

School of Civil and Environmental Engineering
Addis Ababa Institute of Technology
Addis Ababa University

Course Information

Title: System Analysis and Management Techniques I
Code: CENG 6103
Credit Hours: 3 / ECTS 6
Lecturer: Dr. Dereje Hailu (email: dereje.hailu@aait.edu.et)

Course description

Network analysis; Line of Balance method; Resource scheduling and leveling; Formulation and application of linear programming: simplex method, transportation and assignment models and relevant software applications.

Course Objectives

The course aims at introducing the students to the fundamentals of systems analysis techniques and its application in construction management and engineering.

On successful completion of this course the student should be able to:

- Solve network and scheduling problems
- Apply different scheduling techniques to construction management
- Solve the resource allocation problem
- Use selected software on construction management and LP
- Formulate mathematical models for LP problems
- Solve linear programming models graphically and the simplex algorithm
- Formulate and solve the transportation and assignment problems

Grading

Class Performance/Attendance	10%
Two Assignments	30%
Final Exam	60%

Reference Books

Hiller, F.S., and Liberman, G.J., Introduction to Operations Research, McGraw-Hill, Inc., New York, 2001. (text)

Taha, Hamdy A. Operation research: an Introduction, 8th edition, 2007

Many OR books are available at AAiT library

Course Outline

1. Introduction to OR/system analysis
 2. Planning and Scheduling techniques: Network methods
 - a. Project Planning
 - b. Scheduling: CPM, PERT, and Bar Charts
 - c. Precedence Networks
 - d. Time/cost trade-off analysis
 - e. Resource scheduling/leveling
 - f. Line of Balance (LoB)/Linear Scheduling Method
 - g. Network models
 - h. Introduction to MS Project Software
 3. Linear Programming
 - a. Formulation and application
 - b. Simplex method
 - c. Duality
 - d. Sensitivity analysis
 - e. Integer programming
 - f. Introduction to software EXCEL Solver, Lindo/Lingo, ToRA, etc..
 4. LP Application: Transportation Problems
 - a. Approximate methods, NWC, Vogel and least-cost methods
 - b. Transshipment problems
 5. LP Application: Assignments Problems;
 - a. Hungarian method
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6. Further application of LP : CPM, Project Crashing