NJIT

CIVIL AND ENVIRONMENTAL ENGINEERING

DEPARTMENT OF CIVIL AND ENVIRONMENTAL ENGINEERING

TRAN 755 Intelligent Transportation Systems

Spring 2024

Brief Course Description

This course will discuss the fundamental concepts and practices of Intelligent Transportation Systems (ITS). The primary topics of this course cover 1) National ITS Architecture; 2) Active Transportation and Demand Management (ATDM) and Active Traffic Management (ATM); 3) Connected and Automated Vehicles; and 4) Data Collection and Communications Technologies for ITS. Students will be assigned to a group project to hone their hands-on experiences of designing and evaluating real-world ITS applications. Every individual of this class will be asked to perform a term project.

Course Objectives

1. Describe the fundamental concepts of Intelligent Transportation Systems
2. Implement working knowledge of emerging ITS applications
3. Identify the best practices of ITS
4. Recognize the gaps and challenges of current ITS applications
5. Develop capabilities to identify and solve transportation problems within the context of ITS applications

Instructors

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Lecture Hours and Location

Wednesday, 6:00 PM - 8:50 PM @ FMH 314

Office Hour:
Wednesday, 3:00 PM - 5:00 PM
Friday, 1:00 PM – 2:00 PM
Any time by appointment.

Textbook & References:
The primary reading material of this class is **ITS-ePrimer** (http://www.pcb.its.dot.gov/ePrimer.aspx). Additional reading materials will be provided by the instructor based on topics during lecture which will be accessible through Canvas. The reading material for the class comes primarily from the instructor's handouts and online references provided during lectures. The following references are optional reading:
- Sussman, Joseph. Perspectives on Intelligent Transportation Systems (ITS). New York, NY: Springer, 2010.
- Mashrur A. Chowdhury, and Adel Sadek, Fundamentals of Intelligent Transportation Systems Planning, Artech House, Inc., 2003.

Grading
Term Paper: 33%
Project 1: 33%
Project 2: 34%

Term Paper (Subject to be changed)
Each student will conduct a term paper for a selected topic. The primary purpose of the term paper is to let students 1) scan previous research efforts related to the topic; 2) examine the gaps and challenges of the previous efforts; and 3) come up with new idea(s) to fill out the gaps and overcome the challenges. Choosing a topic for the term paper is up to student. Each student will be presenting the progress of the term project on a weekly basis; the presentation schedule will be announced during lecture. The timeline of the term paper is as follows.
- 3rd Week: Submit the list of term paper topics
- 6th Week: Submit term paper abstract
- 7th Week: Submit the final abstract of term paper
- 8st Week: Presentation
- 10th Week: Final paper

Project 1

This project is to hone each student's data analytics skill for traffic condition (e.g., speed, travel time, volume, delay) forecasting by using practical dataset obtained from various sources (e.g., loop detector, radar sensors, cctv cameras) The tentative timeline of the group project is as follows.
- 6th Week: Matlab Lab for Traffic Data Forecasting
- 10th Week : Project 1 Final Report

Project 2
The class will be divided into multiple groups (i.e., up to 2 members per group) to conduct a hypothetical ITS design project. Given scenarios reflecting real-world practices, each group will propose the most desirable ITS application to deal with the given problem and prove the effectiveness of their proposal visually and numerically. The tentative time line of the group project is as follows.
- 11st Week : Submit Project 2 Scope of Work
- 15th Week : Final Presentation & Final Report (Concept of Operations Document)

Exam/Homework Policies

- individuals who either asked or allowed such behaviors. The NJIT honor code will be upheld and any violation will be brought to the immediate attention to the Dean of Students. See http://studentsenate.njit.edu/wp-content/uploads/2010/03/University_Code_on_Academic_Integrity.pdf

Class Polices

- Cell Phones and mobile devices (e.g., Laptop, IPad/Tablet PC, IPod, etc.): Cell Phone should be turned off prior to coming to class. Texting and the use of mobile devices during the class shall not be allowed.
    - Each student will be excused to miss up to two classes with prior permission/**VALID** reason. Each subsequent class missed will cost the student up to 5% of the overall grade. Five (5) or more missed classes will result in an F grade.

Course Schedule (Subject to be changed)

Week	Class Agenda	Deliverable
1	- Course Overview - Introduction to ITS	
2	- National/Regional ITS Architecture - Data Collection Technologies	
3	- Data Collection Technologies - Performance Measures	Term Paper Topic
4	- Lab 1: Traffic Data Collection (Remote Traffic Microwave Sensor; Video Analytics) - Active Transportation and Demand Management (ATDM) Overview	
5	- Advanced Traveler Information System & Forecasting Techniques	
6	- Lab 2: Matlab for Traffic Data Forecasting - Macroscopic Traffic Flow Theory Basics	Term Paper Abstract
7	- Active Traffic Management (ATM) – Variable Speed Limit	
8	- Active Traffic Management (ATM) – Ramp Metering **- Term Paper Presentation**	(Final) Term Paper
9	Spring Recess: No Class	
10	- ITS Evaluation Techniques: Sketchup- Macro-, Meso-, Microsimulations - Lab 3: VISSIM	Project 1 Report
11	- Transit Signal Priority	Project 2 Scope of Work
12	- Adaptive Traffic Signal Control	
13	- Adaptive Traffic Signal Control - Connected and Automated Vehicles	
14	- Connected and Automated Vehicles	
15	- Group Project Final Presentation	Project 2 Final Report
TBD	Final Exam	