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 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.