

## Modeling and Operations Research, PPD 557

Tuesdays 6-9:20pm, Course ID: 51208R

Website: [www.blackboard.usc.edu](http://www.blackboard.usc.edu)

Fall 2023 Course Syllabus

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### Contact Information

Dr. Jeffrey H. Smith

Office Hours: Tuesdays 5-6pm; after class or by appointment on zoom

Location: by Zoom or Email: [jeffs@usc.edu](mailto:jeffs@usc.edu)

TA: TBD

Homework submission address: [ppd557hw@gmail.com](mailto:ppd557hw@gmail.com)

### Importance of this course:

Probability and statistics, risk and uncertainty, resource allocation, and forecasting have enormous impacts on policy and decision-makers. Some of the questions addressed in PPD 557 include: How to identify a preferred policy or regulatory option from a portfolio of competing alternatives; how to use simulation to measure risks associated with candidate plans; how to forecast future patient demand for a hospital; how to determine the level of staffing for various arrival demands; and how to determine the optimal allocation of labor, scheduling, or development resources for an organization? The PPD graduate must know how to collect, organize, and analyze quantitative information in the policy environment. Previous students have won the Price policy competitions using methods from the course. This course is designed to help students quantify and organize policy information through modeling of relationships among decision-making variables.

### Course Prerequisite Knowledge

Prior course in probability and statistics; working knowledge of algebra. Familiarity with Microsoft Excel.

### Course Goal

Students will learn the tools and techniques of quantitative analytics outlined in the schedule, how and when to apply them, and practice application of the tools with homework exercises. Students completing this goal will be prepared to quantify a variety of policy problems for analysis and decision-making.

Text

Taylor, Bernard, Introduction to Management Science, 12th Edition, or similar.

Course Description

Chapter 1, Introduction	Introduction to Management Science
Chapter 11, Probability and Statistics	Probability review, random variables, methods; discrete/continuous probability models in policy and planning
Chapter 12, Decision Analysis	Bayesian decision theory, multi-attribute decision analysis
Chapter 13, Queuing Theory	Arrival and service time analysis
Chapter 14, Simulation	Modeling of probabilistic and dependent relationships
Chapter 15, Forecasting	Prediction models, time series
Chapters 2, 3, Linear Programming	Resource optimization models
Chapter 5, Integer programming	Resource allocation of non-divisible resources

In general, we will follow the book, but in a different order (see the schedule).

Suggestions (for success)

You should read over the reading assignments before the corresponding lecture.

You should attempt the homework on your own before asking for help.

Make an honest attempt to understand the material before uttering the words, "I don't get this."

Course Requirements and Grades

The course requirements are as follows:

Requirement	Point Total
3 Homework assignments @ 10 points	30
Midterm Exam @ 25 points	25
Mini-Project	20
Final Exam	25
Subtotal	100

The project requirements are defined after submission of homework assignment 2. The project is graded using the attributes of creativity, relevance; content, organization, and timeliness (4 pts each).

Late papers will be assessed a penalty of 40% per day. All grading issues are closed after 2 weeks from the original due date. Unclaimed papers will be kept 3 weeks before being discarded.

Here is the class schedule.

PPD 557 Fall 2022 Schedule

**(Note: homework due in class on date shown)**

Date	Topic	Readings	Assignments/Notes
Tuesday Aug 22	Introduction to Management Science	Chapter 1	
Tuesday Aug 29	Probability and Statistics: Review	Chapter 11	
Tuesday Sep 5	Probability and Statistics: Applications	Chapter 11	
Tuesday Sep 12	Decision Analysis-Bayes	Chapter 12	
Tuesday Sep 19	Decision Analysis-Multiattribute Decision Theory	Chapter 12 and notes	
Tuesday Sep 26	Queuing Theory	Chapter 13	Hw 1 due
Tuesday Oct 3	Midterm Review	Chapter 11-13	
Tuesday Oct 10	Midterm		
Tuesday Oct 17	Simulation	Chapter 14	
Tuesday Oct 24	Forecasting	Chapter 15	
Tuesday Oct 31	Linear Programming 1 Intro, Project Requirements	Chapters 2, 3, 4	Hw 2 due
Tuesday Nov 7	Linear Programming 2 – Simplex Algorithm	Chapters 3-4	
Tuesday Nov 14	Linear Programming 3 – More Examples	Chapters 3-4	
Tuesday Nov 21	Linear Programming 4 - Integer Programming	Chapter 5	
Tuesday Nov 28	Review; last class	Chapter 5; Course overview, final prep	Hw 3 due, Projects due
Tuesday Dec 12	Final Exam, 7-9 pm		

Statement for Students with Disabilities

Any student requesting academic accommodations based on a disability is required to register with Disability Services and Programs (DSP) each semester. A letter of verification for approved accommodations is from DSP. Please be sure I receive the letter as early in the semester as possible. DSP is located in STU 301 and is open 8:30 a.m.–5:00 p.m., Monday through Friday. Website and contact information for DSP:

[http://sait.usc.edu/academicsupport/centerprograms/dsp/home\\_index.html](http://sait.usc.edu/academicsupport/centerprograms/dsp/home_index.html), (213) 740-0776 (Phone), (213) 740-6948 (TDD only), (213) 740-8216 (FAX) ability@usc.edu.

Statement on 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 scientific misconduct, policy.usc.edu/scientific-misconduct.

Support Systems:

Student Health Counseling Services - (213) 740-7711 – 24/7 on call  
engemannshc.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) 740-4900 – 24/7 on call  
engemannshc.usc.edu/rsvp  
Free and confidential therapy services, workshops, and training for situations related to gender-based harm.

Office of Equity and Diversity (OED) | Title IX - (213) 740-5086  
equity.usc.edu, titleix.usc.edu  
Information about how to get help or help a survivor of harassment or discrimination, rights of protected classes, reporting options, and additional resources for students, faculty, staff, visitors, and applicants. The university prohibits discrimination or harassment based on the following protected characteristics: race, color, national origin, ancestry, religion, sex, gender, gender identity, gender expression, sexual orientation, age, physical disability, medical condition, mental disability, marital status, pregnancy, veteran status, genetic information, and any other characteristic which may be specified in applicable laws and governmental regulations.

Bias Assessment Response and Support - (213) 740-2421  
studentaffairs.usc.edu/bias-assessment-response-support  
Avenue to report incidents of bias, hate crimes, and microaggressions for appropriate investigation and response.

The Office of Disability Services and Programs - (213) 740-0776  
dsp.usc.edu  
Support and accommodations for students with disabilities. Services include assistance in providing readers/notetakers/interpreters, special accommodations for test taking needs, assistance with architectural barriers, assistive technology, and support for individual needs.

USC Support and Advocacy - (213) 821-4710  
studentaffairs.usc.edu/ssa  
Assists students and families in resolving complex personal, financial, and academic issues adversely affecting their success as a student.

Diversity at USC - (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.