

IE 517
HEURISTIC METHODS IN OPTIMIZATION

Spring 2016

Instructor: Necati Aras, Ph.D.

Office: Engineering Building 4070

Phone: 359-7506

E-mail: arasn@boun.edu.tr

Lecture Hrs: Tuesday 11:00-12:00, Thursday 11:00-13:00

Textbook: There is no textbook, but the following books are very good sources of reference:

Handbook of Metaheuristics, Edited by Glover and Kochenberger, Kluwer Academic Publishers, 2003

Metaheuristics: From Design to Implementation, El-Ghazali Talbi, Wiley, 2009

Objectives of the Course:

Although most discrete optimization research is based on exact solution of integer or combinatorial problems, there are numerous applications which use some form of a heuristic. Heuristics are methods that seek a good, but not necessarily optimal solution in a reasonable amount of time. This course will survey a wide range of heuristic methods, emphasizing their generic characteristics and limitations, and the types of problems to which they are best adapted.

Important Notice: This course requires programming in a high level language. It is up to the student which language will be used (e.g., C#, C++, Visual Basic, MATLAB). The students will write codes in the assignments as well as in the project for some heuristics learned throughout the course.

Evaluation:

Assignments (4): 40%

Project: 30%

Exam: 30%

Topics Covered:

1. Introduction
2. Classical Construction Heuristics
3. Classical Improvement Heuristics
4. Simulated Annealing/Threshold Accepting
5. Variable Neighborhood Search
6. Tabu Search
7. Lagrangean Relaxation and Lagrangean Heuristics for IP/MIP problems
8. Genetic Algorithms
9. Ant Colony Optimization
10. Particle Swarm Optimization
11. Electromagnetism-like Algorithm