



Sungkyunkwan University (SKKU) International Summer Semester (ISS) 2022

## Introduction to AI: Thinking Analytically about Creative Machines

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### SHORT COURSE DESCRIPTION

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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

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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. (3<sup>rd</sup>/4<sup>th</sup> ed.). Prentice Hall Press, Upper Saddle River, NJ, USA. [[3<sup>rd</sup> ed.](#)][[4<sup>th</sup> ed.](#)]

### COURSE REQUIREMENTS AND GRADING

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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:

30% Class attendance and participation  
40% Assignments, Quizzes & Discussions  
30% Final presentation

## COURSE SCHEDULE

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		<b>– WEEK I –</b>
<u>Monday (27 June)</u>	Search	What is AI: history, rationality, strong & weak AI goals
<u>Tuesday (28 June)</u>		Intelligent agents & search: PEAS, initial states, operators, goal test, path cost function
<u>Wednesday (29 June)</u>		Uninformed & informed search: depth-first, breadth-first, heuristics, uniform-cost search, greedy search, A*
<u>Thursday (30 June)</u>		Local search: hill-climbing, simulated annealing, genetic algorithm
		<b>– WEEK II –</b>
<u>Monday (4 July)</u>	Learning	Search algorithms review and discussion
<u>Tuesday (5 July)</u>		Machine learning I: supervised learning: linear regression, logistic regression (classification)
<u>Wednesday (6 July)</u>		Machine learning II: unsupervised learning, clustering, overfitting, testing and validation
<u>Thursday (7 July)</u>		Machine learning review and discussion
		<b>– WEEK III –</b>
<u>Monday (11 July)</u>	NLP & Ethics	Deep learning 1: neural networks basics, CNNs
<u>Tuesday (12 July)</u>		Deep Learning 2: image recognition, GANs & deepfakes
<u>Wednesday (13 July)</u>		Natural Language Processing: history, RNNs, Transformers
<u>Thursday (14 July)</u>		NLP Applications: machine translation, language modelling, sentiment analysis, recommendation systems, chatbots
<u>Friday (15 July)</u>		Philosophical & ethical issues
		<b>– WEEK IV –</b>
<u>Monday (18 July)</u>	Impact	Applications: Robotics (autonomous vehicles, humanoid robots), healthcare (medical imaging, drug discovery), games (DeepBlue, AlphaGo)
<u>Tuesday (19 July)</u>		Final Project Presentations & Conclusions