

Tennessee Technological University  
Department of Civil & Environmental Engineering  
CEE 4630 (5630) – Traffic Engineering  
Elective  
Fall Semester 2007

2007 Catalog Data: CEE 4630 / 5630 – Traffic Engineering. Lecture 3. Credit 3. Techniques of traffic engineering measurements, investigations, and data analysis; design, application, and operation of traffic control systems and devices. Prerequisite: CEE 3610

Textbook: *Highway Capacity Manual*, 2000 Edition with 2004 Updates, Transportation Research Board, Washington, DC, 2000, 2004.

Reference: *Manual on Uniform Traffic Control Devices*, Federal Highway Administration, Washington, DC, online at <http://mutcd.fhwa.dot.gov/>.

Coordinator: S. Click, Assistant Professor of Civil Engineering

Goal: The goal of CEE 4630 (5630) “Traffic Engineering” is to introduce the theory and practice of traffic operations engineering, including traffic stream characteristics, facility types, analysis of highway facilities, analysis of non-highway facilities, and the analysis and applicability of intersection control methods.

Course learning objectives:

1. Students should become familiar with traffic stream characteristics such as Volume, Flow Rate, Speed, and Density and operational characteristics such as Facility Types, Capacity, and Level of Service.
2. Students should become familiar with the Highway Capacity Manual, including its purpose and its worksheet-based analysis methods.
3. Students should be able to utilize HCM procedures to analyze uninterrupted flow facilities such as Basic Freeway Segments, Freeway Weaving Areas, Merge and Diverge Areas, and Two-lane Highways.
4. Students should be able to utilize HCM procedures to analyze interrupted flow facilities such as at Two- and Four-way Stops, Roundabouts, Traffic Signals, and Urban Streets.
5. Students should be able to utilize HCM procedures to analyze non-highway facilities like Pedestrian Paths, Bicycle Paths, Shared Pedestrian-Bike Paths, and Transit Routes.
6. Students should become familiar with field data collection methods for operational analysis, including speed studies, volume studies, and traffic signal studies.
7. Students should become familiar with industry-standard software packages like HCS+ and Synchro+SimTraffic.

Course measurable outcomes:

Students should be able to:

1. define key traffic stream variables;
2. analyze uninterrupted flow facilities such as using HCM methods;
3. analyze interrupted flow facilities using HCM methods;
4. analyze non-highway facilities using HCM methods;
5. collect field data appropriate to freeway and intersection studies, and carry out those studies; and
6. use basic features of the industry-standard software packages HCS+ and Synchro+SimTraffic.

Topics covered: (Three lecture classes per week, 55 minutes each)

1. Introduction and Flow Concepts (5 classes)
2. Freeway Analyses – Basic Freeway Segments, Freeway Weaving, Ramps and Ramp Junctions (6 classes)
3. Two-lane Highways (3 classes)
4. Unsignalized Intersections – 2-way Stops, 4-way Stops, and Roundabouts (6 classes)
5. Signalized Intersections – Warrants, Timing, Analysis, Urban Streets, and Coordination (6 classes)
6. Non-Highway Facilities – Pedestrian and Bike Paths, Transit Routes (4 classes)

7. Industry Software – HCS+ and Synchro+SimTraffic (5 classes)
8. Special Topics, Professional Issues, and Review (4 classes)
9. Exams (3 classes)

Contribution of the course meeting professional component:

This course is part of engineering topics of the curriculum and is an elective.

ABET Category Content as estimated by faculty member who prepared this course description:

Engineering Science: 2.0 credits or 67%  
 Engineering Design: 1.0 credits or 33%

Relation of course to program outcomes:

- Outcome 2: The graduates will have a general comprehension of four technical areas appropriate to civil engineering.
- Outcome 3: The graduates will be prepared to begin the professional registration process.
- Outcome 4: The graduates will be capable of design activities and have the ability to identify, formulate, and solve engineering problems.
- Outcome 7: The graduates will have an understanding of experimental processes.
- Outcome 8: The graduates will have the ability to use techniques, skills, and modern engineering tools needed for engineering practice.
- Outcome 10: The graduates will have an understanding of the need to emphasize their education through life-long learning.

Relation of course to ABET Program Outcomes:

<u>General Criteria</u>	Bloom's Level of Achievement
3(a) Knowledge of math, science, engineering	3
3(b) Design and conduct experiments; analyze and interpret data	4
3(c) Design a system, component, or process	3
3(e) Identify, formulate, and solve engineering problems	3
3(i) Need for life-long learning	3
3(k) Techniques, skills, modern engineering tools for engineering practice	3

<u>Program Criteria</u>	Bloom's Level of Achievement
1. Apply knowledge of four technical areas appropriate to civil engineering	3
2. Conduct civil engineering experiments and analyze and interpret the resulting data	3
3. Design a system, component, or process in more than one civil engineering context	3
4. Explain the importance of professional licensure	2

Computer usage:

1. Word Processing and Spreadsheets for homework and lab projects.
2. Industry Software including HCS+ and Synchro+SimTraffic

Laboratory projects:

This course typically includes three laboratory-style homework assignments:

1. Local freeway and ramp current and future operations analysis
2. Local stop-controlled intersection: analysis of operations and evaluation of different control types
3. Local traffic signal: analysis of current operations, comparison of evaluation tool results.

Prepared by: S. Click

Date: December 2006