CE 496 INTRO. TO INTELLIGENT TRANSPORTATION SYSTEMS

Elective Course

Fall 2008

Instructor: *Name:* Ilgın Yaşar

Office Hours: M W F 3

Course Data: Hours: TT 78, Th 5, Room: M2200

Course Description (Proposed Catalog):

CE496 Introduction to Intelligent Transportation Systems (ITS) (3+0+0)3

Introduction to ITS. Sensors in modern traffic management systems. Traffic flow theory as applied to ITS. Traffic flow characterization. Traffic simulation and simulation tool examples. Discrete traffic modeling. Traffic flow sensor technologies. Overhead sensor installation along a highway. Data requirement for future traffic management applications. Applications of sensor data to traffic management. Freeway incident management. Adaptive traffic signals. Corridor management-ramp metering. Evaluating ITS.

Prerequisite: Consent of the instructor

Course Objectives (Learning Outcomes):

To develop an understanding of and appreciation for basic concepts in ITS such as traffic flow theory as applied to ITS, traffic flow characterization, and discrete traffic modeling. To provide the students with an introduction to components of ITS, evaluation and design tools such as SYNCHRO, PARAMICS and similar software packages. To introduce basic principles of traffic flow detector technologies and their applications in several ITS components, such as Freeway Incident Management, and Ramp Metering, and evaluation of ITS projects. To develop communication skills through a series of progressive, formal writing and presentation assignments.

Textbook:

Daganzo, C.F., (1997), "***Fundamentals of Transportation and Traffic Operations"***, Pergamon.

Klein, L.,"***Sensor Technologies and Data Requirements for ITS***", Artech House Publishers.

Chen***, "ITS Handbook 2000: Recommendations from the World Road Association (PIARC)"***

Curricular Context

This elective course introduces basic principles of traffic flow detector technologies and their applications in several ITS components, such as Freeway Incident Management, and Ramp Metering, and evaluation of ITS projects.

Laboratory and Computer Usage:

Students are asked to asked to develop computer programs to complete homework and class projects related to ITS and traffic flow theory for ITS.

Class Policies:

Homework: 10% of the course grade; Progress reports and presentations: 10% of the course grade
Attendance (if absenteeism<6hrs): 5% of the course grade; Final project: 25% of the course grade
Midterm exams: One exam, 30% of the course grade.
Final exam: Comprehensive exam at the end of the semester, 20% of the course grade.

Contribution of the Course to Program Outcomes:

(a) An ability to apply knowledge of mathematics, science and engineering
(e) An ability to identify, formulate, and solve engineering problems
(g) An ability to communicate effectively
(i) A recognition of the need for, and an ability to engage in life-long learning
(j) A knowledge of contemporary issues
(k) An ability to use the techniques, skills and modern engineering tools necessary for engineering practice

Course Assessment:

Course will be assessed on the basis of the accomplishments regarding the course objectives and the contributions to the program outcomes. The evaluation will consist mainly of the responses from the students, who will provide their comments to various course related questions in the final week of the semester.

Week	Topics	Homework Assignment	Content
1	Introduction to ITS		Introduction to Intelligent Transportation Systems
2	Sensors in Modern Traffic Management Systems		Prevalence of recurring congestion, impact of traffic management strategies on congestion, sensors as part of an Intelligent Transportation traffic management system, evolution of sensor requirement
3	Traffic flow theory as applied to ITS	Presentation I Progress Report I	Traffic flow theory as applied to ITS, traffic stream characteristics
4			
5	Traffic Flow Characterization	Homework I	Traffic parameters for uninterrupted flow, speed flow rate plots, speed-density and flow rate density plots, traffic parameters for interrupted flow, traffic parameters as measures of effectiveness, traffic flow parameter definitions
6	Traffic Simulation and Simulation Tool Examples	Presentation II Progress Report II	Traffic simulation, SYNCHRO and PARAMICS introduction
7	Discrete Traffic Modeling	Midterm I	Discrete traffic modeling
8	Traffic Flow Sensor Technologies	Presentation III Progress Report III	Video image processor, mounting and traffic viewing considerations, video surveillance on freeways and arterials, infrared video image processors, microwave radar, infrared sensors, active infrared laser sensors, passive infrared sensors, inductive loop detectors
9	Overhead Sensor Installation along a Highway		
10	Data Requirement for Future Traffic Management Applications	Presentation IV Progress Report IV	Sensor data requirements for evolving applications, sensor specification development through systems analysis, effect of data limitations on characterizing traffic flow
11	Applications of Sensor Data to Traffic Management	Homework II	Traffic signal timing parameters, local isolated intersection signal control, pretimed control, actuated control, interconnected intersection signal control, sensor functions, arterial systems, network systems, timing plan selection, system performance measures of effectiveness, critical intersection control, review of traffic adaptive signal control systems, freeway incident management.
12	Corridor Management- Ramp Metering		Freeway metering, ramp metering, mainline metering, freeway-to-freeway metering, coordinated operation of freeways and surface streets
13	Evaluating ITS Projects	Final Presentation , Final Report	Evaluating ITS projects