

The University of Texas at El Paso  
Department of Civil Engineering

**CE6306 Infrastructure Engineering (CRN 18401)**

**Course Syllabus (Fall 2016)**

Time & venue	Class times: TR, 10:30 p.m. to 11:50 p.m., HSSN 216
Instructor	Dr. Ruey (Kelvin) Cheu Office: Engineering Annex Room A208 Email: <a href="mailto:rlcheu@utep.edu">rlcheu@utep.edu</a> Phone: (915)747-5717 Office hours: MTWR 1:30 p.m. to 3:00 p.m.
Teaching assistant	None
Course website	See Blackboard
Course objective	In UTEP course catalog: “This course introduces systems concepts and tools in engineering civil infrastructure. The technical topics are grouped into 3 parts: infrastructure location; infrastructure capacity analysis; and decision analysis. The infrastructure location analysis addresses the issue on where to locate/site an infrastructure facility (e.g. transportation terminals, water/wastewater treatment plants, schools, and etc.). The capacity analysis covers the analysis of a facility’s capacity and for infrastructure systems that spread over a network (e.g. transportation, water distribution, sewage, storm water), the capacity and distribution of materials across a network.”
Pre-requisite	No pre-requisite, but students are expected to have some background in <ul style="list-style-type: none"><li>- Linear programming</li><li>- Probability and statistics</li></ul>
Textbook	No required textbook.  Reference books, not required, but excellent books to have are: 1. Taha, H. A., 2007. Operations Research: An Introduction. Prentice Hall. 2. Daskin, M. S., 1995. Network and Discrete Location. John Wiley. 3. Ang, A. H-S. and Tang, W. H., 1984. Probability Concepts in Engineering Planning and Design, Volume II: Decision, Risk and Reliability. John Wiley. These books are not available in UTEP Bookstore, but can be purchased over the internet.

Grading	<p>Contributions towards final mark (out of 100%)</p> <ul style="list-style-type: none"> <li>15% Class attendance</li> <li>15% Exam 1 (at the end of infrastructure capacity analysis)</li> <li>15% Exam 2 (at the end of infrastructure locations analysis)</li> <li>15% Exam 3 (at the end of decision analysis)</li> <li>25% Homework</li> <li>10% Topical presentation</li> <li>4% Portfolio</li> <li>2% Others (to be determined)</li> </ul> <p>Letter grades will be assigned based on the final course marks:</p> <ul style="list-style-type: none"> <li>A 90 and above</li> <li>B 80 to 89.99</li> <li>C 70 to 79.99</li> <li>D 60 to 69.99</li> <li>F below 60</li> </ul>
Exams	<p>Exams will be given during the class times. The dates and topics to be tested will be announced in the class one week prior to the exam. The exams are open book. You can bring the textbook, class notes and homework to the exam.</p>
Final Exam	<p>See above. The final exam will be Exam 3.</p>
Portfolio	<p>The portfolio will be graded during Exam 3. The portfolio should be submitted in a ring binder with dividers. You are expected to include all the syllabus, class notes, homework, assignments, project works, revision notes and other materials related to this course.</p>
Homework	<p>The homework problems will be assigned at the completion of a topic and will be due in class on the day stated in the homework sheet. All homework problems will be graded. Homework solutions will be discussed in subsequent classes.</p> <p>In all your homework and exam solutions, you are expected to present, in written form (typed, printed or hand written notes), the formulae used, the variable values, intermediate calculation, final answers and their units. No having any of the above will lead to marks being deducted.</p>
Topical presentation	<p>At the end of 3<sup>rd</sup> week, each student will propose/select a topic for presentation in the class. The purpose of this is to train students to learn a relatively advanced topic on his/her own, and to teach fellow classmates. The duration of the presentations depends on the class size. The dates of presentations will depend on the topic of interest, to</p>

	fit the class schedule.
Late homework/ assignment policy	Late homework is normally accepted with the following penalties used by EPISD: Late by $\leq 24$ hours: 70% credit Late by $> 24$ hours but $\leq 48$ hours: 50% credit Late by $> 48$ hours: 0% credit.
Re-schedule of exams	Make-up for exams will only be arranged if you inform the instructor prior to the exam, with a valid reason. Examples of valid reasons are child birth, illness, passing of an immediate family member, court appearance, and travel for official UTEP business. They are not expected or cannot be rescheduled. You may be required to show evidence for the valid reason. Events that can be pre-scheduled or rescheduled are not considered valid reasons. Examples of non-valid reasons are bridge delay, wedding, driving test, clash in course schedule, and etc. Job interview will be considered on a case by case basis. If an emergency happens during the exam day, you should contact the instructor at the earliest possible time (or contact one of your classmates who will then inform the instructor).
Collaboration/ cheating	Being a PhD course, the assignments and homework are challenging. Discussions between classmates on homework are strongly encouraged. However, the written work submitted must be your own effort (in your own words and your own style). Directly copying someone else's work is cheating. Any case of suspected cheating will be reported to the Dean of Students, which may lead to you getting an F grade in this course, suspension in the program of study and/or dismissal from UTEP.
Audio/video recording	Recording of class instructions by any audio or video device is not permitted. The only exception is at the request of the Center for Accommodation and Support Services, or at the request of Department, College or University for teaching evaluation.
Cell phone policy	Please turn off your cell phone or switch it to silent mode during class time. If you need to answer a phone call, please leave the class quietly and only answer "Hello" or "Bueno" outside the class door. You are not allowed to answer any phone call during the examination.
Disability	If you have any disability and you need special assistance in taking this course, please contact the Center for Accommodations and Support Services (CASS), formerly known as Disable Student Service at Union East. Your identity will be kept confidential.

## **Suggested Topics for Presentations**

- Probabilistic facility location models
- Spatial and temporal queuing models
- Demand forecasting models
- Time series models
- Infrastructure inspection, health assessment, risk/security analysis
- Environmental impact assessment (EIA)
- Discrete event and Monte-Carlo simulations
- Leadership in Energy & Environmental Design (LEED)
- Climate change on infrastructure
- Sustainable infrastructure, sustainable mobility
- Smart Cities
- Infrastructure resilience
- Infrastructure performance measures
- Infrastructure project financing
- ASCE sustainability scoring system
- Other relevant topics

Students are free to propose his/her own topic, related to thesis/dissertation.

The presentation should cover (1) the basic concepts and models; and (2) application examples in civil or infrastructure engineering.

## Tentative Weekly Schedule

The dates of the exam are tentative.

Wk	Date	Topic
1	8/23, 8/25	Course introduction Civil infrastructure characteristics
2	8/30, 9/1	America's infrastructure report card ASCE initiatives
3	9/6, 9/8	Infrastructure capacity: queuing models
4	9/13, 9/15	Infrastructure capacity: queuing models
5	9/20, 9/22	Infrastructure capacity: queuing models, network models
6	9/27, 9/29	Infrastructure capacity: network models
7	10/4, 10/6	Infrastructure capacity: network models; <b>exam 1</b>
8	10/11, 10/13	Infrastructure location: review of linear programming
9	10/18, 10/20	Infrastructure location: set covering model
10	10/25, 10/27	Infrastructure location: median covering model; <b>exam 2</b>
11	11/1, 11/3	Infrastructure location: probabilistic covering model;
12	11/8, 11/10	Decision analysis
13	11/15, 11/17	Decision analysis
14	11/22	Decision analysis
15	11/29, 12/1	<b>Exam 3</b> <b>12/2 Dead Day</b>
16	12/8 10am- 12:45pm	Official final exam (if needed)