
Quantitative Methods for Decision Making

MASTER OF ENGINEERING MANAGEMENT
QUANTITATIVE METHODS #407
Winter 2010

Instructor: Halit Uster (Email: uster@northwestern.edu, Phone: (847) 491 7008, Office: C140)

Bring a lap top computer to class. No need for wireless (but it is a nice plus).
You will need to be running Excel and a relatively recent version of the Windows operating system (XP, Vista, 7).

L.	Date	Module and Description	
Module I: Data Management, Statistics, and Forecasting			
1.	1/6/10	Statistics	Review of descriptive statistics, confidence intervals, distribution fit, hypothesis testing, regression analysis.
2.	1/13/10	Forecasting	Quantitative Methods in Forecasting, Time series analysis, seasonal demand, Regression.
3.	1/20/10	Introduction to Mathematical Modeling	Business modeling examples, the modeling process, certainty and uncertainty in models. Importance of understanding data before modeling, and modeling with spreadsheet in simple decision situations. Data Analysis in spreadsheet.
Module II: Optimization			
4	1/27/10	Linear Programming Models	Decision Variables, objectives, constraints, Blending Models, Product Mix Models, Linear Programming Solver, Sensitivity and what-if analysis
5	2/3/10	Linear and Nonlinear Models, Financial Optimization	Multi-period planning models, nonlinear models, Markovitz model, Capital budgeting models, Reinvestment models

6.	2/10/10	Network and Integer Optimization	Assignment, staffing, scheduling, shortest path problems. Transportation and Transshipment models, Introduction to Integer Programs.
7.	2/17/10	Integer and multi-objective optimization, location, routing and logistics	Facility location and logistics modeling, multi-objective modeling
Module III: Decision Analysis and Simulation			
8.	2/24/10	Decision Analysis	Decision criterion, advanced probabilistic decision models, expected value of perfect and imperfect information, decision trees, and utility functions.
9.	3/3/10	Spreadsheet Simulation	Basics of Monte-Carlo simulation, Input and Output analysis.
10	3/10/10	Queueing Analysis	Design and analysis of production and service system using queueing models to predict and mitigate delay and congestion.
		No Final Examination	

1. Course Description

This course provides you with an understanding of how various business situations are modeled and optimized effectively using mathematical modeling and quantitative techniques. Examples of the techniques covered in this course are time-series analysis, regression, optimization (linear, nonlinear, and discrete), probabilistic modeling, decision analysis, and simulation. Application areas include forecasting, finance, operations, production and logistics.

You will learn, through examples, cases, and use of software.

2. Book

Quantitative Analysis for Management by B. Render, R. M. Stair, and M.E. Hanna, Prentice Hall; 10 edition, ISBN-10: 0136036252 (Available at Amazon.com). Economy edition (paperback without color pictures) is also available at Amazon at a lower price.

3. Class Web-site

<https://www.courses.northwestern.edu>

Course related material, homeworks, case studies and any additional announcements will be posted on the blackboard website for the course. You will receive emails from the instructor posting the materials as it becomes available.

4. Grading and Late Homework Policy

Your course grade will be based on weekly homework given during the course. Each homework carries equal weight towards your final grade. Homework is due in class on the due date indicated on the homework. No late homework is accepted unless prior arrangements are made with the instructor assigning the homework. There is NO FINAL EXAM in the course.

Mean + 1std dev or greater or (93% or better)	A
Between Mean + .5 Std dev and Mean + 1 std dev or (90% or better)	A-
Between Mean and Mean + .5 std dev or (87% or better)	B+
Between Mean - .5 std dev and Mean or (84% or better)	B
Between Mean - 1.5 std dev and Mean - .5 std dev or (80% or better)	B-
Between Mean - 2.0 std dev and Mean - 1.5 std dev or (75% or better)	C+
Between Mean - 3 std dev and Mean - 2.0 std dev or (70% or better)	C

5. NU Disability Policy

<http://www.northwestern.edu/disability/policies/syllabus.html>

To be eligible for disability-related services; students must have a visibly obvious or documented disability as defined by the Americans with Disabilities Act of 1990 (ADA) and Section 504 of the Rehabilitation Act of 1973. Under the ADA and Section 504, a person has a disability if he/she has a physical or mental impairment that substantially limits one or more major life activities such as walking, standing, seeing, speaking, hearing, sitting, breathing, and/or taking care of oneself.

SSD is the designated office at Northwestern University that obtains and files disability-related documents, certifies eligibility for services, determines reasonable accommodations, and develops plans for the provision of such accommodations. Students with disabilities are also offered auxiliary services, including assessment, library and lab assistants, notetakers, tutoring, assistive/adaptive technology, academic, psycho/social support, and mentorship.

Certifying Eligibility for Services

When appropriate, SSD requests disability-related documents from the appropriate licensed professional to certify a student as having a disability and to determine reasonable accommodations. Students who suspect that they have a disability, and have not received a formal assessment, may be referred to on-campus (Counseling and Psychological Services, Department of Communication Sciences and Disorders) or off-campus resources for an evaluation. Pending receipt of documentation, SSD reserves the right to deny services or accommodations.