

Course Number	CE 351 Winter Quarter 2020
Title	Introduction to Transportation Engineering
Section	003
CRN(s)	40484
Credits	4
Prerequisite(s)	STAT 451 and junior standing in engineering
Days/Time	Tuesday and Thursday, 8:00 to 9:50
Location	CH 150
Final Exam Session	Thursday March 19, 2020 8:00-9:50

Course Website	https://d2l.pdx.edu/ Logon to D2L to find syllabus, assignments, announcements, etc. You are responsible for checking D2L regularly.
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Instructor	Prof. Avinash Unnikrishnan, Ph.D.
Office	301D Engineering Building
Phone & Voicemail	503-725-2872
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Office Hours	Tuesday and Thursday 10:30 AM – 11:30 AM and anytime by appointment
Mailbox Location	CEE Office, Engineering Building Room 200

Required Text:

Manning, Fred L. and Washburn Scott S. *Principles of Highway Engineering and Traffic Analysis*, 6th ed., 2016.

Recommended References/Optional Text/Supplemental Readings & Resources:

1. *Highway Capacity Manual 2010*, Transportation Research Board, 2010.
2. *A Policy on Geometric Design of Highways and Streets*, American Association of State Highway and Transportation Officials (AASHTO Green Book), 6th Edition, 2011.
3. *Highway Design Manual*, Oregon Department of Transportation, 2012
http://www.oregon.gov/ODOT/HWY/ENGSERVICES/Pages/hwy_manuals.aspx#2012_English_Manual
4. Manual on Uniform Traffic Control Devices for Streets and Highways (MUTCD), Federal Highway Administration, 2009. Available free at: <http://mutcd.fhwa.dot.gov>

Catalog Description:

A study of engineering problems associated with the planning and design of urban and intercity transportation with emphasis on systems approach to problems definition and solution. Vehicle operation characteristics and traffic control devices for land, air, and water, data collection methods and development of transportation models for the establishment of design criteria for transportation structures.

Course Statement

This course is an introduction to the principles of transportation engineering with a focus on highway engineering and traffic analysis. Topics include vehicle fundamentals and road-vehicle performance, geometric design, pavement design, and fundamentals of traffic flow and queuing theory. Linkages beyond the highway mode are included. The material learned will allow students to solve transportation problems that are likely to appear in professional practice and on the Fundamentals of Engineering exam (FE) and Principles and Practice of Engineering Exam (PE).

Course Objectives – Students must demonstrate the ability to:

1. Understand how transportation systems and the various modes of transportation fit into the civil infrastructure and society
2. Communicate an awareness of basic transportation issues
3. Understand the basic physical concepts that impact vehicle/infrastructure interactions and affects on transportation system users.
4. Be able to design horizontal and vertical curves using AASHTO guidelines
5. Understand the basic principles of pavement design
6. Apply traffic flow and queuing theory to transportation problems
7. Understand and apply basic highway capacity principles on freeways and multi- and two-lane highways. Grasp how capacity issues affect other modes.
8. Become familiar with social and sustainability impacts of transportation systems

Course Requirements:

- Lecture materials, handouts, supplemental reading, in-class announcements and all materials posted on D2L.
- Be engaged and participate actively in class discussions and exercises.
- Assigned readings should be done prior to the relevant class.
- Homework assignments to be done on one side of letter-sized paper. Use care and make sure that the TA can read your writing. Use clearly legible engineering style block lettering, do not over-crowd your writing, and maintain professional presentation standards. Staple your un-folded homework in the upper left corner.
- Midterm exam and comprehensive final exam.
- All written responses in this course shall be in your own words.

Course Evaluation

The course grade will be determined with the following weight for class assignments:

<u>Assignment</u>	<u>Percent of Total Grade</u>
Homework Assignments	30%
Midterm Exam	30%
Final Exam	40%
Total	100%

A grade of incomplete "I" is granted by the instructor only with prior approval and consent. Criteria are outlined in the PSU Bulletin. Note that for Civil Engineering Undergraduates the CEE Department requires that junior and senior engineering courses must be completed with a minimum grade of C-, and a student's cumulative PSU GPA must be 2.25 or higher to graduate from the BSCE program.

Professionalism

All assignments, communications and class participation should be conducted in a professional manner. Attention to detail on class assignments and communication is important and is part of the learning experience and it will be included in part of student evaluation.

Attendance

Attendance is strongly encouraged. If you miss a class session, it is your responsibility to check D2L for any materials and to check with a classmate for any announcements or other information not posted on D2L.

Submit Work On Time

We will not accept late work for this course. The due date for each assignment is clearly indicated and the assignment must be turned in at the beginning of class when requested by the instructor unless indicated otherwise.

Description of Assignments

Assignments and Problem Sets (30% of final grade)

Problem sets are posted online or assigned during the class session and are due the following week at the start of class (unless otherwise noted by the instructor). The instructor will do numerical examples in class. Place your name, the course number (CE351), assignment number, and due date on the header of each page in case they get separated. Clearly restate the problem and provide your answer. Staple pages together in the upper left hand corner and please do not fold the pages.

Midterm and Final Exams (Total 70% of final grade)

There will be one midterm exam and one final exam and they will cover all topics discussed up to the exam day or as indicated in class. The final exam is comprehensive.

Computer and Email Accounts

Email is a great way for us to remain in contact and is the best way to reach me. I will periodically send reminders and other notices to the class via email. When contacting me please include **CE351** in the subject line.

All engineering students should activate their engineering computer account which will allow them to use engineering computer labs and email. You should activate it *before* the day you need it. If you encounter problems with your account, see the lab attendant, or email: support@cecs.pdx.edu. Please note: the CEE Department also regularly sends course announcements, job information, etc. to students' CECS accounts, so if you do not check it regularly, I recommend forwarding your CECS email (and PSU for that matter) to whatever email address you most often use.

Ethics and Professionalism

As future professional engineers you should plan to take the Fundamentals of Engineering Exam and after the required experience, the Professional Engineering Exam (see the Oregon State Board of Examiners for Engineering and Land Surveying at www.osbeels.org). You should also be familiar with the ASCE Code of Ethics (<http://www.asce.org/Leadership-and-Management/Ethics/Code-of-Ethics/>), which includes the following:

Engineers shall act in such a manner as to uphold and enhance the honor, integrity and dignity of the engineering profession.

The PSU Student Conduct Code prohibits all forms of academic cheating, fraud, and dishonesty. Further details can be found in the PSU Bulletin. Allegations of academic dishonesty may be addressed by the instructor, and/or may be referred to the Office of Student Affairs for action. Acts of academic dishonesty may result a failing grade on the exam or assignment for which the dishonesty occurred, disciplinary probation, suspension or dismissal from the University. The students and the instructor will work together to establish optimal conditions for honorable academic work. Questions about academic honesty may be directed to the Office of Student Affairs (<http://www.pdx.edu/dos/psu-student-code-conduct>).

Resources

Student Groups and Professional Organizations

Participation in student and professional groups can be a valuable part of your education experience. Membership gives students opportunities to get to know fellow students better, meet and network with professionals, collaborate in solving real engineering problems, learn about internship or job possibilities, socialize and have fun. Your fellow students can be a great source of help and guidance in your academic endeavors. Consider becoming active with a student organization, such as the following:

- American Society of Civil Engineers Student Group (ASCE): <http://www.asce.pdx.edu>
- Engineers Without Borders
- Students in Transportation Engineering And Planning (STEP): <http://www.step.groups.pdx.edu/>

Most professional organizations have monthly meetings and encourage student participation by providing discounts for lunch and dinner meetings. These meetings provide opportunities to network with potential future employers, learn about scholarships, and increasing your technical knowledge. Take a look at these organizations as a starting point:

- American Society of Civil Engineers (ASCE) Oregon Section: www.asceor.org
- Institute of Transportation Engineers (ITE) Oregon Section: www.oregonite.org
- Society of Women Engineers (SWE) Columbia River Section - www.swe-columbia-river.org
- Structural Engineers Association of Oregon (SEAO): www.seao.org
- Women's Transportation Seminar, Portland Section: wtsinternational.org

Campus Help

As a PSU student, you have numerous resources at your disposal. Please take advantage of them while you are here. A small sample is listed below:

- CEE Website (includes program info, job listings, etc.): www.cee.pdx.edu
- Advising and Career Services: www.pdx.edu/careers 402 University Services Building
- MCECS Student Career Success: Frank Goovaerts (fhg@pdx.edu), 101 Engineering Building, 503-735-2876
- Center for Student Health & Counseling: www.pdx.edu/shac located at 1880 SW 6th Ave., University Center Building, Suite 200.
- The Writing Center: www.writingcenter.pdx.edu 188 Cramer Hall.
- PSU Disability Resource Center: www.pdx.edu/drc 116 Smith Memorial Student Union
Note: The PSU Disability Resource Center is available to help students with academic accommodations. If you are a student who has need for test-taking, note-taking or other assistance, please visit the DRC and notify the instructor at the beginning of the term.

Library and Literature Research www.library.pdx.

With the advent of the Internet it is very tempting to think that all necessary resources for a term project will be available in full text after typing in a few words at Google.com. This is

not the case. You will often need to go to the library, use real library search tools and access real books and articles contained in refereed/archival journals.

Campus Safety www.pdx.edu/cpso

Call **911** if there is an emergency. The University considers student safety paramount. The Campus Public Safety Office is open 24 hours a day to assist with personal safety, crime prevention and security escort services. Call 503-725-4407 for more information. **For Campus emergencies call 503-725-4404.** CPSO is located in Shattuck Hall, 1914 SW Park Ave, Suite 148.

Final Notes

- The syllabus is subject to change at the discretion of the instructor as course or other circumstances requires.
- Students with documented disabilities are encouraged to discuss with me arrangements that will enhance their learning in this class.

Tentative Course Schedule

This is a tentative schedule of topics and may change depending on progress made in each section.

Lecture	Date	Content
1	7-Jan	Introduction
2	9-Jan	Road Vehicle Performance
	14-Jan	NO CLASS
3	16-Jan	Road Vehicle Performance
4	21-Jan	Road Vehicle Performance
5	23-Jan	Geometric Design
6	28-Jan	Geometric Design
7	30-Jan	Geometric Design
8	4-Feb	Geometric Design
9	6-Feb	Geometric Design
10	11-Feb	Pavement Design
11	13-Feb	Pavement Design
12	18-Feb	Traffic Flow Theory
	20-Feb	Mid Term (Tentative)
13	25-Feb	Traffic Flow Theory
14	27-Feb	Traffic Flow Theory
15	3-Mar	Traffic Flow Theory
16	5-Mar	Traffic Flow Theory
17	10-Mar	Highway Capacity Analysis
18	12-Mar	Highway Capacity Analysis
	19-Mar	Final Exam