ENGR 522: Object-oriented GIS Programming for Engineers

Credits: 3

Term(s) to be offered: Spring

Catalog Description: Introduction to object-oriented GIS programming with C# and the .NET framework; integrating common GIS libraries and database management; development of custom desktop GIS applications

Prerequisites: CIVE 576 or CIVE 577, or consent of the instructor


Software: Visual C# 2010 Express Edition; ArcGIS 10 one year education version license

Course Coordinator: Dr. John W. Labadie, Professor of Civil and Environmental Engineering

Course Objectives: This course provides an introduction to object-oriented GIS programming with C# and the .NET framework. The focus is on principles of object-oriented programming with C# while integrating with common GIS libraries and database management systems. The course is fast-paced and involves a considerable amount of coding. The goal is that students will develop a solid foundation in C# and object-oriented programming, understand basic GIS data structures/algorithms, and be capable of developing custom desktop GIS applications in engineering. Students successfully completing this course will be able to develop custom GIS programs in the ArcGIS Development Environment using ESRI ArcObjects, including design, formulation, testing, and application to geospatial engineering projects.

Schedule:
wk 1 Introduction to C#, Visual Studio, and conditional statements
wk 2 Iteration; introduction to classes and methods
wk 3 Object-oriented programming and strings
wk 4 Object-oriented programming (cont.)
wk 5 UML and ArcObjects in GIS; reading ArcObjects diagrams
wk 6 Basic data structures
wk 7 Error handling and GUI’s; demonstration on development of a GUI
wk 8 ArcObjects commands; demonstration on creating ArcGIS commands with ArcObjects
wk 9 C# stream classes and file I/O
wk.10 ActiveX Data Objects for .NET; accessing data and data services
wk.11 Web services and XML; demonstration of Web services
wk.12 Open Source GIS; libraries and standards
wk.13 Development of custom applications in GIS
wk.14 Special topics
wk.15 Student project presentations
wk.16 Student project presentations
**Mode of Delivery:**  Two hours of class lectures and two hours of laboratory per week.

**Methods of Evaluation:**  Term grades for this course will use the +/- grading system as described in the CSU catalog. The course grade will be based on approximately the following distribution; however, the instructor may adjust these weights as necessary:

<table>
<thead>
<tr>
<th>Component</th>
<th>Weight</th>
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<tbody>
<tr>
<td>Homework</td>
<td>40%</td>
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<tr>
<td>Midterm Exam</td>
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<tr>
<td>Final Project</td>
<td>25%</td>
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<tr>
<td>Discussion Board</td>
<td>10%</td>
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<tr>
<td>Quizzes</td>
<td>5%</td>
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