

**Modeling and Operations Research, PPD 557**  
Tuesdays 6-9:20pm, VKC 211; Course ID: 51221R  
Website: [www.blackboard.usc.edu](http://www.blackboard.usc.edu)  
Spring 2019 Course Syllabus

Contents

[Basics](#)  
[Importance of this course](#)  
[Course Description](#)  
[Suggestions for success](#)  
[Course Prerequisite](#)  
[Course Goal](#)  
[Texts](#)  
[Course Requirements and Grading](#)  
[My Office Hours](#)  
[Academic Integrity](#)  
[Disability Accommodation](#)  
[Emergency Preparedness](#)

Contact Information

Dr. Jeffrey H. Smith

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

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

Importance of this course:

As the dramatic consequences of analytics on policy decisions demonstrate the power to generate change while at the same time drive successful organizations into obsolescence, the role of models for understanding the impacts of decision making on outcomes has become increasingly important for dealing with complex, interdependent problems. Probability and statistics, risk and uncertainty, resource allocation, and timing have enormous quantitative impact to influence policy and decision makers. Specifically, the PPD graduate must know how to collect, organize, analyze, and interpret quantitative information in the policy environment.

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, 2016.

## 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, 4, Linear Programming   | Resource optimization models   |
| Chapter 5, Integer programming         | Resource allocation of physical objects (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 Spring 2019 Schedule

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

| Date           | Topic  | Readings                               | Assignments/Notes                  |
|----------------|--|--|------------------------------------|
| Tuesday Jan 8  | Introduction to Management Science               | Chapter 1                              |                                    |
| Tuesday Jan 15 | Probability and Statistics: Review               | Chapter 11                             |                                    |
| Tuesday Jan 22 | Probability and Statistics: Applications         | Chapter 11                             |                                    |
| Tuesday Jan 29 | Decision Analysis-Bayes                          | Chapter 12                             |                                    |
| Tuesday Feb 5  | Decision Analysis-Multiattribute Decision Theory | Chapter 12 and notes                   |                                    |
| Tuesday Feb 12 | Queuing Theory                                   | Chapter 13                             | Hw 1 due                           |
| Tuesday Feb 19 | Midterm Review                                   | Chapter 11-13                          |                                    |
| Tuesday Feb 26 | Midterm  |  |                                    |
| Tuesday Mar 5  | Simulation                                       | Chapter 14                             |                                    |
| Tuesday Mar 12 | **No Class – Spring Break**                      |  |                                    |
| Tuesday Mar 19 | Forecasting                                      | Chapter 15                             |                                    |
| Tuesday Mar 26 | Linear Programming Intro, Project Requirements   | Chapters 2, 3, 4                       | Hw 2 due                           |
| Tuesday Apr 2  | Linear Programming                               | Chapters 3-4                           |                                    |
| Tuesday Apr 9  | Linear Programming 2                             | Chapters 3-4                           |                                    |
| Tuesday Apr 16 | Integer Programming                              | Chapter 5                              |                                    |
| Tuesday Apr 23 | Review   | Chapter 5: Course overview, final prep | Hw 3 due, Projects due (hard copy) |
| Tuesday May 8  | 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.