COMP341 Introduction to Artificial Intelligence – Spring 2024

Class
Times: Tuesdays and Thursdays between 16.00 and 17:10
Location: SOSB08
Website: http://blackboard.ku.edu.tr
E-mail policy: Students are responsible for checking their account frequently and consistently

Instructor
Barış Akgün
Office Hours: To be announced on the first week (by appointment is always possible)
E-mail: baakgun@ku.edu.tr

Teaching Assistants
For communication, prefer the TA e-mail, comp341-tas-group@ku.edu.tr Their personal e-mails are given for specific questions.

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Prerequisites
ENGR200 or equivalent

Description
An undergraduate course to introduce the foundations of modern artificial intelligence, geared towards building systems and agents that can reason, learn, and adapt to solve problems. Students will be exposed to search, constraint satisfaction, logic, uncertainty, machine learning and Markov decision processes with examples from vision, robotics, language, and games.

Course Objectives
1. To provide a broad survey of Artificial Intelligence (AI)
2. To prepare students for the advanced courses related to AI
3. To have students develop design and programming skills to create AI systems and agents

Learning Outcomes
1. Understand basic principles of agent-based AI and computational decision making
2. Analyze a problem, use the right representation, formulation, and the method to solve it
3. Know about models and their use in solving AI methods
4. Know the basic concepts of Machine Learning (ML) and how it relates to AI
5. Understand sources of uncertainty, representing uncertainty and decision making under uncertainty

Textbooks

Required book:

- Peter Norvig and Stuart J. Russell, *Artificial Intelligence: A Modern Approach* (either 3rd ed. or 4th ed.) – do not worry if it is not available.

If you want to learn more about advance topics or get a different perspective:

- Poole and Mackworth, *Artificial Intelligence: Foundations of Computational Agents*
- Sutton and Barto, *Reinforcement Learning: An Introduction*
- Koller and Friedman, *Probabilistic Graphical Models: Principles and Techniques*
- Brachman and Levesque, *Knowledge Representation and Reasoning*
- Hastie, Tibshirani, and Friedman, *The Elements of Statistical Learning*

Teaching and Assessment Methods

The class will be taught mainly through lectures. Students are highly encouraged to participate, ask, and answer questions. There will be both written and programming homeworks. The class includes three midterm exams and one final exam. The grading will be:

Type	Description	Grade %	Min. to Pass %
Homework	Programming and Written Exercises[1]	20	8
Midterm Exam	Best two out of three written exams[2]	40	15
Final Exam	Comprehensive written exam	40	15
Total		**100**	**40**[3]

1. Homeworks will have the different weights
2. No midterm makeups!
3. The minimum weighted total to pass is greater on purpose

Minimum Passing Grade

You need to collect the minimum percentage grades from each assessment method as given in the above table to pass this course. If you did not collect the minimum for the homework and the midterm exams, you will not be eligible for the remedial exam.

Late Policy

All homeworks will be submitted online through the blackboard system. The submission time will be taken as the **server** received time. Late homeworks will be graded as the instructor sees fit.

Make-up and Early Final Policy

There are no makeup exams for midterms. You need to have a legitimate excuse to be able to take the final makeup exam. The eligibility will be decided by the instructor. The timing of the makeups will be determined by the instructor. There will be no makeups for the makeup exam.

You need to contact the instructor before week 10 to schedule an early final. There will be no makeups for the early final.

Code of Conduct
The students are expected to abide by the student and classroom codes of conduct of KU. There will be no tolerance for cheating, plagiarism, unruliness, and all other unethical and disruptive behavior. Any violation will be dealt with according to university policies.

Large Language Model (LLM) use Policy
The instructor sees LLMs (e.g., ChatGPT) as useful tools and thinks students should learn to use them, just like a calculator. As such, the students are allowed to use them for writing their reports or coding without any loss in grades. In such a case, the students are required to cite their use of such models. Failure to do so will be treated as plagiarism. Note, that these models are prone to "hallucinations" and will occasionally give incorrect results. Any mistakes made by these models will be treated as your mistakes. If you are going to go down this path, you must know the topics to spot the issues and have some experience in "prompt engineering".

Topics
The instructor reserves the right to change the following schedule, such as changing the amount of time spent on subjects or removing them.

Subject	**Details**	**Book Chapter**
Introduction	Definition and history of AI, Agents, Basic concepts	1,2
Search	Problem definition, Uninformed Search, Informed Search, Local Search, Adversarial Search	3,4,6
Constraint Satisfaction	Problem Definition, Solution Methods (search based and local search based)	5
Uncertainty	Probability Primer, Representing Uncertainty, Bayesian Networks: Representation, Independence, and Inference, Decision Networks, Probabilistic Reasoning over time: Hidden Markov Models	12,13,14,15
Machine Learning	Introduction to ML, basic concepts, several ML methods, ml pipelines	19, 21
Decision Making	Markov Processes, Markov Decision Processes (MDPs), Solving MDPs, Reinforcement Learning (RL), RL Solution Methods	16, 23
Logic (Optional)	Concepts of Logics, Knowledge Representation, Propositional Logic, First Order Logic	7,8,9

Catalog Description
Introduction to artificial intelligence concepts; agent-based thinking; uninformed and informed search; constraint satisfaction; knowledge representation; logic; introduction to machine learning; representing uncertainty; Markov decision processes; examples from vision, robotics, language, and games.