Geography and Urban Studies (GUS)

Course information contained within the Bulletin is accurate at the time of publication in July 2024 but is subject to change. For the most up-to-date course information, please refer to the Course Catalog.

GUS 5000. Special Topic Seminars. 3 Credit Hours.
A faculty member offers special seminars in a research specialty. Recent topics have included current perspectives on development, the information and technology needs of low resource community organizations, and information systems design and management.

Level Registration Restrictions: Must be enrolled in one of the following Levels: Graduate.

Repeatability: This course may be repeated for additional credit.

GUS 5006. Sustainable Infrastructures: Theory, Practice and Application. 3 Credit Hours.
Contemporary cities are undergirded by a diverse range of infrastructure networks including energy, water, wastewater, transportation, communication, and social infrastructures. These infrastructures plan a pivotal role in shaping sustainable and resilient futures for people living in urban regions and beyond. This seminar offers an immersive exploration of sustainable infrastructures with a strong emphasis on theoretical inquiry and real-world application. Approaches to foster more sustainable and resilient forms of infrastructures and society will be introduced and evaluated. Throughout the course, you will engage in hands-on projects, site visits, and guest lectures by industry experts. You will have the chance to apply your knowledge in real-world contexts, addressing infrastructure challenges faced by communities and municipalities. By the end of the course, you will emerge with a comprehensive understanding of sustainable infrastructures, informed by both theory and practice. This knowledge will empower you to contribute meaningfully to the development of a more sustainable, resilient, and equitable future.

Level Registration Restrictions: Must be enrolled in one of the following Levels: Graduate.

Course Attributes: SF

Repeatability: This course may not be repeated for additional credits.

GUS 5010. Special Topics in GUS. 3 Credit Hours.
Variable content; see graduate chair for specific details.

Level Registration Restrictions: Must be enrolled in one of the following Levels: Graduate.

Repeatability: This course may be repeated for additional credit.

GUS 5014. Urban Social Geography. 3 Credit Hours.
The course acquaints students with social and cultural understandings of urban space in the U.S. city. Students are asked to use photography to explore how geography grounds itself on the landscape.

Level Registration Restrictions: Must be enrolled in one of the following Levels: Graduate.

Repeatability: This course may not be repeated for additional credits.

GUS 5015. Land Use Planning. 3 Credit Hours.
This course is an examination of the forces that influence land use planning in and around American metropolitan regions. It considers economic perspectives (land values); public interest perspectives (zoning subdivision, housing and building codes, redevelopment and renewal programs, etc.); and social perspectives of land use. Also examined are separate housing, commercial locations, and industrial development.

Level Registration Restrictions: Must be enrolled in one of the following Levels: Graduate.

Repeatability: This course may not be repeated for additional credits.

GUS 5017. Health and Environment Seminar. 3 Credit Hours.
This course addresses the relationship between community-level characteristics, such as neighborhood socioeconomic disadvantage, with health outcomes, with an emphasis on health behaviors such as substance use, exercise, and healthy eating. Access to resources such as health services and nutritious food will be examined, as will exposure to harmful or risky environmental conditions that can promote disease. A methodological focus will address how environmental influences on health is analyzed, as well as how individual-level characteristics such as age, sex, race/ethnicity, and peer and family relationships may moderate such influences. The role of community level factors in health disparities will also be examined.

Level Registration Restrictions: Must be enrolled in one of the following Levels: Graduate.

Repeatability: This course may not be repeated for additional credits.

GUS 5018. Economic Development and Planning Cities. 3 Credit Hours.

The focus is on the causes of economic decline in American cities, history of governmental policies to promote urban economic development, and major tools available to local economic planners, with special emphasis on the political issues of who controls the programs and who reaps the benefits.

Level Registration Restrictions: Must be enrolled in one of the following Levels: Graduate.

Repeatability: This course may not be repeated for additional credits.

GUS 5021. International Urbanization. 3 Credit Hours.

This course examines urbanization around the world. The focus may include issues of rapidly industrializing areas, as well as postcolonial and transition societies. Students address topics related to the effects of rapid social and spatial change in a variety of settings. They also examine the problems of providing housing and urban infrastructure in rapidly urbanizing areas, as well as the social and cultural tensions related to urban change.

Level Registration Restrictions: Must be enrolled in one of the following Levels: Graduate.

Repeatability: This course may not be repeated for additional credits.

GUS 5022. Climate Justice. 3 Credit Hours.

This course will examine climate justice through several different lenses. First, it will consider climate justice as geographically distributed, meaning we will explore the unevenness of the production and impacts of climate change. This part of the course will be heavily case-study based. Second, we will think about climate justice as a movement. We will want to know exactly what concept of justice might make sense given the complexity of climate change, but also what shape the climate justice movement will have to take to enact such a notion of justice. This course will thus bring together earth science, policy, politics, economics and geography to better understand how climate justice might be molded to better address the case studies we cover early in the semester.

Level Registration Restrictions: Must be enrolled in one of the following Levels: Graduate.

Course Attributes: SF

Repeatability: This course may not be repeated for additional credits.

GUS 5023. Police, Prisons and Pollution. 3 Credit Hours.

In 2001, a group of farmworkers, environmental justice activists and anti-prison organizers in California held a conference called "Joining Forces: Environmental Justice and the Fight against Prison Expansion." The goal was to interrogate prisons as forms of environmental racism and injustice and to build coalitions between the anti-prison and environmental justice movements. This course takes as a starting point an insight made by a group of youth participants at that conference: that the greatest threats to their communities constituted "three Ps," police, prisons and pollution. We will explore critical texts and organizing surrounding police, prisons and pollution. How do struggles for environmental justice intersect with organizing against police and prisons? How are racial and class disparities heightened through overlapping geographies of policing, incarceration and environmental pollution? How do policing and imprisonment operate as environmental toxins themselves, much like pesticides and greenhouse gas emissions? What insights for your own work can you gain from abolitionist organizing and scholarship?

Level Registration Restrictions: Must be enrolled in one of the following Levels: Graduate.

Course Attributes: SF

Repeatability: This course may not be repeated for additional credits.

GUS 5028. Environmental Impact Assessment. 3 Credit Hours.

In this course you will learn about the environmental review process and the methods of environmental impact assessment (EIA). During the course of your environmental careers, you may be expected to conduct, reference, evaluate or otherwise incorporate EIA into your work. We will discuss the history and importance of environmental review, the affected environment considered, methods and criteria used for evaluating impact and measures that can be implemented to avoid, minimize or mitigate adverse impacts. We will also discuss recent changes and proposed changes to the National Environmental Policy Act, the importance of agency coordination and public involvement to the environmental review process, and the consideration of climate change and equity in environmental impact assessment.

Level Registration Restrictions: Must be enrolled in one of the following Levels: Graduate.

Course Attributes: SF

Repeatability: This course may not be repeated for additional credits.

GUS 5031. GIS Programming. 3 Credit Hours.
Building on previous coursework with Geographic Information Systems (GIS), students will learn computer programming in a GIS environment. Students will design and execute spatial data management and spatial analysis projects using automated geoprocessing functions available in the built-in scripting languages of prominent GIS software packages, with an emphasis on the Python programming language. Students will learn programming concepts such as variable typing, function definition, conditional evaluation, looping, and object-oriented programming. The course will also introduce geospatial programming strategies independent of any specific GIS software.

Level Registration Restrictions: Must be enrolled in one of the following Levels: Graduate.

Repeatability: This course may not be repeated for additional credits.

Pre-requisites: Minimum grade of B- in GUS 5062.

GUS 5032. Geosimulation. 3 Credit Hours.
Geosimulation (or spatial simulation) "is a catch-all phrase" that can be used to represent an emerging stream of spatially-explicit simulation models, often being computationally intensive. Developed at the confluence of geographic information science and computer science, geosimulation incorporates different computational systems such as cellular automata (CA) and agent-based modeling (ABM). This course will explore the conceptual, developmental, implementational, and evaluation aspects of these different simulation modeling systems. We primarily focus on cellular automata, agent-based systems, neural networks, and expert systems using geographical data, (hence spatially-explicit models). Simulation models developed using these techniques are used to investigate patterns and processes of complex systems in different topical areas such as urban growth, climate change, migration, birds and animal movements, environmental health, and conservation. This course builds upon the concepts introduced in Fundamentals of GIS, GIS Programming and other GIS courses offered by the department. The course structure will consist of lecture, class discussion, and lab activities. Students will be expected to read academic and professional literature and to actively participate in and lead class discussions. Students will also be expected to develop a final project on geosimulation modeling topic. Preferably, they will develop and implement a CA or ABM model of their own.

Level Registration Restrictions: Must be enrolled in one of the following Levels: Graduate.

Repeatability: This course may not be repeated for additional credits.

Pre-requisites: Minimum grade of B- in GUS 5062 and GUS 5031.

GUS 5033. Urban Analytics. 3 Credit Hours.
With the increase of data availability and the computing power together with advanced data analytics, the data driven approach becomes a more objective and scientific way for us to understand the urban system for solving the social, economic, and environmental challenges in cities. Knowledge and skills for collecting and analyzing urban spatial data become an essential skill for urban researchers. This course will teach students the concepts, techniques, and analytical methods for urban analytics. Methods for collecting, storing, processing, analyzing, and visualizing various types of urban data using programming will be taught in this course. Examples of real urban analytics applications will be introduced in this course in order for students to get the practical skills in handling urban spatial data. The course is designed for students who have programming experience and want to reinforce the knowledge and skills and learn advanced topics in urban informatics and urban data analytics for solving urban issues. This course includes lectures and lab exercises. The knowledge and skills learned in this course further prepare students for an emerging career in smart city, data science, GIS, urban planning, and environmental management.

Level Registration Restrictions: Must be enrolled in one of the following Levels: Graduate.

Course Attributes: SF

Repeatability: This course may not be repeated for additional credits.

Pre-requisites: Minimum grade of B- in GUS 5062.

GUS 5034. Applied Machine Learning for Spatial Analysis. 3 Credit Hours.

Machine Learning (ML) is a branch of artificial intelligence that enables computer systems to learn from data and improve their predictive capacity without explicit human intervention. ML algorithms are growingly being applied to solve complex spatial problems due to their ability to efficiently process large, high-dimensional datasets, improve predictive capacity and reveal hidden patterns in data. This course provides conceptual foundations, methods and analytical skills for the application of broadly used machine learning methods to geospatial analysis. The course will enable students to become familiar with basic definitions, conceptual foundations and applications of different machine learning methods. Students will become familiar with the main steps related to the conception, development, evaluation and interpretation of predictive models using machine learning methods. Students will also learn basic computer programming skills for spatial data integration and their use for the calibration and evaluation of spatial machine learning models. Students who took GUS 5074: Applied Machine Learning for Spatial Analysis may not take this course for additional credit.

Level Registration Restrictions: Must be enrolled in one of the following Levels: Graduate.

Repeatability: This course may not be repeated for additional credits.

Pre-requisites: Minimum grade of B- in (GUS 3062 or GUS 5062) and GUS 5161.

GUS 5041. Sustainable Natural-Human Systems. 3 Credit Hours.

This course provides the scientific basis and theoretical background for understanding the most essential challenges to address sustainability in natural-human systems. The course will provide knowledge about theories, conceptual frameworks and research methods to understand and appreciate the interactions and co-dependencies between human and natural systems. The course will also introduce students to the main global research and policy agendas to understand and address sustainability in natural-human systems.

Level Registration Restrictions: Must be enrolled in one of the following Levels: Graduate.

Course Attributes: SF

Repeatability: This course may not be repeated for additional credits.

GUS 5042. Climate Change and Security. 3 Credit Hours.

Climate change is widely understood by a range of state and non-state actors to pose significant security risks, but the relationship between climate change and security is much more complex than simple cause and effect. Researchers from diverse fields are actively engaged with questions about what kinds of security are threatened by climate change and through what mechanisms. For example, will severe drought lead to violent conflict? What are the consequences of viewing a problem as a livelihood versus national security risk? Who are the winners and losers of climate change-based security interventions? This course orients students to the evolving debate on the relationship between climate change and its impacts on national, human, and environmental security.

Level Registration Restrictions: Must be enrolled in one of the following Levels: Graduate.

Course Attributes: SF

Repeatability: This course may not be repeated for additional credits.

GUS 5043. Black Geographies. 3 Credit Hours.

This course explores theoretical and methodological advances made by the interdisciplinary field of Black geographies. Texts and discussions will draw on the discipline of geography along with theorizing from Black studies, Black feminism, queer studies, anthropology, sociology, and political science to highlight how erasures, exclusions, and exploitations of Black people have structured historical and current world conditions. The course will center lessons from Black knowledges, radical struggles, and everyday life practices as a guide for scholarship and action aimed toward reshaping a new, more just world.

Level Registration Restrictions: Must be enrolled in one of the following Levels: Graduate.

Repeatability: This course may not be repeated for additional credits.

GUS 5044. Urban Housing. 3 Credit Hours.

An overview of the economic, social, physical, and political forces that have molded the present urban housing stock is provided. Also examined are the implications of present urban housing stock, implications of present trends for the future, and the development of rational housing policies, emphasizing the Philadelphia metropolitan area.

Level Registration Restrictions: Must be enrolled in one of the following Levels: Graduate.

Repeatability: This course may not be repeated for additional credits.

GUS 5045. Urban Public Spaces. 3 Credit Hours.
This course will explore the role that public spaces, such as parks and libraries, play in cities today. We will evaluate what makes a space "public" and will examine the social, economic, environmental, and health dimensions of urban public spaces and the factors that moderate how equitably the benefits and costs of public spaces are distributed across urban neighborhoods. The goal of the course is to use key theories from different disciplinary perspectives to evaluate the opportunities and limitations of public spaces.

Level Registration Restrictions: Must be enrolled in one of the following Levels: Graduate.

Course Attributes: SF

Repeatability: This course may not be repeated for additional credits.

GUS 5051. Environmental Hazards and Disasters. 3 Credit Hours.
Natural and technological hazards are the focus for this course. We review the evolution of theoretical and applied conceptualizations of "hazard" and hazard vulnerability, examine the human dimensions of the resultant hazardscapes, and look to past, present, and anticipated "cases on the ground." Our emphasis is on geographical approaches, but this can be read as a broadly interdisciplinary perspective, as is typical of most geographical analysis. Among the varied issues we may take up are metropolitan impacts of climate change, coastal vulnerability, nuclear hazards, seismic threats, and public health threats associated with disease, hunger, and nutrition. Global, as well as U.S. and local perspectives, are integral to the course.

Level Registration Restrictions: Must be enrolled in one of the following Levels: Graduate.

Course Attributes: SF

Repeatability: This course may not be repeated for additional credits.

GUS 5052. Fundamentals of Sustainability Science and Environmental Justice. 3 Credit Hours.
How can we apply science to promote intergenerational equity in the face of global environmental change? This graduate-level course provides a transdisciplinary introduction to sustainability science, exploring the complex interactions between human and environmental systems. Students will become acquainted with the key concepts, issues, and debates of this integrative field to apply a systems-thinking approach to solve real-world sustainability problems.

Level Registration Restrictions: Must be enrolled in one of the following Levels: Graduate.

Course Attributes: SF

Repeatability: This course may not be repeated for additional credits.

GUS 5054. Energy, Resources and Society: An Interdisciplinary Approach. 3 Credit Hours.
Despite the importance and ubiquity of "energy" in contemporary debates, the complicated relationship between energy and society, along with its inherent contradictions, is often oversimplified. Plans to replace fossil fuels with electricity come not only at a high ecological cost, as electrical equipment can spark catastrophic fires, but also challenges long-held cultural practices, identities, and norms for many communities; energy development remains a geopolitical project that is intimately connected to war and nation building; and both the benefits of new energy investments and their detrimental environmental effects are unevenly distributed. Moreover, the materiality of energy systems often serves as an undue barrier to its social study. The goal of this course is to give students the broad tools to think critically about energy and society, and its relationship to everyday life.

Level Registration Restrictions: Must be enrolled in one of the following Levels: Graduate.

Course Attributes: SF

Repeatability: This course may not be repeated for additional credits.

GUS 5056. Political Ecology. 3 Credit Hours.
Political ecology is an integrated, interdisciplinary approach to the study of human-nature relations. This course examines resource use, the construction of landscapes, questions of structure-agency, and definitions of "nature" and "development." We study cases at a variety of spatial scales and settings, and include examples from industrialized countries as well as non-industrialized regions. Topics are diverse, ranging from subsistence fishing to access to green spaces in cities. The critical roles of the state, non-governmental organizations, and individual actors in shaping social, political, and economic landscapes are considered.

Level Registration Restrictions: Must be enrolled in one of the following Levels: Graduate.

Repeatability: This course may not be repeated for additional credits.

GUS 5059. Politics of Water. 3 Credit Hours.
Despite decades of scientific research and policy action aimed at managing water resources equitably and sustainably, it remains that the world's water resources continue to be severely polluted, pose grave hazards to lives and infrastructure, and be obstinately unevenly distributed in space and time. Moreover, an estimated four billion people experience severe water scarcity for at least one month every year. Although such challenges have long been approached with technical expertise (e.g., hydro-engineering, economic models), this course examines the social and political dynamics that underpin these problems. This seminar examines key concepts, major approaches, and current debates regarding water governance in various regions of the world. Course topics include the privatization of water, water as a human right, and human vulnerability to water hazards. In viewing water provision and management as not solely a technical concern but as inherently political, the course seeks to provide a set of analytical tools that is both critical and constructive.

Level Registration Restrictions: Must be enrolled in one of the following Levels: Graduate.

Course Attributes: SF

Repeatability: This course may not be repeated for additional credits.

GUS 5061. Cartographic Production. 3 Credit Hours.
This course presents advanced approaches to design and production of thematic maps.

Level Registration Restrictions: Must be enrolled in one of the following Levels: Graduate.

Repeatability: This course may not be repeated for additional credits.

GUS 5062. Fundamentals of Geographical Information Systems. 3 Credit Hours.
This course prepares students with the knowledge necessary to effectively use GIS software packages, and covers fundamental principles such as spatial data models, database management systems, network modeling and geo-coding, and basic vector and raster operations.

Level Registration Restrictions: Must be enrolled in one of the following Levels: Graduate.

Repeatability: This course may not be repeated for additional credits.

GUS 5063. Remote Sensing. 3 Credit Hours.
This course introduces students to the most basic concepts and skills for downloading, exploring and processing satellite data for broad remote sensing applications. The course is designed to guide students through the most relevant steps required from acquisition to production for the application of remote sensing to agriculture, forestry, ecology and hydrology, as well as for characterizing and assessing changes in urban and rural landscapes and in seascapes. The course will include weekly lab sessions that will allow students to apply the concepts and procedures learned in class and improve their skills on the use and application of remote sensing information.

Level Registration Restrictions: Must be enrolled in one of the following Levels: Graduate.

Repeatability: This course may not be repeated for additional credits.

Pre-requisites: Minimum grade of C- in (GUS 3062, ENST 3062, or GUS 5062)

GUS 5065. Urban Geographical Information Systems. 3 Credit Hours.
Assuming basic familiarity with Geographic Information Systems, this course focuses on applying GIS techniques to the study of such processes as urban sprawl, socioeconomic change, and ecological functioning of urban regions.

Level Registration Restrictions: Must be enrolled in one of the following Levels: Graduate.

Repeatability: This course may not be repeated for additional credits.

Pre-requisites: Minimum grade of B- in GUS 5062.

GUS 5066. Environmental Applications of GIS. 3 Credit Hours.
Geographic Information Systems are widely used to investigate environmental processes and to develop solutions to environmental issues. This course will build upon concepts introduced in Fundamentals of GIS to investigate how the techniques, data, and interpretations from GIS analysis are applied across a variety of environmental fields. Topics to be covered include natural hazard vulnerabilities, global climate change, renewable energy potential, environmental health, and conservation. The course structure will consist of lecture, class discussion, and GIS-based lab activities. Students will be expected to read academic and professional literature and to actively participate in and lead class discussions. Students will also be expected to develop a final project on an environmental topic.

Level Registration Restrictions: Must be enrolled in one of the following Levels: Graduate.

Course Attributes: SF

Repeatability: This course may not be repeated for additional credits.

Pre-requisites: Minimum grade of B- in GUS 5062.

GUS 5067. GIS and Location Analysis. 3 Credit Hours.
This course examines the concepts and techniques of location analysis - how to 1) describe the spatial arrangements of features on the earth's surface and 2) prescribe the best location or spatial arrangement of features for a particular activity - for economic and social service applications. The course introduces concepts in Geographic Information Systems (GIS) and spatial statistics to address issues of location.

Level Registration Restrictions: Must be enrolled in one of the following Levels: Graduate.

Repeatability: This course may not be repeated for additional credits.

GUS 5068. Census Analysis with Geographical Information Systems. 3 Credit Hours.
Students gain an understanding of U.S. census geography and tabular data through the use of GIS. Activities, discussions, and lectures familiarize students with U.S. Census Bureau data, while lab assignments and exercises provide experience using GIS to analyze real world problems. By the end of the semester, students will have learned a variety of advanced GIS techniques and be able to make effective use of census data for academic research.

Level Registration Restrictions: Must be enrolled in one of the following Levels: Graduate.

Repeatability: This course may not be repeated for additional credits.

GUS 5069. GIS for Health Data Analysis. 3 Credit Hours.
Geographic Information Systems (GIS) has emerged as an essential tool for the analysis of health and disease data. This course provides an introduction to the most common geographic methods used for mapping and analyzing health disparities, disease risk factors, health services and geographic variation in health outcomes and disease. Through lecture and laboratory exercises students will learn how to create and edit spatial data, create disease maps, develop neighborhood-based measures, conduct geographic cluster detection and point pattern analysis, locate and map geographic health disparities, measure geographic access to health services, and critically assess potential study bias introduced from missing geographic data or positional accuracy.

Level Registration Restrictions: Must be enrolled in one of the following Levels: Graduate.

Repeatability: This course may not be repeated for additional credits.

GUS 5071. Health Geography. 3 Credit Hours.
This course offers an analysis of the factors responsible for the geographic patterns of disease, mortality, and health care services: the role of the environment in evaluating mortality and disease patterns. NOTE: This course was previously titled "Medical Geography." Students who complete this course under the new title will not receive additional credit.

Level Registration Restrictions: Must be enrolled in one of the following Levels: Graduate.

Repeatability: This course may not be repeated for additional credits.

GUS 5072. Advanced Remote Sensing. 3 Credit Hours.
This hands-on course will provide skills and knowledge for the effective and efficient processing and analysis of satellite data for advanced applications with emphasis in the application of remote sensing for detecting and monitoring socio-environmental changes. The course will include a semester-long project where students will apply the concepts and procedures learned to their own research or a particular topic of their interest. Students will learn programming skills for effective and efficient processing of remote sensing data.

Level Registration Restrictions: Must be enrolled in one of the following Levels: Graduate.

Repeatability: This course may not be repeated for additional credits.

Pre-requisites: Minimum grade of C- in (GUS 3063, ENST 3063, GUS 5063, EES 3011, or EES 5011)

GUS 5073. Geovisualization. 3 Credit Hours.
Maps can be powerful devices for communication, but also tools for exploration of relationships among social and physical processes manifesting in space. This computer-intensive course will focus on this dual purpose of maps as tools for visual communication and visual thinking. You will create data-driven products that combine geographic and statistical visualizations for static, interactive, and animated display. Previous experience with a programming language will be helpful. A previous course in cartography is recommended but not required. Heavy emphasis on open source tools.

Level Registration Restrictions: Must be enrolled in one of the following Levels: Graduate.

Repeatability: This course may not be repeated for additional credits.

Pre-requisites: Minimum grade of C- in (GUS 3161 or GUS 5161)

GUS 5075. Regional Development. 3 Credit Hours.
This course examines the transformations, beginning with the European expansion 500 years ago, that have, to a large extent, created the regional variation we see today. Theoretical approaches to understanding "modernization" and "development" are considered. This foundation is then built on to look at the historic factors that have shaped different parts of the world. Examined are the political, economic, social, spatial, and environmental processes that have shaped those countries that share a colonial past (our primary focus) as well as North America, Asia, Japan, and Eastern Europe.

Level Registration Restrictions: Must be enrolled in one of the following Levels: Graduate.

Repeatability: This course may not be repeated for additional credits.

GUS 5096. Field Methods in Environmental Justice. 3 Credit Hours.
Local urban environmental problems are considered by members of the class in research teams, with a view toward seeking possible solutions.

Level Registration Restrictions: Must be enrolled in one of the following Levels: Graduate.

Course Attributes: SF

Repeatability: This course may not be repeated for additional credits.

GUS 5097. Race, Class, Gender in Cities. 3 Credit Hours.
This research seminar examines the spatial dimensions of metropolitan inequality, focusing on how inequality is perpetuated along race, class, and gender lines. Topics include urban growth politics, zoning and land use planning, domestic architecture, racial segregation, poverty, and homelessness. Students design a research proposal based on course materials.

Level Registration Restrictions: Must be enrolled in one of the following Levels: Graduate.

Repeatability: This course may not be repeated for additional credits.

GUS 5159. Geographic Inquiry. 3 Credit Hours.
This course familiarizes students with the theoretical, conceptual, and methodological debates underlying the use of spatial analysis in the social sciences. Students explore how place, space, and scale are conceptualized and utilized to examine urban processes as well as different approaches to spatial representation, including visual, mathematical, digital, and cognitive.

Level Registration Restrictions: Must be enrolled in one of the following Levels: Graduate.

Repeatability: This course may not be repeated for additional credits.

GUS 5161. Statistics for Urban Spatial Analysis. 3 Credit Hours.
This course provides an introduction to statistical analysis of spatial phenomena and processes with an emphasis on urban applications using a variety of economic, demographic, health, crime, and environmental data sets. The course covers the basic principles of sampling, probability, and tests of significance; spatial exploratory data analysis (SEDA); measures of association; ordinary least squares regression; and factor, principal component, and cluster analysis.

Level Registration Restrictions: Must be enrolled in one of the following Levels: Graduate.

Repeatability: This course may not be repeated for additional credits.

GUS 5162. Advanced Statistics for Urban Applications. 3 Credit Hours.
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.

Level Registration Restrictions: Must be enrolled in one of the following Levels: Graduate.

Repeatability: This course may not be repeated for additional credits.

Pre-requisites: GUS 5161.

GUS 5163. Qualitative Methods. 3 Credit Hours.
This course is designed to foster an understanding of the principles and appropriate application of qualitative methods in Urban Studies. It provides an overview of qualitative research design and emphasizes the connections between grounded theory, explorative inquiry, and thick description. Specific skills that are introduced include participant observation, in-depth and open-ended interviewing, oral histories, case study analysis, focus groups, narrative analysis, content analysis, archival analysis, and social action methods. The course examines the limitations and advantages of qualitative approaches, triangulation with quantitative methods, and ethical issues in conducting research.

Level Registration Restrictions: Must be enrolled in one of the following Levels: Graduate.

Repeatability: This course may not be repeated for additional credits.

GUS 5165. Community Based Program Evaluation. 3 Credit Hours.
The course focuses on how to design and conduct evaluation plans that are useful for improving community-based human service and educational programs, as well as the challenges encountered in conducting evaluations in real world settings. A major emphasis is on the various methods and issues involved in conceptualizing, planning, conducting, and utilizing program evaluations. Among the topics covered are logic models and program theory, evaluability assessment, needs assessment, and process and outcome evaluation design.

Level Registration Restrictions: Must be enrolled in one of the following Levels: Graduate.

Repeatability: This course may not be repeated for additional credits.

GUS 5221. Land System Science. 3 Credit Hours.
This course will provide scientific and theoretical foundations, and practical applications of land system science. The course will include a description of the main theories and conceptual frameworks used to understand complex interactions between human decisions and ecological processes that derive into changes in the land system. The course also explores the sustainability implications of such changes for biodiversity conservation and people's well-being across different locations and scales. Students will become familiar with available technologies for monitoring, modeling and predicting land system change. The course will also draw on concepts and techniques from landscape ecology, land system modeling and scenario building to teach students how to assess social and ecological consequences of land system change and to inform land use decisions.

Level Registration Restrictions: Must be enrolled in one of the following Levels: Graduate.

Course Attributes: SF

Repeatability: This course may not be repeated for additional credits.

GUS 5304. Food Studies. 3 Credit Hours.
This course introduces students to key issues in food systems from a geographical and environmental perspective. The course begins with an overview of what constitutes a food system and critically examines agricultural transitions that took place over the last century, including the erasure of nondominant rural imaginaries. After, the course turns to look at issues of food security, access and control, focusing our attention to the question of how to produce more just food systems. We end with an exploration in critical nutrition and food-body relationships.

Level Registration Restrictions: Must be enrolled in one of the following Levels: Graduate.

Repeatability: This course may not be repeated for additional credits.

GUS 5307. Transportation and Culture. 3 Credit Hours.
Students will learn to approach the modern geography of transportative possibility from a critical standpoint. Rather than accepting this contemporary geography as being the outcome of supposedly "superior" transport technologies' rendering marginalized technologies obsolete, students will examine how processes of cultural and political struggle have shaped, opened up, and in some cases limited the modern array of possibilities for human mobility. Waterborne, animal-based, and human-powered modes of transportation will receive special attention, as will ongoing debates and struggles over automobile planning and urban mass transit. The history of transportation will be presented as necessarily entangled with parallel histories of public protest, political struggle, emergency logistics, human-animal relations, and environmental geography. The course readings will look at many parts of the world.

Level Registration Restrictions: Must be enrolled in one of the following Levels: Graduate.

Course Attributes: SI

Repeatability: This course may not be repeated for additional credits.

GUS 8006. Geographic Thought. 3 Credit Hours.
This course reviews current concepts and methods used in geographic and urban interdisciplinary research. The major goals are to have students trace the pedigree of their research interests and develop a bibliography of essential readings.

Level Registration Restrictions: Must be enrolled in one of the following Levels: Graduate.

Repeatability: This course may not be repeated for additional credits.

GUS 8010. Geographic Inquiry. 3 Credit Hours.
Level Registration Restrictions: Must be enrolled in one of the following Levels: Graduate.

Repeatability: This course may not be repeated for additional credits.

GUS 8011. History and Theory of Urban Studies. 3 Credit Hours.
This course provides students with the foundational knowledge to pursue graduate studies in the interdisciplinary field of Urban Studies. It surveys the historical and philosophical bases of contemporary urban studies and provides an introduction to contemporary explanatory frameworks and associated critiques in the social sciences.

Level Registration Restrictions: Must be enrolled in one of the following Levels: Graduate.

Repeatability: This course may not be repeated for additional credits.

GUS 8016. Public Policy for Urban Regions. 3 Credit Hours.
This course introduces students to the major policy approaches used to sustain and develop cities and regions in the United States and beyond - i.e., direct government intervention, market models, and third sector institutions. The course examines the changes brought about by globalization in the scope and function of governments, including regulatory regimes and privatization of services and infrastructure. Students analyze the consequences of different policy approaches for social equity, environmental sustainability, and economic growth.

Level Registration Restrictions: Must be enrolled in one of the following Levels: Graduate.

Course Attributes: SI

Repeatability: This course may not be repeated for additional credits.

GUS 8021. Geography of Urban Services. 3 Credit Hours.
The course provides an analysis of concepts basic to understanding spatial service patterns and emphasizes use of models in service area delineation.

Level Registration Restrictions: Must be enrolled in one of the following Levels: Graduate.

Repeatability: This course may not be repeated for additional credits.

GUS 8031. Critical Issues in Globalization, Sustainability, and Social Justice. 3 Credit Hours.
This course explores the theories, facts, and debates related to globalization, sustainability, and social justice, the themes that are critical to understanding contemporary urban conditions and dynamics. It provides students with an overview of a wide range of issues, in a number of U.S. and international settings, and at several spatial scales. The material is foundational for making decisions on research topics.

Level Registration Restrictions: Must be enrolled in one of the following Levels: Graduate.

Course Attributes: SF

Repeatability: This course may not be repeated for additional credits.

GUS 8033. Urban Economic and Spatial Structure. 3 Credit Hours.
This course provides an introduction to the analysis of urban economic and spatial structure. Key ideas from urban economic theory (comparative advantage, scale economies, location economies, urbanization economies, clustering, increasing returns) are introduced. They are combined with key ideas from trade theory (transportation cost and globalization) and the impact of federal, state, and local government policies on creating and changing internal structures of cities and their consequences for access and distribution in fragmented metropolises.

Level Registration Restrictions: Must be enrolled in one of the following Levels: Graduate.

Repeatability: This course may not be repeated for additional credits.

GUS 8043. Seminar on Homelessness in America. 3 Credit Hours.
This course explores various issues relating to homelessness, with a focus on public policy and research. A dominant theme is how public policy decisions have contributed to this problem. Topics are the experience of being homeless, the epidemiology of homelessness, structural and individual theories of homelessness, the history of homelessness in the United States, substance abuse and mental illness among the homeless, homeless women and children, homelessness in Philadelphia, and public policies needed to address the problem.

Level Registration Restrictions: Must be enrolled in one of the following Levels: Graduate.

Repeatability: This course may not be repeated for additional credits.

GUS 8045. Poverty and Employment. 3 Credit Hours.
The course examines the relationships among the globalization of the economy, economic restructuring, metropolitan labor markets, and poverty focusing on contemporary U.S. cities. It evaluates theoretical and public policy debates about employment and poverty. Particular attention is paid to how class, gender, and racial inequities are reproduced in the urban economy.

Level Registration Restrictions: Must be enrolled in one of the following Levels: Graduate.

Repeatability: This course may not be repeated for additional credits.

GUS 8047. Comparative Urban History. 3 Credit Hours.
The course reviews methodological tools for comparative readings and research on the history of cities, across cultural and chronological boundaries.

Level Registration Restrictions: Must be enrolled in one of the following Levels: Graduate.

Repeatability: This course may not be repeated for additional credits.

GUS 8050. Environmental Seminar. 3 Credit Hours.
This course examines the ecological consequences of contemporary economic development. Focus is on countries at the low end of the developmental scale in Latin America, Africa, and South Asia. The course illustrates through case studies how changes in the relations of production give rise to increasing degradation of resources.

Level Registration Restrictions: Must be enrolled in one of the following Levels: Graduate.

Course Attributes: SF

Repeatability: This course may be repeated for additional credit.

GUS 8055. Sustainable Cities. 3 Credit Hours.
This course introduces the concept of sustainability and explores environmental problems linked to urbanization, drawing on historical analysis, social theory, landscape ecology, and city planning/design practice. Primary topics covered include social and economic drivers of urban development and suburban sprawl; the principle of carrying capacity; the measurement of landscape-scale ecological function (e.g., habitat fragmentation); and the use of decision support tools to generate alternative policy scenarios for urban sustainability planning.

Level Registration Restrictions: Must be enrolled in one of the following Levels: Graduate.

Course Attributes: SF

Repeatability: This course may not be repeated for additional credits.

GUS 8061. Big GeoSpatial Data. 3 Credit Hours.
In Big data era, knowledge and skills for collecting and analyzing big spatial data become an essential skill for spatial data scientists. This course will teach students the concepts, techniques, and analytical methods for big spatial data. Methods for storing, processing, analyzing, and visualizing various types of big spatial data using cloud computing and advanced Python programming will be taught in this course. Examples of real big spatial data applications will be introduced in this course in order for students to get the practical skills in handling big spatial data. The course is designed for students who have programming experience or have finished GUS 5031 (GIS Programming) previously and want to reinforce the programming skills and learn advanced computing skills for solving big geospatial data problems. This course includes lectures and lab exercises. The knowledge and skills learned in this course further prepare students for an emerging career of Spatial Data Science.

Level Registration Restrictions: Must be enrolled in one of the following Levels: Graduate.

Repeatability: This course may not be repeated for additional credits.

Pre-requisites: Minimum grade of B- in GUS 5031.

GUS 8065. Cartographic Design. 3 Credit Hours.
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.

Level Registration Restrictions: Must be enrolled in one of the following Levels: Graduate.

Repeatability: This course may not be repeated for additional credits.

GUS 8066. Application Development for Geographic Information Systems. 3 Credit Hours.
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.

Level Registration Restrictions: Must be enrolled in one of the following Levels: Graduate.

Repeatability: This course may not be repeated for additional credits.

Pre-requisites: Minimum grade of B- in GUS 5062 and GUS 5031.

GUS 8067. Spatial Database Design. 3 Credit Hours.
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.

Level Registration Restrictions: Must be enrolled in one of the following Levels: Graduate.

Repeatability: This course may not be repeated for additional credits.

Pre-requisites: Minimum grade of B- in GUS 5062.

GUS 8068. Web Mapping and Map Servers. 3 Credit Hours.
In this course, students will explore theoretical and practical concepts of Web GIS (Internet GIS). From a theoretical perspective they will study about advantages and techniques for publishing, visualizing and accessing maps on the Internet including architecture of Web GIS/Web mapping systems, markup languages (e.g. HTML, XML, SVG and GML), a scripting language, screen cartography, data sharing and geoportals, spatial web services and OGC standards. From a practical perspective they will learn to develop Web GIS/Web mapping applications including static and interactive web mapping systems. They will also learn and work with some famous open source software and libraries for developing a Web GIS.

Level Registration Restrictions: Must be enrolled in one of the following Levels: Graduate.

Repeatability: This course may not be repeated for additional credits.

Pre-requisites: Minimum grade of B- in GUS 5062.

GUS 8069. GIS Ethics and Professional Practice. 3 Credit Hours.
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.

Level Registration Restrictions: Must be enrolled in one of the following Levels: Graduate.
Degree Restrictions: Must be enrolled in one of the following Degrees: Prof Science Masters.

Repeatability: This course may not be repeated for additional credits.

Pre-requisites: Minimum grade of B- in GUS 5062.

GUS 8097. Research Design. 3 Credit Hours.
The goals of this course are to provide students with an understanding of the basic concepts underlying different spatial approaches to research design and analysis. The course emphasizes fundamentals of designing investigations using a variety of methods and data to better understand urban processes, problems, and topics. Students learn to critically evaluate and conduct research, formulate meaningful research questions, design studies using different research methods, and develop a rigorous research proposal.

Level Registration Restrictions: Must be enrolled in one of the following Levels: Graduate.

Repeatability: This course may not be repeated for additional credits.

GUS 8113. Community-Based Research. 3 Credit Hours.
This course deals with applied, empirical research experience on issues affecting communities, often in the Philadelphia region. Students conduct research projects in collaboration with community organizations working for a more sustainable future. The course includes the study of contemporary environmental issues, broadly defined, and training in ethical community partnerships, research methods, applied research techniques, report writing, and engaging in community-driven research.

Level Registration Restrictions: Must be enrolled in one of the following Levels: Graduate.

Course Attributes: SF

Repeatability: This course may not be repeated for additional credits.

GUS 8985. Teaching in Higher Education: Social Sciences. 3 Credit Hours.
Level Registration Restrictions: Must be enrolled in one of the following Levels: Graduate.

Repeatability: This course may not be repeated for additional credits.

GUS 9082. Independent Study: Geography and Urban Studies. 1 to 3 Credit Hour.
Level Registration Restrictions: Must be enrolled in one of the following Levels: Graduate.

Repeatability: This course may be repeated for additional credit.

GUS 9083. Readings in Geography. 3 Credit Hours.
Level Registration Restrictions: Must be enrolled in one of the following Levels: Graduate.

Repeatability: This course may be repeated for additional credit.

GUS 9085. Internship in Geography and Urban Studies. 3 Credit Hours.
The internship provides on-the-job training for graduate students with local consulting firms, planning commissions, community organizations, and various state, local, and federal government agencies in the Philadelphia metropolitan area.

Level Registration Restrictions: Must be enrolled in one of the following Levels: Graduate.

Repeatability: This course may be repeated for additional credit.

GUS 9086. Internship Paper. 1 to 6 Credit Hour.
Students complete a summary paper that is based on their experience in the field.

Level Registration Restrictions: Must be enrolled in one of the following Levels: Graduate.

Repeatability: This course may be repeated for additional credit.

GUS 9087. Mapping Practicum I. 3 Credit Hours.
Students are assigned cartographic projects and encouraged to plan, design, and execute them for faculty and those from outside firms and planning agencies.

Level Registration Restrictions: Must be enrolled in one of the following Levels: Graduate.

Repeatability: This course may be repeated for additional credit.

GUS 9187. GIS Capstone. 3 Credit Hours.
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.

Level Registration Restrictions: Must be enrolled in one of the following Levels: Graduate.

Repeatability: This course may not be repeated for additional credits.

Pre-requisites: Minimum grade of B- in GUS 5062.

GUS 9188. Sustainability Capstone. 1 to 3 Credit Hour.
The Sustainability Capstone course provides an experiential and industry-relevant learning experience for students matriculated in the Professional Science Master's (PSM) in Sustainability program at Temple University. Students will engage in a structured internship experience (46-140 hours during the term), identified with the guidance of the PSM faculty at Temple and a prospective employer. The student will complete a sustainability-oriented project during the internship that draws on their knowledge and skills gained in the program and their primary interest. The completed capstone project will include a mutually agreed upon deliverable to the employer and a public presentation.

Level Registration Restrictions: Must be enrolled in one of the following Levels: Graduate.

Course Attributes: SF

GUS 9991. Master's Research Paper. 3 Credit Hours.
Students develop a high-quality research paper on a topic of their choice. Students connect the development of their paper to their work within a specific course as a means of facilitating their project. Students also work with an individual advisor to develop the content, implement the project design, and approve the final paper.

Level Registration Restrictions: Must be enrolled in one of the following Levels: Graduate.

Repeatability: This course may be repeated for additional credit.

GUS 9994. Doctoral Qualifying Examination. 1 Credit Hour.
Preparation for the preliminary examination.

Level Registration Restrictions: Must be enrolled in one of the following Levels: Graduate.

Repeatability: This course may be repeated for additional credit.

GUS 9996. Masters Research. 1 to 6 Credit Hour.
Level Registration Restrictions: Must be enrolled in one of the following Levels: Graduate.

Repeatability: This course may be repeated for additional credit.

GUS 9998. Dissertation Proposal. 1 to 3 Credit Hour.
Preparation of the dissertation proposal in consultation with the primary dissertation supervisor.

Level Registration Restrictions: Must be enrolled in one of the following Levels: Graduate.

Repeatability: This course may be repeated for additional credit.

GUS 9999. Dissertation Research. 1 to 6 Credit Hour.
After passing the Qualifying Exam, continuous registration in 9999 during the Fall and Spring semesters is required until the dissertation is successfully defended. One credit is the minimum required each semester after the proposal defense and while the student is researching and writing the dissertation. A minimum of 2 s.h. of GUS 9999 must be taken before one can secure the PhD degree.

Level Registration Restrictions: Must be enrolled in one of the following Levels: Graduate.
Student Attribute Restrictions: Must be enrolled in one of the following Student Attributes: Dissertation Writing Student.

Repeatability: This course may be repeated for additional credit.