CEE4604
Traffic Engineering

Charles Via Jr. Department of Civil and Environmental Engineering
Virginia Polytechnic Institute and State University

Instructor

Dr. Hesham Rakha
301-D3 Patton Hall
Tel.: (540) 231-1505
E-mail: hrakha@vt.edu

Course Overview and Objectives

Traffic engineering is concerned with the safety of public, the efficient use of transportation resources, and the mobility of people and goods. Traffic engineers are called on to protect the environment while providing mobility, to preserve a scarce public resource (capacity) while working with others to assure safety and security.

The goal of this course is to provide a background in traffic engineering with a focus on urban traffic engineering issues. In achieving this goal a number of objectives are identified, as follows:

a. Describe the basic traffic stream models and compute the basic traffic stream parameters.

b. Model simple urban traffic networks using the INTEGRATION software.

c. Conduct statistical tests to identify the number of test runs required to evaluate alternative traffic engineering projects and the goodness-of-fit of a distribution.

d. Evaluate the operation of existing signal timings.

e. Optimize the signal timings of an isolated intersection.

f. Compute the delay along an arterial roadway.

Course Website and Material

All course material is available on the Blackboard web site. Material on the website include lecture notes, the INTEGRATION manuals (Volumes I and II), and the INTEGRATION software. The course will use some chapters from the *Traffic Engineering: Third Edition* textbook by Roess, Prassas, and McShane.

Course Grading

The final grade for the class will be determined as follows:

Item	Grade (%)
Class Participation	5.0
Assignments	30.0
Project	10.0
Mid-term Test	27.5
Final Test	27.5

Evaluation of class participation will consider lecture attendance, involvement in class discussions, and reading assigned material. Assignments and course project are to be delivered on or before the due dates. Late delivery will be penalized as follows:

Delay	Penalty
1 day	-10%
2 days	-25%
3 days	-50%
4 days	-100%

The course project will involve (a) measuring the start loss, end gain, and unopposed saturation flow rate at the approaches to a signalized intersection; (b) conducting turning movement counts at the signalized intersection approaches during the PM peak hour; (c) Evaluating the existing signal timings; and (d) Enhancing the existing signal timings.

The course grading scheme is as follows:

Grade	Mark
A	95-100
A-	90-94
B+	85-89
B	80-84
B-	75-79
C+	70-74
C	65-69
C-	60-64
D	50-59
F	0-49

Borderline cases will be evaluated individually based solely on the instructor's discretion considering class participation, enthusiasm, and other subjective factors.

Course Syllabus and Schedule

Week	Topic	Deliverable
Week 1	Introduction: Emerging Issues in Traffic Engineering Introduction: Traffic Stream Basic Concepts	
Week 2	INTEGRATION: Overview INTEGRATION: Basic Coding	
Week 3	INTEGRATION: Basic Coding INTEGRATION: Interpretation of Results	Assignment 1
Week 4	INTEGRATION: Advanced Coding Statistics: Basic Principals of Probability and Statistics	Assignment 2
Week 5	Statistics: Normal, Binomial, and Poisson Distributions Statistics: Confidence Bounds	Assignment 3
Week 6	Statistics: Hypothesis Testing Statistics: Goodness-of-fit Testing	Assignment 4
Week 7	Review Mid-term Test	
Week 8	Data Collection Techniques Introduction to Intersection Control	
Week 9	Traffic Signal Terms and Definitions Estimation of Delay: Under-saturated Conditions	Assignment 5
Week 10	Estimation of Delay: Over-saturated Conditions Isolated Signal Phasing	Assignment 6
Week 11	Isolated Signal Basic Timing Isolated Signal Timing Parameters – Opposing Flows	Assignment 7
Week 12	Isolated Signal Shared Volume Allocation & Capacity Isolated Signal Timing with Shared Lanes	Assignment 8
Week 13	Example Application of Isolated Traffic Signal Timing Introduction to Traffic Signal Coordination	Assignment 9
Week 14	Project Presentations Project Presentations	Project
Week 15	Review	