EEOS 381 - Applications of Geographic Information Systems
Fall, 2008

- Syllabus -

This course is designed to give students an overview of GIS applications, an understanding of spatial and relational database concepts, and the practical experience of using GIS to solve real world problems.

The course will include both lecture and lab components. The lab will use ESRI’s ArcGIS 9.2 software, its extensions, and ArcSDE, as well as the database applications Microsoft Access 2003 and SQL*Plus. Students will complete a final project involving data collection, analysis and display.

Topics covered include:

- **Relational databases** - An understanding of relational databases in general and how they apply to GIS applications
- **Project design** - Overview of the project design process including: Awareness, developing system requirements, evaluation of alternative systems, system justification and development of an implementation plan
- **Data collection** - Examination of the methods of identifying and capturing the data necessary for the project
- **Data development and conversion** - Examination of data input and development methods, with a focus on data quality standards
- **Data manipulation** - Examination of the tools available for data manipulation and their strengths and drawbacks
- **Data storage** - Examination of various formats of GIS data, including relational database management systems (RDBMSes) personal and multi-user (ArcSDE) geodatabases
- **Data analysis** - The analysis of multiple spatial and non-spatial data sets in an integrated manner forms the major part of a GIS
- **Presentation of the final result** - The presentation of spatial data in a format that allows the user to view spatial data as it relates to other data elements. Hardcopy and softcopy data display will be discussed.

Prerequisites:

- EEOS 265 (Computer Applications in Geography)
- EEOS 380 (Introduction to GIS)
- or permission of the instructor

Students are expected to have a working knowledge of the Microsoft Windows operating system, including file management with Windows Explorer. Additionally, students are expected to have experience with Web browsers and ESRI's ArcGIS Desktop software.

Credits: 4

Instructor:

Michael Trust
Sr. GIS Database Administrator
MassGIS, MA Executive Office of Environmental Affairs, Boston, MA
Email: michael_trust@yahoo.com (preferred method of contact)
Phone: (617) 626-1195 (at MassGIS; call only in emergency)
Office Hours:
Mondays, 5:00 - 6:00 P.M., room S-3-35

Class Hours:
Lecture: Mondays, 6:00 - 8:30 P.M., room S-3-35
Lab: Wednesdays, 6:00 - 8:30 P.M., room S-3-20

Attendance is mandatory for all lectures. We will cover a large amount of material and move quickly through topics. Lectures will cover some material from the readings but will also significantly include other relevant topics and computer demonstrations. Lecture presentations will be posted on the class Web site. It is the responsibility of the student to review materials and arrange to get notes from other students if unable to attend lectures. Please inform the instructor ahead of time, if possible, if you will not be able to attend the lectures.

Teaching Assistant:
Name: Barry Fradkin
Email: bdf22282@gmail.com

Required Textbook:
• Geographic Information Systems and Science, 2nd Edition (Longley, Goodchild, Maguire, Rhind; 2005, John H. Wiley & Sons, Ltd.)

Required Readings and Lab Materials (in PDF format, on the network in the lab):
• Microsoft Official Academic Course: Microsoft Office Access 2003 (Microsoft Press, 2004) (located in S:\ge381_f08\Access_Book)

The following PDFs are in S:\ge381_f08\ESRI_PDFs
• What is ArcGIS 9.2? (ESRI)
• Understanding SDE (ESRI)
• Editing Geodatabases Tutorial (ESRI)
• Editing GIS Features Tutorial (ESRI)
• Building Geodatabases Tutorial (ESRI)
• Getting Started with ArcGIS (ESRI)
• Geocoding in ArcGIS (ESRI)

Class Web Site: http://www.faculty.umb.edu/michael.trust/
Lecture presentations, lab assignments, and various notes and Web links will be posted here.

Labs:
Lab sessions are an integral part of the course and are intended to provide you with hands-on experience using GIS. The PC-based GIS software used in this course will be ArcGIS 9.2 Desktop (ArcInfo level), with access to the server software ArcSDE 9.0. We will also make use of Microsoft Access and Oracle 10g relational database management system software and the client application SQL*Plus. Students will also use Notepad and Web browsers.

The assignments will relate to the topics covered in the lectures. These assignments will be posted on the class Web site, and, where appropriate, will be accompanied by an overview and some demonstrations during the scheduled lab session. In the event exercises are not completed during the reserved lab time, it is the responsibility of the student to complete the exercise before the due date. You can access the Room S-3-20 computer lab during open lab hours. Check the posted lab
hours to see when the computer lab will be available. The lab in Room S-3-34 is accessible via key code 24/7 when the room is not used for classes.

Grading of lab exercises will be based on the completeness and accuracy of the work that is submitted. The total points available for each exercise will be listed on the assignment.

All labs must be turned in by the date the exercises are due. **If any exercise is submitted late, a 10% deduction will be made for each week the exercise is late. No exercise will be accepted after two weeks following the due date.** This policy is to ensure that students keep up with the weekly lab homework. To avoid the late penalty due to extenuating circumstances, students should notify the instructor ahead of time if meeting a due date will not be possible.

**Project:**
In addition to lab exercises, all students are required to complete an individual project. The purpose of this project is to give students the experience of working through all the steps required to complete a "real world" type of GIS project. For this project, the following criteria must be met:

- Define the purpose of your project (in writing)
- Collect all necessary spatial and non-spatial data
- Perform spatial analysis
- Make a formal presentation to the class of your project’s purpose, methodology and results (preferably using Microsoft PowerPoint, along with live ArcGIS demos)
- Submit a written report with your maps

The objectives and specific requirements of the projects will be provided later in the semester.

**Policies:**
All students enrolled in this course are expected to adhere to the guidelines set forward by the University of Massachusetts-Boston Code of Student Conduct. Any violations of this code (i.e. cheating or copying the work of others) will result in disciplinary action taken by the instructor and any further disciplinary action taken by the Office of Dean of Student Affairs.

In order to succeed in this course, attendance to both lecture and lab is essential. Class participation and asking questions is strongly encouraged. The more time spent using the software - usually beyond the assigned lab time - the better students will do. It is the responsibility of the student to obtain any materials (i.e. notes) from other students in the event the student cannot attend class.

Make-up exams will be given only in the event of personal illness (with a doctor’s note) or extreme circumstances. The instructor must be notified before the exam date if there is prior knowledge that you will not be able to take the exam on the scheduled date.

**When in the classroom please turn off cell phones or put them in silent mode.**

**Grading:**

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<tr>
<th>Component</th>
<th>Percentage</th>
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<tbody>
<tr>
<td>Lab Exercises</td>
<td>30%</td>
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<tr>
<td>Project</td>
<td>30%</td>
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<tr>
<td>Midterm Exam</td>
<td>20%</td>
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<tr>
<td>Final Exam</td>
<td>20%</td>
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Schedule:

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<thead>
<tr>
<th>Week</th>
<th>Lecture Topic(s), Readings, Labs</th>
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| 1. Sept. 3 | Course overview  
Introduction to Applications of GIS  
Principles of Project Design  
*Reading: Chapters 1, 2, 4 (Sections 4.1 - 4.4) in GIS&S*  
*Lab 1: Microsoft Access, Lessons 1, 2, 3* |
| 2. Sept. 8/10 | Data Collection, Data Sources, Data Development  
Data QA/QC  
*Reading: Chapters 5 (Sections 5.1, 5.4, 5.9, Technical Box 5.3), 6 (Sections 6.1 - 6.2.3), 9 in GIS&S*  
*Lab 2: Microsoft Access, Lessons 4, 7 and 8* |
| 3. Sept. 15/17 | Data Models  
Data Formats, Conversion Methods, Topology  
*Reading: Chapters 3 (sections 3.1, 3.4 - 3.9), 7 (Sections 7.1, 7.5, 7.6), 8 (Sections 8.1, 8.2) in GIS&S; Getting Started with ArcGIS, Chapter 3.*  
*Lab 3: Geocoding to create a map of business locations. (See PDF Geocoding in ArcGIS for reference).* |
| 4. Sept. 22/24 | Introduction to RDBMSes  
*Reading: Chapter 10 in GIS&S; What is ArcGIS, Chapters 1, 2, 4*  
*Lab 4: Editing Geodatabases Tutorial* |
| 5. Sept. 29/Oct. 1 | ArcGIS Geodatabase  
*Reading: What is ArcGIS, Chapters 3, 5*  
*Lab 5: Editing GIS Features Tutorial* |
| 6. Oct. 6/8 | ArcGIS Geodatabase, ArcSDE  
*Reading: Understanding ArcSDE, Chapters 1-3*  
*Lab 6: Building Geodatabases Tutorial* |
| 7. Oct. 15 | No Lecture on 10/13 (Columbus Day)  
*Reading: Understanding ArcSDE, Chapters 4-6*  
*Lab (in-class): ArcSDE Versioning*  
*Lab 7: SQL*Plus* |
| 8. Oct. 20/22 | **Mid-term Exam **  
*Lab 8: Data Analysis - Getting Started With ArcGIS, Chapters 5 & 6* |
| 9. Oct. 27/29 | ArcSDE; Data Analysis  
*Reading: Chapter 14 in GIS&S*  
*Lab 9: Data Analysis - Getting Started With ArcGIS, Chapters 7 & 8* |
| 10. Nov. 3/5 | Data Analysis  
*Reading: Chapter 15 in GIS&S*  
*Lab: Continue/complete Labs 8 and 9* |
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<thead>
<tr>
<th>Date</th>
<th>Event</th>
<th>Reading</th>
<th>Lab</th>
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<tbody>
<tr>
<td>11. Nov. 10/12</td>
<td>Display and Presentation</td>
<td>Reading: Chapters 12-13 in GIS&amp;S</td>
<td>Lab 10: Creating theme maps and layer files in ArcMap</td>
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<td>12. Nov. 17/19</td>
<td>Metadata</td>
<td>Reading: Chapter 11 in GIS&amp;S</td>
<td>Lab 11: Produce a full, FGDC-compliant metadata document using ArcCatalog</td>
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<td>13. Nov. 24/26</td>
<td>Project Work</td>
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<td>14. Dec. 1/3</td>
<td>Project Work</td>
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<td>15. Dec. 8/10</td>
<td>Project Work, Project Presentations</td>
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<tr>
<td>TBA</td>
<td><strong>Final Exam</strong></td>
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