

COURSE ANNOUNCEMENT FOR SPRING 2009

CE 563 SYSTEMS OPTIMIZATION USING EVOLUTIONARY ALGORITHMS

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Time: T R 11:15A - 12:30P
Schedule Number: 178999

Evolutionary algorithms are global optimization heuristics that search for optima using a process that is analogous to Darwinian natural selection. Since their inception in the 1960s, evolutionary algorithms have been used in a tremendous array of applications. The growing popularity of evolutionary algorithms stems from their ease of implementation and robust performance for difficult engineering and science problems.

This course provides a comprehensive introduction to the field of genetic and evolutionary computation (GEC). The course will emphasize state-of-the-art methods for designing and implementing evolutionary algorithms for computationally intensive engineering and science problems. Course concepts will be demonstrated using case studies drawn from the disciplines of the students enrolled.

Example Projects: <http://water.engr.psu.edu/reed/CE563.htm>

Student projects from this course often lead to publications in conference proceedings and/or journals.

Course topics will include:

- Traditional Algorithms
 - Genetic algorithms (GAs)
 - Evolutionary Strategies (ES)
 - Evolutionary Programming
 - Ant Colony Optimization
 - Particle Swarm Optimization
- Advanced Algorithms
 - Multiobjective evolutionary algorithms
 - Self Adaptive ES
 - Competent GAs (e.g., the Bayesian Optimization Algorithm)
- Theoretical guidelines for selecting GA operators and parameter values
- Design theory for parallelizing evolutionary algorithms
- Techniques for approximating computationally intensive objective functions

This course is highly interdisciplinary and does not assume a background in optimization. It is important that students have programming experience using at least one standard language (C, C++, Fortran, Fortran-90, Matlab, etc.) for project work.