Model Syllabus for TCSS 435
Version: March 2012
(Approved May 11, 2012)

Catalog Description

Introduction to artificial intelligence theories and techniques. Foundational material includes search, knowledge representation, machine learning, and planning. Artificial intelligence techniques applied to practical problems in areas such as control systems, optimization, scheduling, and classification. Prerequisite: a minimum grade of 2.0 in TCSS 322 and TCSS 342.

Preconditions

- Use basic counting techniques to determine the size of a problem space.
- Represent a range of computer science problems using graph and tree models.
- Select data abstractions, structures, and implementations that a developer would use in solving large problems and defend the appropriateness of these choices.
- Analyze the worst- and average-case time and space complexity of algorithms incorporating common data structures.

Course Student Learning Goals (to be added to syllabus handed out to students)

- Describe and contrast broad categories of artificial intelligence techniques, e.g., search, reasoning, machine learning.
- Formulate practical problems as computational problems and identify an appropriate solution technique.
- Implement basic artificial intelligence algorithms, e.g., breadth- and depth-first search, logical resolution, constructing a decision tree.
- Translate and incorporate simple theoretical elements into functional algorithms, e.g., gradients, entropy, perception learning rules.

CSS Degree Student Learning Outcomes that this course contributes to (to be added to syllabus handed out to students). Note that the use of the term *outcome* here instead of *goal* is simply for purposes of integration with ABET and has no other semantic import.

a. an ability to apply knowledge of computing and mathematics appropriate to the discipline;

b. an ability to analyze a problem, identify and define the computing requirements appropriate to its solution;

c. an ability to design, implement and evaluate a computer-based system, process, component, or program to meet desired needs;

UWT Student Learning Goals that this course contributes to (to be added to syllabus handed out to students)

Inquiry and Critical Thinking
Students will acquire skills and familiarity with modes of inquiry and examination from diverse disciplinary perspectives, enabling them to access, interpret, analyze, quantitatively reason, and synthesize information critically.

Recently used textbook: *Artificial Intelligence: A Modern Approach*, Russell & Norvig, 3rd edition.

Suggested Topics

- Deterministic search algorithms
    - Breadth-first, depth-first, iterative deepening depth-first, best-first, A*
- Non-deterministic/probabilistic search algorithms
    - Hill-climbing, simulated annealing, genetic algorithms
- Reasoning
    - Deductive logic, resolution
- Machine learning
    - Decision trees, neural networks, q-learning