

DSO 516: Probability & Data Modeling, Spring 2022

Instructor: Dawn Porter
Class Time: Tuesdays, 2:00 – 4:50pm PST in JKP 212
Email: dcporter@marshall.usc.edu
Office Hours: Wednesdays, 1:00pm – 2:00pm PST (Zoom) and by appointment

Course goals:

Students completing this course will have a detailed understanding of how to work with, and understand, uncertainty. Many business decisions are made with imperfect information, so understanding the methodology and process for handling the unknown is critical. Probability theory will help us understand this, and Excel computations will be critical in applying these ideas to real situations.

This course is intended for all students interested in how to deal with uncertainty when building mathematical models (statistical models, simulation models, decision models, etc.). This course is also a prerequisite for the more advanced course DSO 536: Monte Carlo Simulation and Decision Models.

Learning Objectives:

- Students will be able to
- Explain basic probability concepts and use common discrete and continuous distributions for modeling.
 - Use Excel to simulate random variables (generate samples from a distribution).
 - Apply techniques for deciding what probability distribution represents given data.
 - Apply tools and theorems to make probability calculations when an underlying distribution is not known.

Prerequisites:

There are no prerequisites. This course is intended for students that would like basic probability and statistics knowledge. Please feel comfortable coming to me with any concerns you might have.

Course Materials:

You will need access to Excel and the Data Analysis Toolpak (discussed on our first day of class). A good reference textbook (not required) is “Applied Probability: Models and Intuition” by Arnold I. Barnett, copyright 2015, ISBN 978-0-9899108-7-3.

We will be analyzing one case from Darden Business Publishing, Appshop. This is a required purchase for \$6.95 from <http://store.darden.virginia.edu/appshop-inc>.

Grading & Requirements:

Three Homework Assts (20% each)	60%
Final Exam	35%
Participation	5%

The assignments are to be done and submitted individually to Blackboard, although you may work in groups. The exam will be on the last class session and is open everything, including your laptop computers.

For class participation, each student should be prepared to contribute individually to the class discussion. The quality of the contribution is more important than the quantity of contributions.

Tentative Course Schedule & Topics

Session	Date	Topic	Reading	Due
1	1/11	Introduction & Discrete Random Variables <ul style="list-style-type: none"> • Summary Statistics, empirical frequency calculations from data, and interpretation of histograms. • Definitions of sample spaces and events, random variables (RV) and cumulative distribution functions (cdf), probability calculations & summary statistics for discrete RVs. 	Chs 2.1 – 2.4	
2	1/18	Basic Probability Concepts & The Appshop Case <ul style="list-style-type: none"> • Rules for calculating probabilities of one event from others, conditional probability, Bayes' Theorem. • Evaluation of decision trees with uncertain discrete outcomes, effects of risk preferences on decision-making. 	Ch 1	
	1/23	http://store.darden.virginia.edu/appshop-inc .		<i>HW 1: Appshop</i>
3	1/25	Continuous Random Variables & Simulations <ul style="list-style-type: none"> • Calculation of probabilities & summary statistics for continuous RVs, reformulation of Appshop Case. • Inversion method with Excel, generation of samples from normal and exponential distributions. 	Chs 3.1 – 3.3, 3.8	
4	2/01	Common Distributions <ul style="list-style-type: none"> • Frequent contexts for various distributions, commonly used statistical formulas. 	Chs 2.5 – 2.9, 3.4 – 3.6	
	2/06			<i>HW 2</i>
5	2/08	Sums of Random Variables, Joint Distributions & Correlation <ul style="list-style-type: none"> • Importance of normal distribution, the Law of Large Numbers, Central Limit Theorem. • Joint distributions, covariance, and correlations. 	Chs 3.6, 4.1– 4.4, 4.8 & 4.9	
6	2/15	Exploratory Data Analysis & Maximum Likelihood Estimation <ul style="list-style-type: none"> • Run-sequence, lag-lag, and Method of Moments techniques for distribution fitting. • Probably parameter estimation from data, comparison to Method of Moments. 		
	2/20			<i>HW 3</i>
7	2/22	In-Class Case: Stock Price Modeling & Class Review <ul style="list-style-type: none"> • Guided practice with modeling & distributions. 		
	3/01	FINAL EXAM – In Class		

Statement of Academic Conduct and Support Systems

Academic Conduct: Plagiarism – presenting someone else’s ideas as your own, either verbatim or recast in your own words – is a serious academic offense with serious consequences. Please familiarize yourself with the discussion of plagiarism in SCampus in Part B, Section 11, “Behavior Violating University Standards” policy.usc.edu/scampus-part-b. Other forms of academic dishonesty are equally unacceptable. See additional information in SCampus and university policies on [Research and Scholarship Misconduct](#).

Students and Disability Accommodations: USC welcomes students with disabilities into all of the University’s educational programs. The Office of Student Accessibility Services (OSAS) is responsible for the determination of appropriate accommodations for students who encounter disability-related barriers. Once a student has completed the OSAS process (registration, initial appointment, and submitted documentation) and accommodations are determined to be reasonable and appropriate, a Letter of Accommodation (LOA) will be available to generate for each course. The LOA must be given to each course instructor by the student and followed up with a discussion. This should be done as early in the semester as possible as accommodations are not retroactive. More information can be found at osas.usc.edu. You may contact OSAS at (213) 740-0776 or via email at osasfrontdesk@usc.edu.

Support Systems:

- Counseling and Mental Health - (213) 740-9355 – 24/7 on call studenthealth.usc.edu/counseling
Free and confidential mental health treatment for students, including short-term psychotherapy, group counseling, stress fitness workshops, and crisis intervention.
- National Suicide Prevention Lifeline - 1 (800) 273-8255 – 24/7 on call suicidepreventionlifeline.org. Free and confidential emotional support to people in suicidal crisis or emotional distress 24 hours a day, 7 days a week.
- Relationship and Sexual Violence Prevention Services (RSVP) - (213) 740-9355(WELL), press “0” after hours – 24/7 on call studenthealth.usc.edu/sexual-assault. Free and confidential therapy services, workshops, and training for situations related to gender-based harm.
- Office for Equity, Equal Opportunity, and Title IX (EEO-TIX) - (213) 740-5086 eeotix.usc.edu. Information about how to get help or help someone affected by harassment or discrimination, rights of protected classes, reporting options, and additional resources for students, faculty, staff, visitors, and applicants.
- Reporting Incidents of Bias or Harassment - (213) 740-5086 or (213) 821-8298 usc-advocate.symplicity.com/care_report. Avenue to report incidents of bias, hate crimes, and microaggressions to the Office for Equity, Equal Opportunity, and Title IX for appropriate investigation, supportive measures, and response.
- The Office of Student Accessibility Services (OSAS) - (213) 740-0776 osas.usc.edu. OSAS ensures equal access for students with disabilities through providing academic accommodations and auxiliary aids in accordance with federal laws and university policy.
- USC Campus Support and Intervention - (213) 821-4710 campussupport.usc.edu. Assists students and families in resolving complex personal, financial, and academic issues adversely affecting their success as a student.
- Diversity, Equity and Inclusion - (213) 740-2101 diversity.usc.edu. Information on events, programs and training, the Provost’s Diversity and Inclusion Council, Diversity Liaisons for each academic school, chronology, participation, and various resources for students.
- USC Emergency - UPC: (213) 740-4321, HSC: (323) 442-1000 – 24/7 on call dps.usc.edu, emergency.usc.edu. Emergency assistance and avenue to report a crime. Latest updates regarding safety, including ways in which instruction will be continued if an officially declared emergency makes travel to campus infeasible.
- USC Department of Public Safety - UPC: (213) 740-6000, HSC: (323) 442-120 – 24/7 on call dps.usc.edu. Non-emergency assistance or information.
- Office of the Ombuds - (213) 821-9556 (UPC) / (323-442-0382 (HSC) ombuds.usc.edu. A safe and confidential place to share USC-related issues with a University Ombuds who will help you to explore options or paths to manage your concern.
- Occupational Therapy Faculty Practice - (323) 442-3340 or otfp@med.usc.edu, chan.usc.edu/otfp. Confidential Lifestyle Redesign services for USC students to support health promoting habits and routines that enhance quality of life and academic performance.