City and Regional Planning
College of Architecture

CP6XXX: Transportation and GIS

COURSE DESCRIPTION

The role of geographic information systems (GIS) in relation to transportation planning, analyzing, evaluating, and system design has become critical. State departments of transportation, metropolitan planning organizations, and private firms have combined GIS with various transportation models.

This course covers the applications of GIS to transportation. Its primary goal is to help students understand the basic principles of geographical information science for transportation, and to equip students with the state-of-the-practice computing technology for transportation planning in a GIS environment.

The course is appropriate for those with transportation experience and interested in learning practical implementation of transportation modeling in the GIS environment. It is also appropriate for those with a GIS background and interested in gaining experience in transportation modeling. The specific learning objectives of this course are to:

1) Understand transportation GIS fundamentals, including network, route and path, etc.
2) Increase proficiency in Transportation GIS routine operations such as data conversion, matrix operation, and topology building;
3) Become experienced in applying TransCAD to travel demand modeling and logistics analysis;
4) Explore creatively the applications of GIS to transportation analytical tasks, for example, accessibility modeling, urban mobility performance, health impact assessment or those specific to students' own areas of study and interest.

Most exercises involve working with TransCAD, a GIS package developed primarily for transportation planning and modeling purposes. Students, however, have the option to complete some of the exercises with ArcGIS or CUBE. By taking advantage of the computing capability of available GIS packages, students can have more energy to develop critical thinking on transportation analysis and GIS models.

TEXTBOOKS/READINGS

Harvey J. Miller and Shih-Lung Shaw (2001), Geographic Information Systems for Transportation: Principles and Applications, Oxford University Press

Caliper Corp. 2000. TransCAD User's Guide.
Caliper Corp. 2005. Travel Demand Modeling with TransCAD 4.8.
Caliper Corp. 2005. Routing and Logistics with TransCAD 4.8

Each student gets a copy of the TransCAD textbooks from the instructor.

Supplementary materials will be provided in electronic files or hard copies.

COURSE EVALUATION

Students will be graded in two areas:

- 14 lab exercises (worth about 6 points each for a total of 85 points).
- Project development (worth 15 points). Students will develop their own project plan, collect data, process and analyze the data, and present the result.

WEEKLY TOPICS

Course introduction /Intro to TransCAD GIS
Data Models and Transportation
Matrix Operation and Relational Data Tables
Network Models
Route Systems and Linear Reference Systems
Vehicle Routing and Arc Routing
Network Flow Models
Facility Location Models
Dealing with Survey and Other Data Sources
Four-step travel modeling: Trip Generation
Four-step travel modeling: Trip Distribution
Four-step Travel Modeling: Mode Split and Others
Four-step Travel Modeling: Traffic Assignment
Mobile GIS for Transportation
Final Presentation / Course Summary