CVEN 689 Civil Engineering Applications of GIS  
Spring 2005

Instructor: Francisco Olivera, Ph.D., P.E.  
Wisenbaker Engineering Research Center, Room 205 – F  
Tel.: 979-845-1404  
e-mail: folivera@civilmail.tamu.edu

Office hours: Mondays and Wednesdays 2:30 pm – 3:30 pm

Schedule: Lectures: Mondays and Wednesdays 12:40 pm – 1:30 pm at CE 221.  
Laboratory: Friday 12:40 pm – 3:30 pm at CE 217.

Objectives: This course discusses the fundamental concepts of geographic information systems (GIS), the methods and software used to implement them, and their applications to solve civil engineering problems. After taking this course, the students will be able to use GIS tools to approach civil engineering problems that involve location as a central variable.

Prerequisite: Graduate standing or instructor’s approval.

The class web page includes an Announcements page in which last-minute information will be posted. Students are expected to access the Announcements page at least each other day.

Textbook: None

Class notes: A CD with class notes in Power Point format will be given to the students at the beginning of the semester. Updates will be posted online whenever necessary.

Grading:  
Laboratory assignments 7.5%  
Literature and data reviews 7.5%  
GIS database development 15%  
Two tests 35%  
Term project 35%
Letter grades will be assigned according to: A (100 – 90), B (89 – 80), C (79 – 70), D (69 – 60) and F (less than 60). Numeric grades will be rounded to the nearest integer.

**Laboratory assignments**
There will be weekly laboratory sessions. Assignment solutions must be handed-in at the end of the session. All laboratory work will be conducted at TAMU – Department of Civil Engineering facilities where software licenses are available.

**Literature reviews**
Students have to prepare four 300- to 400-word article reviews. At least two of the select articles must be related to the student's term project. Articles published in the previous five years in technical journals and other nationally or internationally recognized periodicals are required. Students should submit a list of complete references of the articles they plan to review by 2/11/05 for approval. An article cannot be reviewed by more than one student. Exceptions to this rule will be considered on a case-by-case basis. Article reviews are due on 2/18/05, 2/25/05, 3/4/05 and 3/11/05.

**Tests**
Two tests will be given. The first test will cover half the material and the second test all the material discussed in class. Questions related to reading material may also be included. Test 1 is scheduled for 3/23/05, and Test 2 for 4/27/05.

**GIS database development**
Develop a database of GIS data of a city, county or hydrologic cataloging unit. In developing the database, stress what is most important in your field (water resources, transportation, public works, urban planning, and regional planning, among others). Prepare color paper maps that display the information. Prepare a list of the data you found including: (1) what it is, (2) who developed it, (3) area covered, (4) scale (i.e., level of detail), (5) map projection, (6) information contained in the attribute table, and any other matter you deem necessary. The GIS data review is due on 3/25/05.

**Term project**
Prepare a paper on an application of GIS in your field of study. Submit the title and a 150-word description of your proposed term project by 2/23/05 for approval. Deliver your term project in HTML or PDF format by 5/3/05, ready to be posted in the class web page. The final report should
include: Header [Texas A&M University, Department of Civil Engineering, Instructor: Dr. Francisco Olivera, CVEN689 Applications of GIS to Civil Engineering, <project title>, <author> and <date>], Abstract [Stand-alone 200-word summary of your project], Introduction [(1) What is your project about?, (2) Why is your project topic important?], Literature review [(1) What has been done in the past?, (2) What is new in your project?], Methodology [What are the methods of analysis used in your project? If possible, this section should not be specific to the selected study area], Application, results and discussion [(1) What is the study area?, (2) What is the data you used, (3) What are the results of your analysis, (4) What do your results mean?], and Conclusions [What has been learned from this project? This section should not include any concept not discussed in any of the previous sections]. Likewise, prepare a poster (24" x 36" in portrait format) that summarizes your work. The poster should include a label [Texas A&M University, Department of Civil Engineering, Instructor: Dr. Francisco Olivera, CVEN689 Applications of GIS to Civil Engineering, <project title>, <author> and <date>], maps, tables and text. Feel free to use of charts, tables and/or pictures to better convey the information. Deliver the poster in hard-copy by 5/3/05. Do not laminate it. Additionally, present your work in a 20-minute presentation at the end of the semester on the day and time assigned. Link your project report to your poster and presentation.

Final Exam:
No final exam will be scheduled

Outline:
Class 1 - 3: Introduction to GIS and ArcGIS
Class 4 - 5 ArcMap and Visualizaion
Class 6 - 7: ArcCatalog and Geodatabases
Class 8 - 9: Map Projections
Class 10: Getting Data
Class 11 - 13: Map Analysis with vector Data
Class 14: Creating and editing feature data
Class 15: Creating and editing tabular data
Class 16: Map analysis with raster data
Class 17: Test 1
Class 18 – 20: Map analysis with grid data
Class 21: Map analysis with network data
Class 22 – 26: Student presentations.
Class 27: Evaluation
Class 28: Project submission
It is the student’s responsibility to be fully acquainted with and to comply with the University Student Rules (http://student-rules.tamu.edu).

The Americans with Disabilities Act (ADA) is a federal anti-discrimination statute that provides comprehensive civil rights protection for persons with disabilities. Among other things, this legislation requires that all students with disabilities be guaranteed a learning environment that provides for reasonable accommodation of their disabilities. If you believe you have a disability requiring an accommodation, please contact the Department of student Life, Services for Students with Disabilities in Room 126 of the Koldus Building, or call 845-1637.

“An Aggie does not lie, cheat, or steal or tolerate those who do.” Students are expected to understand and abide by the Aggie Honor Code presented on the web at: http://www.tamu.edu/aggiehonor No form of scholastic misconduct will be tolerated. Academic misconduct includes cheating, fabrication, falsification, multiple submissions, plagiarism, complicity, etc. These are more fully defined in the above web site. Violations will be handled in accordance with the Aggie Honor System Process described on the web site.

Unless specifically allowed in advance by the instructor, all assignments and homework in this class are expected to be completed based on individual effort. Copying the work of others, including homework, is a violation of Texas A&M Aggie Honor Code, Cheating.

The handouts used in this course are copyrighted. By “handouts,” I mean all materials generated for this class, which include but not limited to syllabi, notes, quizzes, exams, in-class materials, review sheets, and additional problem sets. Because these materials are copyrighted, you do not have the right to copy the handouts unless I expressly grant permission.