Spring 2024

# MGMT 630-102: Decision Analysis with Quantitative Modeling

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NJIT MARTIN TUCHMAN SCHOOL OF MANAGEMENT
NEW JERSEY INSTITUTE OF TECHNOLOGY

# Decision Analysis with Quantitative Modeling
# MGMT 630 102
# Spring 2024

**Instructor:** Sathish Rajamani
**Phone:** 201-917-8456 (Only Text or WhatsApp)
**Email:** srajaman@njit.edu
**Class Time & Location:** Hybrid Mode- Alternate Tuesdays (see the schedule below)
**Prerequisites:**
**Office Hours:** By appointment. Online through Webex or in person on Mondays or Tuesdays at pre-scheduled times.

## Course Overview

This course covers decision modeling and analysis tools based on managerial science (MS) methods and related computerized support systems to help managers in their decision-making processes. The offers a comprehensive overview of applied decision science techniques to solve managerial problems typically encountered in business and economics. The goal is to provide quantitative analysis skills for the treatment of sales, investments, employment, service/production, and related data from marketing, MIS, finance, human resources, manufacturing, supply chains distribution logistics, and other business operations. The course emphasizes on hand problem solving using models and solution methods developed with computerized tools such as Microsoft Excel and ready-to-use modern software packages designed for management science and decision support systems. Presently, the design, implementation, and use of such models and methods for Business Intelligence Systems are the fastest-growing areas of technology management-oriented MS and MBA programs. The perspective envisioned in this course is one of modeling and design of solutions with software tools; the processes of effective modeling and design require and enhance decision analysis, problem-solving, and solution implementation processes. The course emphasizes building the skills needed to formulate problems toward implementing model-oriented decision support systems. Using problems and case studies, this course provides opportunities to review many concepts in problem-solving by means of mathematical programming statistical modeling, and decision evaluation via sensitivity analysis and feedback. Class projects and papers comprise realistic case studies on important problems dealing with modeling and model implementations for use in decision analysis.

## Required Course Materials

Quantitative Analysis for Management, 13th Edition, by Barry Render, Ralph Stair, and Michael Hanna, 2014, Prentice Hall (Pearson Publishing Company)

**Learning Outcomes**

1. Understand the applications of management science modeling tools and techniques to real-world business situations.
2. Be able to define and analyze problems, develop models, and construct computerized solutions with spreadsheet implementations to perform quantitative analysis.
3. Review the basic foundations of probability concepts and applications in quantitative analysis
4. Build understanding and skills in developing management science modeling tools for various business problem areas including (1) stochastic and (2) deterministic models listed below:

o Stochastic Models including models for decision analysis and decision trees; simple linear-nonlinear and multiple regression models; forecasting models; inventory models; waiting-lines and queuing models; and simulation models.

o Deterministic Models including Break-even analysis models; linear programming models and related applications; advanced linear programming models; transportation, transshipment, and assignment models; goal programming and other multi-criteria models for scoring and analytic hierarchy process evaluations; and project management models.

5. Understand the role of sensitivity analysis in solution implementations.
6. Use the knowledge and skills from the above to leverage information technology for building business intelligence systems to analyze complex problems and data for sound business decisions.
7. Accomplish all the above objectives as an individual or in a team environment.

**Course Website**

Please go to CANVAS. The Canvas site is where most course materials are posted. Make sure you have an NJIT UCID and password so that you are able to access Canvas. I will use Canvas to post announcements and supplemental materials throughout the semester. **So, please be sure to check the site (canvas.njit.edu) frequently. Please contact helpdesk (973-596-2900) for problems associated with Canvas.**

**Important Details Regarding Course Exams**

Respondus LockDown Browser for Exams. Please do note that this system must be activated and use to preserve the integrity of the exams and the course.

Respondus Practice Quiz- Requires Respondus LockDown Browser + Webcam
This is only a practice quiz for practice in using the Respondus Lockdown Browser.

Please download the browser
at: http://www.respondus.com/lockdown/download.php?id=264548414

You will need to install this browser onto your computer to take the quiz. Once installed,

open the browser on your computer and proceed to take the exam. This practice quiz does not count and you may take the quiz as many times as you wish for practice.

**Course Deliverables/ Final Grade Components**

- 2 Case/Discussions (Group assignments) - 30 Points
- Midterm Exam - 20 Points
- Software Application (Group Assignment) - 30 Points
- Final Exam - 20 Points. Depending on the progress made the class, I may change it to an Individual project if need be.

**Final Grades**

Grades are a reflection of the level of understanding of course content. Therefore, to achieve a grade of A or B in this class expect to:

- Be prepared. This means actively participating in discussions, exercises, and activities to further understanding.
- Turn in all course deliverables in a timely and professional manner.

With less preparation and participation expect a grade of C or lower.

I have had students be very casual in taking a class for the first part of a term. Then, as the class nears the end, the student realizes a bad grade may be in the future and asks for an extra credit opportunity or extensions to due dates. This is usually done with a **sad face, a soft voice, and a remorseful heart**. Please know now that such opportunities are not fair to the other students. So, the grading system established in this syllabus is final and no other opportunities exist. This means that each student should take this class seriously from the first week.

**Final course grades will be based on the following scale (there will be NO curve):**
**Grading Scale**

| A | B+ | B | C+ | C | F |
|---|---|---|---|---|---|
| >91% | 86% to 90.99% | 81% to 85.99% | 75% to 80.99% | 70%to 74.99% | <70% |

**Late Assignments**

Late assignments will not be accepted for grading unless there is a severe illness or an emergency situation. In these cases, legitimate documentation of the emergency must be presented and approved by the office of the Dean of Students before extensions will be granted.

**Email Etiquette**

This is a business course, and the expectation is that you will conform to appropriate business letter-writing practice in all of your emails to me. The following are the basics.

- Put the course name (e.g. course name or course number) in the subject line
- Identify the subject of the e-mail with a brief but descriptive summary of the topic: include a proper salutation and the assignment details such as the title, homework, or test.
- Proofread your e-mail for proper sentence structure, capitalization, spelling, and punctuation.
- Conclude the e-mail message with a proper closing (e.g. Regards, Sincerely) and your full name.

(Note: Do not e-mail requests for additional grade points unless there is an error in the grading. Please note that any grade discrepancies must be addressed within 2 weeks of the assignment due date. Grades are not 'given out' by the professor; they are 'earned' by the student. So, make sure that you 'earn' a grade that you can live with.)

**Academic Integrity**

Learning is both an individual and a cooperative experience. Asking for and giving help freely in appropriate settings helps you learn. However, you should present only YOUR work as your own. University rules and standards define and prohibit "academic misconduct" by all members of the academic community including students. You are asked and expected to be familiar with these standards and abide by them.

Academic Integrity is the cornerstone of higher education and is central to the ideals of this course and the university. Cheating is strictly prohibited and devalues the degree that you are working on. As a member of the NJIT community, it is your responsibility to protect your educational investment by knowing and following the academic code of integrity policy that is found at: *http://www5.njit.edu/policies/sites/policies/files/academic-integrity-code.pdf*.

Please note that it is my professional obligation and responsibility to report any academic misconduct to the Dean of Students Office. ***Any student found in violation of the code by cheating, plagiarizing or using any online software inappropriately will result in disciplinary action. This may include a failing grade of F, and/or suspension or dismissal from the university.*** If you have any questions about the code of Academic Integrity, please contact the Dean of Students Office at *dos@njit.edu*.

**Accommodations**

Educational access is the provision of classroom accommodations, auxiliary aids and services to ensure equal educational opportunities for all students regardless of their disability. If you are in need of accommodations due to a disability please contact Scott Janz (oars@njit.edu), Associate Director of the Office of Accessibility Resources & Services (OARS), Kupfrian Hall 201, to discuss your specific needs. A Letter of Accommodation Eligibility from the OARS authorizing your accommodations will be required. Accommodations need to be requested in advance and will not be granted retroactively.

**Classroom Policies**

I will submit your assignments to Turnitin to check for plagiarism.

**Final Comments**

**I reserve the right to change any aspect of this syllabus or the course schedule at any time**, as the need arises. Students registered for this course assume full responsibility for reading and understanding the course policies as stated above.

**The topics are tentative. Updates will be provided.**

| # | Dates | Course Topics | Remarks |
|---|---|---|---|
| **1** | Jan 16 | Modules of Cost, Revenue, and Profit | Hybrid - Asynchronous |
| **2** | Jan 23 | Basic Probability Concepts and Applications | Online - Synchronous |
| **3** | Jan 30 | Decision Analysis | Hybrid - Asynchronous |
| **4** | Feb 6 | Regression Models | In- Person |
| **5** | Feb 13 | Forecasting Techniques and Models for Time Series | Hybrid - Asynchronous |
| **6** | Feb 20 | An Introduction to Linear Programming | In- Person |
| **7** | Feb 27 | Applications of Linear Programming | Hybrid - Asynchronous |
| **8** | Mar 5 | Transportation, Assignment, Transshipment & Related Models | In- Person |
| **9** | Mar 12 | SPRING BREAK | No Class |
| **10** | Mar 19 | Overview of Multi-criteria Models Goal Prog. AHP/QESM | Hybrid - Asynchronous |
| **11** | Mar 26 | Overview of Integer Programming, Goal Programming, and Nonlinear Programming Models | In- Person |
| **12** | Apr 2 | Overview of Project Management: PERT, CPM, and LP Formulation of Time/Cost Tradeoff Analysis | Hybrid - Asynchronous |
| **13** | Apr 9 | Overview of Queuing/Waiting Models | In- Person |
| **14** | Apr 16 | Overview of Computer Simulation Models | Hybrid - Asynchronous |
| **15** | Apr 23 | Review for Final Exams | In-Person (Reserve class) |