

COURSE DESCRIPTION

Department and Course Number: COMP 6600

Course Title: Artificial Intelligence

Total Credits: 3

Required: No

Prerequisites: COMP 4640 or departmental approval

Class meetings per week: 3 hours

Lab meetings per week: 0 hours

Course Coordinator: Dr. Gerry Dozier

Date Prepared: February 18, 2004

Current Catalog Description:

Introduction to intelligent agents, search, knowledge, representation and reasoning, machine learning.

Textbooks:

Russell, Stuart, and Norvig, Peter. 2003. *Artificial Intelligence: A Modern Approach, 2nd Edition*. Prentice Hall. ISBN 0-13-790395-2.

References:

1. Fogel, D. B. 2000. *Evolutionary Computation: Toward a New Philosophy of Machine Intelligence*, IEEE Press. ISBN 0-7803-5379-X.
2. Larranaga, P. and Lozano, J. A. 2002. *Estimation of Distribution Algorithms: A New Tool for Evolutionary Computation*, Kluwer Academic Publishers. ISBN 0-7923-7466-5.
3. Mitchell, T.M. 1997. *Machine Learning*, McGraw-Hill. ISBN 0-07-042807-7.

Course Objectives:

1. Be able to design subsymbolic AI techniques for solving optimization and machine learning problems.

Prerequisites by Topic:

1. Familiarity with basic tree search and hill-climbing algorithms
2. Fundamentals of algorithms

Topics Covered: (specify number of hours on each)

1. Introduction (2 hours)
2. Introduction to evolutionary computation (2 hours)
3. Genetic algorithms (5 hours)
4. Evolutionary programming (3 hours)
5. Evolution strategies (3 hours)
6. Particle swarm optimization (3 hours)
7. Estimation of distribution algorithms (3 hours)
8. Introduction to machine learning (1 hour)
9. Decision tree learning (3 hours)

10. Neural networks (4 hours)
11. Artificial immune systems (3 hours)
12. Instance-based models (4 hours)
13. Naïve Bayesian classifiers (3 hours)
14. PAC-Learning (3 hours)
15. Exams (3 hours)

Laboratory Projects: (specify number of weeks on each)

1. Modified evolutionary programming algorithm (2 weeks)
2. Genetic algorithms (2 weeks)
3. Evolutionary strategies (2 weeks)
4. Particle swarm optimization (2 weeks)

Oral and Written Communications:

Students are required to do a series of assignments comparing a number of AI methods on a test suite. The results are presented in the form of a report in IEEE conference format.

Social and Ethical Issues:

None.

Theoretical Content:

The Schema Theorem, No Free Lunch Theorem, and 1/5 Rules will be discussed in the lectures on genetic algorithms, evolutionary programming, and evolutionary strategies. Computational learning theory will be discussed in the lectures on PAC-Learning.

Problem Analysis and Solution Design:

Students implement modified versions of evolutionary and learning AI methods for solving problems as part of programming assignments.