



Artificial Intelligence

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SHORT COURSE DESCRIPTION

This course aims to teach the fundamentals of artificial intelligence starting with the concepts of intelligence, rationality and intelligent agents. Next, it will probe into problem solving, introducing the notion of search by drawing examples from puzzles and games amongst others. Machine learning, a fast-growing subfield of AI will also be covered focusing on major areas such as computer vision and natural language processing. The impact and ethics of AI on our society today surrounding real-world applications such as robotics, medicine, autonomous vehicles and social networks will be major discussion points. This is an introductory-level course and would be suitable for students without any computing background or early-stage computing-related majors interested to pursue AI-related courses in the future. Students will be given assignments that do not require any programming.

READING MATERIALS

All teaching material (slides and notes) will be provided during the course. Most material will be taken from the following textbook:

1. Artificial Intelligence: A Modern Approach. Stuart Russell and Peter Norvig, 2011/2020. (3rd/4th ed.). Pearson

COURSE REQUIREMENTS AND GRADING

Students are not required to have any background in AI, computer science or maths. No prior knowledge of programming is required. The core search algorithms will be taught in conceptual notation to promote analytical thinking and reasoning. Other algorithms will be covered broadly, rather than requiring deep mathematical or statistical knowledge.

Learning outcomes:

- To know the concepts of artificial intelligence, rationality and agents
- To demonstrate an understanding of basic search strategies & machine learning technologies
- To demonstrate an appreciation of AI applications and their impact on various domains from classical games to more critical ones such as medicine and security
- To have awareness and thoughts on ethical and philosophical issues related to the rapid development of AI today

Attendance & Passing Criteria

All ISS classes are pass/fail based on the student academic achievement evaluated by grades on a scale of 100 points (grade of 60 or above is Pass). SKKU regulations require students to attend at least 80% of all classes so you may miss at most 2 classes without providing a valid reason.

N.B: In coursework, students should always acknowledge the source where a particular piece of information is obtained (e.g. books, scientific papers, credible websites), if it is not their own. Failure to do so could lead to suspicion of plagiarism. Grounds for failing the class include failure to reach at least 60% in grades, failure to show up for 80% of classes and/or academic dishonesty.

Grade Breakdown:

20% Class attendance and participation
50% Assignments, Quizzes & Discussions
10% Research Paper
20% Final debate

COURSE SCHEDULE

– WEEK I (Search) –

Monday (1 July)

What is AI: history, rationality, strong & weak AI goals

Tuesday (2 July)

Intelligent agents & search: PEAS, initial states, operators, goal test, path cost function

Wednesday (3 July)

Uninformed & informed search: depth-first, breadth-first, heuristics, uniform-cost search, greedy search, A*

Thursday (4 June)

Local search: hill-climbing, simulated annealing, genetic algorithm

– WEEK II (Learning) –

Monday (8 July)

Search algorithms review and discussion

Tuesday (9 July)

Machine learning I: supervised learning: linear regression, logistic regression (classification)

Wednesday (10 July)

Machine learning II: unsupervised learning, clustering, overfitting, testing and validation

Thursday (11 July)

Machine learning review and discussion

– WEEK III (Deep Learning and NLP) –

Monday (15 July)

Deep learning 1: neural networks basics, CNNs

Tuesday (16 July)

Deep Learning 2: image recognition, GANs & deepfakes

Wednesday (17 July)

Natural Language Processing: history, RNNs, Transformers

Thursday (18 July)

NLP Applications: machine translation, language modelling, sentiment analysis, recommendation systems, chatbots

– WEEK IV (Ethics & Impact) –

Monday (22 July)

LLM and Generative AI models
Philosophical & ethical issues

Tuesday (23 July)

Applications: Robotics (autonomous vehicles, humanoid robots), healthcare (medical imaging, drug discovery), games (DeepBlue, AlphaGo, generative agents)

Wednesday (24 July)

Final Debate