Course Syllabus: Artificial Intelligence & Expert Systems

Code: END3971
Title: Artificial Intelligence & Expert Systems
School: Yildiz Technical University
Department: Department of Industrial Engineering
Instructor: Assist. Prof. Dr. Ali Karaşan
School Year/Semester: Spring (2023-2024)

1. Course Description

This course provides students with an overview of artificial intelligence & expert systems preliminaries, focusing on heuristics and forecasting algorithms together with concepts involving uncertainties in the mathematical formulations to make inferences for expert systems. Through it, explanatory examples of different techniques for different cases will be presented. Also, quantitative methods and their results will be discussed. Moreover, Python, PROLOG, and MATLAB softwares may also be introduced for the selected quantitative methods.

2. Course Objectives

Upon completion of this course, the students are able to:

- Understand the basic principles and definitions of artificial intelligence.
- Understand the basic principle of artificial intelligence applications in a wide range of areas.
- Learn about fundamental methods in artificial intelligence.
- Gain knowledge of the basic principles of expert systems.
- Gain the ability of artificial intelligence and expert systems how to apply in industrial engineering applications.

3. Course Outline and Time Frame

Syllabus	
Week	**Subject**
1	**Course Overview** Introduction to the Course Introducing the Course Objectives Course Outline and Timeframe Classroom Policies Grading System **Definitions – Artificial Intelligence**
2	**Agents**
3	**Problem-Solving**

Syllabus	
Week	**Subject**
4	**Sorting Algorithms** ❖ Selection Sort ❖ Quick Sort ❖ Merge Sort ❖ Bubble Sort ❖ Insertion Sort ❖ Heap Sort
5	**Searching Algorithms - Uninformed** ❖ Breadth-first search ❖ Uniform-cost search ❖ Depth-first search ❖ Depth-limited search ❖ Iterative deepening search ❖ Bi-directional search
6	**Searching Algorithms - Informed** ❖ Greedy Best First Search ❖ A* Search ❖ Uniform-cost search
7	**Regression**
8	**Midterm I**
9	**Fuzzy Sets Theory – Basic Concepts**
10	**Fuzzy Sets Theory – Operations**
11	**Expert Systems**
12	**Midterm II**
13	**Matlab – Mamdani's Fuzzy Inference System**
14	**Prolog – Expert System**
15	**Final**

4. Classroom Policies

4.1. Attendance: **At least %70** regular class attendance is **required.**

4.2. Late hand-in: Due dates will be set at the assignment time and are published on the question sheet. Assignments and reports must be submitted on time. Late submittal (without prior instructor approval) will incur the following grade adjustments: -5% per day (including weekends) until the 7th day after the deadline. After that point, you will receive 0 Points for that assignment.

4.3. Academic Honesty: Plagiarism, cheating, and facilitating dishonesty. Occurrences of any of those practices will be dealt with according to university policy. Each group/individual (as applicable) requires an original write-up of homework for a given assignment or report. The homework will be checked for plagiarism and similarity via Turnitin.

4.4. Classroom Behavior: It is not permitted to consume food or drink (**unless water**) in the classroom. Students are strongly encouraged to turn off or mute all cell phones or other electronic communication devices during class.

4.5. Make-ups: Make-up activities may be given only to students who have missed or are unable to complete or undertake a significant class requirement due to:

- Participation in an official school activity (proving it with an assignment letter from the related school department),
- Illness, which involves hospitalization or contagious diseases (proving it with sick leave report).

They will be submitted to the department secretary.

5. Grading System

The final grade of the course will result from adding the following elements:

Evaluation activity	Weight
Mid-term	25%
Quiz (× #)	10%
Final exam	40%

Consultation

For matters related to course activities, students may send e-mails to the following e-mail address:

akarasan@yildiz.edu.tr

Ali Karaşan, Ph.D.