MASTER OF URBAN SPATIAL ANALYTICS (MUSA)

MUSA 500 Spatial Statistics and Data Analysis
This hands-on course will provide an introduction to statistical methods and will serve as a prequel to ESE502. Topics covered will include exploratory univariate analysis, correlation and Chi-square analysis, t-tests and ANOVA. Non-parametric alternatives to the standard tests will be discussed. OLS regression, including assumptions and diagnostics, will be covered in detail. Heavy emphasis will be placed on the application of each method covered. The course will conclude with an introduction to spatial statistical methods and a brief overview of linear algebra and matrix notation for OLS and spatial regression. Students will learn to use JMP-IN, ArcGIS and GeoDa for data analysis.
Taught by: Eugene Brusilovskiy
Course usually offered in fall term
Also Offered As: CPLN 671
Activity: Lecture
1.0 Course Unit

MUSA 501 Introduction to Applied Statistics
This hands-on course will provide an introduction to statistical methods and will serve as a prequel to ESE502. Topics covered will include exploratory univariate analysis, correlation and Chi-square analysis, t-tests and ANOVA. Non-parametric alternatives to the standard tests will be discussed. OLS regression, including assumptions and diagnostics, will be covered in detail. Heavy emphasis will be placed on the application of each method covered. The course will conclude with an introduction to spatial statistical methods and a brief overview of linear algebra and matrix notation for OLS and spatial regression. Students will learn to use JMP-IN, ArcGIS and GeoDa for data analysis.
Taught by: Brusilovskiy
Course usually offered in spring term
Activity: Lecture
1.0 Course Unit

MUSA 503 Modeling Geographical Objects
This course offers a broad and practical introduction to the acquisition, storage, retrieval, maintenance, use, and presentation of digital cartographic data with vector-oriented (i.e. drawing based) geographic information systems (GIS) for a variety of environmental science, planning, and management applications. Previous experience in GIS is not required.
Taught by: Tomlin or Hillier
Course usually offered in fall term
Also Offered As: CPLN 503
Activity: Lecture
1.0 Course Unit

MUSA 504 Business and Crime Geographics
In this hands-on course, students will learn how to use ESRI Business Analyst software and data to undertake real estate and social service market studies, business location studies, and consumer expenditure profiles. New this year, the course will also explore techniques and software for tracking and forecasting crime; and deploying police resources.
Taught by: Amos
Course usually offered in spring term
Prerequisites: Prior experience with ArcGIS.
Activity: Seminar
1.0 Course Unit

MUSA 505 Web-based Mapping
This hands-on course will teach students how to develop and implement web-and internet-based mapping tools and applications using ESRI’s ArcGIS Server and ArcGIS Online products as well as the GoogleMaps Applications Programming Interface (API). Students will learn how to use web-based tools to build spatial databases, analyze and display spatial data at multiple scales, mix web-based vector and raster data with image data, conduct spatial analysis and develop urban and environmental planning applications.
Taught by: Landis and Dailey
Course usually offered in spring term
Prerequisite: CPLN 670 / LARP 743
Activity: Laboratory
1.0 Course Unit

MUSA 507 Spatial Analysis for Urban and Environmental Planning
This course builds on prior knowledge of GIS and basic statistics to help students to develop GIS and spatial analysis applications for use in urban and environmental planning and management. Each weekly session will focus on a particular analytical approach (e.g., buffering, geo-processing, map algebra, network analysis) as applied to a particular urban or environmental planning tasks (e.g., identification of development opportunities, prioritizing conservation lands, urban growth modeling, housing price modeling). The format of the class includes weekly lectures/in-class demos; and weekly homework assignments. The course will make extensive use of ArcGIS and associate Extensions, especially Spatial Analyst, Network Analyst, and Business Analyst. One-year student versions of ArcGIS and ArcGIS extensions will be available free of charge at the City Planning Office. ArcGIS runs best on Windows machines; those with Macs will need to install a Windows emulator.
Taught by: Steif
Course usually offered in fall term
Also Offered As: CPLN 590
Prerequisite: MUSA 501 or CPLN 503 or equivalent
Activity: Lecture
1.0 Course Unit

MUSA 610 Javascript Programming for Planning Applications
This course will introduce city planning, MUSA and design graduate students to Java and Javascript. Students will learn the logic and syntax of the Java programming language for use in simple web applications (Weeks 1 to 7), as well as how to program database and map-oriented web and desktop applications using Javascript (Weeks 8 to 14). The "hands-on" uses of Java and Javascript in urban planning applications will be emphasized. Students will hone their programming and applications development skills through a series of bi-weekly assignments.
Taught by: Faculty
Course usually offered in spring term
Also Offered As: CPLN 690
Activity: Laboratory
1.0 Course Unit
MUSA 611 Java Script Programming for Planners and Designers
This course will introduce City Planning, MUSA and design graduate students to Javascript. Students will learn the logic and syntax of the Java programming language for use in a simple web application (weeks 1 to 7); as well as how to program database and map-oriented web and desktop applications using Javascript (weeks 8 to 14). The "hands-on" uses of Javascript in urban planning applications will be emphasized. Students will hone their programming and applications development skills through a series of bi-weekly assignments.
Taught by: Faculty
Course usually offered in fall term
Also Offered As: CPLN 692
Activity: Lecture
1.0 Course Unit

MUSA 620 Data Wrangling and Visualization
The purpose of this course is to familiarize students with the "pipeline" approach to data science. This involves the process of gathering data; sorting the data; analyzing the data and visualizing the data such that non-technical managers can make use of it for decision making. The first part of the course teaches students how to gather data by way of scraping, APRs, Google Big Query, Twitter and other unstructured sources. The second part of this course, teaches students how to store and retrieve these data in a database. The third part of the class teaches some more esoteric machine driven analytics. The fourth and final component of the class is data visualization both in state and dynamic (web-based) form. The students will be expected to replicate this pipelines on a data set of their own choosing for their final project.
Course usually offered in spring term
Also Offered As: CPLN 691
Prerequisites: Prerequisites include a working knowledge of R and ArcGIS.
Activity: Seminar
1.0 Course Unit

MUSA 795 MUSA SUMMER: INTRODUCTION TO GIS & STATISTICS
The summer GIS Bootcamp prepare students for the intermediate GIS classes that begin in the fall semester. It begins with a discussion of GIS in planning and the social sciences and then moves on to topics related to spatial data, geocoding, projection, vector and raster-based geoprocessing, 3D visualization and more. Each class includes a brief lecture and a walk through involving actual planning related data. Course enrollment is by permit only. Please contact Roslynne Carter (CPLN Dept.) at roslynne@design.upenn.edu.
Taught by: Faculty
Course usually offered summer term only
Activity: Lecture
0.0 Course Units

MUSA 800 MUSA Capstone Project
One-term course offered either term
Activity: Seminar
1.0 Course Unit

MUSA 801 MUSA/Smart Cities Practicum
The purpose of this course is for students to work with city and non-profit clients on data science that convert government data into actionable public policy intelligence. Groups of 2-3 students will work with the client to understand the business process, wrangle data, develop spatial and aspatial analytics and serve these outputs to non-technical decision makers through the medium of data visualization. Students will be mentored by MUSA Faculty and advised by someone from the partnering agency. Prerequisites: students must have a working knowledge of R and experience building both spatial and statistical models including machine-learning models. Prerequisites include MUSA-507/CPLN-590 and either CPLN-505 or MUSA-500. Students must have taken or be enrolled concurrently in MUSA-601 or MUSA-800. Students without these specific prerequisites are asked to contact the instructor. Please contact the instructor for full admission details, no later than November 15, 2018. Interested students are asked to contact the instructor to learn about specific projects and how to apply for the course.
Taught by: Ken Steif
Course usually offered in spring term
Also Offered As: CPLN 790
Prerequisites: MUSA-507/CPLN-590 and either CPLN-505 or MUSA-500
Activity: Seminar
1.0 Course Unit