# CE392H & CRP384: REGIONAL TRANSPORTATION PLANNING APPLICATIONS/TOOLS
**Spring 2025**  (Unique #s: 16990 CE392H & 01468 CRP384)
**Lectures:** Mon/Weds 3:30-4:45 pm in 3.122 ECJ

**I. Instructor: Dr. Kara Kockelman** https://www.caee.utexas.edu/prof/kockelman/home.htm
　　　**Office Hours:** Tuesdays & Wednesdays 10:30-Noon in 6.904 ECJ
　　　　　& by phone: 512-471-0210 (office), email kkockelm@mail.utexas.edu for appointment
　　　**Course Assistant:** Kentaro Mori, mori@utexas.edu

**II. Prerequisites:** Graduate students are not required to have satisfied any specific courses as prerequisites for this course. However, undergraduates and graduate students outside the transportation engineering and planning majors should receive permission from the instructor before enrolling in this course. Experience with GIS applications and large-file manipulation (e.g., million-cell matrixes of interzonal travel times) is desired.

**III. Grading:** Student performance will be assessed using the following scoring system:

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|---|---|
| Homeworks | 30-35% of score/grade |
| Course Project | 25-30% (20-25% for report + 5% for presentation) |
| Examination | 30% |
| Participation* (& Quizzes) | 5% |

* Participation score may be up to 5% of your grade, and is based on participation in the class (including attendance, in cases where attendance is weak). Pluses and minuses will be used in final course grades.

**IV. Examinations[*]:** Only one course examination (a significant "midterm") is expected, towards the end of the semester (e.g., Weds. April 16 or 23) and this may take place outside of lecture hours (e.g., as a take-home exam).  The UT-scheduled **final examination slot (Friday, May 2, 7-9 pm)** may be used **for oral presentations** of final-project work, if times during the final week of class do not work well.

　　　* The instructor reserves the right to periodically administer, grade, and use in student evaluation "pop"/unannounced *quizzes*.  Students should come to class prepared to contribute to each class's lecture and discussion by staying up-to-date with homeworks and reading.

　　　Make-up exams will *not* generally be given to any student.  If a student is absent from a scheduled exam due to medical or other problems beyond her/his control and can plainly demonstrate this, the instructor can choose to give the student a completely different exam, additional assignments, and/or change the weighting of the student's various graded contributions.

**V. Homework Assignments:** Homework problems will be assigned roughly every two weeks and 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*.  However, **all** assigned problems **must** *be completed* (within 3 weeks of their due date and at least one week before the final exam) to help ensure that each student learns the course material. Alternatively, a student's participation score will be adversely affected.

**Homework Solutions & Academic Dishonesty:** The use of unauthorized sources of homework solutions or LLMs (e.g., websites like Chegg & ChatGPT & CoPilot, previous semester student solution copies, & instructor CDs) is considered scholastic dishonesty, plagiarism and a violation of UT's Standard of Academic Integrity. The University Honor Code defines plagiarism as the following:

- When a person represents another's (including a machine's) material as their own work without attribution.
- When a person misrepresents citation or attribution for purposes of an academic advantage.
- When a person submits essentially the same work for two assignments (in different classes, for example) without the permission of the Faculty Member.

Please see the University Honor Code at https://deanofstudents.utexas.edu/conduct/standardsofconduct.php and https://deanofstudents.utexas.edu/conduct/academicintegrity.php, and let me know if you see this happening.

## VI. Course Project

The course project is a multi-person team endeavor for students to apply travel demand forecasting models at the regional scale for the 6-county Austin network. Teammates will learn and apply TransCAD software (or extended AequibriaA code, if they prefer to use open-source code) with feedback of travel times and costs for multiple system equilibria. They will specify, model, and compare results of **at least 3 different scenarios**. These scenarios may involve transportation system modifications (e.g., new transit services, shared autonomous vehicle fleets, or added highway links), travel demand management practices (e.g., new road tolls, higher speed limits, and/or congestion pricing), changing land use patterns (e.g., more balanced job-household settings, infill development, transit-oriented design, and urban growth boundaries), and/or changing demographics (e.g., added user classes with shifting values of time, different population and job growth-rate scenarios, and greater preference for shared fleets). Such work will be followed by an oral presentation to the class (of roughly 20 minutes per team, plus 5 minutes for questions & answers).

## VII. Texts and Course Notes

The recommended textbook for this course is Ortúzar and Willumsen's *Modelling Transport*. Chapters of that text will be assigned for reading, along with sections of NCHRP reports 716 and 365 (available at http://onlinepubs.trb.org/onlinepubs/nchrp/nchrp_rpt_716.pdf and http://ntl.bts.gov/lib/21000/21500/21563/PB99126724.pdf) and the SHRP2 C46 Primer on activity-based travel demand models (http://onlinepubs.trb.org/onlinepubs/shrp2/SHRP2_C46.pdf). Copies of assigned book chapters available via a Course Packet should be purchased from Jerome Kubala (512-497-6662; jerome.kubala@gmail.com), for approx. $30. Updated versions of lecture notes will posted periodically online, for students to download. Any additional, required materials will be made available.

## VIII. Add/Drop Dates

From the 1st through the 12th class day, an undergraduate student can drop a course via the web and receive a refund, if eligible. From the 13th through the university's academic drop deadline, a student may Q drop a course with approval from the Dean, and departmental advisor.

***For graduate students****:* From the 1st through the 4th class day, graduate students can drop a course via the web and receive a refund. During the 5th through 12th class day, graduate students must initiate drops in the department that offers the course and receive a refund. After the 12th class day, no refund is given. No class can be added after the 12th class day. From the 13th through the 20th class day, an automatic Q is assigned with approval from the Graduate Advisor and the Graduate Dean. From the 21st class day through the last class day, graduate students can drop a class with permission from the instructor, Graduate Advisor, and the Graduate Dean. Students with 20-hr/week GRA/TA appointment or a fellowship may not drop below 9 hours.

## IX. Evaluation Plan
UT's Course/Instructor Survey form will be used as the basic evaluation tool. All students are encouraged to submit written comments during this survey. Other formal assessment opportunities may arise mid-semester; and students are strongly encouraged to provide feedback at any time during the course, in person, via other students or anonymously, to the TA and/or the instructor.

## X. Other Information
1. The University of Texas at Austin provides, upon request, appropriate academic accommodations for qualified students with disabilities. For more information, contact the Division of Diversity and Community Engagement, Services for Students with Disabilities, 471-6259 (voice) or 410-6644 (video phone) or http://ddce.utexas.edu/disability/.
2. A student who misses classes or other required activities, including examinations, for the observance of a religious holy day should inform the instructor as far in advance of the absence as possible, so that arrangements can be made to complete an assignment within a reasonable time after the absence.
3. Students in this course are encouraged and authorized to work on homework assignments together and prepare for exams together. However, all written work handed in by a student is considered to be his/her own work, prepared without *unauthorized* assistance. To ensure your actions never compromise your and our class's integrity, please visit http://catalog.utexas.edu/general-information/appendices/appendix-c/student-discipline-and-conduct/. Students who violate University rules on scholastic dishonesty (*e.g.*, anything which gives unfair academic advantage to a student) are subject to disciplinary penalties, including the possibility of failure in the course and/or dismissal from the University. Since such dishonesty harms the individual, all students, and the integrity of the University, policies on scholastic dishonesty will be strictly enforced. An "F" grade will be the recommended penalty in most cases of scholastic dishonesty. One should refer to the Student Judicial Services website at http://catalog.utexas.edu/general-information/appendices/appendix-c/student-discipline-and-conduct/ to access the official University policies and procedures on scholastic dishonesty as well as further elaboration on what constitutes scholastic dishonesty.
**Sharing of Course Materials is Prohibited:** No materials used in this class, including, but not limited to, lecture hand-outs, videos, assessments (quizzes, exams, papers, projects, homework assignments), in-class materials, review sheets, and additional problem sets, may be shared online or with anyone outside of the class unless you have my explicit, written permission. Unauthorized sharing of materials promotes cheating. It is a violation of the University's Student Honor Code and an act of academic dishonesty. We are well aware of the sites used for sharing materials, and any materials found online that are associated with you, or any suspected unauthorized sharing of materials, will be reported to Student Conduct and Academic Integrity in the Office of the Dean of Students. These reports can result in sanctions, including failure in the course.

**Class Recordings:** Class recordings are reserved only for students in this class for educational purposes and are protected under FERPA. The recordings should not be shared outside the instructor's courses in any form. Violation of this restriction by a student could lead to Student Misconduct proceedings.

## XI. Course Objectives, Academic/Learning Goals, Content, & Schedule

This course covers various aspects of urban and regional transportation system performance forecasting. By the end of this course, students should have a solid understanding of the theory and methods underlying the practice of urban and regional travel demand modeling and should be able to:

- describe Americans' **evolving travel choices**, and their variations as a function of demographics and land use patterns;
- identify **key data sources** and methods for planning activities, including **model specification**, forecasting and validation, for **personal vs. commercial, local and long-distance travel**;
- define and apply key elements of **different modeling paradigms for aggregate and disaggregate** approaches to city-wide and region-wide transportation system performance forecasts;
- **apply travel demand modeling software** for system-wide forecasts of activity participation rates, destination and mode choices, traffic and travel time & cost outcomes; and
- **evaluate the differences** in distinctive land use-transportation **scenarios**, including changes in travelers' net benefits.

To attain these objectives, we will systematically proceed through a series of topic modules in class, and students will undertake multiple homework assignments and a team-base course project. A tentative scheduling of the course topics is shown here, along with suggested readings (which can largely be found online).

### Schedule of Topics

1. **Introduction to Course** (<1 lecture) READING: Course syllabus
2. **U.S. Travel Data Trends** (2 lectures) READING: Commuting in America 2022, NHTS 2022 Summary of Travel Trends, BTS Pocket Guide 2025
3. **Technology Trends** (1 lecture)  READING: Huang et al.'s How Will Self-Driving Vehicles Affect US Megaregion Traffic, Hawkins et al.'s Anticipating Technologies…, Huang et al.'s CASE Innovations… + other papers & reports you may find online
4. **Land Use Patterns** (1 lecture) READING: US Land Use (2017), UN World Cities (2018), UN World Urbanization (2018)
5. **Transportation's Costs & Benefits** (2 lectures) READING: Chapter 1 of Kockelman et al.'s *Economics of Transportation Systems*
6. **The Regulatory Environment**  (1 – 2 lectures) READING: AASHTO NEPA Handbook + NRDC's NEPA Toolkit

*Useful Data Sets for Regional Transportation Planning Applications*

7. **Land Use Data Sets** (1 lecture) READING: Chapters 1-3 in NCHRP 716
8. **Travel Data Sets** (2 lectures) READING: Chapters 3 & 4 in NCHRP 716
9. **Network Details**(1 lecture)

*Travel Choice Modeling*

10. **Travel Demand Model Frameworks:**  (1 to 2 lectures) READING: Castiglione et al.'s SHRP2 C46 Primer

11. **Trip Generation & Attraction Models** (1 to 2 lectures) <u>READING</u>: Chapter 4 of NCHRP Report 716 and Chapter 4 of Ortúzar & Willumsen's *Modeling Transport*
12. **Trip-Distribution Models** (2 to 3 lectures) <u>READING</u>: Chapter 4 of NCHRP Report 716 and Chapter 5 of Ortúzar & Willumsen's book
13. **Mode Choices** (2 lectures) <u>READING</u>: Chapter 4 of NCHRP Report 716 and scan Chapters 6, 7, & 8 of Ortúzar & Willumsen's book
14. **Time of Day Choices** <u>READING</u>: Section 4.9 of NCHRP Report 716 & section 11.5 of Ortúzar & Willumsen's *Modeling Transport*
15. **Network Assignment of Traffic** (2 to 3 lectures) <u>READING</u>: Chapters 10 & 11 of Ortuzar & Willumsen's book
16. **Models for Freight Movements** (2 lectures) <u>READING</u>: Chapter 13 of Ortúzar & Willumsen's book
17. **Long-distance Travel Choices** (1 lecture)
18. **Introduction to Congestion Pricing & Land Use Modeling** *(if time permits)*