CE 3400: Transportation Infrastructure Design
CE 3402: Transportation Infrastructure Design Workshop
Spring 2017

CE 3400 Lecture Hours and Location: MW 12:00-1:15pm, THN D-223
Instructor
Prof. T Donna Chen, P.E., Ph.D.
Office: Room THN D203
E-mail: tdchen@virginia.edu
Office Phone: 924-6224
Office Hours: Tuesdays & Wednesdays 3:00-4:00pm, other times by appointment

CE 3402 Workshop Hours and Location: Thursdays 2:00-3:30pm, MEC 215
Lab Instructor
Shraddha Praharaj
Office: Room THN D101
Email: sp3at@virginia.edu
Teaching Assistant
Mengmeng Ye
Office: Room THN D107
Email: my5an@virginia.edu
Lab Instructor & TA Joint Office Hours: Tuesdays 10:00am-12:00pm, other times by appointment

Course Description
Transportation infrastructure is vital to sustain economic growth and to improve quality of life. This introductory course covers characteristics of vehicle movement; basic geometric design of highways; traffic flow relations in traffic streams and on transit lines; highway capacity; transit operation; traffic engineering; and legal requirements and procedures for transportation planning.


Goals
At the end of course, you should be able to (i) articulate transportation infrastructure planning, design, operation and maintenance, and (ii) apply transportation infrastructure design principles for roadway geometry design and transit services.

Objectives

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<tr>
<th>ABET Outcome</th>
<th>Description</th>
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<tbody>
<tr>
<td>(a)</td>
<td>Apply knowledge of mathematics, science, and engineering in planning, analysis, and design of transportation facilities</td>
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<td>(b)</td>
<td>Design and conduct experiments and analyze and interpret transportation data</td>
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<td>(c)</td>
<td>Design a transportation system or component, or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability</td>
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<td>(e)</td>
<td>Identify, formulate, and solve transportation engineering problems</td>
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Understand professional and ethical responsibility in planning, design, and operation of transportation facilities.

Communicate effectively in conveying transportation solutions.

Understand the impact of transportation engineering solutions in a global, economic, environmental, and societal context.

Recognize the need for, and an ability to engage in lifelong learning.

Knowledge of contemporary issues related to transportation systems.

Use the techniques, skills and modern engineering tools necessary for practice of transportation engineering.

Lecture Grading:
- Overall class participation (5%)
- Participation in project presentation evaluation (5%)
- Weekly homework assignments (15%)
- Two mid-term exams (2 X 25%)
- Comprehensive Final (25%)

Workshop Grading:
- Lab exercises (3 X 10%)
- Design project proposal (10%)
- Interim design project report (10%)
- Design project presentation (25%)
- Design project final report (25%)

Class Participation & Discussion
Regular attendance and participation in class discussions is a vital part of critical understanding of course materials. Attending class and actively participating in discussions will both enhance your experience in the course and your grade.

Homeworks
Homework problem sets must be handed in at the beginning of the period in which they are due. After this time, they will be considered late and given no credit unless extenuating circumstances are documented.

In-Class Midterms
The midterm exams are tentatively scheduled for 2/15 and 3/29. No makeup exams are allowed unless extenuating circumstances are documented.

Tentative Lecture Schedule

<table>
<thead>
<tr>
<th>Date</th>
<th>Topic</th>
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<tbody>
<tr>
<td>1/18</td>
<td>Introduction and Background</td>
</tr>
<tr>
<td>1/23</td>
<td>Characteristics of System Users and Facilities</td>
</tr>
<tr>
<td>1/25</td>
<td>Traffic Flow Variables &amp; Measures</td>
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<tr>
<td>1/30</td>
<td>Traffic Flow Models</td>
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<tr>
<td>2/1</td>
<td>Freeway Capacity Concepts</td>
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<tr>
<td>2/6</td>
<td>Freeway Level of Service</td>
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<tr>
<td>2/8</td>
<td>Capacity and Level of Service at Signalized Intersections</td>
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</tbody>
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2/13  Transportation Planning Process  
2/15  Exam I  
2/20  Transportation Demand Modeling  
2/22  Transportation Cost & Benefit Concepts  
2/27  Methods for Project Evaluation  
3/1  Functional Classification of Roadways  
3/6-3/8  Spring Break  
3/13  Sight Distance Concepts  
3/15  Geometric Design: Horizontal Alignments  
3/20  Geometric Design: Layout of Horizontal Curves  
3/22  Geometric Design: Vertical Curves  
3/27  Intersection Design  
3/29  Exam II  
4/3  Traffic Control Devices and Signalization Warrants  
4/5  Freight Systems and Capacity Concepts  
4/10  Freight Design Concepts  
4/12  Design of Bicycle and Pedestrian Facilities  
4/17  Transit Systems  
4/19  Transit Design Concepts  
4/24  Design Project Presentations (Peer & Guest Evaluators)  
4/26  Design Project Presentations (Peer & Guest Evaluators)  
5/1  Design Project Presentations (Peer & Guest Evaluators)  
5/9  Final Exam (2-5pm)  

Tentative Workshop Schedule

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<thead>
<tr>
<th>Date</th>
<th>Topic</th>
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<tbody>
<tr>
<td>1/19</td>
<td>Lab and Design Project Introduction Project Team Survey</td>
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<td>1/26</td>
<td><strong>Project Teams Assigned</strong></td>
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<td>Design Showcase (Guest Speaker)</td>
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<td>Design Project Proposal Work</td>
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<td>2/2</td>
<td>Design Showcase (Guest Speaker)</td>
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<td></td>
<td>Design Project Proposal Work</td>
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<tr>
<td>2/9</td>
<td>Exam I Review</td>
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<tr>
<td></td>
<td>Design Project Proposal Work</td>
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<tr>
<td>2/16</td>
<td>Design Showcase (Guest Speaker)</td>
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<tr>
<td></td>
<td>Design Project Proposal Work</td>
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<tr>
<td>2/23</td>
<td><strong>Design Project Proposal Due</strong></td>
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<td>Lab Exercise 1: Transportation Planning/Trip Generation</td>
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<td></td>
<td>Interim Design Project Work</td>
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<tr>
<td>3/2</td>
<td>Interim Design Project Work</td>
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<tr>
<td></td>
<td>SPRING BREAK</td>
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<td>Date</td>
<td>Event</td>
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| 3/16 | Lab Exercise 2: Project Alternatives and Evaluation  
Interim Design Project Work |
| 3/23 | Exam II Review  
Interim Design Project Work |
| 3/30 | Interim Design Project Work |
| 4/6  | **Interim Project Report Due**  
Lab Exercise 3: Geometric Design  
Final Design Project Work |
| 4/13 | Final Design Project Work |
| 4/20 | Final Design Project Work |
| 4/27 | Final Exam Review  
Final Design Project Work  
**Final Project Report due by 5pm on 5/2** |

**Honor System**
I trust every student in this course to fully comply with all of the provisions of the UVA honor system. All alleged honor violations brought to my attention will be forwarded to the Honor Committee. If, in my judgment, it is beyond a reasonable doubt that a student has committed an honor violation with regard to a given assignment/exam, that student will receive an immediate grade of 'F', irrespective of any subsequent action taken by the Honor Committee.

**Students with Disabilities**
All students with special needs requiring accommodations should present the appropriate paperwork from the Student Disability Access Center (SDAC). It is the student's responsibility to present this paperwork in a timely fashion and follow up with the instructor about the accommodations being offered. Accommodations for test-taking (e.g., extended time) should be arranged at least 1 week prior to the exam.