



## Course Objectives

### 1. **Transportation and the Environment**

- 1.1. Describe the impacts of motor vehicle transportation on the environment and public health.
- 1.2. Outline the roles and describe the interactions of city, regional, state, and federal transportation agencies.
- 1.3. Describe and critique transportation funding policies.

### 2. **Traffic Flow Theory**

- 2.1. Define and calculate traffic stream characteristics: speed, density, and volume.
- 2.2. Apply basic traffic stream mathematical models to analyze performance of uninterrupted flow highway facilities.
- 2.3. Apply basic deterministic queuing methods to analyze performance on highway and traffic facilities.

### 3. **Highway Capacity**

- 3.1. Describe data collection methods.
- 3.2. Perform capacity analysis (e.g. Level of Service) for highway segments.

### 4. **Traffic Control**

- 4.1. Differentiate between actuated and manual signal control.
- 4.2. Apply a signal warrant analysis.
- 4.3. Label a signal phase diagram.
- 4.4. Calculate signal phases including change and clearance intervals and delay.
- 4.5. Perform capacity analysis of signalized intersections.

### 5. **Traffic Safety**

- 5.1. Calculate crash rates.
- 5.2. Determine countermeasures and calculate expected reductions in crashes.

### 6. **Transportation Planning and Travel Demand Models**

- 6.1. Describe the role of regional and state transportation agencies in the planning process.
- 6.2. Identify and evaluate current and anticipated transportation network problems based on travel demand and network performance.
- 6.3. List the steps of the four-step travel demand model.
- 6.4. Calculate the output of each step of the four-step travel demand model.

## Textbook and Course Materials (all materials are recommended but not required)

- Principles of Highway Engineering and Traffic Analysis, 6<sup>th</sup> or 7<sup>th</sup> Edition, Mannering and Washburn. ISBN-13: 978-1119385585 *NOTE: editions older than the 6th do not have updated codes and references! I suggest you buy this book so you can have it for the FE exam to study and PE exam as a reference*
- Manual on Uniform Traffic Control Devices - For Streets and Highways (2009 Edition). U.S. Department of Transportation. Available online for free from <https://mutcd.fhwa.dot.gov> or <https://app.knovel.com/hotlink/toc/id:kpMUTCDFS1/manual-uniform-traffic/manual-uniform-traffic>
- Highway Capacity Manual - A Guide for Multimodal Mobility Analysis (6th Edition). Transportation Research Board. Available on UArk Knovel from <https://app.knovel.com/hotlink/toc/id:kpHCMAGMM2/highway-capacity-manual/highway-capacity-manual>
- Trip Generation Manual 10<sup>th</sup> Edition from the Institute of Transportation Engineers. *NOTE: This reference will be made available to you electronically through the UArk Library or other TBD.*
- Handouts, additional reading material, lecture notes, and grades will be posted to Blackboard before the start of class.

## Grading Policy

Attendance	10%
Quiz/Surveys	10%
Discussion Boards	10%
Project 1 (Signal Warrants)	25%
Project 2 (Traffic Impact Analysis)	25%
Final Exam (take home)	20%

## Tentative Grading Scale:

A: 100-90%  
B: 89-80%  
C: 79-70%  
D: 69-60%  
F: <=59%

*Note: Please read the University's COVID response grading policy for Pass/Fail options.*

<https://provost.uark.edu/changes-to-spring-2020-grading-policy.php>

### Attendance

Attendance to live sessions during the scheduled class time is required. In these sessions we will work practice problems, participate in interviews with practicing engineers, and review project requirements. Practice problems will be posted with each learning module so that you can try to work them before joining the live session. The 'A Day in the Life' series includes live 10-minute interviews with practicing transportation professionals from ARDOT, consulting firms, and public works and planning agencies. This is meant to help you explore the diverse areas of transportation and to see what a typical day looks like for practicing engineers and planners. Extra credit will be given to students who ask a question in the chat box during the interview or volunteer to serve as a class ambassador who interacts by video with the speaker. You may be excused from five sessions without prior permission from the TA. Although rarely granted, exceptions to online attendance due to unplanned technology issues, illness, and course conflicts will be granted with permission of the TA. You must email the TA within 24 hours of your absence to be eligible for an exception.

### Quizzes and Surveys

Pre-recorded content includes video lectures accompanied by idea surveys and concept quizzes (e.g., a learning module in Blackboard). Content in the learning modules will be covered in the live sessions the following week, e.g., traffic signal timing lectures will be available week 1 and practice problems on signal timing will be covered week 2. Idea surveys ask you to respond in a couple sentences to a thought prompt and are to be done before watching the lectures. Quizzes are concept questions and are to be done after watching the lectures. The survey and quiz are due by Sunday before the corresponding topic is covered in the first live session. Note that homework is not part of this class. Instead, you are asked to complete each learning module by watching pre-recorded content and completing in surveys, quizzes, and discussion boards. The live online sessions are where we do practice problems typically thought of as homework. The final exam will include questions from the quizzes and problems from the live sessions.

### Discussion Boards

To engage student-to-student dialogue, discussion boards on some course topics will be generated throughout the semester. You will be required to respond at least three times to existing threads or create a new thread at least once. The discussion board will be monitored for civil dialogue. Any posts not perceived as appropriate civil discourse by the TA or instructor will be removed and the student will receive a grade of zero points.

### Projects

Two projects will be assigned. In Project 1 we will conduct a signal warrant analysis for stop-controlled intersection in Oklahoma. In Project 2 we will conduct a Traffic Impact Analysis for a local development. Each project generally consists of remote traffic data collection, data analysis, and a written report. Further instructions will be given during the semester. The projects will be done in groups of three students. Students are responsible for selecting their own groups and the TA will assist students that need

help finding a group. In-class time for group organization will be carried out in the live sessions. Extra credit will be offered for groups who make recorded videos along with their written reports.

### **Final Exam**

The final exam will be cumulative, take-home, open-book and notes, and timed (60 minutes). Questions will be like those found on the Fundamentals of Engineering (FE) exam and those covered during the live sessions and quizzes during the semester. Anyone missing a scheduled examination must notify Dr. Hernandez by email at least one week in advance. Requests for alternate exam dates are given on a per case basis. If you do not email to make accommodations ahead of time, you will receive a zero.

### **Office Hours**

The Instructor and TA will hold virtual office hours on Blackboard Collaborate through the 'Course Room'. The Course Room is for video and call-in and has a virtual whiteboard for problem solving. You can log in at any time during the posted in-session hours for live video help and/or post questions in the discussion boards for projects and learning modules during off-hours. You can email the instructor or TA to request office hours outside the posted hours. The application **Slack** will be used to encourage quick communication. You will be added to the course group. There is a phone app, web app, and downloadable app for PC or Mac.

### **Academic Misconduct, Emergency Preparedness, and Covid-19**

Students are required to be familiar with and abide by the University's policies on 'Academic Integrity' and 'Emergency Preparedness.' Students with questions about how these policies apply to this course should contact Dr. Hernandez immediately. Students are required to wear a mask at all times while on campus. Details about campus policies regarding Covid-19 precautions can be found on the Covid-19 website.

<http://honesty.uark.edu/>

<http://emergency.uark.edu/>

<https://health.uark.edu/coronavirus/>

### CVEG 3413 Fall 2020 Tentative Schedule

W	Date	Learning Module <small>Student paced, with quizzes, discussion board, and surveys</small>	Live Session <small>Live scheduled class time, attendance required</small>
1	8/24/2020	Getting to know.... you, me, and and class tools!	Introductions to Class Tools
	8/26/2020		Course Syllabus and Trivia GAME!
	8/28/2020		Day in the Life and Project Overview
2	8/31/2020	Transportation Sustainability <i>(course objective 1.1)</i>	Transportation Organizations
	9/2/2020		The Career Center Presentation
	9/4/2020		Sustainable Solutions
3	9/7/2020	Transportation Governance and Project Impact Analysis <i>(course objectives 1.2 and 1.3)</i>	Labor Day, No class
	9/9/2020		Impact Assessment
	9/11/2020		Day in the Life and Project Tools/Resources
4	9/14/2020	Traffic Flow <i>(course objectives 2.1 and 2.2)</i>	Cost-benefit analysis activity
	9/16/2020		Introduction to Project 1: Warrants
	9/18/2020		Day in the Life and Project Group Roles
5	9/21/2020	Queuing Theory <i>(course objective 2.3)</i>	Traffic stream parameters
	9/23/2020		Traffic stream models
	9/25/2020		Day in the Life and Traffic stream models, cont'd
6	9/28/2020	Traffic Control and Signalization <i>(course objectives 4.1 and 4.2)</i>	D/D/1 queuing diagrams
	9/30/2020		D/D/1 queuing practice problems
	10/2/2020		Day in the Life and Highway bottleneck queuing
7	10/5/2020	Traffic Signal Timing and Phasing <i>(course objectives 4.3 and 4.4)</i>	Signal warrant review and resources
	10/7/2020		Signal warrant practice problem
	10/9/2020		Day in the Life and warrant problem
8	10/12/2020	Traffic Analysis at Signalized Intersections <i>(course objective 4.5)</i>	Signal phase diagrams
	10/14/2020		Signal timing
	10/16/2020		Day in the Life and signal timing cont'd
9	10/19/2020	Highway Capacity Analysis <i>(course objectives 3.1 and 3.2)</i>	Control delay problems
	10/21/2020		LOS for signalized intersections
	10/23/2020		Introduction to Project 2: Impact Analysis
10	10/26/2020	Traffic Impact Analysis <i>(course objective 6.1)</i>	Basic freeway segment LOS
	10/28/2020		Multilane freeway LOS
	10/30/2020		Day in the Life and Multilane LOS, cont'd
11	11/2/2020	Traffic Safety <i>(course objectives 5.1 and 5.2)</i>	Traffic impact analysis data needs
	11/4/2020		Trip generation manual
	11/6/2020		Day in the Life and LOS for signals
12	11/9/2020	Transportation Planning <i>(course objective 6.2)</i>	Crash rates
	11/11/2020		Crash modification factors
	11/13/2020		Safety performance functions
13	11/16/2020	Travel Demand Forecasting: Trip Generation and Mode Choice <i>(course objective 6.3 and 6.4)</i>	Data resources
	11/18/2020		Equity in Transportation
	11/20/2020		Day in the Life and Planning scenarios
14	11/23/2020	<b>Thanksgiving Week (no classes)</b>	
	11/25/2020		
	11/27/2020		
15	11/30/2020	Travel Demand Forecasting: Trip Distribution and Route Assignment <i>(course objective 6.3 and 6.4)</i>	Trip generation (regression)
	12/2/2020		Model choice (logit models)
	12/4/2020		Day in the Life and Mode and destination choice
16	12/7/2020	Course Reviews	Trip distribution (gravity model)
	12/9/2020		Route assignment (user equilibrium)
	12/11/2020		Dead Day, no class