**Quantitative Models for Decision Makers**

**MASY1-GC 1210 | 101 | Fall 2024 |** **9/03/2024 - 12/10/2024 | 3 Credits**

**Modality:** In-Person

**Course Site URL:** [https://brightspace.nyu.edu](https://brightspace.nyu.edu/d2l/home/195633)

General Course Information

**Name/Title:** Daniel Davidson, Adjunct Instructor, He/Him/His

**NYU Email:** [drd221@nyu.edu](mailto:drd221@nyu.edu)

**Class Meeting Schedule:** 9/03/2024 - 12/10/2024 | Tuesdays | 2:00 pm - 4:35 pm

**Class Location:** Midtown (20 W. 43rd Street) Room 1013

**Office Hours:** In classroom following class sessions or by email appointment over NYU Zoom

**Description**

This course prepares students to analyze operational and strategic business situations and select appropriate and optimal courses of action. Using quantitative tools, students learn to analyze the firm’s operation, employ sound critical decision making to initiate appropriate action and move the organization to creative problem solving. This course provides students with the tools and techniques required to manage these processes efficiently and make decisions effectively.

**Prerequisites**

N/A

**Learning Outcomes**

At the conclusion of this course, students will be able to:

* Apply appropriate mathematical concepts and computational methods in economics, operations research, logistics, and business planning
* Design, business case solutions using probability theory, numerical computations, and quantitative methods
* Apply skills and knowledge of advanced analytical methods and tools to facilitate decision making
* Analyze business problems using linear programming and network flow management for decision making

**Communication Methods**

Be sure to turn on your [NYU Brightspace notifications](https://www.nyu.edu/servicelink/KB0018507) and frequently check the “Announcements” section of the course site. This will be the primary method I use to communicate information critical to your success in the course. To contact me, send me an email. I will respond within 24 hours.

Credit students must use their NYU email to communicate. Non-degree students do not have NYU email addresses. Brightspace course mail supports student privacy and FERPA guidelines. The instructor will use the NYU email address to communicate with students. All email inquiries will be answered within 24 hours.

**Structure | Method | Modality**

There are 14 session topics in this course.

This course is In-person Synchronous and will meet once a week on Tuesday at 2pm in the Midtown NYU building at 20 W. 43rd Street, Classroom 1013. Brightspace is the learning management system we will use for assignments, announcements, and emails. Students must check Brightspace website. Course work involves in-class lecture, discussion, and team projects.

Active learning experiences and small group projects are key components of the course. Assignments, papers, and exams will be based on course materials (e.g., readings, videos), lectures, and class discussions. Course sessions will be conducted synchronously on NYU Zoom, which you can access from the course site in [NYU Brightspace](https://brightspace.nyu.edu/).

**Expectations**

Learning Environment

You play an important role in creating and sustaining an intellectually rigorous and inclusive classroom culture. Respectful engagement, diverse thinking, and our lived experiences are central to this course and enrich our learning community.

SPS classrooms are diverse and include students who range in age, culture, learning styles, and levels of professional experience. To maintain an inclusive environment that ensures all students can equally participate with and learn from each other, as well as receive feedback and instruction from faculty during group discussions in the classroom, all course-based discussions and group projects should occur in a language that is shared among all participants.

Participation

You are integral to the learning experience in this class. Be prepared to actively contribute to class activities, group discussions, and work outside of class. Attendance is mandatory, but not sufficient.

Students who join the course during add/drop are responsible for ensuring that they identify what assignments and preparatory work they have missed and complete and submit those per the syllabus.

Assignments and Deadlines

Students are required to complete (on their own) homework assignments following each chapter covered in the text, group case problems which will be periodically assigned, and a final exam.

Assignments and readings must be executed and are due on the dates indicated at the time of assignment. The Brightspace Assignment section will be the trusted source for timing. Missed assignments will lower the student’s grade based on the percentage of the grade allocable to it. Late assignments are permitted only with advance notice to, and permission from, the instructor. Assignments will be graded for content and clarity.

There will likely be six or seven individual homework assignments (problems from the textbook), assigned as we progress through the text. The weight of each homework toward the total Individual Homework Assignment grade is a function of the number of problems assigned in that homework. E.g., if Homework 1 has five problems, and over the semester a total of thirty homework problems are assigned, then Homework 1 comprises 5/30ths of your total Individual Homework Assignment grade. All homework assignments are graded and returned.

I expect we will have time for two Group Assignments. If two, each will contribute one half of your total Group Assignments grade. Ninety percent of each Group Assignment grade will be based on whether the group uses the appropriate methodologies and determines the correct answer to the problems. The Group Assignments are Case Problems from the text or similar problems. Ten percent of the grade will be assessed on the group’s ability to clearly present the problems and solutions.

Each team member will be expected to be responsible for analyzing a specific aspect of the strategic decision-making metrics for the team’s chosen company. This analysis will form the basis for assessing each individual student’s contributions towards the group results.

Course Technology Use

We will utilize multiple technologies to achieve the course goals. I expect you to use technology in ways that enhance the learning environment for all students. All class sessions in addition to in-person attendance may require use of Zoom.All class sessions require use of technology (e.g., laptop, MS Excel and other applicable software, computer lab) for learning purposes.

**Generative AI Use**

**With Prior Permission**

Students are only allowed to use AI tools, such as ChatGPT or Dall-E 2, on assignments in this course with advance permission. Students must submit a written request with an explanation of how they will use a particular tool in their assignment, and use is not permitted without written approval. If you are unclear if something is an AI tool, please check with your instructor.

Feedback and Viewing Grades

I will provide timely meaningful feedback on all your work via our course site in NYU Brightspace. You can access your grades on the course site Gradebook.

Attendance

Students are expected to attend all in-person class sessions. Excused absences are granted in cases of documented serious illness, family emergency, religious observance, or civic obligation. In the case of religious observance or civic obligation, this should be reported in advance. Unexcused absences from sessions may have a negative impact on a student’s final grade. Students are responsible for assignments given during any absence.

If for some reason (excused absence) you will not be in class, you must notify the instructor prior to the scheduled session if you will not be attending and the reason.

Each unexcused absence or being late may result in a student’s grade being lowered by a fraction of a grade. A student who has three unexcused absences may earn a Fail grade.

Students who join the course during add/drop are responsible for ensuring that they identify what assignments and preparatory work they have missed and complete and submit those per the syllabus.

Refer to the [SPS Policies and Procedures page](https://www.sps.nyu.edu/homepage/student-experience/policies-and-procedures.html) for additional information about attendance.

**Textbooks and Course Materials**

*Students can purchase these items through the NYU Bookstore.*

**Required:**

* An Introduction to Management Science: Quantitative Approaches to Decision Making, CENGAGE Learning. Anderson, Sweeney, Williams, Camm, Cochran, Fry, Ohlmann. 2019. 15th Edition, ISBN-13: 978-1337406529 / ISBN-10: 133740652X
* An electronic version of the text is acceptable.
* Occasional additional short readings may be provided during the term. These will predominantly be distributed electronically.

Grading | Assessment

Your grade in this course is based on your performance on multiple activities and assignments. Since all graded assignments are related directly to course objectives and learning outcomes, failure to complete any assignment will result in an unsatisfactory course grade. All written assignments are to be completed using APA format and must be typed and double-spaced. Grammar, punctuation, and spelling will be considered in grading. Please carefully proof-read your written assignments before submitting them for a grade. I will update the grades on the course site each time a grading session has been completed— there may be times in the semester where there is a lag in which case you may email me for a timely direct feedback appointment until grades have been formally posted.

**DESCRIPTION** **PERCENTAGE**

Assigned Homework and Quizzes 35%

Class Participation 15%

Group Assignments 20%

Final Exam 30%

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TOTAL POSSIBLE 100%

Class Participation consists of asking questions and engaging in class discussions in a manner that demonstrates proper preparation from the assigned readings and other background materials prior to class.

The Final Exam will likely consist of 12 to 15 quantitative problems that may or may not be in case format. The weight of each problem toward the calculation of the Final Exam grade will be indicated on the exam. I reserve the right to adjust format as we see how the class progresses.

See the [“Grades” section of Academic Policies](https://www.sps.nyu.edu/homepage/student-experience/policies-and-procedures.html#Graduate1) for the complete grading policy, including the letter grade conversion, and the criteria for a grade of incomplete, taking a course on a pass/fail basis, and withdrawing from a course.

**NYU SPS Graduate Grading Scale**

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| --- | --- | --- | --- |
| **A** | 95-100 | 4.000 | **Exceptional:** Demonstrates exceptional mastery of all learning outcomes of the course and thorough and complete understanding of all concepts. |
| **A-** | 90-94 | 3.667 | **Excellent:** Demonstrates highly competent mastery of all learning outcomes of the course and strong understanding of all concepts. |
| **B+** | 87-89 | 3.333 | **Very Good; exceeds course standards:** Demonstrates mastery of all learning outcomes of the course and understanding of core concepts. |
| **B** | 83-86 | 3.000 | **Good; meets course standards:** Demonstrates mastery of some learning outcomes; understanding of some core concepts could be improved. |
| **B-** | 80-82 | 2.667 | **Somewhat Satisfactory;** meets some course standards and requires improvement: Demonstrates basic understanding of some learning outcomes; improved understanding of all core concepts is needed. |
| **C+** | 77-79 | 2.333 | **Less than Satisfactory; requires significant improvement:** Demonstrates partial understanding of all learning outcomes and core concepts; requires significant improvement. |
| **C** | 73-76 | 2.000 | **Unsatisfactory; requires substantial improvement:** Demonstrates partial understanding of some learning outcomes and core concepts; requires substantial improvement. |
| **C-** | 70-72 | 1.667 | **Unsatisfactory; requires extensive improvement:** Demonstrates poor understanding of all learning outcomes and core concepts; requires extensive improvement. |
| **F** | Below 70 |  | **Fail:** Demonstrates minimal to no understanding of all key learning outcomes and core concepts; work is unworthy of course credit towards the degree. |
| **P** |  |  | **Passing:** If a Pass/Fail grade is allowed, the choice of pass/fail must be made prior to the completion of the fifth week of the term. |

**Course Outline**

**Start/End Dates:** 9/03/2024 - 12/10/2024 | Tuesdays

**Time:** 2:00 pm - 4:35 pm

**No Class Date(s):** Tuesday, 10/15/2024

**Special Notes:** Tuesday 10/15/2024 – Legislative Monday: Classes will meet according to a Monday schedule on Tuesday, October 15, 2024

**Session 1 - 09/03/24**

A general knowledge of the uses of Management Science in problem solving and an introduction to some commonly used techniques. Chapter 1, Problems 8-16, due prior to next class.

**Session 2 – 09/10/24**

The ability to model, analyze, and solve business problems using graphic and algebraic methods of linear programming. Chapter 2, Problems 7, 10, 12, due prior to next class.

**Session 3, 09/17/24**

The ability to model, analyze, and solve business problems using graphic and algebraic methods of linear programming continued. Follow on homework may be assigned shortly after class based on progress.

**Session 4, 09/24/24**

Tentative date for Presentations of Chapter 2-based Group Project #1

**Session 5, 10/04/22**

Skill in achieving an optimal strategy in situations with several decision alternatives or uncertainty, utilizing different methodologies involving probabilities and mathematical models. Chapter 13, Problems 5, 7a, 9, 11, 13, 15, due 10/7.

**Session 6, 10/01/24**

Skill in achieving an optimal strategy in situations with several decision alternatives or uncertainty, utilizing different methodologies involving probabilities and mathematical models continued. Follow on homework may be assigned shortly after class based on progress.

**Session 7, 10/08/24**

The ability to recognize and solve different types of network flow problems, using linear programming. Chapter 6, Problems 3a-b, 5a-b (formulate only), 9, 13a-b (formulate only), due prior to class.

**10/15/2024** No Class. Fall Break

# Session 8, 10/22/24

The ability to utilize analytical tools such as Critical Path Method (CPM) and Program Evaluation and Review Technique (PERT) to solve planning and scheduling problems. Chapter 9, Problems 7, 15, and a problem not from the text, due prior to class.

**Session 9, 10/29/24**

The ability to utilize analytical tools such as Critical Path Method (CPM) and Program Evaluation and Review Technique (PERT) to solve planning and scheduling problems continued. Group projects due 11/08.

**Session 10, 11/05/24**

Tentatively Team Presentations based on Chapter 9-based Group Project #2.

**Session 11, 11/12/24**

A fundamental understanding of the applications of Queuing Theory and the ability to solve basic queuing problems. Chapter 11, Problems 1, 3, 9, prior to next class session.

**Session 12, 11/19/24**

A fundamental understanding of the applications of Queuing Theory and the ability to solve basic queuing problems. Follow on homework may be assigned based on progress.

**Session 13, 11/26/24**

Tentatively a selection of Supplemental topics listed below. Course review and Final Exam presentation. Alternatively, there may be a relevant guest speaker.

**Session 14, 12/03/24**

**Final Exam**

This class will cover the following content:

* Introduction to Management Science – Quantitative Analysis, Modeling, Methods
* Linear Programming – Graphical Solutions, Extreme Points, Sensitivity Analysis, Applications
* Decision Analysis
  + Distribution and Network Models
  + Project Scheduling – PERT/CPM
  + Queuing Theory/Waiting Line Models
* If time permits, supplemental topics may include:
  + Time Series Analysis and Forecasting
  + Inventory Models
  + Quality Control
  + Integer Linear Programming Nonlinear Optimization Simulation

**NOTES:**

The syllabus may be modified to better meet the needs of students and to achieve the learning outcomes.

The School of Professional Studies (SPS) and its faculty celebrate and are committed to inclusion, diversity, belonging, equity, and accessibility (IDBEA), and seek to embody the IDBEA values. The School of Professional Studies (SPS), its faculty, staff, and students are committed to creating a mutually respectful and safe environment (*from the* [SPS IDBEA Committee](https://www.sps.nyu.edu/homepage/about-us/idbea/about-idbea.html)).

**New York University School of Professional Studies Policies**

1. Policies - You are responsible for reading, understanding, and complying with [University Policies and Guidelines](http://www.nyu.edu/about/policies-guidelines-compliance.html), [NYU SPS Policies and Procedures](http://sps.nyu.edu/academics/academic-policies-and-procedures.html), and [Student Affairs and Reporting](https://www.nyu.edu/about/policies-guidelines-compliance/policies-and-guidelines/student-services.html).

2. Learning/Academic Accommodations - New York University is committed to providing equal educational opportunity and participation for students who disclose their dis/ability to the [Moses Center for Student Accessibility](https://www.nyu.edu/students/communities-and-groups/student-accessibility.html). If you are interested in applying for academic accommodations, contact the [Moses Center](https://www.nyu.edu/students/communities-and-groups/student-accessibility/academic.html) as early as possible in the semester. If you already receive accommodations through the Moses Center, request your accommodation letters through the [Moses Center Portal](https://www.nyu.edu/students/communities-and-groups/student-accessibility.html) as soon as possible ([mosescsa@nyu.edu](mailto:mosescsa@nyu.edu) | 212-998-4980).

3. Health and Wellness - To access the University's extensive health and mental health resources, contact the [NYU Wellness Exchange](https://www.nyu.edu/students/health-and-wellness/wellness-exchange.html). You can call its private hotline (212-443-9999), available 24 hours a day, seven days a week, to reach out to a professional who can help to address day-to-day challenges as well as other health-related concerns.

4. Student Support Resources - There are a range of resources at SPS and NYU to support your learning and professional growth. For a complete list of resources and services available to SPS students, visit the [NYU SPS Office of Student Affairs site](https://www.sps.nyu.edu/homepage/student-experience/resources-and-services.html).

5. Religious Observance - As a nonsectarian, inclusive institution, NYU policy permits members of any religious group to absent themselves from classes without penalty when required for compliance with their religious obligations. Refer to the [University Calendar Policy on Religious Holidays](https://www.nyu.edu/about/policies-guidelines-compliance/policies-and-guidelines/university-calendar-policy-on-religious-holidays.html) for the complete policy.

6. Academic Integrity and Plagiarism - You are expected to be honest and ethical in all academic work. Moreover, you are expected to demonstrate how what you have learned incorporates an understanding of the research and expertise of scholars and other appropriate experts; and thus recognizing others' published work or teachings—whether that of authors, lecturers, or one's peers—is a required practice in all academic projects.

Plagiarism involves borrowing or using information from other sources without proper and full credit. You are subject to disciplinary actions for the following offenses which include but are not limited to cheating, plagiarism, forgery or unauthorized use of documents, and false form of identification

[Turnitin](https://www.nyu.edu/servicelink/KB0018471), an originality detection service in NYU Brightspace, may be used in this course to check your work for plagiarism.

Read more about academic integrity policies at the NYU School of Professional Studies on the [Academic Policies for NYU SPS Students](https://www.sps.nyu.edu/homepage/student-experience/policies-and-procedures.html) page.

7. Use of Third-Party Tools - During this class, you may be required to use non-NYU apps/platforms/software as a part of course studies, and thus, will be required to agree to the “Terms of Use” (TOU) associated with such apps/platforms/software.

These services may require you to create an account but you can use a pseudonym (which may not identify you to the public community, but which may still identify you by IP address to the company and companies with whom it shares data).

You should carefully read those terms of use regarding the impact on your privacy rights and intellectual property rights. If you have any questions regarding those terms of use or the impact on the class, you are encouraged to ask the instructor prior to the add/drop deadline.