The course is intended for master students in the Master of Engineering Information Technologist Program.

Artificial intelligence (AI) is an important research field that focuses on the modelling of intelligent human behaviour on a machine. The aim is to design and make a computer that can learn, reason, and solve problems autonomously, ie in such a way that the actions result reflects the result of the activities of human thinking. Even though artificial intelligence has been studied for quite a long time now, it is still a challenge to make a computer that is as intelligent as a human. There are some very specific fields where there are some success already, for example the Deep Blue system defeated the world chess champion, yet in other cases as well as in general, there are a lot of work in front of us.

After the course, students will

- know the main areas of AI,
- have a glance into the current trends of AI,
- know the results achieved of AI,
- be able to typify AI problems,
- know what sort of techniques to use to solve specific AI problems.

The Course includes:

- Lectures including some theoretical issues of AI.
- Presentations by the Students.

The course is based on continuous discussions; examine of case studies, actual topics, conventional and non-conventional situations. The students' verbal feedback is required.

Methods:

- Lectures about the fields of artificial intelligence.
- Discussion of event cases, situations.
- A short oral presentation by the Students at a fixed time during the semester.
- Tests by the Students at a fixed time during the semester.

Artificial intelligence include and involve a lot of fields such as problem representation, knowledge representation, combinatorial search, problem solving, expert systems, reasoning, planning, natural language understanding, computer vision, machine learning, genetic programming, neural nets, robotics and so on. Obviously, these field have a continuous effect on AI back and forth and also on each other; problem solving itself should involve learning and its methods are useful for reasoning; while computer vision can be solved using methods developed in the field of pattern recognition.

In this course, the students will get familiar with the most fundamental knowledge for understanding artificial intelligence. Some basic search algorithms for problem solving will be introduced together with knowledge representation, reasoning and neural nets.

week	Topic	Compulsory reading; page number (from … to …)
1.	Introduction.	
2.	General concept and definitions of artificial intelligence.	[1] 1-26
3.	Problem representation. State space representations.	[1] 27-43
4.	Search algorithms 1	[1] 44-73
5.	Search algorithms 2.	[1] 74-101
6.	Graph theory.	[1] 102-129
7.	Problem reduction. Decomposition.	[1] 130-145
8.	Hypergraphs. Games.	[1] 146-157
9.	Partial evaluation algorithms.	[1] 158-173
10.	P-graphs.	[3] 1973-1988, [4] S313-S320
11.	Genetic algorithms. Agents. Neural nets. Knowledge representation.	[1] 174-228
12.	Presentation by students	
13.	Test	

Presentations by the students.

Students receive a topic to present. The theme should be worked on at home, independently and the results should be presented in front of everybody at a specific date. Presentations should be 12-30 minutes long (min. 10 slides). Presentations should include one or more details highlighted. Presentations should be detailed and specific, at the engineering level. The presentations will be distributed among the students. The topics are subjects of the exam. After the presentations, questions can be addressed to the presenter. The presentation slides should be sent electronically before week 10.

In case the presentation is missed or it is not successfully performed, it is neglected. Presentations can only be completed during the Study Period. Should the presentation be missed or neglected, the Student cannot enter the Exam Period, ie it is grounds for failing the course.

Tests by the students. All tests are in writing. Tests are evaluated by points. Tests cover all or some of the main topics of the Course. No external aids are allowed to be used. In case the performance is below 40%, the test is said to be failed. In case the test is missed it is calculated as 0 points. No external aids are allowed to be used. Should the average of the tests be below 40%, the Student cannot enter the Exam Period, ie it is grounds for failing the course.

Attendance:

According to the university code.

An attendance sheet is used.

Mid-term assessments, performance evaluation and their weighting as a pre-requisite for taking the final exam

Type	Assessment
1. **_Presentations by the students_**	_acceptable / not acceptable_
1. **_Test_**	_acceptable above 40%_

Requirements for the end-of-semester signature:

The mid-term performance accounts for 100 %.

Presentations by the students. Students receive a topic to present. The theme should be worked on at home, independently and the results should be presented in front of everybody at a specific date. Presentations should be 12-30 minutes long (min. 10 slides). Presentations should include one or more details highlighted. Presentations should be detailed and specific, at the engineering level. The presentations will be distributed among the students. The topics are subjects of the exam. After the presentations, questions can be addressed to the presenter. The presentation slides should be sent electronically before week 10. In case the presentation is missed or it is not successfully performed, it is neglected. Presentations can only be completed during the Study Period. Should the presentation be missed or neglected, the Student cannot enter the Exam Period, ie it is grounds for failing the course.

Tests by the students. All tests are in writing. Tests are evaluated by points. Tests cover all or some of the main topics of the Course. No external aids are allowed to be used. In case the performance is below 40%, the test is said to be failed. In case the test is missed it is calculated as 0 points. No external aids are allowed to be used. Should the average of the tests be below 40%, the Student cannot enter the Exam Period, ie it is grounds for failing the course.

Re-takes for the end-of-semester signature

According to the general Code of Studies and Examinations. All the tests and the records to be submitted can be repeated/improved each at the end of the semester, and home assignments, i.e. the presentation can be repeated/improved in the first week of the examination period latest.

Exam:

No external aids are allowed to be used. The exam is successful if the result is minimum 40 %.

Exams of the Students can be done during the Exam Period. The exam will test the Students' knowledge and problem-solving skills on all preceding lectures of the Course as well as the Presentations held by other Students'. The exam has a written part, it is approximately 60 mins. It covers all or some of the main topics of the Course. In case the performance is below 40%, the exam is said to be failed. In case the achievement is above 40%, then the oral part of the exam is entered automatically.

Evaluation + Grading

The mid-term performance accounts for **_0_** %, the performance at the exam accounts for **_100_** % in the calculation of the final grade.

Calculation of the final grade based on aggregate performance in percentage.

Course grade	Performance in %
excellent (5)	85 % …
good (4)	70 % ... 85 %
satisfactory (3)	55 % ... 70 %
pass (2)	40 % ... 55 %
fail (1)	below 40 %

Required:

[1.] Ercsey Zsolt és Achs Ágnes (2019) *ARTIFICIAL INTELLIGENCE MESTERSÉGES INTELLIGENCIA EGYETEMI OKTATÁSI SEGÉDLET*, ISBN 978-963-429-195-4.

[2.] Storcz, Tamás (2019) *Intelligens rendszerek*. Pécs, Magyarország : Pollack Press ISBN: 9789634295570

[3.] F. Friedler, K. Tarján, Y.W. Huang, L.T. Fan (1992) Graph-theoretic approach to process synthesis: axioms and theorems. Chemical Engineering Science, Volume 47, Issue 8, 1992, Pages 1973-1988, ISSN 0009-2509, https://doi.org/10.1016/0009-2509(92)80315-4

[4.] F. Friedler, K. Tarjan, Y.W. Huang, L.T. Fan (1992) Combinatorial algorithms for process synthesis. Computers & Chemical Engineering, Volume 16, Supplement 1, 1992, Pages S313-S320, ISSN 0098-1354, https://doi.org/10.1016/S0098-1354(09)80037-9.

[5.] Stuart Russell, Peter Norvig (2005) Artificial Intelligence. A Modern Approach. Prentice Hall. 2003. ISBN 0137903952. (In Hungarian: Mesterséges intelligencia modern megközelítésben. Panem. 2005. ISBN 963 545 411 2.)

recommended literature and availability

[6.] Alison Cawsey (1998) The Essence of Artificial Intelligence. Prentice Hall. 1998. ISBN-13: 978-0135717790 (In Hungarian: Mesterséges intelligencia, alapismeretek. Panem. 2002. ISBN 963 545 285 3.)

[7.] Mesterséges intelligencia (1999). Szerkesztette: Futó Iván. Aula Kiadó. 1999. ISBN 963 9078 99 9.