

# **Tentative Course Syllabus**

## **IE 552 Heuristic Methods for Optimization**

**Year and Semester: 2016-2017 Spring**

**Credit Hour: (3 0 3)**

**ECTS: 7.5**

### **Catalog Description**

Includes such methods as the genetic algorithm, simulated annealing, ant colony optimization, gradient ascent techniques, differential evolution, and particle swarm optimization.

### **Textbook**

- El-Ghazali Talbi: Metaheuristics - From Design to Implementation, Wiley, 2009 .
- J. Dr'eo, A. P'etrowski, P. Siarry, E. Taillard, Metaheuristics for Hard Optimization, Simulated Annealing, Tabu Search, Evolutionary and Genetic Algorithms, Ant Colonies,..., Springer, 2003.

### **Reference Books**

- Sean Luke, 2013, Essentials of Metaheuristics, Lulu, second edition.
- Gendreau, Michel and Jean-Yves Potvin (eds) (2012) Handbook of Metaheuristics. Springer.
- Talbi, El-Ghazali (2009) Metaheuristics; From Design to Implementation. Wiley.
- Stefan Edelkamp, Peter Norvig: Heuristic Search: Theory and Applications, Elsevier, 2011.
- Fred Glover, Gary A. Kochenberger: Handbook of Metaheuristics, Springer, 2010.
- Zbigniew Michalewicz, David B. Fogel: How to Solve It: Modern Heuristics, Springer, 2004.
- Holger H. Hoos ,Thomas Stützle: Stochastic Local Search, Morgan Kaufmann, 2005.
- Sadiq M. Sait, Habib Youssef: Iterative Computer Algorithms with Applications in Engineering: Solving Combinatorial Optimization Problems, Wiley, 2000.
- Christos H. Papadimitiou, Kenneth Steiglitz: Combinatorial Optimization., Dover Publications, 2nd edition, 1998.
- K. Deb: Multiobjective optimization using Evolutionary Algorithms, Wiley, 2001

### **Course Objective**

To cover various (meta)heuristic search approaches for solving difficult combinatorial optimization problems.

### **Computer Usage**

It is imperative that students use any computer programming language effectively.

### **Grading**

Term Paper presentation 20%

Midterm Exam 30%

A project 50% (to account for the final grade)

The project is expected to be an original research paper, possibly an application of a heuristic search technique to an optimization problem or an extensive literature survey with substantial

comparative discussion. It could take another form agreed upon by the instructor and the student. Deadlines regarding the project proposal submission and the final report will be announced later.

### **Lecture Hours**

Monday 18:00-21:00 (Balgat Campus)

### **Lecturer**

Ayyuce Aydemir Karadağ, Ph.D in Industrial Engineering

Office: L-310, aykaradag@cankaya.edu.tr

Office hour: Monday 16:00-17:00

**Course Outline:** A tentative outline is given below and the instructor reserves the right to make changes as she sees necessary.

Week	Topics
1	Introduction
2	Categorization of heuristics
3	Construction heuristics
4	Classical improving search
5	Simulated annealing
6	Tabu search
7	Genetic algorithms
8	Some other heuristics
9	Some other heuristics
10	Constraint handling
11	Multiobjective optimization
12	Variable neighborhood search
13	Evaluation of heuristic performance
14	Computational complexity of heuristics