

ISE 710

GENETIC ALGORITHMS in MANUFACTURING

Spring 2004

Credit Hours: 3, **Prereq:** Permission Required. **Call Number:** 03615

Description:

Foundations of Genetic Algorithms, discussion of various genetic strategies and operators, applications in constrained, combinatorial, and multi-objective optimization; scheduling, cellular manufacturing and layout.

Sessions:

TTH , 3:10pm-4:30pm, Irvine Hall 114.

Instructor:

Dr. Gürsel A. Süer, Room 274, Stocker Center.

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Office Hours:

TTH 10:00-11:30AM or by appointment.

Textbook:

Gen, M., and Cheng, R. Genetic Algorithms and Engineering Optimization. John Wiley, 2000.

Reference Book:

Gen, M., and Cheng, R. Genetic Algorithms and Engineering Design. John Wiley, 1997.

Course Objective:

To prepare students to understand the foundations of Genetic Algorithms. To help them compare different genetic strategies and operators. To discuss potential Genetic Algorithm applications particularly in Manufacturing. To provide an understanding of Genetic Algorithms as a heuristic optimization technique.

After the course, students will be able to develop GA-based solution approaches for various manufacturing problems.

Exams:

Two midterm exams and a final exam will be given. Exams will be announced at least one week in advance (tentatively scheduled for February 6 and March 6). Exams might have both theory and problem sections. Students must take the exams on the date and the time scheduled. Exceptions can only be made if the student submits a written request

before the exam with valid reasons and if it is approved by the instructor. Final exam is comprehensive.

Presentation:

Each student is required to make an article presentation on Genetic Algorithms and Manufacturing. Students will select the article they want to present but it has to be approved by the Instructor. Students are also required to distribute a copy of the presentation and the original article. ***Deadline for article selection is April 19.***

Presentations will be scheduled for mid-Early May. Students will also evaluate their classmates' presentation. Presentations involving Immune Systems, Ant Colonies, Genetic Programming and Swarm Intelligence are encouraged.

Project:

There are two options for the class project: 1) Individual Project, 2) 2-member Group Project. GA programming is “must” for a Group Project. The experimentation expected is also extensive to be able to justify 2 members in the group. On the other hand, individual project can involve either GA programming and some moderate level experimentation or extensive experimentation with an already developed GA software. ***Deadline for project topic selection is April 26. Project Progress Report is due May 17 and final report is due June 2.***

Homeworks:

Homework problems will be assigned every Thursday and they will be due in the following Tuesday.

Readings:

You are recommended to read the material before the class.

Computer Usage:

All the reports have to be typed. Programming is required from the students who have selected Group Project option. There is no requirement on the programming language to be used.

Grading:

Midterm I	17% (April 29)
Midterm II	18% (May 27)
Final Exam	25%
Homework	15%
Presentation	5%
Project	20%

Attendance Policy:

Attendance to all sessions is strongly recommended. Students are responsible for all of the material covered in the class.

Academic Misconduct:

No collaboration of any kind is permitted during any of the exams and homework. All suspected cases will be treated according to the University Policy as stated in the Catalog and the Student Handbook.

Tentative Schedule:

1. W. of March 29 Introduction, Basic Problem
2. W. of April 5 Foundations of GA, T-Ch1, R-Ch1
3. W. of April 12 Foundations of GA, T-Ch1, R-Ch1
4. W. of April 19 Constrained Optimization, R-Ch2
Article Selection
5. W. of April 26 Combinatorial Optimization, T-Ch2, R-Ch3
EXAM I
Project Topic Selection
6. W. of May 3 Multi-Objective Optimization T-Ch3
7. W. of May 10 Scheduling, T-Ch6, R-Ch5, 6, 7
Article Presentations
8. W. of May 17 Scheduling, T-Ch6, R-Ch5, 6, 7
Project Progress Report
9. W. of May 24 Cellular Manufacturing, T-Ch9
EXAM II
10. W. of May 31 Layout, R-Ch9
Final Report and Project Presentation

Final Exam is scheduled on Friday, June 11, at 2:50pm in the same classroom.