CS 480 Spring 2022
Introduction to Artificial Intelligence

Course information and Syllabus

1. Meeting times [ONLINE ONLY until January 24, 2022]

Lecture: Tuesdays/Thursdays 01:50 PM CST - 03:05 PM CST in PH 131

2. Instructor

Name: Jacek Dzikowski
e-mail: dzikjac@iit.edu (please add [CS480 S2022] to the subject line)
Office: Stuart Building, Room SB 217E
Office hours: TBD or by appointment (limited: please email me to schedule)

3. Exam dates:

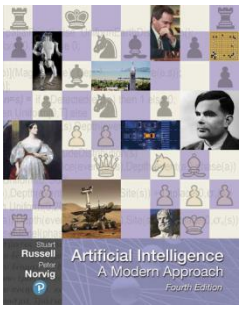
Midterm: February 24, 2022 during lecture time
Final: April 28, 2022 during lecture time

4. Teaching assistants

Name	E-mail	Office hours
Amit Nikam	anikam@hawk.iit.edu	TBD

5. Textbook

Title: Artificial Intelligence: A Modern Approach (4th Edition)
Authors: Stuart Russell and Peter Norvig
ISBN (print): 9780134610993
Publisher: Pearson
Published: April 28, 2020



6. Programming environment

Python 3.x will be the programming language for this course.

7. Current catalog description

Introduction to computational methods for intelligent control of autonomous agents, and the use of programming paradigms that support development of flexible and reactive systems. These include heuristic search, knowledge representation, constraint satisfaction, probabilistic reasoning, decision-theoretic control, and sensor interpretation. Particular focus will be places on real-world application of the material.

PREREQUISITE(S): (CS 331 and MATH 474*) or (CS 401 and CS 402) or (CS 331 and MATH 475*), An asterisk (*) designates a course which may be taken concurrently.
LECTURE: 3 LAB: 0 CREDITS: 3
SATISFIES: CS Technical Elective (T)

8. Topics

- Introduction [Chapter 1]
- Intelligent Agents [Chapter 2]
- Solving Problems by Searching [Chapter 3]
- Adversarial Search and Games [Chapter 5]
- Constraint Satisfaction Problems [Chapter 6]
- Logical Agents [Chapter 7]
- First-order Logic [Chapter 8]
- Inference in First-Order Logic [Chapter 9]
- Quantifying Uncertainty [Chapter 12]
- Probabilistic Reasoning [Chapter 13]
- Making Simple Decisions [Chapter 16]
- Making Complex Decisions [Chapter 17]
- Learning From Examples [Chapter 19]
- Deep Learning [Chapter 21]
- Reinforcement Learning [Chapter 22]
- Philosophy, Ethics, and Safety of AI [Chapter 27]
- The Future of AI [Chapter 28]

9. CS 480 course outcomes

Upon completion of this course students should be able to:

- Define Artificial Intelligence
- Describe and critique the Turing test
- Develop PEAS (Performance, Evaluation, Actuators, Sensors) descriptions of artificially intelligent agents
- Compare and contrast search algorithms using the following criteria: completeness, optimality, time complexity, and space complexity.
- Implement and evaluate search algorithms to create a sequence of actions that take an agent from an initial state to a goal state.
- Create admissible heuristics for the A* algorithm.
- Implement mini-max and alpha-beta pruning algorithms for playing two-player games.

- Implement backtracking search for solving constraint satisfaction algorithms.
- Apply the resolution algorithm to propositional logic and first-order logic knowledge bases.
- Apply variable elimination algorithm to compute probabilities in a given Bayesian network.
- Describe probabilistic independencies in a given Bayesian network.
- Apply the maximum expected utility principle to identify the optimal action in a given influence diagram.
- Compute the value of information for various nodes of an influence diagram.
- Explain the differences among the three main styles of machine learning: supervised, unsupervised, and reinforcement.
- Apply value iteration and policy iteration algorithms to a problem described as a Markov decision process.
- Develop, apply, and evaluate deep learning models for an image classification task.
- Explain the ethical considerations of deploying an AI system.

10. CS 480 program outcomes

- Analyze a complex computing problem and to apply principles of computing and other relevant disciplines to identify solutions.
- Design, implement, and evaluate a computing-based solution to meet a given set of computing requirements in the context of the program's discipline.

11. Lectures

Attendance is expected, but not required (**for in-person students**) at all lectures. Lectures consist of the class working together on new concepts. Pre-reading of assigned reading and regular class attendance is required and students are expected to be prepared and to actively participate in class activities. See Blackboard for copies of all lecture materials.

12. Assignments and grading

Written assignments:	20%
Programming assignments:	25%
Quizzes and lecture Participation:	5%
Exam 1 (Midterm):	20%
Exam 2 (Final):	30%

A: 90-100 B: 80-89 C: 70-79 D: 60-69 E: 0-59

Note: NO LATE ASSIGNMENTS ACCEPTED! NO EXTRA CREDIT!

13. Ethics

Any behavior on any homework, project or exam that could be considered copying or cheating will result in an immediate zero on the assignment for all parties involved and will be reported to academichonesty@iit.edu . Please see the IIT Code of Academic Honesty:

https://web.iit.edu/student-affairs/handbook/fine-print/code-academic-honesty

Reasonable accommodations will be made for students with documented disabilities. In order to receive accommodations, students must obtain a letter of accommodation from the Center for Disability Resources. The Center for Disability Resources (CDR) is located at 3424 S. State Street - 1C3-2 , 312 567.5744 or disabilities@iit.edu

Communication is critical to the success and satisfaction of the learning experience. Please take advantage of myself, my posted office hours, and e-mail to communicate any class issues with me.