

CEE 220B TRAVEL DEMAND ANALYSIS II: DISCRETE CHOICE MODELING

Catalog Data:	CEE 220B Travel Demand Analysis II: Discrete Choice Modeling (Credit Units: 4) Lectures, discussions, in-class coding, and individual term project to learn, analyze, and critique theories of travel demand analysis, model formulation, estimation, and applications to predict travel behavior. (Course units: 4)
Prerequisites:	Graduate standing and CEE220A (or instructor's permission)
Restrictions:	None
Required Textbook:	None
Recommended Textbook:	Ben-Akiva, M. E., & Lerman, S. R. (1985). Discrete choice analysis: Theory and application to travel demand. MIT Press.
Reference Texts:	None
Instructor:	Elisa Borowski

Note: CEE102 is planned to be an elective in the General Specialization for the BSCE.

Relationship to Student Outcomes

	<p>This course relates to the following Students Outcomes:</p> <ul style="list-style-type: none"> • Apply engineering design to produce solutions that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors (EAC 2). • Communicate effectively with a range of audiences (EAC 3). • Develop and conduct appropriate research, analyze and interpret data, and use engineering judgment to draw conclusions (EAC 6). • Acquire and apply new knowledge as needed, using appropriate learning strategies (EAC 7).
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Course Learning Outcomes. Students will:

	<ul style="list-style-type: none"> • Analyze and interpret data • Estimate discrete choice models • Critically interpret model output • Design and conduct discrete choice experiments • Communicate effectively on the topic of discrete choice modeling • Demonstrate knowledge of contemporary issues in transportation engineering • Describe the impact of engineering solutions in a global, economic, environmental, and societal context
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Prerequisites by Topic

	None
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Class Schedule:	Meets for 3 hours of lecture each week for 10 weeks and requires on average 2 hours per week of individual research.
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Grading Criteria

Activity:	Percentage of Grade:
Attendance & Participation:	10%
Homework Assignments:	45% (HW1: 15%, HW2: 15%, HW3: 15%)

Term Project Deliverables:	35% (TP1: 5%, TP2: 5%, TP3: 10%, TP4: 5%, TP5: 10%)
Presentations:	10% (P1: 10%)
Course Evaluation Bonus:	1%

Term Project Description [35% of total grade]

In the term project, you will craft an 8-page research proposal in the typical style of a National Science Foundation proposal (including project summary, intellectual merit, broader impacts, literature review, research plan, etc.). The proposed research will apply discrete choice analysis to investigate human decision-making and behavior. It should identify a specific research question, outline the significance of understanding decision-making in the chosen context (e.g., transportation, consumer behavior, public health), and propose a robust methodological approach leveraging discrete choice model estimation. You must include a thorough literature review, a clear articulation of the theoretical framework, and a detailed research plan addressing data collection, model specification, and anticipated outcomes. The proposal should also discuss the broader impacts of the research, emphasizing how the findings could contribute to advancing knowledge or solving practical challenges. This project will help you develop critical thinking, analytical, and professional writing skills while exploring the potential of discrete choice analysis to illuminate complex human behaviors for improved policymaking and design.

Grading Scale: UCI's EEE Grading Scale

Grade	Range
A+	96.5% to 100%
A	93.5% to < 96.5%
A-	90.0% to < 93.5%
B+	86.5% to < 90.0%
B	83.5% to < 86.5%
B-	80.0% to 83.5%
C+	76.5% to 80.0%
C	73.5% to < 76.5%
C-	70.0% to < 73.5%
D+	66.5% to < 70.0%
D	63.5% to < 66.5%
D-	60.0% to < 63.5%
F	0.0 to < 60.0%

Overall Program Schedule

Quarter	Activities Performed	Milestones
Fall	n/a	n/a
Winter	n/a	n/a
Spring	n/a	n/a

Schedule

Week #	Lecture

1	<u>Introduction to Discrete Choice Modeling</u> Course Overview Reading: Chapter 1, Ben-Akiva, M. E., & Lerman, S. R. (1985)
1	<u>Introduction to Discrete Choice Modeling</u> Course Overview Reading: Chapter 1, Ben-Akiva, M. E., & Lerman, S. R. (1985)
2	<u>Theories of Individual Choice Behavior</u> Reading: Chapter 3, Ben-Akiva, M. E., & Lerman, S. R. (1985)
2	<u>Review of Statistics for Model Estimation</u> Reading: Chapter 2, Ben-Akiva, M. E., & Lerman, S. R. (1985) <u>TP1 Due: Term Project Outline</u>
3	<u>Discrete Choice Experiment Design</u>
3	<u>Discrete Choice Experiment Design</u> <u>Student Presentation 1</u>
4	<u>Binary Logit Models</u> Reading: Chapter 4, Ben-Akiva, M. E., & Lerman, S. R. (1985)
4	<u>Binary Logit Modeling Workshop</u> Reading: Chapter 4, Ben-Akiva, M. E., & Lerman, S. R. (1985) <u>TP2 Due: Discrete Choice Experiment (Draft 1)</u> <u>Student Presentation 2</u>
5	<u>Multinomial Logit Models</u> Reading: Chapter 5, Ben-Akiva, M. E., & Lerman, S. R. (1985)
5	<u>Multinomial Logit Modeling Workshop</u> Reading: Chapter 5, Ben-Akiva, M. E., & Lerman, S. R. (1985) <u>HW1 Due: Binary Logit Model Assignment</u> <u>Student Presentation 3</u>
6	<u>Nested Logit Models</u> GEV, Cross-Nested Logit Reading: Chapter 10, Ben-Akiva, M. E., & Lerman, S. R. (1985)

6	<u>Nested Logit Modeling Workshop</u> GEV, Cross-Nested Logit Reading: Chapter 10, Ben-Akiva, M. E., & Lerman, S. R. (1985) <u>TP3 Due: Research Proposal (Draft 1)</u> <u>Student Presentation 4</u>
7	<u>Ranking and Rating Models</u> Ordered Logit, Best-Worst Logit
7	<u>Ranking and Rating Models</u> Ordered Logit, Best-Worst Logit <u>HW2 Due: Multinomial Logit Model Assignment</u> <u>Student Presentation 5</u>
8	<u>Mixture Models</u> Mixed Logit, Error Components, Latent Class
8	<u>Mixture Models</u> Mixed Logit, Error Components, Latent Class <u>Student Presentation 6</u>
9	<u>Hybrid Choice Models</u> Integrated Choice and Latent Variable Models
9	<u>Hybrid Choice Models</u> Integrated Choice and Latent Variable Models <u>HW3 Due: Nested Logit Model Assignment</u>
10	<u>Implications for Survey Design</u>
10	<u>Review Session</u> <u>TP4 Due: Discrete Choice Experiment (Final)</u>
Finals	<u>TP3 Due: Research Proposal (Final)</u>

Course Logistics

Canvas Site

The course Canvas can be found here. Please frequently visit the site for any important updates, messages, and to hand in completed assignments:

<https://canvas.eee.uci.edu/courses/XXXXX>

Instructor

Prof. Elisa Borowski, 4036 Anteater Instruction and Research Building, borowski@uci.edu
Dr. Borowski's Office Hours: TBD

Communication Channels

Class Sessions:

Class sessions are a good time for you to ask questions and share knowledge related to the lecture material and assignments.

Email:

When emailing me, please include the course code at the start of the subject line. I will do my best to respond to emails within one business day. Please feel free to follow-up if I do not respond to your email within 48 hours.

Office Hours:

My office hours are a great time to address any questions that you have about the course, discuss your areas of interest, brainstorm ideas for your project, and seek career advice.

Electronic devices

Please refrain from taking calls, texting, gaming, updating social media, etc. while in class. Minimizing distractions will contribute positively to your course performance.

Academic Integrity

Late and Incomplete Assignments:

Points will be deducted for late assignments. At times, you may have a valid excuse for missing a deadline. Valid excuses include: 1) Doctor's note, 2) Official university travel, or 3) Documented family emergency. Permission to miss a deadline due to a valid excuse must be requested prior to the deadline. Students are responsible for completing all assignments from the start of the quarter. Failure to complete any assignments, even those given before you have added the course, may result in a zero score.

Academic Dishonesty:

You are intellectually and morally obliged to maintain academic standards that reflect the highest level of honesty and integrity. I will report any plagiarism or cheating.

According to the University of California, Irvine: "Plagiarism is defined as the act of incorporating ideas, words, or specific substance of another and submitting as one's own work to fulfill academic requirements without giving credit to the appropriate source. Plagiarism includes but is not limited to:

- Submitting work, either in part or in whole, completed by another
- Omitting footnotes for ideas, statements, facts, or conclusions that belong to another
- Omitting quotation marks when quoting directly from another, whether it be a paragraph, sentence, or part thereof
- Paraphrasing in a close or lengthy manner of the writings of another
- Submitting another person's artistic works, such as musical compositions, photographs, paintings, drawings, or sculptures
- Submitting as one's own work papers purchased from research companies."

'Self-plagiarism' refers to a student's attempt to submit the same work for credit in multiple courses, and it is not allowed.

In accordance with the current policy of UCI: You may not use AI-generated content as a replacement for original thoughts and viewpoints. You are encouraged to approach your projects and writing with creativity and originality. While using AI tools (e.g., ChatGPT, Bard) may be appealing, it is crucial to form and communicate your own ideas. Any usage of AI-generated content must adhere to ethical and legal principles. If you decide to use AI tools, you must give credit to the AI tools you use.

Student Resources

Standard Campus Resources:

- UC Policy on Sexual Violence and Sexual Harassment
- UCI Library
- UCI Center for Excellence in Writing and Communication
- The Learning & Academic Resource Center (LARC)
- UC Irvine Launches Online Learning Research Center
- UCI Student Portal
- UCI Disability Service Center (DSC)
- Office Information Technology (OIT)
- UCI Wellness, Health, and Counseling
- UCI Office of Academic Integrity & Student Conduct
- UCI Counseling Center
- Student Affairs

Basic Needs Security:

Any student who faces challenges securing sufficient food or housing and believes this may affect their performance in the course is urged to contact the Dean of Students for support (A Message from the Dean of Students; 949-824-5181). Also, note the following resources available at UCI:

- Student Outreach and Retention Center (SOAR)
- UCI Basic Needs Center – located at the FRESH Basic Needs Hub at 4079 Mesa Rd (Lot 5 trailers), open M-Th 11am - 5pm

UC Policy on Sexual Violence and Sexual Harassment:

Title IX prohibits gender discrimination, including sexual harassment, domestic and dating violence, sexual assault, and stalking. If you have experienced sexual harassment or sexual violence, you can receive confidential support and advocacy at the Campus Advocacy Resources & Education (CARE) office, by phone at (949) 824-7273, or by email at care@uci.edu. We encourage you to also report incidents through the Office of Equal Opportunity and Diversity's (OEOD's) reporting page.

In addition, the campus Title IX Officer, along with the OEOD, has provided a number of local and national Sexual Violence Resources should you need immediate assistance related to sexual violence or other sexual misconduct. These resources are available even when the campus is closed or on an administrative holiday.

Faculty and TAs are required under the UC Policy on Sexual Violence and Sexual Harassment to inform the Title IX Office should they become aware that you or any other student has experienced sexual violence or sexual harassment.

UC Irvine is committed to creating and maintaining an environment in which all persons who participate in University programs and activities can work and learn together in an atmosphere free of all forms of discrimination and harassment. Such behavior is prohibited by law and University policy. The University will respond promptly and effectively to reports of discrimination and harassment, and will take appropriate action to prevent, to correct, and when necessary, to discipline behavior that violates University policy and these Guidelines. Questions regarding the UC Policy on Sexual Harassment and Sexual Violence or reports/inquiries from those feeling they have been subjected to sexual harassment or sex offenses may be directed to the Sexual Harassment Office in one of the following ways:

Main Line: 949-824-5594
 Sexual Harassment Call Line: 949-824-7037 (anonymous or not)
 TDD Line: 949-824-7593
 Email: oeod@uci.edu
 Campus Office: 103 MSTB
 Medical Center Office: 333 City Tower, Suite 110 (by appointment)

Inclusivity of All Students Regardless of Citizenship:

This course will work to make sure that all students feel included, respected, and safe in order to best heighten each student's' academic experience. If you feel that you need any kind of assistance as you are affected by either your immigration status or a loved one (family member, parents, friends, partner) feel free to contact the UCI DREAM Center at dream@uci.edu.

Accommodation Policies:

If you need an accommodation to participate in this course, please come see me no later than the second week of class. Review the policies on accommodation at: <http://disability.uci.edu/>

FERPA Statement:

You will be sharing your work with one another, as well as the UCI community. If you feel this would compromise your privacy, you may make a written request to me to meet the requirement in an alternative way.

Estimated ABET Category Content:

	Mathematics and Basic Science:	0.0 credit units
	Computing:	0.0 credit units
	Engineering Topics:	0.0 credit units
	Engineering Science:	0.0 credit units
	Engineering Design:	0.0 credit units

Prepared:	December 9, 2024
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Prepared By:	Elisa Borowski
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