Master Syllabus

Department of Geography

GEOG 445/545: Geographic Information Systems Application Design and Development

Course Description:

Fundamentals of geographic information systems (GIS) programming. Develop and implement customized GIS applications. Exposure to widely used GIS software programming environments. (3 credit hours).

Prerequisite: GEOG 265, 344, or permission of the instructor.

Course Objectives

The objectives of the course are to provide the student with:

1. an overview of widely used programming environments,
2. a background in GIS programming techniques and principles, and
3. hands-on programming experience with widely used GIS software.

Each Student will be required to do laboratory exercises, some of it outside of class hours.

Course Rationale:

This is the third course in a 4-course sequence. Many employees are looking for GIS personnel with these skills.

Course Content and Format:

The content of the course is based on the programming environments supported by Environmental Systems Research Institute’s (ESRI) GIS software. The following course content reflects widely used programming languages used to automate ESRI GIS software. The content is likely to change based on the current development environments and/or the expertise of the instructor.

Part I. Automating Geoprocessing

I. Programming Basics for Python
   a. Basics
   b. Variables and data types
   c. Statements
   d. Strings
   e. Lists
f. Flow Control Statements  
g. Reading and Writing Text Files  

II. ESRI Virtual Campus Course - Basics of Python (for ArcGIS 10)  
a. Why Python?  
i. Where can you run your scripts?  
ii. Using the Python window  
iii. Set up the Python window  
b. Introducing Python  
i. Working with variables  
ii. What types of data can Python use?  
iii. Adding functionality to your scripts  
iv. Work with variables and data types  
v. Making decisions and controlling the flow of your script  
vi. Control the flow of your script  
vii. Tips for writing successful scripts  
viii. Handling errors  
ix. Find common Python syntax errors  
x. Managing Python error messages  
c. Working with Python in ArcGIS  
i. Python snippets  
ii. Geoprocessing example  
iii. Rewrite the Clip tool using variables  
iv. Create a geoprocessing script to support notification  

III. Geoprocessing with Python  
a. Accessing Tools  
i. Importing ArcPy  
ii. Adding toolboxes  
iii. Using tools  
iv. Using functions  
v. Using Classes  
vi. Using environment settings  
vii. Understanding message types and severity  
viii. Error handling  
ix. Setting paths to data  
b. Working with sets of data  
i. Listing data  
ii. Working with multivalue inputs
c. Accessing geographic data
   i. Describing data
   ii. Using fields
   iii. Using the spatial reference class
   iv. Checking for the existence of data
   v. Accessing data using cursors
   vi. Specifying a query
   vii. Working with geometry

d. Creating script tools
   i. Understanding script tool parameters
   ii. Adding a script tool
   iii. Setting script tool parameters

Part II. ArcGIS Server & Silverlight

A. ArcGIS Server
B. Silverlight
C. ArcGIS Server and Silverlight
D. Visual Studio Silverlight Application
E. XAML Overview
F. Visual Studio Silverlight Solution
G. Map Services
H. Map Controls
I. Map Layers
J. Feature Layers
K. Graphics

Methods for Evaluating Student Performance

Forms of evaluation might include examinations, quizzes, and programming assignments. Graduate students are required to do a literature review paper and/or an additional project in addition to class requirements.

Evaluation of the Course

Student evaluation of the course, administered anonymously.