OPERATIONS RESEARCH

- Credit = 3 (Course = 2, TD = 1, TP = 0)
- Course = 32 hours per semester
- TD = 32 hours per semester
- Assessment: Attendance = 10%, Assignment = 10%, Class Activities = 10%, Mid-term = 30%, Final = 40%
- Reference:

1. Taha, H. A. (2017). *Operations Research: An Introduction* (10th ed.). Pearson.
2. Hillier, F. S., Lieberman, G. J. (2021). *Introduction to Operations Research* (11th ed.). McGraw-Hill Education.
3. Baker, K. R., Trietsch, D. (2009). *Principles of Sequencing and Scheduling*. John Wiley & Sons.

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2.1.5 Maximization Case
2.1.6 Degeneracy
2.1.7 Time Minimization
2.1.9 Transshipment Problem
2.1.10 Redundancy

2.2 Assignment
2.2.1 Introduction
2.2.2 Comparison with Transportation Problem
2.2.3 Formulation of Assignment Problem
2.2.4 Hungarian Method
2.2.5 Applications: Scheduling Problem

Chapter 3: Sequencing and Queuing Models 8 hours

3.1 Sequencing Models
3.1.1 Single Machine Sequencing
(a) Priority Rules: FCFS, SPT, EDD
(b) Applying Priority Rules to Determine Sequence
3.1.2 N Jobs on M Machines
(a) Formulation
(b) Exact and Heuristic Solutions

3.2 Queuing Models
3.2.1 M/M/1 Queue
(a) System Components: λ, μ, ρ
(b) Performance Measures: L, L_q, W, W_q
3.2.2 M/M/c Queue
(a) Multi-Server System
(b) Utilization and Performance Measures
(c) Erlang-C Formula

Chapter 4: Replacement and Staffing Problems 6 hours

4.1 Replacement
4.1.1 Failure Mechanisms of Items
4.1.2 Gradual Efficiency Loss vs Sudden Failure
4.1.3 General Approaches to Replacement
4.1.4 Replacement with Increasing Maintenance Costs
4.1.5 Present Value Criteria
4.1.6 Sudden Failure of Expensive Items

4.2 Staffing

4.2.1 Introduction and Importance
4.2.2 Staff Rotation Scheduling
4.2.3 Application of Replacement Methods to Staff
4.2.4 Optimal Staffing Levels
4.2.5 Case Studies / Examples

Chapter 5: Game Theory 6 hours

5.1 Introduction to Game Theory
5.1.1 Concept, Scope and Applications
5.1.2 Types of Games: Zero-Sum, Non-Zero-Sum, Cooperative, Non-Cooperative

5.2 Solution Methods
5.2.1 Payoff Matrix
5.2.2 Pure Strategies and Dominance Rule

5.3 Mixed Strategies
5.3.1 Games without Saddle Point
5.3.2 Nash Equilibrium (Introductory)

5.4 Applications of Game Theory
5.4.1 Applications in Business
5.4.2 Applications in Economics
5.4.3 Applications in Operations