University of Florida
Department of Civil and Coastal Engineering

TTE 4201/5256
TRAFFIC ENGINEERING

Course Description: The purpose of this course is to provide students with an overview of the fundamentals of traffic engineering, with emphasis on data measurement techniques and technologies, data analysis, performance assessment, and traffic control devices. This is a 3-credit course.

- From Institute of Transportation Engineers (ITE) Traffic Engineering Handbook (2009)…

  "*Transportation Engineering* is the application of technology and scientific principles to the planning, functional design, operation, and management of facilities for any mode of transportation in order to provide for the safe, rapid, comfortable, convenient, economical, and environmentally compatible movement of people and goods."

  "*Traffic Engineering* is that phase of transportation engineering which deals with the planning, geometric design and traffic operations of roads, streets, and highways, their networks, terminals, abutting lands, and relationships with other modes of transportation."

Course Objectives: This course deals with the technical aspects of traffic engineering. A person who completes this course will have an understanding of the typical duties and responsibilities of the professional traffic engineer.

Pre-requisite: TTE 4004, or engineering graduate student, or permission of instructor. *Note that a considerable level of computer programming (macro-style code) is required in this course*.

Instructor: Dr. Scott Washburn
                     Department of Civil and Coastal Engineering
                     580-A Weil Hall
                     Email: swash@ce.ufl.edu or through Canvas
                     Web: swash.essie.ufl.edu
                     Office Hours: To be determined

Meeting Times:
- Tuesday, Periods 2 and 3 (8:45 – 10:25, 100 minutes)
- Thursday, Period 9 (9:35 – 10:25, 50 minutes)

Meeting Location:
- Weil Hall 234
- https://campusmap.ufl.edu/#/index/0024

Course Website: http://elearning.ufl.edu/

Computer Requirements: https://www.eng.ufl.edu/students/advising/fall-semester-checklist/computer-requirements/

Software Requirements: RStudio (https://www.rstudio.com/), free version

Reference Material:

Lecture Slides (provided)
Textbook (optional): *Principles of Highway Engineering and Traffic Analysis*, 7th Edition Mannering and Washburn; Wiley & Sons, Inc.; ISBN 978-1-119-49396-9. https://www.wiley.com/en-us/Principles+of+Highway+Engineering+and+Traffic+Analysis%2C+7th+Edition-p-9781119493969 or https://www.vitalsource.com/products/principles-of-highway-engineering-and-traffic-fred-l-mannering-scott-s-v9781119493969?term=9781119493969
Highway Capacity Manual, 7th Edition Electronic version is available for free at https://app.knovel.com/; Need to be on UF network (use VPN if off-campus, https://it.ufl.edu/ict/documentation/network-infrastructure/vpn/)
Signal Timing Manual, 2nd Edition. NCHRP Report 812. Washington, DC: The National Academies Press. 2015. https://doi.org/10.17226/22097
Manual on Uniform Traffic Control Devices (MUTCD), 11th Edition Electronic version is available for free at https://mutcd.fhwa.dot.gov/
ITE Traffic Engineering Handbook, 7th Edition Electronic version is available for free at https://app.knovel.com
Highway Safety Manual, 1st Edition, with Supplement 2014 Electronic version is available for free at https://app.knovel.com/

Topics Covered:
- Traffic Stream Parameters and Performance Measures
- Traffic Stream Measurement Methods and Technologies
- Traffic Analysis Models/Methods
- Statistical Methods for Traffic Data Analysis
- Traffic Impact Studies
- Traffic Control Devices
- Basic Safety Analysis

Schedule at a Glance (subject to change):

Class	Date	Day	Topic
1	14-Jan	Tues	Course Overview
2	16-Jan	Thur	Introduction to Traffic Engineering
3	21-Jan	Tues	Introduction to Performance Measurement
4	23-Jan	Thur	Introduction to R/R Markdown/Rstudio, Assign 1
5	28-Jan	Tues	Assign 1 (cont.)
6	30-Jan	Thur	Traffic Stream Parameter Definitions and Calculations
7	4-Feb	Tues	Assign 2
8	6-Feb	Thur	Assign 2 (cont.), Basic Traffic Stream Models
9	11-Feb	Tues	Assign 3
10	13-Feb	Thur	Assign 3 (cont.), Statistical Data Analysis
11	18-Feb	Tues	Statistical Data Analysis (cont.), Assign 4
12	20-Feb	Thur	Assign 4 (cont.)
13	25-Feb	Tues	Measuring Traffic Stream Parameters
14	27-Feb	Thur	Traffic Impact Studies Overview
15	4-Mar	Tues	Traffic Performance Analysis Methods (HCM, Simulation)
16	6-Mar	Thur	Assign 5
17	11-Mar	Tues	Assign 5 (cont.)
18	13-Mar	Thur	Introduction to Project
19	18-Mar	Tues	No Class - Spring Break
20	20-Mar	Thur	No Class - Spring Break
21	25-Mar	Tues	Field Trip to Gainesville Traffic Management Center (9:00-10:00 AM)
22	27-Mar	Thur	Assign 6
23	1-Apr	Tues	Assign 6 (cont.)
24	3-Apr	Thur	Assign 7
25	8-Apr	Tues	MUTCD Overview
26	10-Apr	Thur	MUTCD Overview (cont.)
27	15-Apr	Tues	In-class project time
28	17-Apr	Thur	Highway Safety Manual Overview
29	22-Apr	Tues	"Pop Quiz" (HCM, HSM, MUTCD, TIS, Measurement Technologies, Simulation)
	29-Apr	Tues	Project Due (11:59 PM)

Assignments:
- The assignments can be completed either individually or in teams of 2 students.
- There will be seven assignments for the semester, as follows:

#	Topic
1	RStudio with R Markdown
2	Traffic Stream Parameters
3	Traffic Stream Models
4	Statistical Data Analysis Methods
5	Arterial Speed and Volume Data Analysis
6	Freeway Detector Data Analysis
7	HCM Signalized Intersection Calculations

Project:

- There will be one project for the course, performed over approximately the last third of the semester. This project will require the application of many of the concepts/methods/etc. learned earlier in the semester.

Grading:

Grades will be given at the end of the semester based only on the work completed during the semester. Only assignments received by the due date/time will be eligible to receive full credit. Assignments will be accepted up to 48 hours after the regular due date/time, but will only be eligible to receive up to 75% of the original maximum score. No credit will be given for assignments turned in after that period. It is of course acceptable to work with the other classmates within your team, and to some extent with classmates outside of your team, to assist your learning of the material required to complete the assignments. However, it is NOT acceptable to copy another student team's assignment solution(s). Only one assignment should be turned in for each student team.

Assignments will be scored on a scale of 0-100%, in increments of 5% (i.e., 0, 5, 10, 15, 20%...). That score will be multiplied by the total number of points available for the assignment. For example, a 50-point assignment given a score of 85% will receive 42.5 points (50 × 0.85). A total of 450 points is allocated to the assignments.

A total of 150 points is allocated to the project, which will be graded on a fully continuous scale (i.e., 0-150 points).

The following grade distribution will be used for the course:

Total Points Earned	Percentage of Available Points	Final Grade	Grade Points
564 - 600	≥ 94.0 %	A	4.00
540 - 563	90.0 - 93.9 %	A−	3.67
516 - 539	86.0 - 89.9 %	B+	3.33
492 - 515	82.0 - 85.9 %	B	3.00
468 - 491	78.0 - 81.9 %	B−	2.67
444 - 467	74.0 - 77.9 %	C+	2.33
420 - 443	70.0 - 73.9 %	C	2.00
396 - 419	66.0 - 69.9 %	C−	1.67
372 - 395	62.0 - 65.9 %	D+	1.33
348 - 371	58.0 - 61.9 %	D	1.00
324 - 347	54.0 - 57.9 %	D−	0.67
0 - 323	< 54.0 %	E	0.00

More information on UF grading policy may be found at:
   https://catalog.ufl.edu/UGRD/academic-regulations/grades-grading-policies/
   https://gradcatalog.ufl.edu/graduate/regulations/

Class Attendance: There is no specific attendance policy. However, students are strongly encouraged to attend all class meetings, as this will certainly improve your likelihood for success in this course. Requirements for class attendance and make-up exams, assignments, and other work in this course are consistent with university policies. Click here to read the university attendance policies: https://catalog.ufl.edu/UGRD/academic-regulations/attendance-policies/

Class Demeanor and Etiquette: This should follow the rules of common sense. Students are encouraged to participate in class discussion and to initiate such discussion whenever they feel that they or the class could benefit from a dialog with the instructor. Other actions that disturb the class are *strongly* discouraged. Use of a laptop for class-related activities will often be necessary. However, laptops/tablets/cell phones should not be used for non-class activities (e.g., engaging in chat room discussions, E-mail, or surfing the web). ***Cell phones should be turned off or muted***. There is no official dress code for this class, but please dress appropriately (i.e., use common sense).

University Policies

Honesty Policy: UF students are bound by The Honor Pledge which states, "We, the members of the University of Florida community, pledge to hold ourselves and our peers to the highest standards of honor and integrity by abiding by the Honor Code. On all work submitted for credit by students at the University of Florida, the following pledge is either required or implied: "On my honor, I have neither given nor received unauthorized aid in doing this assignment." The Honor Code (https://sccr.dso.ufl.edu/process/student-conduct-code/) specifies a number of behaviors that are in violation of this code and the possible sanctions. Furthermore, you are obligated to report any condition that facilitates academic misconduct to appropriate personnel. If you have any questions or concerns, please consult with the instructor or TAs in this class.

Commitment to a Safe and Inclusive Learning Environment
The Herbert Wertheim College of Engineering values varied perspectives and lived experiences within our community and is committed to supporting the University's core values, including the elimination of discrimination. It is expected that every person in this class will treat one another with dignity and respect regardless of race, creed, color, religion, age, disability, sex, sexual orientation, gender identity and expression, marital status, national origin, political opinions or affiliations, genetic information, and veteran status.

If you feel like your performance in class is being impacted by discrimination or harassment of any kind, please contact your instructor or any of the following:
•   Your academic advisor or Undergraduate Coordinator
•   HWCOE Human Resources, 352-392-0904, student-support-hr@eng.ufl.edu
•   Pam Dickrell, Associate Dean of Student Affairs, 352-392-2177, pld@ufl.edu
•   Toshikazu Nishida, Associate Dean of Academic Affairs, 352-392-0943, nishida@eng.ufl.edu

Students Requiring Accommodations: Students with disabilities who experience learning barriers and would like to request academic accommodations should connect with the disability Resource Center by visiting https://disability.ufl.edu/students/get-started/. It is important for students to share their accommodation letter with their instructor and discuss their access needs, as early as possible in the semester.

Student Privacy: There are federal laws protecting your privacy with regards to grades earned in courses and on individual assignments. For more information, please see: https://registrar.ufl.edu/ferpa/

Software Use: All faculty, staff, and students of the University are required and expected to obey the laws and legal agreements governing software use. Failure to do so can lead to monetary damages and/or criminal penalties for the individual violator. Because such violations are also against University policies and rules, disciplinary action will be taken as appropriate. We, the members of the University of Florida community, pledge to uphold ourselves and our peers to the highest standards of honesty and integrity.

Course Evaluation: Students are expected to provide professional and respectful feedback on the quality of instruction in this course by completing course evaluations online via GatorEvals. Guidance on how to give feedback in a professional and respectful manner is available at https://gatorevals.aa.ufl.edu/students/. Students will be notified when the evaluation period opens, and can complete evaluations through the email they receive from GatorEvals, in their Canvas course menu under GatorEvals, or via https://ufl.bluera.com/ufl/. Summaries of course evaluation results are available to students at https://gatorevals.aa.ufl.edu/public-results/.

In-Class Recording: Students are allowed to record video or audio of class lectures. However, the purposes for which these recordings may be used are strictly controlled. The only allowable purposes are (1) for personal educational use, (2) in connection with a complaint to the university, or (3) as evidence in, or in preparation for, a criminal or civil proceeding. All other purposes are prohibited. Specifically, students may not publish recorded lectures without the written consent of the instructor.

A "class lecture" is an educational presentation intended to inform or teach enrolled students about a particular subject, including any instructor-led discussions that form part of the presentation, and delivered by any instructor hired or appointed by the University, or by a guest instructor, as part of a University of Florida course. A class lecture does not include lab sessions, student presentations, clinical presentations such as patient history, academic exercises involving solely student participation, assessments (quizzes, tests, exams), field trips, private conversations between students in the class or between a student and the faculty or lecturer during a class session.

Publication without permission of the instructor is prohibited. To "publish" means to share, transmit, circulate, distribute, or provide access to a recording, regardless of format or medium, to another person (or persons), including but not limited to another student within the same class section. Additionally, a recording, or transcript of a recording, is considered published if it is posted on or uploaded to, in whole or in part, any media platform, including but not limited to social media, book, magazine, newspaper, leaflet, or third party note/tutoring services. A student who publishes a recording without written consent may be subject to a civil cause of action instituted by a person injured by the publication and/or discipline under UF Regulation 4.040 Student Honor Code and Student Conduct Code.

Campus Resources

Health and Wellness

> **U Matter, We Care:** Your well-being is important to the University of Florida. The U Matter, We Care initiative is committed to creating a culture of care on our campus by encouraging members of our community to look out for one another and to reach out for help if a member of our community is in need. If you or a friend is in distress, please contact umatter@ufl.edu so that the U Matter, We Care Team can reach out to the student in distress. A nighttime and weekend crisis counselor is available by phone at 352-392-1575. The U Matter, We Care Team can help connect students to the many other helping resources available including, but not limited to, Victim Advocates, Housing staff, and the Counseling and Wellness Center. Please remember that asking for help is a sign of strength. In case of emergency, call 9-1-1.
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> **Counseling and Wellness Center:** https://counseling.ufl.edu, and 392-1575; and the University Police Department: 392-1111 or 9-1-1 for emergencies.

Sexual Discrimination, Harassment, Assault, or Violence
If you or a friend has been subjected to sexual discrimination, sexual harassment, sexual assault, or violence contact the **Office of Title IX Compliance**, located at Yon Hall Room 427, 1908 Stadium Road, (352) 273-1094, title-ix@ufl.edu

Sexual Assault Recovery Services (SARS)
Student Health Care Center, 392-1161.

University Police Department at 392-1111 (or 9-1-1 for emergencies), or
http://www.police.ufl.edu/.

Academic Resources

E-learning technical support: 352-392-4357 (select option 2) or e-mail to Learning-support@ufl.edu.
https://elearning.ufl.edu/.

Career Connections Center: Reitz Union, 392-1601. Career assistance and counseling;
https://career.ufl.edu.

Library Support: http://cms.uflib.ufl.edu/ask. Various ways to receive assistance with respect to using the libraries or finding resources.

Teaching Center: Broward Hall, 392-2010 or 392-6420. General study skills and tutoring.
https://teachingcenter.ufl.edu/.

Writing Studio: 302 Tigert Hall, 846-1138. Help brainstorming, formatting, and writing papers.
https://writing.ufl.edu/writing-studio/.

Student Complaints Campus: https://sccr.dso.ufl.edu/policies/student-honor-code-student-conduct-code/; https://care.dso.ufl.edu.

On-Line Students Complaints: https://distance.ufl.edu/getting-help/;
https://distance.ufl.edu/state-authorization-status/#student-complaint.