Catalog Data: Artificial Intelligence (3)
Introduction to the theory, research paradigms, implementation techniques, and
philosophies of artificial intelligence. Prerequisite: CMPSC 122 or equivalent.
Concurrent: CMPSC 465.

Addison-Wesley
Mind Design II: Philosophy, Psychology, Artificial Intelligence, John Haugland (Ed.),
MIT Press.

Course Objectives: To introduce the basic theories of artificial intelligence; in addition to the algorithms and
programming aspects, this course includes the philosophical, psychological, and
biological issues related to artificial intelligence.

Primary Course Outcomes:

- Analyze algorithms or computer code for correctness and efficiency.
  - This outcome is supported by detailed analysis of the algorithms used in rule-based,
    frame-based, connectionist, and genetic architectures.
  - This outcome is measured via the tests, the research paper, the presentation and the
    project development.
- Analyze the performance of software and/or hardware systems using probabilistic,
  statistical, and simulation methods.
  - This outcome is supported specifically by detailed analysis of the algorithms used in
    connectionist, and genetic architectures.
  - This outcome is measured via the tests, the research paper, the presentation and the
    project development.
- Write clear and effective technical prose.
  - This outcome is supported by the required research paper.
  - This outcome is measured via the research paper.
- Speak clearly and persuasively about technical subjects in large and/or small group
  settings, and use supporting materials effectively.
  - This outcome is supported by the required presentation.
  - This outcome is measured via the presentation.
- Demonstrate independent learning by using unfamiliar computer systems, test
  equipment, and software tools to solve technical problems.
  - This outcome is supported by the course requirement that the student develop his/her
    own programmatic solution to solve the project problem.
  - This outcome is measured via the project development.
- Be able to discuss major trends in industry and current research activities within the
  discipline.
  - This outcome is supported by the entire structure of the course, which by necessity
    deals with advanced industry and research topics.
  - This outcome is measured via the tests, the research paper, the presentation and the
    project development.
- Demonstrate an ability to work effectively in multi-disciplinary teams. The term
  multi-disciplinary is used here in the broader sense to include teams of computer
  professionals having different skills; e.g., one team member might be familiar with web
  development, whereas another might have experience with microprocessor systems.
  - This outcome is supported by the required team-based presentation.
  - This outcome is measured via the presentation.

Relationship to Undergraduate Program Outcomes: See “Primary Course Outcomes.”
Required Topics:
- Introduction to the course and AI issues (Haughland article)
- History of AI & Turing article
- Predicate calculus
- Newell & Simon article (Computer Science as Empirical Inquiry)
- Negnevitsky, Chapter 2: Rule based expert systems
- Minsky article (Frame-based systems)
- Negnevitsky, Chapter 5: Frame based expert systems
- Dreyfus article & Searle article (Counter-arguments to AI)
- Rumelhart article (Connectionist architecture)
- Negnevitsky, Chapter 6: Artificial Neural Networks
- Fodor & Pylyshyn article (A defense of good-old fashioned-AI (GOFAI))
- Negnevitsky, Chapter 7: Evolutionary systems
- Van Gelder article (Dynamical systems)
- Project presentations
- Project competition

Class Format: Lecture: 2 classes per week, 75 minutes per class.
Laboratory: Students use a computing lab (unsupervised) as needed to complete assignments and projects.

Professional Component: CMPSCI 442 is an elective course for seniors who are interested in the field of artificial intelligence. Software development using a modern programming language is a required element in the course. Students complete a major semester project which includes a research paper, a conference-like presentation, and an extensive program that implements one of the AI methods studied in the course.

Evaluation:

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