

OFFICIAL SYLLABUS
OR 441 – Operations Research: Stochastic Models
Adopted - Spring 2004 (Committee: Drs. M. Agustin, M. Cooper, E. Sewell)

Course Description. (Same as IME 461) Probabilistic models, elementary queuing theory with single or multiple server systems, use of queues in facility designs, elementary decision theory. Markov processes and decision-making. Prerequisite: STAT 380 or STAT 480a.

Textbook. Operations Research: Applications and Algorithms, Third Edition, by Wayne L. Winston.

Course Outline and Topics

<p>Chapter 13: Decision Making Under Uncertainty 13.1 Decision Criteria 13.2 Utility Theory 13.3 Decision Trees 13.4 Bayes' Rule and Decision Trees 13.5 Decision Making with the Normal Distribution (Optional) Chapter 14: Decision Making with Multiple Objectives (Optional) 14.1 Multiattribute Decision Making in the Absence of Uncertainty: Goal Programming 14.2 Multiattribute Utility Functions Chapter 15: Game Theory (Optional) 15.1 Two-Person Zero-Sum and Constant-Sum Games: Saddle Points 15.2 Two-Person Zero-Sum Games: Randomized Strategies, Domination, and Graphical Solution 15.3 Linear Programming and Zero-Sum Games 15.4 Two-Person Non-Constant-Sum Games Chapter 16: Deterministic EOQ Inventory Models 16.1 Introduction to Basic Inventory Models 16.2 The Basic Economic Order Quantity Model 16.3 Computing the Optimal Order Quantity When Quantity Discounts Are Allowed 16.4 The Continuous-Rate EOQ Model (Optional) 16.5 The EOQ Model with Back Orders Allowed 16.6 When to Use EOQ Models Chapter 17: Probabilistic Inventory Models 17.1 Single-Period Decision Models 17.2 The Concept of Marginal Analysis 17.3 The News Vendor Problem: Discrete Demand 17.4 The News Vendor Problem: Continuous Demand 17.5 Other One-Period Models 17.6 The EOQ with Uncertain Demand: The (r, q) and (s, S) Models Chapter 19: Markov Chains 19.1 What Is a Stochastic Process? 19.2 What Is a Markov Chain? 19.3 n-Step Transition Probabilities</p>	<p>19.4 Classification of States in a Markov Chain 19.5 Steady-State Probabilities and Mean First Passage Times 19.6 Absorbing Chains Chapter 20: Deterministic Dynamic Programming (Optional) 20.1 Two Puzzles 20.2 A Network Problem 20.3 An Inventory Problem 20.4 Resource Allocation Problems 20.5 Equipment Replacement Problems 20.6 Formulating Dynamic Programming Recursions Chapter 21: Probabilistic Dynamic Programming (Optional) 21.1 When Current Stage Costs Are Uncertain, but the Next Period's State Is Certain 21.2 A Probabilistic Inventory Model 21.5 Markov Decision Processes Chapter 22: Queuing Theory 22.1 Some Queuing Terminology 22.2 Modeling Arrival and Service Processes 22.3 Birth-Death Processes 22.4 The $M/M/1/GD/\infty/\infty$ Queuing System and the Queuing Formula $L = \lambda W$ 22.5 The $M/M/1/GD/c/\infty$ Queuing System 22.6 The $M/M/s/GD/\infty/\infty$ Queuing System 22.7 The $M/G/\infty/GD/\infty/\infty$ and $GI/G/\infty/GD/\infty/\infty$ Models 22.8 The $M/G/1/GD/\infty/\infty$ Queuing System 22.9 Finite Source Models: The Machine Repair Model 22.10 Exponential Queues in Series and Open Queuing Network 22.11 The $M/G/s/GD/s/\infty$ System (Blocked Customers Cleared) (Optional) 22.12 How to Tell Whether the Interarrival Times and Service Times Are Exponential 22.13 What to Do If Interarrival or Service Times Are Not Exponential 22.14 Priority Queuing Models (Optional)</p>
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Any instructor should cover all of the material specified; any additional sections are optional.