaches advanced statistical methods to examine urban processes and patterns. The course covers spatial point pattern analysis, multivariate regression, logit and probit regression, spatial econometrics, Geographically Weighted Regression (GWR), and hierarchical linear modeling.

**Cartographic Design** – This course introduces students to computer-based cartographic design for both online and paper publishing. Principles of cartography including symbolization, layout, color, and typography will be applied to the creation of reference maps and thematic maps. Strong emphasis on achieving eye-catching, informative, and unambiguous visual communication through the use of industry-standard GIS and graphic design software.

**Application Development for Geographic Information Systems** – This course introduces students to geospatial software development through the creation of standalone software applications and plugins that add new functionality to major GIS software products. The emphasis will be on geospatial algorithms and object-oriented programming. Other topics in software design will be addressed including documentation, version control, user interface design, software testing, and software project management. The course will be taught using Python, JavaScript, or another major programming language with strong geospatial support. There will be a heavy emphasis on Free and Open Source Software, and active participation in the developer community outside of the classroom. At the end of the course students will have produced fully functioning geospatial software, shared their code to a public online repository, generated documentation, and promoted their work publicly.

**Spatial Database Design** – The focus of this course is on the design and management of spatial databases. Topics covered include the database design process, spatial storage and access methods, relational and object-relational database models, and spatial query languages. Students will learn fundamental spatial database design concepts as well as their implementation and application within geographic information systems (GIS). Emphasis is placed on developing skills necessary for management of both desktop and enterprise-wide GIS databases. At the end of the course students are expected to know how to design relational and object-relational schemas for GIS databases, implement database designs in spatial database management systems (DBMS), and retrieve and manage spatial data in a GIS database.

**GIS Ethics and Professional Practice** – The focus of this course is on the ethical use and application of spatial data and geographic information systems and technologies. Topics covered include overviews of the geospatial industry and GIS profession, issues of spatial data sharing, the maintenance of privacy, and laws applicable to spatial data and GIS. Students will learn about the primary GIS industry sectors and professional organizations, and the codes of ethics and codes of conduct associated with being a GIS professional. A variety of case studies presenting ethical issues relating to the ethical use and application of spatial data and GIS are presented and discussed throughout the semester as a vehicle for exploring issues of ethics and professional practice. At the end of the course students are expected to be able to define the GIS industry, its sectors, and its workforce; explain the legal and ethical issues germane to the GIS profession; demonstrate familiarity with potential ethical challenges presented to GIS professionals; and understand how established codes of ethics and conduct apply to the GIS profession.

## Electives (12 Credits Worth)

## Capstone Course

**GIS Capstone** – The GIS Capstone course provides an experiential learning experience for students matriculated in the Professional Science Master's in GIS program at Temple. Students engage in a structured internship experience (140 hours during the semester), identified with the guidance of PSM faculty at Temple and a prospective employer. The student will complete a GIS-oriented project during the internship that draws on the GIScience and professional skills developed through the PSM curriculum. Student performance will be evaluated based on three criteria: 1) employer report of student performance during the internship, 2) student presentation of project, and 3) student-submitted report of project. The projects will be presented to PSM faculty and students at the conclusion of the semester and reports will be made available to employers and members of the Advisory Board. This course is required for all students matriculated in the GIS PSM at Temple. Students are expected to complete 140 hours of internship experience during the semester and to participate in an online course to reflect on their experiences during the internship. Students **MUST** have their internship opportunity approved by the instructor prior to the start of the semester.

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## Courses:

Click [HERE](#) for more information on the courses below.

- Special Topic Seminars
- Special Topics in GUS
- Urban Social Geography
- Land Use Planning
- Health and Environment Seminar
- Economic Development and Planning Cities
- International Urbanization
- GIS Programming
- Sustainable Natural-Human Systems
- Urban Housing
- Hazards Geography
- Political Ecology
- Cartographic Production
- Fundamentals of Geographical Information Systems
- Remote Sensing
- Urban Geographical Information Systems
- Environmental Applications of GIS
- GIS and Location Analysis
- Census Analysis with Geographical Information Systems
- GIS for Health Data Analysis
- Medical Geography
- Advanced Remote Sensing
- Geovisualization
- Regional Development
- Problems in Environmental Quality
- Race, Class, Gender in Cities
- Geographic Inquiry
- Statistics for Urban Spatial Analysis
- Advanced Statistics for Urban Applications
- Qualitative Methods
- Community Based Program Evaluation
- Food Studies
- Transportation and Culture
- Geographic Thought
- Geographic Inquiry
- History and Theory of Urban Studies
- Public Policy for Urban Regions
- Geography of Urban Services

- Critical Issues in Globalization, Sustainability, and Social Justice
- Urban Economic and Spatial Structure
- Seminar on Homelessness in America.
- Poverty and Employment
- Comparative Urban History
- Environmental Seminar
- Spatial Database Design
- Web Mapping and Map Servers
- GIS Ethics and Professional Practice
- Research Design
- Community-Based Research
- Teaching in Higher Education: Social Sciences
- Independent Study: Geography and Urban Studies
- Readings in Geography
- Internship in Geography and Urban Studies
- Internship Paper
- Mapping Practicum I
- GIS Capstone
- Master's Research Paper
- Masters Research