



**Course Code:** AIN2001

**Course Name:** Principles of Artificial Intelligence

## SYLLABUS<sup>1</sup>

### Instructor

Office : D531  
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Office Hours: : Tuesday 16.00 – 17.00  
CV (link) : <https://onermustafaumit.github.io>

### Course Information

Period : Fall  
Time : Section-1: Friday 13.30 – 16.20, Section-2: Tuesday 12.30 – 15.20  
Course Credit / ECTS : 3 / 6  
Classroom : Section-1: D302, Section-2: D506  
Mode of Delivery: : Face to Face  
Course type : Must  
Course ECTS Page Link : [https://akts.bau.edu.tr/bilgipaketi/index/ders/ders\\_id/46994/program\\_kodu/04142101/h//s/3/st/M/In/en](https://akts.bau.edu.tr/bilgipaketi/index/ders/ders_id/46994/program_kodu/04142101/h//s/3/st/M/In/en)

### Course Objectives

The course aims to present the fundamentals and techniques of Artificial Intelligence. The first part of the course begins with an overview of intelligent agents and agent architectures. We then introduce basic search techniques for problem solving and planning. Adversarial search and the principals of game theory are given. Knowledge representation and logical formalisms using propositional and first order logic are explained. Planning in partial observable environments is introduced. In the second part, we first give a summary of probability theory for Artificial Intelligence applications. Then, machine learning algorithms including supervised and unsupervised learning are discussed. Deep learning is briefly explained. We discuss the applications of AI including computer vision, robotics, and NLP. Finally, we give the impacts of AI in society and ethics.

### Course Learning Outcomes

The students who have succeeded in this course will be able to:

1. Have the fundamental knowledge on principles of artificial intelligence
2. Formulate a state space description of a problem and to develop an algorithm for the problem.
3. Compare and evaluate the most common models for knowledge representation and planning.
4. Implement some of the basic algorithms for supervised learning and unsupervised learning.
5. Develop problem solving skills on various artificial intelligence problems and implement related applications.

### Contribution of the Course to the Program

This course will provide students with theoretical and practical background in artificial intelligence engineering. It will help students use theoretical and applied knowledge to identify, define, formulate, and solve artificial

<sup>1</sup> It is essential that the syllabus announced at the beginning of the term is not changed except when necessary. When a requirement occurs, the curriculum can be changed by the lecturer of the course by notifying this situation in writing or verbally beforehand. It is the student's responsibility to follow the current program.

intelligence engineering problems using modern techniques and tools. Besides, it will contribute to students' skills and abilities in analyzing a system by designing and conducting experiments including data collection, analysis, and interpretation.

## **Course Structure**

The course consists of two main components: learning foundations of artificial intelligence and gaining hands-on experience in implementing models. We will learn the foundations via in-class discussions. Each lecture will have some resources that will provide us with the details of the topic. Usually, we will follow the textbook as our reference, and related chapters of the book for each week are indicated in the weekly schedule. Additional resources, if any, will be made available before the class. You are strongly urged to go through them before the in-class discussion. We will gain hands-on experience by implementing the concepts and building models using Python as an integral part of the classes.

## **Course Policies**

### ***Communication Channels and Methods:***

All the communication (announcements, discussions, submissions, etc.) will go through Itslearning course site.

- You are strongly encouraged to post your questions and comments in the course's discussion forums. If you have any personal issues that you cannot post in the course discussion forum, you can contact your instructor via email.
- You must submit all your work via Itslearning course site. Hard copy submissions and submissions via email will not be accepted.

### ***Usage of Digital Tools:***

You are requested **NOT to use** your electronic devices (phone, tablet, laptop etc.) in the class.

### ***Attendance:***

Attendance is not compulsory, yet highly recommended. There is a strong correlation between class attendance and success in the course since it provides a unique experience of interaction and discussion, which promotes learning. Class attendance and contributing to the discussions will be awarded up to a 5% bonus.

### ***Disabled Student Support:***

You can contact me directly regarding the issues that may be an obstacle for you (vision, hearing, etc.). In addition to this, there is a Disabled Student Unit to minimize the difficulties that our disabled students will encounter due to their disabilities and to eliminate the obstacles. You should contact this unit regarding your situation.

### ***Oral and Written Communication Ethics:***

You have to express yourself respectfully in your communication with everyone in the class. In addition, you are responsible for maintaining this respect in discussions and correspondence on the online platform.

### ***Privacy and Copyright:***

In accordance with the Personal Data Protection Law, it is strictly forbidden to register the participants (students and instructors) during the course.

## **Course Resources**

### ***Textbook:***

Stuart Russell, Peter Norvig, "Artificial Intelligence: A Modern Approach" (4th Edition), Pearson, ISBN-10: 0-13-461099-7, 2021.

### ***Additional Resources:***

Additional resources will be announced/made available via Itslearning course site.

## Grading and Evaluation

Assignment	Description	Scoring	Weight (%)
<b>Weekly Quizzes</b>	<ul style="list-style-type: none"> <li>• There will be 14 weekly quizzes, weighted equally.</li> <li>• Your best 12 out of 14 quizzes will be retained.</li> <li>• Quizzes will generally (but not always) be released on Friday and due 72 hours later.</li> <li>• Each quiz may cover the topics of previous weeks and the next week.</li> <li>• Quizzes may contain multiple-choice questions, True/False questions, written questions, or programming questions. If there are any written questions, solutions must be in PDF format and typeset in LaTeX.               <ul style="list-style-type: none"> <li>○ Overleaf, an online LaTeX editor, is strongly recommended in writing solutions: <a href="https://www.overleaf.com">https://www.overleaf.com</a></li> </ul> </li> </ul>	100	24
<b>Programming Assignments</b>	<ul style="list-style-type: none"> <li>• There will be four programming assignments, weighted equally.</li> <li>• Programming parts will be auto graded using scripts. You must follow the submission guidelines; otherwise, you may get zero.</li> <li>• Programming assignments may also include written parts. Solutions to these parts must be in PDF format and typeset in LaTeX.</li> <li>• Selected solutions will be invited to present in the class.</li> </ul>	100	16
<b>Midterm Exam</b>	There will be one midterm exam covering all subjects in the first 8 weeks. <b>It will be given face to face in the classroom during Week-9.</b>	100	20
<b>Final Exam</b>	There will be one final exam covering all subjects. <b>It will be given face to face in the classroom during final exams.</b> A student with “NA” will <b>NOT</b> be allowed to take the final exam.	100	40
<b>Contribution Bonus</b>	<ul style="list-style-type: none"> <li>• Attending the lectures and contributing to the discussions will be awarded a 5% bonus.</li> <li>• The bonus will be prorated based on the number of weeks a student contributed to the lecture.</li> <li>• The followings during a lecture are accepted as a contribution:               <ul style="list-style-type: none"> <li>○ Asking at least one question</li> <li>○ Commenting on a subject at least once</li> </ul> </li> </ul>	100	5
<b>TOTAL</b>			105

### *Late Submissions:*

You are given a total of 7 free late (calendar) days. You can use your late days only in quizzes and programming assignments. Each late day is bound to only one assignment. For example, if you submit one quiz and one programming assignment 3 hours after the deadline, you will be charged for 2 late days.

Once you run out of late days, your late submissions will be penalized 20% per late day. However, submissions will not be accepted more than 3 days after the deadline.

## Course Calendar

Resources in this table refer to the textbook chapters. Apart from that, we will have additional resources specific to each topic. Additional resources will be announced/made available via Itslearning course site.

Week	Course Topic	Resources	Assignments
W1	A review of AI concepts Rational agents	Chapter-1 and Chapter-2	Quiz1
W2	Solving problems by searching • Search algorithms (uniformed and informed)	Chapter-3	Quiz2
W3	Solving problems by searching • Constraint satisfaction problems	Chapter-6	Quiz3
W4	Games • Adversarial search • Game theory	Chapter-5	Quiz4 Assignment1
W5	Logical agents • Propositional logic • First order logic and inference	Chapter-7, Chapter-8, and Chapter-9	Quiz5
W6	Planning	Chapter-11	Quiz6
W7	Probabilistic reasoning • Basic probability concepts • Inference using joint distributions	Chapter-12	Quiz7 Assignment2
W8	Probabilistic reasoning • Naïve Bayes' model • Bayesian networks	Chapter-12 and Chapter-13	Quiz8
W9	Machine learning	Chapter-19	Quiz9 Midterm
W10	Neural networks	Chapter-21	Quiz10 Assignment3
W11	Deep learning • Convolutional neural networks	Chapter-21 and Chapter-25	Quiz11
W12	Deep learning • Recurrent neural networks	Chapter-21, Chapter- 23, and Chapter-24	Quiz12 Assignment4
W13	Reinforcement learning	Chapter-22 and Chapter-26	Quiz13
W14	AI, ethics, and society	Chapter-27 and Chapter-28	Quiz14

## Matters Needing Attention

- Read all weekly course materials before coming to the class.
- Take the quizzes to review the topics and get prepared for in-class discussions.
- Attend the lectures actively every week.
- Participate in and contribute to in-class activities and discussions.
- Please be careful about attendance requirement to be eligible to take the final exam.

## Academic Integrity, Cheating and Plagiarism

Academic integrity is a serious matter in this course. Any violation will be reported to the university's highest levels and maximum punishment will be argued for.

You are encouraged to form study groups to discuss quizzes and programming assignments. However, you must write down your own solutions without referring to the notes taken during discussions. It is a violation of academic integrity to copy, refer to or look at written solutions and code from another student or any other sources. It is also a violation of academic integrity to post your solutions and code online. Besides, you should write down the names of your collaborators in your submissions.

You are expected to comply with the University Policy on Academic Integrity and Plagiarism. Violations of the university policy can result in severe penalties, including failing this course and possible expulsion from Bahçeşehir University. If you have any questions about this policy and any work you are doing in the course, please feel free to contact your instructor for help.

ARTICLE 25 – (1) In case it is doubled that a student cheats or attempts to cheat, commits plagiarism or similar violations defined in the applicable disciplinary regulation in any exam, assignment or other assessment activities, a disciplinary proceeding is brought against the student. Such activity is not assessed during the proceedings. A student who is found guilty is assigned zero point in addition to the disciplinary punishment. If the student is found innocent because of disciplinary proceeding, the exam taken by the student shall be assessment or a make-up exam or activity is provided.

[You can access Bahçeşehir University and Higher Education Institution Regulations by clicking this sentence.](#)

**Prepared by:** Mustafa Ümit ÖNER

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