

COURSE DESCRIPTION

Department and Course Number: COMP 6610

Course Title: Artificial Intelligence Programming

Total Credits: 3

Required: No

Prerequisites: COMP 6600

Class meetings per week: 3 hours

Lab meetings per week: 0 hours

Course Coordinator: Dr. Gerry Dozier

Date Prepared: February 19, 2004

Current Catalog Description:

Design and implementation of advanced artificial intelligence techniques including expert systems, planning, logic and constraint programming, knowledge representation and heuristic search methods.

Textbooks:

Banzhaf, W., Nordin, P., Keller, R. E., and Francone, F. D. 1998. *Genetic Programming: An Introduction: On the Automatic Evolution of Computer Programs and Its Applications*. Morgan Kaufmann Publishers, Inc. ISBN 1-55860-510-X.

References:

1. Russell, S., and Norvig, P. 2003. *Artificial Intelligence: A Modern Approach*. Prentice Hall. ISBN 0-13-790395-2.
2. *Genetic Programming and Evolvable Machines Journal* (Kluwer)
3. *The IEEE Transactions on Evolutionary Computation*.
4. *Evolutionary Computation Journal* (MIT Press)
5. *Proceedings of the Genetic and Evolutionary Computation Conference* (GECCO).
6. *Proceedings of the Congress on Evolutionary Computation* (CEC).

Course Objectives:

1. Understand the complementary nature of symbolic and subsymbolic AI.
2. Be able to apply genetic and evolutionary programming in an effort to evolve programs for solving AI problems.
3. Be able to design, develop, and analyze symbolic/subsymbolic hybrid solutions.

Prerequisites by Topic:

1. A general understanding of symbolic AI.
2. A general understanding of evolutionary computation.
3. Familiarity with machine learning

Topics Covered: (specify number of hours on each)

1. Review of symbolic and subsymbolic AI (2 hours)
2. Introduction to genetic programming (3 hours)
3. Genetic programming and its relation to biology (2 hours)

4. Genetic programming and its relation to the field of evolutionary computation (2 hours)
5. Basic concepts of genetic programming (3 hours)
6. Recombination of genetic programs (2 hours)
7. Emergence (3 hours)
8. Analyzing genetic programs (3 hours)
9. A survey of genomes for genetic programming (3 hours)
10. Advanced genetic programming (3 hours)
11. Implementation issues (3 hours)
12. Genetic programming applications (14 hours)
13. Exams (2 hours)

Laboratory Projects: (specify number of weeks on each)
Three genetic programming projects, three weeks each.

Oral and Written Communication:

Students are required to do a series of assignments applying genetic programming (or genetic programming hybrids) to evolve solutions in to AI problems. The results are presented in the form of a report in IEEE conference format.

Social and Ethical Issues:

None.

Theoretical Content:

None.

Problem Analysis and Solution Design:

Students are required to apply genetic programming (or hybrids) for a variety of problems. Students will be required to apply concepts presented in order to appropriately design and analyze their solutions.