IE 517
HEURISTIC METHODS IN OPTIMIZATION

Spring 2022

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Lecture Hrs: Thursday 16:00-17:00, Friday 11:00-13:00
Textbook: There is no textbook, but the following books are very good sources of reference:

Handbook of Metaheuristics, Second Edition, Edited by Michel Gendreau and Jean-Yves Potvin, Springer, 2010

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, Python, R, MATLAB). The students will write codes in the assignments as well as in the project for some of the heuristics learned throughout the course.

Evaluation:
Assignments (3): 45%
Project: 20%
Exam: 35%

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. Genetic Algorithms
9. Ant Colony Optimization
10. Particle Swarm Optimization
11. Lagrangean Relaxation and Lagrangean Heuristics for IP/MIP problems