

SIMULATION MODELLING OF PRODUCTION AND SERVICE SYSTEMS

By Arif N. Gulluoglu

EM

Prof. Dr. Arif N. Gulluoglu

Course Organization

Course Outline

Introduction, Basic Linear Programming, Log Allocation Modeling, Sensitivity Analysis, Network Problems, More Network Problems, Integer Programming, Dynamic Programming, Heuristic Programming, Implementation of a Mathematical Programming System of Planning.

Course Learning Outcomes:

Upon successful completion of this course you will have the skills to:

- Develop A Program With User Controls
- Develop Simple Program Tools To Summarize Data And Compare Options
- Formulate A Mixed Integer Programming Model To Optimize Production Variables
- Conduct Sensitivity Analysis To Determine Which Production Variables Are Most Important In Meeting The Company's Goals
- Understand Optimization Systems Using Networks And Dynamic Programming

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Class Hours : Tuesday 7:00-9:50 p.m., D206
Instructor : Arif Nihat Gulluoglu, Prof. of MSE
Office : D205 Mühendislik D Building
Phone : (216) 348 0292, 605
E-mail : gulluoglu@eng.marmara.edu.tr,

Secretary : Naciye Karamahmut
Office : 206 Mühendislik D Building
Phone : (216) 348 0292, 625

Text book : Williams, H. P. 1999. *Model Building in Mathematical Programming* – 4th Edition. John Wiley & Sons. .

Grading Policy

Well-written and concise projects will be **expected**.

Project & Homework turned in should be neatly organized in a technical writing format.

Midterm Examination: 20%
Homework& Project: 40 %,:
Final Examination: 40%

A passing mark is required on the final examination to pass the course.

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Topics

Week 1: Introduction

- The concept of a model
- Types of mathematical models
- Basic modeling principles

Week 2: Basic Linear Programming

- Mathematics of the LP
- Solving the LP Graphically
- Basics of the Simplex Algorithm

Week 3: Log Allocation Modeling

- Objective Functions
- Types of Constraints
- LP Solution Packages

Week 4: Sensitivity Analysis

- Interpreting Model Results
- The Dual Model
- Shadow Prices and their Interpretation
- Reduced Costs

Week 5: More Sensitivity Analysis

- Stability of the Model
- Further economic interpretations

Week 6: Network Problems

- Intro to Networks
- Special Algorithms
- Road Location Problems

Week 7: More Network Problems

- Project Planning

Week 8: Integer Programming

- Integer Variables
- Binary Variables
- Conditions
- Branch and Bound Algorithms

Week 9: Dynamic Programming

- Production Optimization Problems
- Knapsack Algorithm
- Transportation Problems

Week 10: Heuristic Programming

Week 11: Implementation of a Mathematical Programming System of Planning

- Implementing Goals

Week 12-14: Project Presentations

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