University of Texas at Tyler - Department of Civil Engineering
CENG 4351/5351 Traffic Engineering: Operations and Control
Fall 2024

Instructor: Dr. Mena Souliman
RBS 1005

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Office Hours:
Monday and Wednesday: 12:30PM-2:00PM (please email me to RSVP)

Lectures:
Monday: 11:15 AM-12:10PM: Recorded Lecture
Wednesday: 11:15 AM-12:10PM: RBN 3039

Laboratory:
Wednesday: 2:30 PM-5:15 PM, RBN 3039

Course Website:
Canvas will be used to manage the course material for the semester. There you will find homework assignments, solutions, handouts and other material pertaining to the class. **PLEASE CHECK THERE REGULARLY.**

Catalog Description:
Introduction to traffic systems, flow characteristics, data collection, control of urban streets and freeways, operations of arterial streets, freeway, and networks, optimal signal timing design, capacity analysis using computer simulation. Additionally, the course will cover a detailed Evaluation of stresses in flexible pavements, materials characterization, and design of flexible pavements for highways and airports.

Learning Objectives:
1. Develop an organized approach to solving traffic engineering analysis and design problems.
2. Explain traffic stream characteristics, volume studies, speed, travel time, delay, accident, intersection design and parking studies.
3. Explain traffic congestion from the supply and demand perspective and classify many intelligent transportation system solutions.
4. Explain uniform traffic control devices including traffic signs, markings, signal, and warrants.
5. Analyze freeway and highway capacity including the unsignalized and signalized intersection capacity, arterial planning and design, identify operational problems and carry out traffic engineering studies.
6. Explain signal components, control and operations, signal timing and systems coordination and evaluate alternative signal timing solutions.
7. Familiarize the students with the procedures used to design pavements.

8. Develop a fundamental understanding of the analysis of pavemnt structures (develop necessary analytical skills to analyze stresses and strains in pavement system).
9. Understand the concepts and theory behind the materials and drainage characterization requirements for input in pavement structural design and performance.

Prerequisites:
CENG 3351: Transportation Engineering Systems.

Required Texts:
Traffic Engineering, Roger P. Roess, William R. McShane, and Elena S. Prassas, 4th Edition (or newer), Prentice Hall, 2010. ISBN: 0136135730. ISBN-13: 9780136135739. Available at the bookstore and web outlets.

Supplemental Textbooks/References:

- Pavement Analysis and Design, Y. H. Huang, 2nd Edition, Prentice Hall, 2004. ISBN-10: 0131424734. ISBN-13: 978-0131424739. Available at the bookstore and web outlets.
- HCM2010: Highway Capacity Manual 2010 (with U.S. Units). Copies/handouts of some chapters will be provided
- MUTCD: Manual on Uniform Traffic Control Devices 2009 Edition dated December 2009 (in both html and pdf formats, as well as a list of known errors included) http://mutcd.fhwa.dot.gov/kno_2009.htm (which is the most recent version for the MUTCD). MUTCD's & Traffic Control Devices Information currently used in Texas adopt this national manual and some supplements are added specifically for the State of Texas. Detailed information can be found in this website: http://www.txdot.gov/government/enforcement/signage/tmutcd.html
- Additional handouts/references for the use of traffic software will be provided in due course.

Schedule (Tentative and Subject to Change):

Course Schedule - Subject to Revision			
Date	Lesson #	Material Covered	Lesson Material
26-Aug	1	Introduction to Traffic Engineering	Ch. 1
28-Aug	2	Traffic stream	Ch. 5
28-Aug	Lab 1: Introduction		
2-Sep	LABOR DAY: NO CLASS		
4-Sep	3	Traffic stream	Ch. 5
4-Sep	4	Volume studies	Ch. 9
9-Sep	Lab 2: Turning Movement Counts		
11-Sep	5	Volume studies	Ch. 9
11-Sep	Lab 3: Turning Movement Counts and Intro. to Synchro		
16-Sep	6	Speed, travel time, delay	Ch. 10
18-Sep	7	Speed, travel time, delay	Ch. 10
18-Sep	Lab 4: Speed Studies		
23-Sep	8	Accident/safety studies	Ch. 11
25-Sep	9	Accident/safety studies	Ch. 11
25-Sep	Lab 5: Accident Study		
30-Sep	10	Parking Studies	Ch. 12
2-Oct	11	Parking Studies	Ch. 12
2-Oct	Lab 6: Parking Study		
7-Oct	Exam 1		
9-Oct	12	Introduction of traffic control devices	Ch. 4
9-Oct	Lab 7: 3D-Move		
14-Oct	13	Introduction of traffic control devices	Ch. 4
16-Oct	14	MUTCD signing and marking	Ch. 17
16-Oct	Lab 8: 3D-Move		
21-Oct	15	MUTCD signing and marking	Ch. 17
23-Oct	16	Hierarchy of Intersection Control	Ch. 18
23-Oct	Lab 9: PaveXpress		
28-Oct	17	Hierarchy of Intersection Control	Ch. 18
30-Oct	18	Hierarchy of Intersection Control	Ch. 18
30-Oct	Lab 10: Introduction to pavement engineering		
4-Nov	19	Signals	Ch. 20
6-Nov	20	Signals	Ch. 20
6-Nov	Lab 11: Introduction to pavement engineering		
11-Nov	Exam 2		
13-Nov	21	Signals	Ch. 20
13-Nov	Lab 12: Rotational Viscometer		
18-Nov	22	Introduction to pavement engineering	PPT
20-Nov	23	How Do Asphalt Pavements Fail?	PPT
20-Nov	Lab 13: Penetration Test		
25-Nov	Thanksgiving Holiday: NO classes		
27-Nov			
27-Nov			
2-Dec	24	Pavement Design methods	PPT
4-Dec	25	Material characterization	PPT
4-Dec	Lab 14: Final Review Session		
9-Dec	Dec 9-13: Final Exams		

Exams:
There will be 2 midterm examinations and one final examination. The exams are **TENITATIVELY** scheduled for:

Exam 1: October 7th
Exam 2: November 11th
Final Exam: TBD

Exams dates may be moved up or pushed back depending on the progress of the lectures. You can use a calculator and instructor approved reference material. Solutions to exams will **NOT** be posted however, key answers will be demonstrated at class. No make-up exams will be given except for medical or other similar hardships where advanced arrangements are made with the instructor; or in case of non-selective medical emergencies with appropriate physician's note or documentation. Other than circumstances described above, failure to take the exam at the scheduled time will constitute a grade of zero in the exam.

Homework:
Homework will be assigned on regular basis. **Homework is due on the date assigned at the beginning of lecture**. No late homework will be accepted except when arrangements are made with the instructor ahead of time. Solutions will be posted on Canvas. **5% Extra credit will be given for each fully computer-typed homework assignments**.

Term paper (for 5351 students):
Term paper topic will be assigned by the mid of September.

Laboratory:
There will be a series of labs completed during the semester. We will meet for lab on Wednesday's from 2:30pm-5:15pm in RBN 3039.

Be sure to review the handout and complete all required work prior to coming to lab. This will help to prepare you the experiment and help to make the sessions run smoother. If necessary a quiz will be given at the beginning of the lab which covers the experiment for the day.

You will work in groups to complete each lab. The instructor will assign the groups. Each group will be required to turn in one report for the entire group. However, there may be some lab assignments which are done individually. The format for the report is provided with the syllabus. You are encouraged to visit the writing center as they can provide excellent feedback and help you with your writing.

Grades (For 4351):
Homework/Quizzes = 20%
Professional Practice = 10%
Midterm Exams (2) = 30%
Final Exam = 20%
Labs= 20%

Grade Scale:
A: 90-100
B: 80-89
C: 70-79
D: 60-69
F: <60

Grades (For 5351):
Homework/Quizzes = 10%
Professional Practice = 5%
Midterm Exams (2) = 30%
Final Exam = 20%
Labs= 20%
Term Paper = 15%

Grade Scale:
A: 90-100
B: 80-89
C: 70-79
D: 60-69
F: <60

****NOTE:** There will be no makeup work or extra credit allowed/granted at the end of or during the semester unless allowed/granted to everyone by the instructor. All assignments must be turned in at the appropriate time to receive credit.

Calculator Policy:

Only NCEES approved calculators will be permitted during tests and your test will be collected and your grade will be a zero if you are using a non-approved calculator.

The approved calculators include the following: (Please check the NCEES website for a complete listing, www.ncees.org/exams/calculator-policy/. Examples include but are not limited to:

- Hewlett Packard – HP 33s, HP 35s, and no others
- Casio – All FX 115 models
- Texas Instruments – All TI 30X or TI-36X models.
- If you are unsure about your calculator, it is your responsibility to check with the instructor for approval.

At the discretion of the course instructor, any calculator not meeting the requirements stated (especially in the case of a graphing calculator) may be used but only after an inspection of the device and a clearing of all the memory within the device, performed for the instructor at a time immediately prior to the exam. At any time during the exam your calculator is subject to a random search by the instructor. Failure or refusal to clear all memory or to surrender your calculator to search will disqualify you from the exam immediately, unless you can produce a calculator meeting the requirements as stated above.

-Laptops/PDAs/MP3 players/Cell Phones or other electronic devices:

The use of any electronic device, except an approved calculator, is not permitted during exams. Your exam will be collected and your grade will be a zero if you are caught using a non-approved electronic device/calculators. Any instances of a calculator inappropriately used during an exam will be the basis of alleging Academic Misconduct and may result in Failing (F) of the course at the determination of the course's instructor or the basis for a recommendation for expulsion from the University. Any Calculator used during an exam in this course must meet the requirements stated within the policy below.

Professional Practice:

Your professional practice grade will be computed based upon your attendance and the number of assignments you turn in that are completed in a professional manner.

Final day to withdraw:

The final day to withdraw from the course without penalty is **November 4th.**

Census dates:
The university requires that instructors to report the attendance to the register at various points in the semester. Therefore, on **September 11th** I will be taking attendance. Please make sure you are there for class on that date or notify ahead if you will not be there.

CENG 4351/5351 General Requirements for Laboratory Reports
Lab Time: Wednesday: 2:30 PM-5:15 PM, RBN 3039

A laboratory report is required for each experiment performed. Only one lab report is required per group for most labs. There may however be certain labs that require each person to submit their own work. Due dates for each lab will be posted. The report should be in the following format.

- **Cover Page:** Laboratory Title, Course Number (CENG 4351), Your Names and Group Number. Each person in the group sign the cover page indicting that they have read the report and approve of the contents contained within.
- **Objective:** Purpose of the experiment should be explained in a few sentences.
- **Procedure:** Include a summarized procedure of the steps you took to complete this lab. Numbered list is preferred.
- **Results and Discussion**: Present tabulated raw data (data sheets are provided with the standard laboratory procedure), relevant calculations, and required plots. **BE SURE TO USE CAPTIONS FOR FIGURES, TABLES AND GRAPHS! Refer to the figures, graphs and tables by number in the text of the discussion.** Partial credit can only be assigned if you present your work in a logical manner. Neatly show your work and attach a page of sample calculations.

Try to have a good understanding of each experiment. Analyze your results. Identify probable sources of error that may have occurred while you performed the laboratory, and explain that how these errors might affect your results (final value will increase or decrease). DISCUSS!! For example, what trends do you notice in the data? Do the results make sense? Are they what you expected? If so why? If not, why not? Some labs will have more data than others to discuss. Be sure to give a thorough discussion of your results.

- **Conclusions:** Summarize your results. Relate what you have learned from class about soil mechanics to what you have learned from performing this lab. Explain that how this experiment is useful to solve the practical civil engineering problems.
- **Team Contributions:** The contributions of each team member should be stated in this section. List what portions of the report each person contributed towards and how much time each person spent. It is okay to have multiple people working on any part.

GRADING

Participation in Lab and Cleanup	20 %
Report	
• Objective	5 %
• Procedure	10%
• Results and Discussion	40 %
• Conclusions	25 %

THINGS TO REMEMBER

- After finishing the experiments, clean the instruments and the work area.
- Data sheets should be typed in Excel
- Sample calculations can be typed or written neatly on engineering paper and placed as an appendix of the report. The remainder of the report should be typewritten.
- When writing your reports, avoid using first person like “I” or “we”.
- **USE CAPTIONS FOR FIGURES AND TABLES! REFER TO THESE FIGURES AND TABLES SPECIFICALLY IN THE TEXT USING THE FIGURE/TABLE NUMBER!**

University Policies and Information

Withdrawing from Class

Students may withdraw (drop) from this course using the Withdrawal Portal. Withdrawing (dropping) this course can impact your Financial Aid, Scholarships, Veteran Benefits, Exemptions, Waivers, International Student Status, housing, and degree progress. Please speak with your instructors, consider your options, speak with your advisor, and visit the One-Stop Service Center (STE 230) or email enroll@uttyler.edu to get a complete review of your student account and the possible impacts to withdrawing. We want you to make an informed decision. UT Tyler faculty and staff are here for you and often can provide additional support options or assistance. Make sure to carefully read the implications for withdrawing from a course and the instructions on using the Withdrawal portal.

Texas law prohibits students from dropping more than six courses during their entire undergraduate career*. The six courses dropped include those from other 2-year or 4-year Texas public colleges and universities. Consider the impact withdrawing from this class has on your academic progress and other areas, such as financial implications. We encourage you to consult your advisor(s) and Enrollment Services for additional guidance. **CAUTION #1:** Withdrawing before census day does not mean you get a full refund. Please see the Tuition and Fee Refund Schedule. **CAUTION #2:** All international students must check with the Office of International Programs before withdrawing. All international students are required to enroll full-time for fall and spring terms. **CAUTION #3:** All UT Tyler Athletes must check with the Athletic Academic Coordinator before withdrawing from a course. CAUTION #4: All veterans or military-affiliated students should consult with the Military and Veterans Success Center.

* Students who began college for the first time before 2007 are exempt from this law.

Artificial Intelligence Statement

UT Tyler is committed to exploring and using artificial intelligence (AI) tools as appropriate for the discipline and task undertaken. We encourage discussing AI tools' ethical, societal, philosophical, and disciplinary implications. All uses of AI should be acknowledged as this aligns with our commitment to honor and integrity, as noted in UT Tyler's Honor Code. Faculty and students must not use protected information, data, or copyrighted materials when using any AI tool. Additionally, users should be aware that AI tools rely on predictive models to generate content that may appear correct but is sometimes shown to be incomplete, inaccurate, taken without attribution from other sources, and/or biased. Consequently, an AI tool should not be considered a substitute for traditional approaches to research. You are ultimately responsible for the quality and content of the information you submit. Misusing AI tools that violate the guidelines specified for this course is considered a breach of academic integrity. The student will be subject to disciplinary actions as outlined in UT Tyler's Academic Integrity Policy. Refer to the About This Course section of the UT Tyler Syllabus Module for specific information on appropriate use of AI in your course(s).

Final Exam Policy

Final examinations are administered as scheduled. If unusual circumstances require that special arrangements be made for an individual student or class, the Dean of the appropriate college, after consultation with the faculty member involved, may authorize an exception to the schedule. Faculty members must maintain student final examination papers for a minimum of three months following the examination date.

Incomplete Grade Policy

If a student, because of extenuating circumstances, is unable to complete all of the requirements for a course by the end of the semester, then the instructor may recommend an Incomplete (I) for the course. The "I" may be assigned in place of a grade only when all of the following conditions are met: (a) the student has been making satisfactory progress in the course; (b) the student is unable to complete all coursework or final exam due to unusual circumstances that are beyond personal control and are acceptable to the instructor, and (c) the student presents these reasons before the time that the final grade roster is due. The semester credit hours for an Incomplete will not be used to calculate the grade point average.
The student and the instructor must submit an Incomplete Form detailing the work required and the time by which the work must be completed to their respective department chair or college dean for approval. The time limit established must not exceed one year. Should the student fail to meet all of the work for the course within the time limit, then the instructor may assign zeros to the unfinished work, compute the

course average for the student, and assign the appropriate grade. If a grade has yet to be assigned within one year, then the Incomplete will be changed to an F, or NC. If the course was initially taken under the CR/NC grading basis, this may adversely affect the student's academic standing.

Grade Appeal Policy

Disputes regarding grades must be initiated within sixty (60) days from the date of receiving the final course grade by filing a Grade Appeal Form with the instructor who assigned the grade. A grade appeal should be used when the student thinks the final course grade awarded does not reflect the grades earned on assessments or follow the grading scale as documented in the syllabus. The student should provide the rationale for the grade appeal and attach supporting document about the grades earned. The form should be sent via email to the faculty member who assigned the grade. The faculty member reviews the rationale and supporting documentation and completes the instruction section of the form. The instructor should return the form to the student, even if a grade change is made at this level. If the student is not satisfied with the decision, the student may appeal in writing to the Chairperson of the department from which the grade was issued. In situations where there is an allegation of capricious grading, discrimination, or unlawful actions, appeals may go beyond the Chairperson to the Dean or the Dean's designee of the college from which the grade was issued, with that decision being final. The Grade Appeal form is found in the Registrar's Form Library.
NOTE: The Grade Appeal Form is different from the Application for Appeal form submitted to the Student Appeals Committee, which does not rule on grade disputes as described in this policy.

Disability/Accessibility Services

In accordance with Section 504 of the Rehabilitation Act, Americans with Disabilities Act (ADA) and the ADA Amendments Act (ADAAA), the University of Texas at Tyler offers accommodations to students with learning, physical, and/or psychological disabilities. If you have a disability, including a non-visible diagnosis such as a learning disorder, chronic illness, TBI, PTSD, ADHD, or a history of modifications or accommodations in a previous educational environment, you are encouraged to visit https://hood.accessiblelearning.com/UTTyler/ and fill out the New

Student application. The Student Accessibility and Resources (SAR) office will contact you when your application has been submitted and an appointment with the Assistant Director Student Accessibility and Resources/ADA Coordinator. For more information, including filling out an application for services, please visit the SAR webpage at https://www.uttyler.edu/disability-services, the SAR office located in the Robert Muntz Library, LIB 460, email saroffice@uttyler.edu, or call 903.566.7079."

Military Affiliated Students

UT Tyler honors the service and sacrifices of our military-affiliated students. If you are a student who is a veteran, on active duty, in the reserves or National Guard, or a military spouse or dependent, please stay in contact with your faculty member if any aspect of your present or prior service or family situation makes it difficult for you to fulfill the requirements of a course or creates disruption in your academic progress. It is important to make your faculty member aware of any complications as far in advance as possible. Your faculty member is willing to work with you and, if needed, put you in contact with university staff who are trained to assist you. The Military and Veterans Success Center (MVSC) has campus resources for military-affiliated students. The MVSC can be reached at MVSC@uttyler.edu or via phone at 903.565.5972.

Students on an F-1 Visa

To remain in compliance with Federal Regulations requirements you must do the following:

- Traditional face-to-face classes: Attend classes on the regular meeting days/times.
- Hybrid Classes: Attend all face-to-face classes convened by the instructor according to the schedule set for your specific course.
- Online course: Only one online course can count toward your full-time enrollment. Students are expected to be fully engaged and meet all requirements for the online course.

Academic Honesty and Academic Misconduct

The UT Tyler community comes together to pledge that "Honor and integrity will not allow me to lie, cheat, or steal, nor to accept the actions of those who do." Therefore, we enforce the Student Conduct and Discipline policy in the Student Manual Of Operating Procedures (Section 8).

FERPA

UT Tyler follows the Family Educational Rights and Privacy Act (FERPA) as noted in University Policy 5.2.3. The course instructor will follow all requirements to protect your confidential information.

Absence for Official University Events or Activities

This course follows the practices related to Excused Absences for University Events or Activities as noted in the Catalog.

Absence for Religious Holidays

This course follows the practices related to Excused Absences for Religious Holy Days as noted in the Catalog.

Absence for Pregnant Students

This course follows the requirements of Texas Laws SB 412, SB 459, SB 597/HB 1361 to meet the needs of pregnant and parenting students. Part of the supports afforded pregnant students includes excused absences. Faculty who are informed by a student of needing this support should make a referral to the Parenting Student Liaison. NOTE: Students must work with the Parenting Student Liaison in order to receive these supports. Students should reach out to the Parenting Student Liaison at parents@uttyler.edu and also complete the Pregnant and Parenting Self-Reporting Form.

Campus Carry

We respect the right and privacy of students who are duly licensed to carry concealed weapons in this class. License holders are expected to behave responsibly and keep a handgun secure and concealed. More information is available at http://www.uttyler.edu/about/campus-carry/index.php.