



52:620:321:04 Optimization and Spreadsheet Modeling
Dr. Shankar Sundaresan
Spring 2026

Contact Information	Office: 438 BSB Phone: 856 225 6694 e-mail: sundares@camden.rutgers.edu
Class Meetings	Tuesdays, Thursdays: 2:00 – 3:20 pm, BSB-335 (or online as necessary)
Office hours	Tuesdays: 3:30 pm to 4:30 pm Thursdays: 3:30 pm to 4:30 pm other times by appointment
Course LMS	Canvas

Course Overview

This course presents the fundamentals of quantitative modeling to help decision making. Management science applies quantitative techniques to model complex real world problems, and employs specialized techniques for their analysis and solution. These solutions form the basis to recommend appropriate managerial actions. The ideas presented in this course provide reliable solutions to everyday problems in all areas of the business world—Marketing, Finance, Accounting, Management or Operations. The material presented will help students develop a thorough conceptual understanding of the role quantitative modeling plays in the decision-making process. Students will learn to model these problems and find solutions using spreadsheets.

At times, the material may appear challenging, but perseverance and practice are the keys to master it. As students gain an understanding of how to apply these ideas in different areas of business, they see their wide applicability and potential in helping with decision making.

Required Course Materials

Required Text:

Introduction to Management Science by Anderson, Sweeney, Williams, Camm, Cochran, Fry and Ohlmann, 15th edition, Cengage.

ISBN-13: 978-1-337-40652-9, ISBN-10: 1-337-40652-X

(Other editions also will do)

The book is available in different formats (hard-bound, e-text etc.). Choose the version that works best for you. Any accompanying software (CD) is not required. Older versions will also work for content, but may not for problem sets.

Other web-based readings (articles, videos, business clippings and web site references) will be assigned regularly.

Software: You will build your applied skills by using Microsoft Excel to formulate and analyze problems.

If it becomes necessary to move to on-line delivery/exam mode, the instructor may require you to turn on video features during online conferences and the use of Respondus/lockdown browser for exams. Some sessions may be delivered online when the University and/or the instructor decide that to be the best course of action.

Course Objectives:

The objective is to help students develop a model oriented approach to decision making and problem solving.

After completing this course, students:

Specifically,

- Understand and apply the building blocks of quantitative analysis for decision making.
 - Identify and summarize the problem, question, or issue.
 - Consider other salient or alternatives
 - Undertake appropriate quantitative analysis including defining criteria for evaluation of alternatives, evaluating the alternatives and choosing the optimal solution
 - Draw conclusions, implications, and consequences
- Formulate and solve linear programs for a variety of business contexts.
- Solve these problems using spreadsheets
- Conduct sensitivity analysis

- Use distribution and network models to solve transportation, assignment, and shortest-route problems
- Formulate and Solve multi criteria decision problems.
- Learn the basics of simulation
- Develop a thorough vocabulary of management science terms
- will be able to critically use information and data to analyze, interpret and solve business problems, specifically using spreadsheet modeling. (**UG goal: Critical Thinking and Analytical Decision Making**)
- will demonstrate conceptual knowledge and practical application of information technology, specifically spreadsheets. (**UG Goal: Technology Fluency /IT Literacy**)

Prerequisite

This course is designed as a core course in the undergraduate program and will assume that all students are comfortable with basic algebra, especially with techniques for solving system of linear equations. You will also need to be comfortable with MS Excel to conduct the hands-on analysis.

Course Requirements

The requirements for the course follow.

Exam 1	24 %
Exam 2	24 %
Exam 3	28 %
Participation	12 %
Assignments	12 %

Class Attendance: Each one of you is expected to attend classes and prepare for class discussions as indicated in the course schedule. Anyone who has neither read the material (see tentative schedule) nor given a hearty attempt at the homework problems will be at a loss during class sessions. You are strongly advised to attend class regularly. **Some classes may be delivered via "on-line" mode.**
Note: As the circumstances (such as university policy, inclement weather or instructor unavailability) require, some classes (or part of them) may be delivered asynchronously via "on-line" mode.

Assignments / Participation: I expect to assign some home works regularly to be completed by each student individually. Some other homeworks may be assigned as groupwork. Please approach me if you need help with the assignments. **Late submissions are not accepted.**

In addition, after important concepts covered in the class, you may be required to attempt and solve problems **in-class**. Often we will work hands-on in class to learn the material. You may ask for help from me, if required. You will be graded on your understanding and the attempt made to solve the problem.

Practice Problems: I expect to assign practice problems regularly for your mastery of the material. For these problems, you are welcome to attempt them on your own or in a group. Solutions will be provided to these problems.

Exam: Three exams are planned. Indicated days for exams are: **Exam 1 – Feb 26, and Exam 2 – Apr 09.** The **Final Exam is scheduled for May 07 (at a different time slot: 11:30 am – 2:20 pm)** as per the University guidelines (to be confirmed). **Make-up exams are not offered.** Please take this exam schedule into consideration when you make your travel arrangements.

The exams will test your ability to analyze, model and solve real-world problems. The exams can serve as a tool for self-evaluation, provide feedback and deepen the learning. Please note that the exams will not merely be an exercise in number crunching. They will explore the “why?” and “how?” of analysis and require you to interpret the solutions creatively and critically.

Usually, even when the exams follow a closed book format, you are allowed to bring an 8.5” X 11” single-sided “memory aid sheet”, on which you can write whatever you want. The idea is that in making the sheet you develop the skills to summarize important points that you can refer to. After going through this exercise it is not unusual for students to say that they never used the sheet on the exam, since they already knew what they wrote very well.

Grading Policy

Students will be assigned a final grade based on the weighted global score computed using the components and weights indicated above. The final grade will be based very approximately on a standardized normal distribution. Usually there is a curve for the global score that benefits students.

Score Range	Grade
90%–100%	A
85%–90%	B+
80%–85%	B
75%–80%	C+
70%–75%	C
60%–70%	D
Below 60%	F

If your score is in the indicated range, you will **at least** receive the grade in the corresponding Grade column. The instructor reserves the right to grade on a curve, which usually improves students' grades.

Instructor Availability and Communication

I encourage you to communicate with me and approach me for help when needed. I am very happy to meet with you in person and provide help. To minimize delays, outside of office hours, it will be best to set up appointments. I strongly encourage communication via e-mail and we may even be able to use other on-line tools for interaction. During the week, from Monday until Friday, I will try reply to all e-mails within 24 hours.

Note that all class communication will be via your Rutgers e-mail and other tools in the LMS. You are expected to check your Rutgers e-mail and the course web page at least (equally spaced) two or three times every week. All class announcements can also be accessed via the 'Announcement' page in the LMS.

Administrative Details

- **Preparation:** Please come prepared for all classes. Not only your participation grade, but the quality of your learning is substantially enhanced when you come prepared.
- **Name Cards:** Use name cards regularly in class throughout the term.
- **Late Submissions:** All work must be turned in by the due date and time, and in the manner suggested (e.g., through LMS). **Late submissions are typically not accepted.** Approved late submissions for emergencies may carry penalties.
- **Handouts:** I expect to post most of the material on the course web site (or email them). You may print and bring them if you

prefer.

- **Website:** Please visit the course web site regularly. The course schedule will be revised dynamically. I expect to update the current assignments, practice problems, etc. in the course web site regularly.
- **Exams:** All students will take the exams during the designated time. Please take this exam schedule into consideration when you make your travel or other arrangements. All exams will be given in the regular classroom unless otherwise posted. You may be asked to take parts of the exam on-line; The instructor may require you to turn on video features and the use of Respondus/lockdown browser for exams. **Note that every student might have a different exam**, because the examination questions are taken from a randomized pool of questions. Any students whose answer(s) do not pertain to their version of the exam, but to another student's version(s) will receive a zero grade for that exam.
- If, for **a university approved reason**, you cannot take an exam at the scheduled time you must give me written notice at least two weeks in advance so that other arrangements can be made. For emergencies, if the situation does not allow for advance notification (for example, emergency hospitalization), contact me as soon as possible after a missed exam. Other than these rare exceptions, **make-up exams are not offered**. I further reserve the right to request written documentation to support your absence.
- **Student Involvement:** You are encouraged and expected to ask questions and to interact with the instructor during class time. Please do not disrupt the class in any way by doing other work not related to this class or operating the computer (unless instructed by me otherwise). If at any time during the course, you have questions regarding course-related matters, do not hesitate to contact me, either in person or via e-mail.
- **Cell Phones and Computer Use:** You are required to *turn off* cell phones while in class, unless there is an emergency. Likewise, unless there are explicit instructions to use a computer to do in-class assignments (or you are using it to take notes,) please keep your computers/monitors closed.
- **Feedback:** I welcome your feedback on the content and style of the class. You may choose to provide your feedback in person, via e-mail, or anonymously at any time. Your suggestions will help me to make the class more useful for everybody.

- **Announcements:** Announcements will be periodically made in class about changes in schedules, assignments, exam, readings, project, policies and other class activities. It is your responsibility to keep abreast of the announcements and changes.

Academic Integrity:

For the policy on Academic Integrity please see:

<http://academicintegrity.rutgers.edu/academic-integrity-at-rutgers>

Academic Integrity means that you must:

- properly acknowledge and cite all use of the ideas, results, or words of others,
- properly acknowledge all contributors to a given piece of work,
- make sure that all work submitted as your own in a course activity is your own and not from someone else
- obtain all data or results by ethical means and report them accurately
- treat all other students fairly with no encouragement of academic dishonesty

Adherence to these principles is necessary in order to ensure that:

- everyone is given proper credit for his or her ideas, words, results, and other scholarly accomplishments
- all student work is fairly evaluated and no student has an inappropriate advantage over others
- the academic and ethical development of all students is fostered
- the reputation of the University for integrity is maintained and enhanced.

For instance, you are responsible for preparing and entering your own work and properly referencing the work of others. Cheating, plagiarism, and other types of misconduct are not acceptable. Penalties can include expulsion from the University. You are free to discuss any part of the course materials with your classmates. However, you are not allowed to discuss (i.e., receive nor give any assistance on) any part of the exams with anyone. You may not refer to sources not permitted nor receive help from outside agencies. If any cheating is found, the most severe sanctions available will be sought.

Students are responsible for understanding the principles of academic integrity and abiding by them in all aspects of their work at the University. Students are also encouraged to help educate fellow students about academic integrity and to bring all alleged violations of academic integrity they encounter to the attention

of the appropriate authorities. Violations are taken seriously and will be handled according to University policy.

Student Code of Conduct

As a student at the University you are expected to adhere to the Code of Student Conduct. The University's Student Code of Conduct can be found at

<http://studentconduct.rutgers.edu/university-code-of-student-conduct>

Rutgers University-Camden seeks a community that is free from violence, threats, and intimidation; is respectful of the rights, opportunities, and welfare of students, faculty, staff, and guests of the University; and does not threaten the physical or mental health or safety of members of the University community, including in classroom space.

Note that the conduct code specifically addresses disruptive classroom conduct, which means "engaging in behavior that substantially or repeatedly interrupts either the instructor's ability to teach or student learning. The classroom extends to any setting where a student is engaged in work toward academic credit or satisfaction of program-based requirements or related activities."

Violations of the Student Code of Conduct are considered serious infractions of student behavior and students who violate the code are subject to penalties relative to the level of the matter. Violations of the Student Code of Conduct should be reported to the Dean of Students office deanofstudents@camden.rutgers.edu or 856-225-6050.

Covid Guidelines

If necessary, we will follow all Covid related guidelines that Rutgers University and the Rutgers School of Business – Camden institute.

Disability Services / Student Health and Well-Being Resources:

The University is committed to supporting the learning of all students and faculty will provide accommodations as indicated in a Letter of Accommodation issued by the Office of Disability Services (ODS). If you have already registered with ODS and have your letter of accommodation, please share this with me early in the course. If you have or think you have a disability (learning, sensory, physical, chronic health, mental health or attentional), please contact <https://success.camden.rutgers.edu/disability-services>.

Accommodation will be provided only for students with a letter of accommodation from ODS. Their services are free and confidential. Letters only provide information about the accommodation, not about the disability or diagnosis.

Our campus provides a number of student health and well-being resources. Please see <https://wellnesscenter.camden.rutgers.edu> for details.

Use of Artificial Intelligence Tools:

The use of generative AI tools (such as ChatGPT, DALL-E, etc.) are not permitted in this class (except when explicitly permitted by the instructor); therefore, any use of AI tools for work in this class may be considered a violation of Rutgers University's Academic Honesty policy and Student Conduct Code. When in doubt about permitted usage, please ask for clarification.

Course Schedule (Major Topics and Reading Materials)

Listed below are the tentative topics to be covered each week. Note that these topics may be subject to change and any changes in topics will be announced in class.

Week 01: Jan 20, 22 (These two class sessions will be delivered in asynchronous on-line mode)	Readings (Book)
Topic : Introduction to Quantitative Modeling	
Introduction to Quantitative Modeling Basics of Linear Equations	Ch 1
Assignment: Chapter 1:	
Week 02: Jan 27, 29 (These two class sessions will be delivered in asynchronous on-line mode)	
Topic : Linear Programming	
Basics of Linear Equations Introduction to Linear Programming	Ch 2 (up to 2.2)
Assignment: Chapter 2:	
Week 03: Feb 03, 05	
Topic : Linear Programming - Continued	
Formulating and Graphing Linear Programming Problems	Ch 2
Assignment: Chapter 2:	
Week 04: Feb 10, 12	
Topic : Spreadsheet Solutions	
Linear Programming –Spreadsheet Solutions	Ch 3
Assignment: Chapter 3:	
Week 05: Feb 17, 19	
Topic : Spreadsheet Solutions and Sensitivity Analysis - Continued	
Linear Programming: Sensitivity Analysis and Interpretation of Solutions	Ch 3
Assignment: Chapter 3:	

Week 06: Feb 24, 26	
Topic : Linear Programming Applications; Exam 1	
Linear Programming Applications in Marketing, Finance, Operations Management	Ch 4
Exam 1 – Feb 26	
Week 07: Mar 03, 05	
Topic : Linear Programming Applications - Continued	
Linear Programming Applications in Marketing, Finance, Operations Management	Ch 4
Assignment: Chapter 4	
Week 08: Mar 10, 12	
Topic: Distribution and Network Models	
Transportation Problems, Assignment Problems, Transshipment Problem	Ch 6 (up to 6.2)
Assignment: Chapter 6	
Mar 16– Mar 22 Spring Break	
Week 09: Mar 24, 26	
Topic: Distribution and Network Models - Continued	
Transportation Problems, Assignment Problems, Transshipment Problem	Ch 6 (up to 6.2)
Assignment: Chapter 6	
Week 10: Mar 31, Apr 02	
Topic: Distribution and Network Models Continued	
Shortest Route Problem, Maximal Flow Problem	Ch 6 (6.3, 6.4, 6.5)
Assignment: Chapter 6	

Week 11: Apr 07, 09	
Topic: Waiting Line Models	
Waiting Line Models	Ch 11
Exam 2 – Apr 09	
Week 12: Apr 14, 16	
Topic: Waiting Line Models	
Waiting Line Models - Continued	Ch 11
Assignment: Chapter 11:	
Week 13: Apr 21, 23	
Topic: MultiCriteria Decisions	
Multi-Criteria Decisions (Goal Programming Scoring Method)	Ch 14 (14.1 to 14.3))
Assignment: Chapter 14:	
Week 14: Apr 28, 30	
Topic: MultiCriteria Decisions .. Continued; Simulation	
Multi-Criteria Decisions (Goal Programming Scoring Method) Simulation	Ch 14 (14.1 to 14.3) Ch 12
Assignment: Chapter 14:	
Week 15: May 07	
Topic: Reading Days, Final Exam	
May 05, 06 -Reading Days	
Topic: Final Exam	
Final Exam–May 07 (11:30 am–2:20 pm) (As per University schedule, To Be Confirmed)	