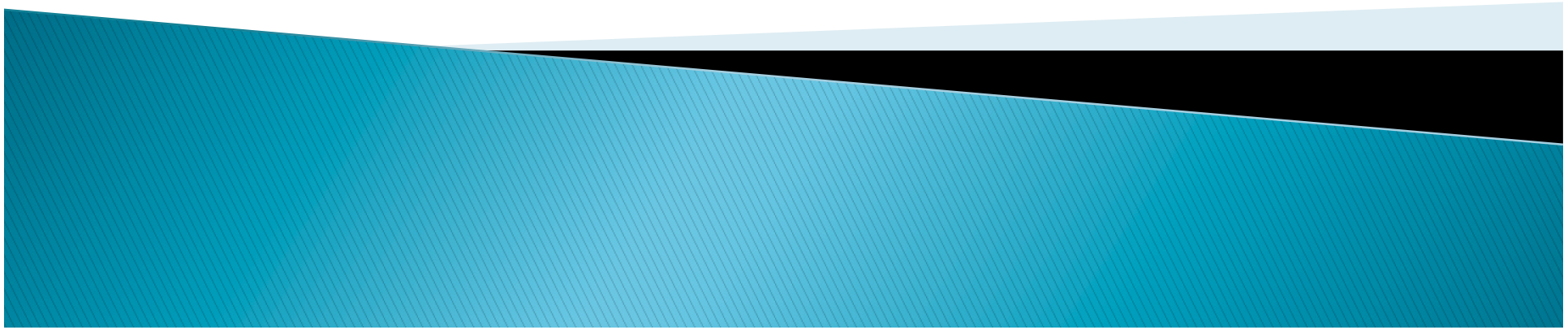
# Operations Research Syllabus



# Syllabus

- **Introduction**
  - The Operations Research Seminar
  - Linear Programming
  - Learning Objectives

- **Phase I: LP Formulation & Graphical Solution**

- **Section 1: Mathematical Formulation**
  - Elements of an LP model
  - Properties of an LP model
  - Problem Formulation (maximization problem)
  - Problem Formulation (minimization problem
  - Mathematical Formulation of a Linear Programming Problem (LP)

- **Section 2: Modeling with Linear Programming**
  - Graphical Solution
    - Solution of a Maximization Problem
    - Solution of Minimization Problem

# Syllabus

- Special Cases in Graphical Solution
  - Alternative Optimal Solution of a problem
  - Infeasible Solution of a problem
  - Unbounded Solution of a problem
- Sensitivity Analysis in Graphical Solution
  - Sensitivity Analysis to Right Hand Side Constraints
  - Sensitivity Analysis to Objective Coefficients

## Phase II: Simplex Method & Dual Problem

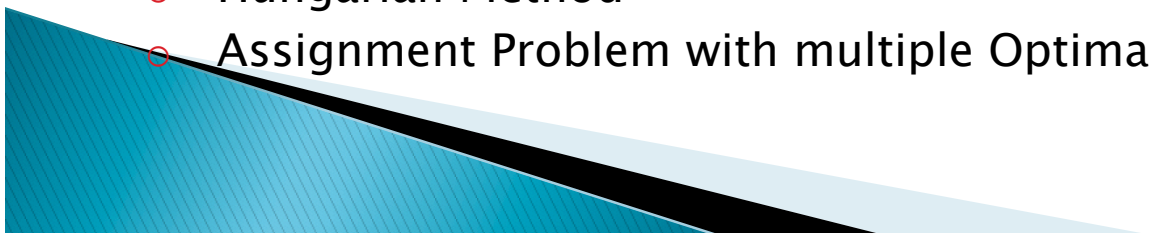
### Section 3: Modeling with Linear Programming

- Types of a Linear Programming Model
  - Normal Type
  - Typical Type
- The Simplex Method
  - Solving a maximization problem with Simplex Method
  - Solving a minimization problem with Simplex Method
- Sensitivity Analysis with Simplex Method
  - Sensitivity Analysis to Right Hand Side Constraints
  - Sensitivity Analysis to Objective Coefficients

# Syllabus

- **Section 4: Dual Problem**
  - Definition of Dual Problem
  - Relationship among Primal and Dual Problem
    - Primal & Dual Problem
    - Rules for constructing a Dual Problem

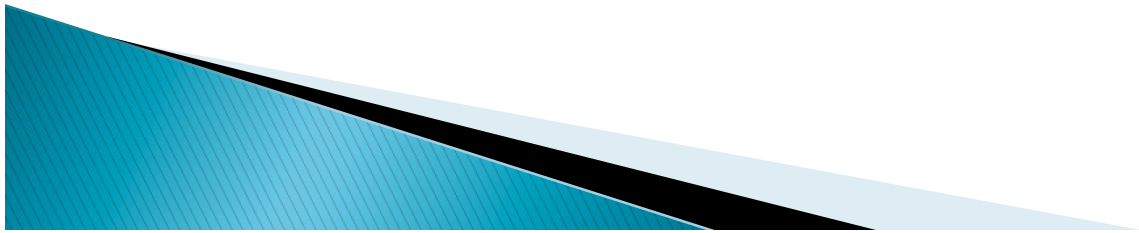
- **Phase II: Transportation & Assignment Problem**
- **Section 5: Transportation Problem**
  - Description of Transportation Problem
  - Algorithms for Starting Solution
    - Vogel Method
    - Northwest Corner Method
  - Modified Distribution Method (MODI)
  - Formulation of Transportation Problem as a LP Problem
- **Section 6: Assignment Problem**
  - Hungarian Method
  - Assignment Problem with multiple Optimal Solutions



# Syllabus

- **Phase IV: Network Analysis**
  - Shortest Path Algorithm
  - Algorithm of max flow

- **Phase V: LP Solution with Solver Excel**
  - Mathematical Formulation in Excel
    - Determination of Variables
    - Determination of Constraints
    - Determination of Objective Function
  - LP Solution with Solver
    - Analysis Report
    - Sensitivity Report
    - Limits Report



# Outline of Seminar