



## **ISE 330: Introduction to Operations Research: Deterministic Models**

**Spring 2022**

**Time:** Tue, Thu 12.30-1.50pm

**Location:** KAP 158

**Instructor:** Prof. Phebe Vayanos

**Office:** OHE 310L

**Office Hours:** TBD

**Contact Info:** phebe.vayanos@usc.edu

**TA:** Yingxiao Ye

**Location:** TBD

**Office Hours:**

TBD

**TA Contact Info:** yingxiao.ye@usc.edu

### **Catalogue Description**

This course is a basic introduction to important models and solution methods in Industrial and Systems Engineering (ISE). ISE is concerned with the modeling, analysis, and solution of complex decision problems that arise in the management or design of a large-scale industrial system such as a supply chain, transportation network, or manufacturing assembly line. This course will focus specifically on the modeling and solution of linear programs, dynamic programs, and integer programs, as well as additional applications thereof in transportation, logistics, supply chain management, among others.

### **Prerequisite(s)**

MATH 225 - Linear algebra and linear differential equations.

### **Course Notes**

Students will be responsible for downloading the lecture notes for each lecture from the course website. All handouts, including homework, homework solutions, exams, and exam solutions will be posted in the Blackboard course website:

<https://blackboard.usc.edu/>

Additional readings and notes beyond the main texts used in the lectures will be provided by the instructor as needed.

### **Optional Texts**

Hillier, Frederick S., and Gerald J. Lieberman. Introduction to Operations Research. 10th edition. McGraw-Hill, 2014.

Badiru, A. B., and O. Omitaomu. Handbook of Industrial Engineering Equations, Formulas, and Calculations. CRC Press, 2011. Available online at <https://libraries.usc.edu/>

Eiselt, H. A., and Carl-Louis Sandblom. Operations Research: A Model-Based Approach. 2nd edition. Springer, 2012. Available online at <https://libraries.usc.edu/>

Ravindran, A. Ravi. Operations Research and Management Science Handbook. CRC Press, 2007. Available online at <https://libraries.usc.edu/>

### **Grading Breakdown**

Students will be graded based on 8 homework assignments (20%), a final project (20%), one mid-term exam (30%), and one final exam (30%). Class participation will be an important tiebreaker. Late submissions will be discounted at 5% for each day late. Submissions made after solutions are published will not be accepted. Solutions will be uploaded 3 days after the deadline.

### **Policy on Collaborations**

You may interact with fellow students when preparing your homework solutions. However, you must write up solutions on your own. Duplicating a solution that someone else has written or providing solutions to be copied is not acceptable. If you do collaborate on homework, you must cite, in your written solution, your collaborators. If you use sources beyond the course materials in one of your solutions, you must also cite such sources.

### **Course Schedule (tentative)**

Please turn over.

PD: project description — 1 page

Lec.	Topic	Read	Homework
1	Introduction to Operations Research	Ch. 1	
2			1 out
3	Modeling with Operations Research and Linear Optimization	Ch. 2 & 3	
4			
5			
6			1 due, 2 out
7			
8			
9	Solving Linear Optimization Problems	Ch. 4 & 5	
10	Julia/JuMP Lecture by TA		2 due, 3 out
11	Solving Linear Optimization Problems (cont'd)		
12			
13			
14			
15		3 due, 4 out	
16	Duality Theory	Bb	
17		Bb	
18		Bb	4 due
19	Midterm		
20	Duality Theory	Ch.6	
21			
22			PD due
23		Ch.6	5 due, 6 out
24		Modeling with Integer Programming	Ch. 11-12
25			
26	Solving Integer Programming Problems		6 due
27			
28	Project Presentations		

**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](http://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](http://osas.usc.edu). You may contact OSAS at (213) 740-0776 or via email at [osasfrontdesk@usc.edu](mailto:osasfrontdesk@usc.edu).

## **Support Systems:**

*Counseling and Mental Health - (213) 740-9355 – 24/7 on call*

[studenthealth.usc.edu/counseling](http://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](http://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](http://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](http://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](http://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 for appropriate investigation, supportive measures, and response.

*The Office of Student Accessibility Services (OSAS) - (213) 740-0776*

[osas.usc.edu](https://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](https://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](https://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](https://dps.usc.edu), [emergency.usc.edu](https://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](https://dps.usc.edu)

Non-emergency assistance or information.

*Office of the Ombuds - (213) 821-9556 (UPC) / (323-442-0382 (HSC)*

[ombuds.usc.edu](https://ombuds.usc.edu)

A safe and confidential place to share your USC-related issues with a University Ombuds who will work with you to explore options or paths to manage your concern.

*Occupational Therapy Faculty Practice - (323) 442-3340 or [otfp@med.usc.edu](mailto:otfp@med.usc.edu)*

[chan.usc.edu/otfp](https://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.