Course: CSC 447/547 Artificial Intelligence (3 credits)
Prerequisite: CSC 300 Data Structures
Room: McLaury 304
Time: MWF 9-9:50AM
Website: http://www.mcs.sdsmt.edu/csc447

Instructor: Dr. Weiss
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Office Hours: M W Th F 10:00-10:50AM, or by appointment

SDSM&T Course Catalog Description: CSC 447/547 Artificial Intelligence (3-0) 3 credits. Prerequisite: CSC 300. Concepts in artificial intelligence: programming in languages such as Prolog or LISP; knowledge representation; search algorithms.

Prerequisites
CSC 447/547 is an upper-level undergraduate/graduate computer science course, comprising an introduction to the study of artificial intelligence. Prior exposure to AI and the Lisp programming language is not required, but you should have a strong background in computer science, including a programming course in data structures.

Textbook: Artificial Intelligence, 6th ed (Luger, 2009)

There is no need to purchase a separate Lisp textbook for this course. Instructional materials and software will be provided by your instructor.

Course Requirements
1. programming assignments (3-4) 40%
2. quizzes 5%
3. midterm exam 20%
4. final exam (May 4, 8-10AM) 35%

Topics
1. Fundamentals of Lisp programming.
2. Knowledge representations: semantic nets, inheritance, frames.
5. Game playing and minimax.
6. Inference: predicate logic, probabilistic reasoning, fuzzy logic.
7. Rule-based expert systems.
8. Advanced topics (learning, planning, intelligent agents, artificial life).
Grading
Letter grades will be assigned at the end of the semester, based on the weighted scoring system outlined above. As part of the course requirements, you must write several good-sized programs, some of which will use the Lisp programming language. These programs will take a considerable investment of your time and energy to complete successfully, and weigh heavily in the determination of your final grade. You will be allowed to work in teams of two on these assignments. To pass the course, you must successfully complete these assignments, as well as pass the exams.

There is no “late policy” in this class. All assignments must be turned in by the due date, otherwise they will not be accepted. To receive full credit, programs must not only be correct, but must adhere to good programming style guidelines (standardized formatting, meaningful identifiers, modular code, good documentation, etc.). Program grading policies are further discussed in the Programming Guidelines document on the course Website.

Objectives
The primary objective of this course is to give the student an introduction to the theory and practice of artificial intelligence. From a theoretical standpoint, we will discuss topics such as AI knowledge representations and AI problem solving approaches. From a practical standpoint, we will consider low-level problem solving approaches (such as artificial neural networks and genetic algorithms) and as well as the high-level symbolic approach based upon state space search. Knowledge representation schemes and inference mechanisms will focus upon use of predicate logic and its variations (probabilistic reasoning, fuzzy logic, etc.), discussed primarily in the context of expert systems. An important AI programming language (Lisp) will be introduced.

Outcomes
Upon completion of this course, students will obtain the following outcomes:
- basic understanding of artificial intelligence, including an appreciation of the central issues and problems of the field
- understanding of low-level AI problem solving approaches based upon artificial neural networks and genetic algorithms
- understanding of high-level AI problem solving approaches based upon state space search, including exhaustive search techniques (depth-first search and breadth-first search) and heuristic search techniques (hill climbing, A*)
- understanding of the fundamental AI approach to game playing (minimax with alpha-beta pruning)
- understanding of major AI knowledge representations (semantic nets and frames) and inference mechanisms (predicate logic, probabilistic reasoning, fuzzy logic)
- understanding of rule-based expert system design
- experience writing programs with the dominant AI language (Lisp)
- greater understanding of the software development process
- experience working in teams
Academic Integrity
Although you may exchange ideas with your classmates, you must complete these assignments by yourself (or with members of your team, in the case of group projects). In particular, it is forbidden under any circumstances whatsoever to exchange source code with your classmates. COPYING CODE IS A SERIOUS INFRINGEMENT UPON THE SDSM&T ACADEMIC INTEGRITY POLICY, AND WILL BE TREATED ACCORDINGLY. Academic integrity is further discussed in the Academic Integrity policy statement on the course Website.

Attendance
Attendance is required for all courses at SDSM&T. You are responsible for the lecture material as well as any assigned readings. Lecture material may diverge significantly from the assigned readings, so good attendance is particularly important in this class. Attendance is further discussed in the Classroom Conduct policy statement on the course Website.

Electronic Devices Policy
Tablet computers may be used to take notes in “tablet mode”. They may not be used for answering email, browsing the Web, or other non-course-related activities. No other electronic devices may be used during class time. Please be sure to turn off cell phones and pagers before class starts.

The following statements must appear on all SDSMT course syllabi:

ADA Statement
Students with special needs or requiring special accommodations should contact the instructor (Dr. John Weiss, 394-6145) and/or the campus ADA coordinator (Jolie McCoy, 394-1924) at the earliest opportunity.

Freedom in Learning Statement
Under Board of Regents and University policy, student academic performance may be evaluated solely on an academic basis, not on opinions or conduct in matters unrelated to academic standards. Students should be free to take reasoned exception to the data or views offered in any course of study and to reserve judgment about matters of opinion, but they are responsible for learning the content of any course of study for which they are enrolled. Students who believe that an academic evaluation reflects prejudiced or capricious consideration of student opinions or conduct unrelated to academic standards should contact the dean of the college which offers the class to initiate a review of the evaluation.