Course Title: Geographic Information Systems and Spatial Analysis for Public Policy

Academic Department/Course Number: PUBP 754

Semester/Year: Fall 2017

Building/Room: FH 307

Days/Time: W 4:30 p.m.-7:10 p.m.

Instructor: Edmund J. Zolnik

Office: FH 653

Office Telephone: (703)993-1144

Office Hours: M 3:30 p.m.-4:30 p.m.

Electronic Mail: Please use Blackboard to send messages.

Course Objectives: Introduces Geographic Information Systems (GIS), including spatial data tools, to answer applied policy questions.

Learning Outcomes: Students will learn technical skills to complete policy analyses using cartographic and statistical tools.

Course Materials


Course Requirements: Five examinations will be administered throughout the semester and during the scheduled final examination time. Each examination will be problem-based. Five exercises will be assigned throughout the semester. Each exercise will be due one week after it is assigned. Exercises will be based on the lecture material and require students to conduct cartographic and statistical analyses to answer applied policy questions.

Course Grade:

<table>
<thead>
<tr>
<th>Evaluation</th>
<th>Weight</th>
</tr>
</thead>
<tbody>
<tr>
<td>Examination</td>
<td>50%</td>
</tr>
<tr>
<td>Exercise</td>
<td>50%</td>
</tr>
</tbody>
</table>
Grade Distribution: For purposes of this course, the grades of A+, A or A− are reserved for sustained excellence and outstanding performance on all aspects of the course. The grades of B+ and B are used to denote mastery of the material and very good performance on all aspects of the course. The grade of B− denotes marginal quality work that is not quite up to graduate level standards. The grade of C denotes work that may be adequate for undergraduate-level performance, but is not acceptable at the graduate level. The grade of F denotes the failure to perform adequately on course assignments.

Course Schedule

<table>
<thead>
<tr>
<th>Date</th>
<th>Day</th>
<th>Chapter</th>
<th>Exercise</th>
</tr>
</thead>
<tbody>
<tr>
<td>8/30</td>
<td>W</td>
<td>Introduction</td>
<td></td>
</tr>
<tr>
<td>9/6</td>
<td>W</td>
<td>GIS Data</td>
<td></td>
</tr>
<tr>
<td>9/13</td>
<td>W</td>
<td>Managing GIS Data</td>
<td></td>
</tr>
<tr>
<td>9/20</td>
<td>W</td>
<td>Coordinate Systems</td>
<td></td>
</tr>
<tr>
<td>9/27</td>
<td>W</td>
<td>Mapping GIS Data</td>
<td></td>
</tr>
<tr>
<td>10/4</td>
<td>W</td>
<td>Presenting GIS Data</td>
<td>Drawing and Symbolizing Features</td>
</tr>
<tr>
<td>10/11</td>
<td>W</td>
<td>Examination 1</td>
<td>Air Quality in North America</td>
</tr>
<tr>
<td>10/18</td>
<td>W</td>
<td>Attribute Data</td>
<td></td>
</tr>
<tr>
<td>10/25</td>
<td>W</td>
<td>Examination 2</td>
<td>Wages, Rents and Amenities</td>
</tr>
<tr>
<td>11/1</td>
<td>W</td>
<td>Queries</td>
<td></td>
</tr>
<tr>
<td>11/8</td>
<td>W</td>
<td>Examination 3</td>
<td></td>
</tr>
<tr>
<td>11/15</td>
<td>W</td>
<td>Spatial Joins</td>
<td></td>
</tr>
<tr>
<td>11/29</td>
<td>W</td>
<td>Examination 4</td>
<td></td>
</tr>
<tr>
<td>12/6</td>
<td>W</td>
<td>Map Overlay and Geoprocessing</td>
<td></td>
</tr>
<tr>
<td>12/13</td>
<td>W</td>
<td>Examination 5</td>
<td></td>
</tr>
</tbody>
</table>

Lecture

Chapter: Introduction
Concepts: What is GIS?
A history of GIS
What can a GIS do?
What do GIS professionals do?
GIS project management
Chapter: GIS Data
Mastering the Concepts: Representing real-world objects on maps
  The vector model
  Coordinate systems
  Map scale
  Data quality
  Data files in ArcGIS
Mastering the Skills: Adding data to ArcMap
  Viewing the map
  Viewing attribute tables
  Choosing map symbols
  Layer files
  Working with data frames
  Data frame coordinate systems
  Using internet map services
Exercises: 4 and 5 (p. 42)

Chapter: Managing GIS Data
Mastering the Concepts: Characteristics of GIS data
  Organizing data files
  Finding data for a project
  Importing and exporting data
  About metadata
  Using ESRI Data and Maps
  Map documents and shared data
  Using ArcCatalog to manage files
  Using ArcToolbox
  Documenting data
  Sources for GIS data
Mastering the Skills: Using ArcCatalog
  Creating and organizing data
  Using the Catalog in ArcMap
  Using ArcToolbox
  Using ArcMap to export data
  Using data from ArcGIS Online and the Internet
  Getting data from the Internet
Chapter: Coordinate Systems
Mastering the Concepts: About coordinate systems
Geographic coordinate systems
Map projections
Common projection systems
Choosing projections
Labeling coordinate systems
On-the-fly projection
Projecting data
Troubleshooting coordinate system problems

Mastering the Skills: Displaying coordinate systems
Troubleshooting projection problems
Creating a custom coordinate system

Chapter: Mapping GIS Data
Mastering the Concepts: Mapping features
Classifying numeric data
Map documents

Mastering the Skills: Exploring symbols
Labeling features
Creating maps from attributes for points
Creating maps for attributes of lines
Creating maps for attributes for polygons
Classifying data

Chapter: Presenting GIS Data
Mastering the Concepts: Basic elements of map design
Choosing symbols
Choosing coordinate systems
Assigning map scales
Setting up scale bars
Labeling, text, and annotation

Mastering the Skills: Setting up the map page
Creating a location map
Using graphic text on layouts
Working with dynamic labels and annotation
Adding a legend to the map
Placing a scale bar on the map
Adding other map elements
Reviewing and editing the layout
Exporting a layout

Exercises: 1 (p. 172)
Chapter: Attribute Data
Mastering the Concepts: Overview of tables
Queries on tables
Joining and relating tables
Summarizing tables
Field types
Tables in ArcGIS
Editing and calculating fields
Importing tables

Mastering the Skills: Viewing tables
Using queries and statistics on tables
Joining tables
Summarizing tables
Relating tables
Editing values in tables
Calculating fields in tables
Working with Excel and XY data

Exercises: 2 and 9 (pp. 203-204)

Chapter: Queries
Mastering the Concepts: About queries
Attribute queries
Spatial queries
Processing layers with selections
Interactive selection
Selecting by attributes
Selecting by location
Choosing the selection method
Managing results from queries
The Selection window

Mastering the Skills: Using interactive selection
Selecting by attributes
Selecting by location
Definition queries
Exporting data

Exercises: 10 (p. 258)
Chapter: Spatial Joins
Mastering the Concepts: What is a spatial join?
Cardinality
Types of spatial joins
Choosing the join type
Setting up a spatial join
Mastering the Skills: Simple inside joins
A summarized inside join
Simple distance joins
Summarized distance joins
Exercises: 1, 3 and 7 (p. 288)

Chapter: Map Overlay and Geoprocessing
Mastering the Concepts: Map overlay
Other spatial analysis functions
Mastering the Skills: Preparing to overlay
Intersecting polygons
Overlay of lines in polygons
Clipping layers
Working with buffers
Investigating relationships with union
Exercises: 6 and 10 (p. 317)

Mason Diversity Statement

George Mason University promotes a living and learning environment for outstanding growth and productivity among its students, faculty and staff. Through its curriculum, programs, policies, procedures, services and resources, Mason strives to maintain a quality environment for work, study and personal growth.

An emphasis upon diversity and inclusion throughout the campus community is essential to achieve these goals. Diversity is broadly defined to include such characteristics as, but not limited to, race, ethnicity, gender, religion, age, disability and sexual orientation. Diversity also entails different viewpoints, philosophies and perspectives. Attention to these aspects of diversity will help promote a culture of inclusion and belonging, and an environment where diverse opinions, backgrounds and practices have the opportunity to be voiced, heard and respected.

The reflection of Mason’s commitment to diversity and inclusion goes beyond policies and procedures to focus on behavior at the individual, group and organizational level. The implementation of this commitment to diversity and inclusion is found in all settings, including individual work units and groups, student organizations and groups and classroom settings; it is also found with the delivery of services and activities, including, but not limited to, curriculum, teaching, events, advising, research, service and community outreach.

Acknowledging that the attainment of diversity and inclusion are dynamic and continuous processes, and that the larger societal setting has an evolving sociocultural understanding of diversity and inclusion, Mason seeks to continuously improve its environment. To this end, the
University promotes continuous monitoring and self-assessment regarding diversity. The aim is to incorporate diversity and inclusion within the philosophies and actions of the individual, group and organization, and to make improvements as needed.

**Accommodations**

If you are a student with a disability and you need academic accommodations, please contact Disability Services (DS) at (703)993-2474 or at ods@gmu. All academic accommodations must be arranged through DS.

**Schar School Policy on Plagiarism**

The profession of scholarship and the intellectual life of a university as well as the field of public policy inquiry depend fundamentally on a foundation of trust. Thus any act of plagiarism strikes at the heart of the meaning of the university and the purpose of the Schar School of Policy and Government (Schar School). It constitutes a serious breach of professional ethics and it is unacceptable.

Plagiarism is the use of another’s words or ideas presented as one’s own. It includes, among other things, the use of specific words, ideas or frameworks that are the product of another’s work. Honesty and thoroughness in citing sources is essential to professional accountability and personal responsibility. Appropriate citation is necessary so that arguments, evidence and claims can be critically examined.

Plagiarism is wrong because of the injustice it does to the person whose ideas are stolen. But it is also wrong because it constitutes lying to one’s professional colleagues. From a prudential perspective, it is shortsighted and self-defeating, and it can ruin a professional career.

The faculty of the Schar School takes plagiarism seriously and has adopted a zero tolerance policy. Any plagiarized assignment will receive an automatic grade of “F”. This may lead to failure for the course, resulting in dismissal from the University. This dismissal will be noted on the student’s transcript. For foreign students who are on a university-sponsored visa (e.g. F-1, J-1 or J-2), dismissal also results in the revocation of their visa.

To help enforce the Schar School policy on plagiarism, all written work submitted in partial fulfillment of course or degree requirements must be available in electronic form so that it can be compared with electronic databases, as well as submitted to commercial services to which the Schar School subscribes. Faculty may at any time submit student’s work without prior permission from the student. Individual instructors may require that written work be submitted in electronic as well as printed form. The Schar School policy on plagiarism is supplementary to the George Mason University Honor Code; it is not intended to replace it or substitute for it.

**Updated:** June 23, 2017