

**THE PENNSYLVANIA STATE UNIVERSITY**  
**DEPARTMENT OF CIVIL AND ENVIRONMENTAL ENGINEERING**

**CE 422                                      TRANSPORTATION PLANNING**

Goals: Acquire basic knowledge on the history and recent developments in transportation planning problems and its quantitative methods. Understand transportation planning, travel behavior, transportation modeling, and data collection techniques and gain laboratory experience with each method. Use mathematical/statistical models and GIS software to analyze, simulate, and forecast the demand for transport services. Gain familiarity with the software used in transportation planning practice.

Textbook and Reading Material:

1. K.G. Goulias (2003) Transportation Systems Planning, CRC Press [KG]
2. J. de D. Ortuzar and L.G. Willumsen (2001) Modelling Transport, Third Edition, Wiley. [OW]
3. Powerpoint presentations by speakers/instructors

**COURSE TOPIC DESCRIPTION & SCHEDULE:**

<b>TOPICS</b>
<b>INTRODUCTION AND SYLLABUS</b> – brief survey on students background
<b>OVERVIEW ON TRANSPORT PLANNING AND MODELING.</b> Mobility, Congestion, Efficiency, Equity, and Air Quality Urban Systems and Transportation Systems Travel Demand and Transport Supply Methods of Analysis and Models Transportation Problems and Proposed Solutions – Technologies
Lab 1: Searching the Internet, Transportation Information, BTS and NTL, introduction to surveys, data contents and basic principles.
<b>TRANSPORTATION PLANS AND PROGRAMS</b> County-wide Planning, Statewide Planning, Regional Planning Metropolitan and Local Planning, STIP-TIP and the ISTE A Planning within ISTE A & TE A 21, Clean Air Act Amendments of 1990, Statewide Planning
Lab 2: Brief overview of CentreSIM regional simulation - household-person-episodes (activities and trips), sample frame, sample size, sample selection and ideas about forecasting
<b>TRANSPORTATION AND THE ENVIRONMENT I</b> Air Quality Issues and Mobile Sources, Air Quality Modeling Mobile Source Emissions Control, Mobile Source Emissions Estimation & Inventory
Lab 3: Design of surveys – overview and examples - ,design of KONTIV questionnaires and contrast with other questionnaires, examples from PA Turnpike and Smartraveler
<b>TRANSPORTATION AND THE ENVIRONMENT II</b> Air Quality Issues and Mobile Sources, Air Quality Modeling Mobile Source Emissions Control, Mobile Source Emissions Estimation & Inventory
Lab 4: CentreSIM Household questionnaire – design, data analysis, findings, Access database examples, and SPSS analysis examples.
<b>DESIGN OF AN URBAN TRANSPORTATION PLANNING SYSTEM (UTPS)</b> The Urban Transportation Planning Process & System, The Travel Model, Microcomputer Applications, Other Transportation Planning Systems UTPS, GIS-T.
Lab 5: Design of CentreSIM activity diary – comparison with trip diaries. Examples of Designs and

Issues to Consider in Practice – data checking and cleaning
<b>TRIP GENERATION MODELING</b> Aggregate Models, Disaggregate Models, Linear and Non-linear Regression Models.
Lab 6: CentreSIM survey and Technology Overview - Technology tools for high tech surveys: GIS, GPS, PDAs, Tablet PCs, Database management software
<b>TRIP DISTRIBUTION MODELING</b> Gravity-type Models, Intervening Opportunities Model
Lab 7: Class Presentation – Improved CentreSIM survey
<b>MODAL SPLIT AND DISCRETE CHOICE MODELS</b>
Modal Split Models, Discrete Choice Models
Lab 8: In class group work
<u>EXAM 1</u>
Lab 9: CENTRE SIM demo with Transcad – EOM’s thesis and SCCCTS scenarios
<b>TRAFFIC ASSIGNMENT ALGORITHMS</b> Introduction to Mathematical Programming, System Optimum Method – User Optimum Method
Lab 10: Overview of TRANSCAD – thematic maps, modeling capabilities, data structure, modeling in CentreSIM
<b>CASE STUDIES – Access Management Impact Simulation &amp; Centre SIM.</b>
Lab 10: In class work – project = new high tech survey design
<b>LIMITATIONS OF TRAVEL MODEL AND NEW METHODS</b> Traveler Behavior & Activity-based Approaches
Lab 11: Final Report and Presentation guidance and in class work
<b>INVITED SPEAKERS:</b> Telecommunications and travel behavior
<b>GROUP PROJECT PRESENTATIONS</b> and final exam overview
FINAL EXAM