

## Discrete Choice Analysis

TTE 6505

**Class Periods:** TBD

**Location:** TBD

**Academic Term:** TBD

### **Instructor:**

Professor Siva Srinivasan

[siva@ce.ufl.edu](mailto:siva@ce.ufl.edu)

352-294-7807

Office Hours: by appointment

### **Teaching Assistant/Peer Mentor/Supervised Teaching Student:**

Please contact through the Canvas website

- Name, email address, office location, office hours
- Name, email address, office location, office hours

### **Course Description:**

TTE 6505 Discrete Choice Analysis

3

Credits

**Grading Scheme:** Letter Grade

Theory and models of individual choice behavior, unordered and ordered multinomial choice models, empirical specifications, maximum-likelihood estimation method, sampling, prediction of choices, state-of-the-art methods, travel modeling applications.

### **Course Pre-Requisites / Co-Requisites:**

Familiarity with the basics of matrix algebra, probability, and statistics

### **Course Objectives:**

The intent of this course is to enable you to

1. Understand the fundamental techniques for analyzing individual choice behavior
2. Estimate and interpret various types of discrete-choice models
3. Improve overall data analysis and statistical-modeling skills
4. Conduct a research project and communicate the findings orally and in writing

### **Materials and Supply Fees:**

N/A

### **Course Outline:**

(1) Probabilistic Choice Theory

(2) Binary Choice Models

Distributional assumptions on error terms (probit and logit models), Derivation of the choice probability expressions, Empirical specification, Data structuring, Maximum likelihood estimation, Goodness of fit measures, Hypothesis testing, Marginal and elasticity effects, Disaggregate and aggregate predictions

(3) Unordered Multinomial Choice Models

Distributional assumptions on error terms (probit and logit models), Derivation of the choice probability expressions, Empirical specification, Data structuring, Maximum likelihood estimation, Goodness of fit measures, Hypothesis testing, Marginal and elasticity effects (IIA property), Disaggregate and aggregate predictions, Choice-based samples, Sampling of alternatives, Fractional split models

#### (4) Ordered Multinomial Choice Models

Non-utility-maximizing approaches, Distributional assumptions on error terms (probit and logit models), Derivation of the choice probability expressions, Empirical specification, Data structuring, Maximum likelihood estimation, Goodness of fit measures, Hypothesis testing, Marginal and elasticity effects, Disaggregate and aggregate predictions, Grouped data models

#### (5) Generalized Extreme Value (GEV) Class of Models

Relaxation of restrictive assumptions of MNL models, Structure, specification, and properties of Nested Logit (NL) and Ordered-GEV (OGEV) models

#### (6) Mixed Logit Models and Other Behavioral Aspects (time permitting)

### **Course Project Instructions:**

**Step 1:** Discuss with me to identify a topic and acquire the relevant data (See Appendix A for topics from past years)

#### **Step 2: Mid Semester Draft Paper**

**E-mail me a word document and name the file as “YOURFIRSTNAME.doc” (or .docx)**

The paper should contain the following elements: *problem definition* (what are you studying?), *background /motivations* (why is that an important/relevant/timely topic?), *literature synthesis* (What are you doing that is new/different?), *data description*, and *modeling methodology*. You should have completed cleaning and assembling the data and must include relevant descriptive statistics in your draft paper. Instructions on writing the paper is provided in Appendix B.

#### **Step 3: Peer Reviews of Draft Papers**

Each of you will be assigned two draft papers to review. A copy of this evaluation sheet is provided as Appendix C. For each review, you will e-mail me AND the author of the paper you are reviewing:

1. A marked-up version of the paper
2. An evaluation/review sheet.

#### **Step 4: End Semester Final Paper**

**E-mail me a word document and name the file as “YOURFIRSTNAME\_FINAL.doc” (or .docx)**

This paper should include your *empirical-analysis results* and *summary/conclusions* in addition to all elements from the mid-semester draft paper. Instructions on writing the paper and the evaluation criteria are provided in Appendix B.

#### **Step 5: Presentations**

Each person will have about 12 minutes to present his/her project work, followed by about 2-3 minutes for Q&A. The students will be called upon to present in random order (this means everyone should be ready to be the first speaker). Further instructions on preparing and delivering your presentation are provided in Appendix D. Your presentation will be evaluated by your peers and the instructor using the sheet provided in Appendix D.

Necessary Appendixes provided.

### **References:**

Koppelman, F.S. and Bhat, C.R. (2006) *A Self Instructing Course in Mode Choice Modeling: Multinomial and Nested Logit Models*, prepared for the U.S. Department of Transportation, Federal Highway

Administration (Available at:

<http://www.ce.utexas.edu/prof/bhat/COURSES/LM Draft 060131Final-060630.pdf>)

Ben-Akiva, M. and Lerman, S.R. (2000) *Discrete Choice Analysis: Theory and Application to Travel Demand*, The MIT Press, Cambridge, Massachusetts

Train, K. (1993) *Qualitative Choice Analysis: Theory, Econometrics, and an Application to Automobile Demand*, The MIT Press, Cambridge, Massachusetts (Available at: <http://elsa.berkeley.edu/~train/books.html>)

Train, K. (2003) *Discrete Choice Methods with Simulation*, Cambridge University Press, Cambridge, UK (Available at: <http://elsa.berkeley.edu/~train/books.html>)

Hensher, D.A., Rose, J.M., and Greene, W.H. (2005) *Applied Choice Analysis: A Primer*, Cambridge University Press, Cambridge, UK

### **Grading:**

Assignments 40% (10% \* 4 Assignments)

Project (overall) 60%

Identify Topic and dataset	0%
Mid-Semester Draft Paper	15%
Peer Review of Draft Papers	5%
Final Paper	25%
Final Presentation	15%

In general, the final grade will be based on your performance *relative* to that of others in the class.

**NOTE:** In order to graduate, graduate students must have an overall GPA and an upper-division GPA of 3.0 or better (B or better). Note: a B- average is equivalent to a GPA of 2.67, and therefore, it does not satisfy this graduation requirement.

### **Attendance Policy, Class Expectations, and Make-Up Policy:**

State whether attendance is required and if so, how will it be monitored? What are the penalties for absence, tardiness, cell phone policy, laptop policy, etc. What are the arrangements for missed homework, missed quizzes, and missed exams? This statement is required: Excused absences must be in compliance with university policies in the Graduate Catalog (<http://gradcatalog.ufl.edu/content.php?catoid=10&navoid=2020#attendance>) and require appropriate documentation.

### **Grading Policy:**

Percent	Grade	Grade Points
90.0 - 100.0	A	4.00
87.0 - 89.9	A-	3.67
84.0 - 86.9	B+	3.33
81.0 - 83.9	B	3.00
78.0 - 80.9	B-	2.67
75.0 - 79.9	C+	2.33
72.0 - 74.9	C	2.00
69.0 - 71.9	C-	1.67
66.0 - 68.9	D+	1.33
63.0 - 65.9	D	1.00
60.0 - 62.9	D-	0.67
0 - 59.9	E	0.00

More information on UF grading policy may be found at:  
<http://gradcatalog.ufl.edu/content.php?catoid=10&navoid=2020#grades>

***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.

***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/>.

***University 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/policies/student-honor-code-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 broad diversity within our community and is committed to individual and group empowerment, inclusion, and the elimination of discrimination. It is expected that every person in this class will treat one another with dignity and respect regardless of gender, sexuality, disability, age, socioeconomic status, ethnicity, race, and culture.

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 Graduate Program Coordinator
- Robin Bielling, Director of Human Resources, 352-392-0903, [rbielling@eng.ufl.edu](mailto:rbielling@eng.ufl.edu)
- Curtis Taylor, Associate Dean of Student Affairs, 352-392-2177, [taylor@eng.ufl.edu](mailto:taylor@eng.ufl.edu)
- Toshikazu Nishida, Associate Dean of Academic Affairs, 352-392-0943, [nishida@eng.ufl.edu](mailto:nishida@eng.ufl.edu)

***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.

***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.html>

***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](mailto: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.

**Counseling and Wellness Center:** <http://www.counseling.ufl.edu/cwc>, 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](mailto:title-ix@ufl.edu), located at Yon Hall Room 427, 1908 Stadium Road, (352) 273-1094, [title-ix@ufl.edu](mailto: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](mailto:Learning-support@ufl.edu).  
<https://lss.at.ufl.edu/help.shtml>.

**Career Resource Center**, Reitz Union, 392-1601. Career assistance and counseling. <https://www.crc.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://care.dso.ufl.edu>.

**On-Line Students Complaints:** <http://www.distance.ufl.edu/student-complaint-process>.