January 9, 2006

METROPOLITAN STATE COLLEGE *of* DENVER
Office of Academic Affairs

REGULAR COURSE SYLLABUS

School of: <u>Letters, Arts, and Sciences</u>

Department: <u>Mathematical and Computer Sciences</u>

CIP Code: <u>11.9999</u>

Prefix & Course Number: <u>CS 4120</u>   **Crosslisted With*:** _____

Course Title: <u>Foundations of Artificial Intelligence</u>

Check All That Apply: Required for Major: _____   Required for Minor: _____   Specified Elective: _____
Required for Concentration: _____   Elective: <u>X</u>   Service Course: _____

Credit Hours: <u>4</u> (<u>4</u> + <u>0</u>)

Total Contact Hours per semester (assuming 15-16 week semester):

Lecture <u>60</u>   Lab <u>0</u>   Internship <u>0</u>   Practicum <u>0</u>   Other (please specify type and hours): <u>0</u>

Schedule Type(s): <u>Lecture</u>   **Grading Mode(s):** <u>Letter</u>

Variable Topics Courses (list restrictions, including the maximum number of hours that can be earned**):
_____

** NOTE: This information must be included in the course description.

Restrictions (Variable Topics Course): _____
Prerequisite(s): <u>CS 3210 with a grade of "C" or better, or permission of instructor</u>
Corequisite(s): <u>none</u>
Prerequisite(s) or Corequisite(s): _____
Banner Enforced:

   Prerequisite(s): _____
   Corequisite(s): _____
   Prerequisite(s) or Corequisite(s): _____

Catalog Course Description:
This course includes a study of the theoretical foundations of artificial intelligence, including the algorithms and techniques and programming languages used to design and implement intelligent systems. The topics covered include search strategies, resolution theorem proving, rule-based deduction, expert systems architecture, plan generating systems, analysis of languages, and machine learning. LISP and PROLOG, the most commonly used AI programming languages, will be covered and used for programming assignments.

APPROVED:
_____   1-17-06
Department Curriculum Committee   Date

_____   1/19/06
Department Chair OR Program Director   Date

_____   1/31/06
Dean OR Associate Dean   Date

_____   2/2/06
Associate VP, Academic Affairs   Date

*If crosslisted, attach completed Course Crosslisting Agreement Form

Required Reading and Other Materials will be equivalent to:
Artificial Intelligence, 3rd Edition, Winston, Addison-Wesley

Specific, *Measurable* Student Behavioral Learning Objectives:

Upon completion of this course the student should be able to
1. Identify the major application areas of AI.
2. Write a program of moderate complexity using LISP.
3. Write a program of moderate complexity using PROLOG.
4. Describe the constraints and capabilities of various notational systems used in AI.
5. Identify various strategies for choosing representations for information in intelligent systems.
6. Describe the applications of fuzzy logic in AI.
7. Discuss the processing of natural language as an AI application.
8. Discuss vision systems and how they can be applied.
9. Describe at least two different search strategies used for finding information in knowledge systems.

Detailed Outline of Course Content (Major Topics and Subtopics):

I.   THE LISP PROGRAMMING LANGUAGE (10%)
II. THE PROLOG PROGRAMMING LANGUAGE (10%)
III. REPRESENTATION OF ARTIFICIAL INTELLIGENCE DATA (25%)
    A. Constraints and Capabilities of Notational Systems
    B. Notational Structures
        1. Trees
        2. Networks
        3. Statistical Representations
        4. Frames
IV. SEARCH STRATEGIES (15%)
    A. Tree and Graph Searches
    B. Depth First and Breadth First Searches
    C. MiniMax Searches
    D. Alpha-Beta Searches
    E. Heuristics
V.   CONTROL (15%)
    A. Characteristics of Production and Procedurally Oriented Systems
    B. Parallel Versus Serial Processing in AI
    C. Review of Existing Systems
VI. COMMUNICATION AND PERCEPTION (10%)
    A. Natural Language Systems
    B. Vision Systems
    C. Tactile Systems
VII. APPLICATIONS (10%)

Evaluation of Student Performance:

1. Homework and Programming Assignments
2. Quizzes and Examinations
3. Final Examination
4. Research Papers and/or Book Reports
5. Oral Presentations
6. Significant Programming Projects

   As determined by the instructor. Written communication skills will be applied in this course.