

# **COMP2211 Exploring Artificial Intelligence**

## Course Logistics

Huiru Xiao

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The Hong Kong University of Science and Technology

# Course Instructor

Huiru Xiao:

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- Office hours: To be confirmed

# Teaching Assistants

## Full-time Instructional Assistant (IA)

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## Postgraduate Teaching Assistants

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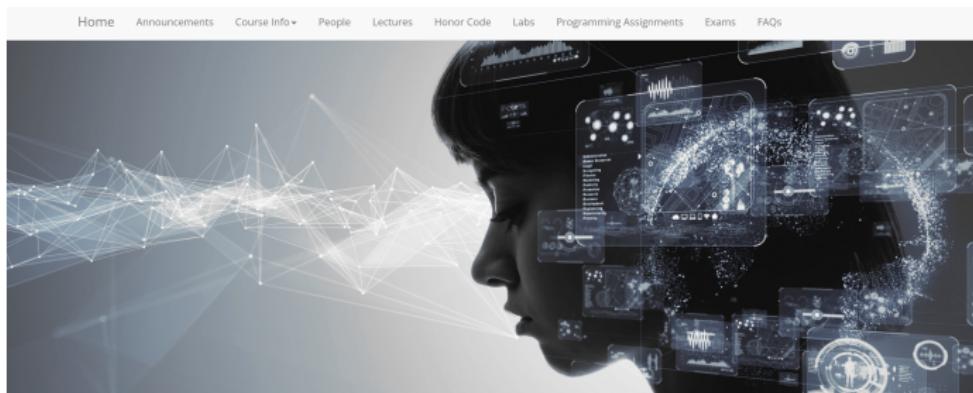
- E-mail: lwubf@connect.ust.hk

## Undergraduate Teaching Assistants

- LI, Ho Yin
- TAN, Rickson Caleb
- ZHANG, Liren

# Course Website

- Official website (For Lecture Notes, Lab Materials, ...):  
<https://course.cse.ust.hk/comp2211>



COMP 2211 Exploring Artificial Intelligence

- Canvas site (For Grades and Discussion via Piazza)  
<https://canvas.ust.hk/courses/64950>

# Course Schedule

## Lectures

- **Section L1**

Tuesday/Thursday, 10:30am - 11:50am,  
Rm4619 (Lift 31-32)

- **Section L2**

Tuesday/Thursday, 3pm - 4:20pm,  
Rm2502 (Lift 25-26)

## Labs

- **Section LA1**

Monday, 4:30pm - 6:20pm,  
Rm5403 (Lift 17-18)

- **Section LA2**

Tuesday, 12noon - 1:50pm,  
LTG (Lift 25-26)

# Labs

## Note

- There will be no labs in the first two teaching week (Sep 1 & 8 for LA1, Sep 2 & 9 for LA2).
- The first lab starts in Week 3 (Sep 15 for LA1, Sep 16 for LA2).
- In Week 2, we will hold an **additional lecture class** to develop your AI programming skills (Time: 7pm-9pm on Sep 9, Tue; Venue: LTB).



# Labs

- The first **60 minutes** will be dedicated to a **tutorial**. Your TAs will demonstrate how to apply what you have learned in class to solve meaningful problems using Python. These techniques will be helpful for your lab work.
- The next **50 minutes** will be for a **Q&A session**. You are welcome to ask questions about the lab exercises, and programming assignments during this time.

Attendance will be taken during the **first 20-minute** of the lab.



# Important Notes about the Labs

- You must attend the registered lab session. If you need to go to a different lab session, seek prior approval from your course instructor.
  - Each lab attendance will be awarded 1 point.
  - Since there are a total of 9 lab meetings requiring lab attendance, the maximum attendance point you can earn is 9.
- 10 lab exercises will be given to consolidate your understanding of course materials.
  - Only 5 lab exercises will be graded. Tentatively, they are Lab 2, Lab 4, Lab 6, Lab 8, & Lab 9.
  - 10 points for each graded lab and only the best 4 will count towards the final grade. So, the maximum is 40 points.
  - To get points/partial points for the lab, you are required to
    - Finish the requirement/program and submit it to ZINC (automatic grading system) on or before the due date. No late lab assignment will be accepted.

Your final total lab points = ((attendance points + best 4 lab scores from ZINC)/49) \* 10

- Although we do not expect you to finish the lab exercises before you attend the lab, we expect you to have read the lab's materials and understand what you are required to do.

# Course Description

- The course consists of, per week
  - 3 hours of lectures
  - 2 hours of lab
- and it gives 3 credits for successful completion of the course.
- Prerequisites
  - COMP 1021 Introduction to Computer Science OR
  - COMP 1029P Python Programming Bridging Course
- Exclusions: more advanced/higher level AI-related or machine learning-related courses.
  - COMP 3211 Fundamentals of Artificial Intelligence
  - COMP 4211 Machine Learning
  - COMP 4221 Introduction to Natural Language Processing
  - COMP 4331 Data Mining
  - COMP 4332 Big Data Mining and Management
  - COMP 4421 Image Processing
  - COMP 4471 Deep Learning in Computer Vision

- Exclusions (Continued)

- COMP 4901K Machine Learning for Natural Language Processing
- COMP 4901L Foundations of Computer Vision
- ELEC 4130 Machine Learning on Images
- ELEC 4230 Deep Learning for Natural Language Processing
- IDPO 4110 Practical Machine Learning
- ISOM 3360 Data Mining for Business Analytics
- MATH 4336 Introduction to Mathematics of Image Processing
- MATH 4432 Statistical Machine Learning
- RMBI 4310 Advanced Data Mining for Risk Management and Business Intelligence
- COMP 5211 Advanced Artificial Intelligence
- COMP 5212 Machine Learning
- COMP 5213 Introduction to Bayesian Networks
- COMP 5221 Natural Language Processing
- COMP 5222 Statistical Learning Models for Text and Graph Data
- COMP 5223 Perception and Information Processing for Robotics
- COMP 5331 Knowledge Discovery in Databases
- COMP 5421 Computer Vision
- ...

# Course Objectives/Aims

- This course aims to give a **gentle introduction to the basic elements of artificial intelligence (AI)** through understanding examples from various applications and **hands-on experimentation using AI software tools**.
- In addition to **covering the technical aspect of AI** through such topics as search and problem solving, knowledge representation, probabilistic reasoning, machine learning, computer vision and image processing, speech and language processing, and robotics, this course will also **study the historical perspective, social and ethical implications, as well as potential and limitations of AI**.

## In short

COMP 2211 gives a gentle introduction to the basic elements of AI. It also studies the historical, social and ethical implications, as well as potential and limitations of AI.

# Topics Covered

- Brief history of Artificial Intelligence
- Search and problem solving
- Knowledge representation
- Probabilistic reasoning
- Machine learning
- Computer vision and image processing
- Speech and language processing
- Robotics
- Social and ethical implications of AI
- Potential and limitations

# Keyword Syllabus (More Exact Topics)

- Brief History of Artificial Intelligence
- Naive Bayes
- K-Nearest Neighbour
- K-Means Clustering
- Perceptron and Multi-Layer Perceptron
- Fundamentals of Image Processing
- Convolutional Neural Networks
- Minimax and Alpha-beta Pruning
- Artificial Intelligence Ethics
- Reinforcement Learning (Self-study)

# Intended Learning Outcomes

On successful completion of this course, you are expected to be able to:

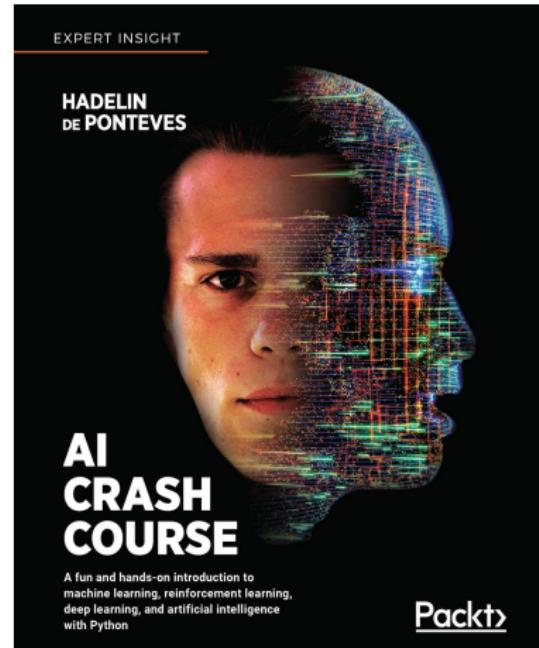
- ① Demonstrate understanding of the historical perspective and development of artificial intelligence (AI)
- ② Demonstrate understanding of the basic elements of AI thinking
- ③ Demonstrate proficiency in applying basic principles and techniques of AI and using AI software tools to solve problems in a range of applications
- ④ Demonstrate awareness of the social and ethical implications as well as potential and limitations of AI

# Reference Textbooks

- **AI Crash Course:** A fun and hands-on introduction to machine learning, reinforcement learning, deep learning, and artificial intelligence with Python, Hadelin de Ponteves, Packt Publishing , c2019, First Edition.
- ISBN: 9781838645359 (360 pages)
- HKUST library provides online access to this textbook

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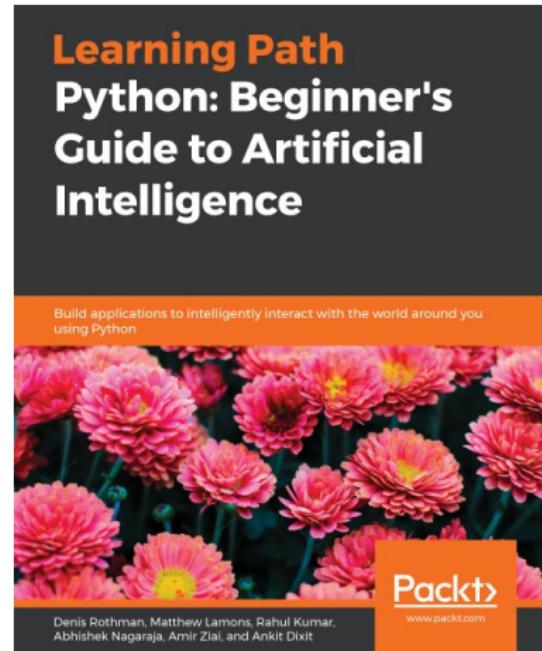
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Learn from friendly, plain English explanations and practical activities

# Reference Textbooks

- Python: Beginner's Guide to Artificial Intelligence: Build applications to intelligently interact with the world around you using Python, Denis Rothman, Matthew Lamons, Rahul Kumar, Abhishek Nagaraja, Amir Ziai, and Ankit Dixit, Packt Publishing, c2018, First Edition.
- ISBN: 9781789957327 (676 pages)



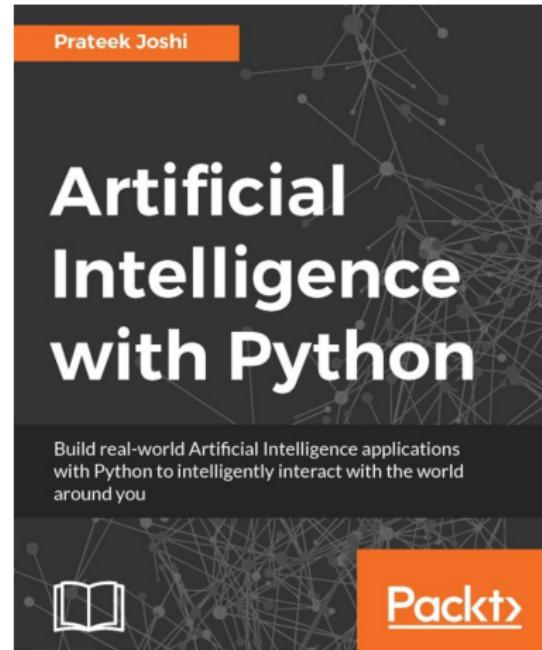
Design and implement machine intelligence using real-world AI-based examples

# Reference Textbooks

- Artificial intelligence with Python:  
Build real-world Artificial Intelligence applications with Python to intelligently interact with the world around you, Prateek Joshi, Packt Publishing, c2017, First Edition.
- ISBN: 9781786464392 (446 pages)
- HKUST library provides online access to this textbook

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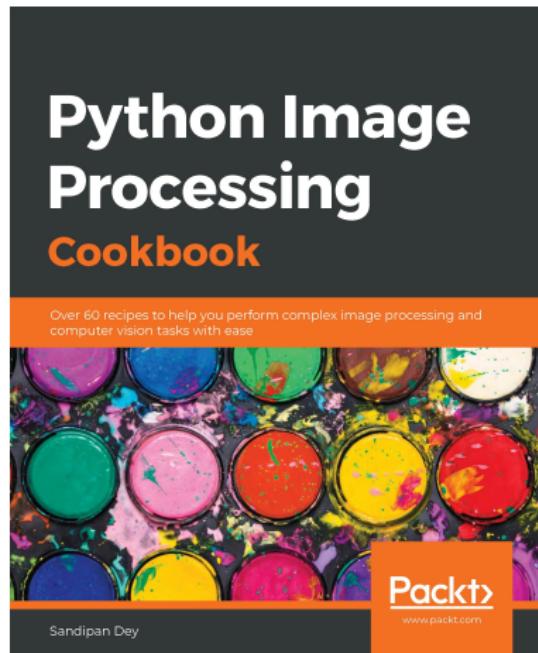
Work through simple yet insightful examples that will get you up and running with Artificial Intelligence in no time

# Reference Textbooks

- Python Image Processing  
*Cookbook*, Sandipan Dey, Packt Publishing, c2020, First Edition.
- ISBN: 9781789537147 (438 pages)
- HKUST library provides online access to this textbook

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Provide solutions addressing the challenges and complex tasks of image processing

# Other Materials

- 12 self-tests  
(one for each topic)
- Past exam papers  
(Midterm and Final Exam - Spring 2022)



# Tentative Teaching Schedule

Topic	# Lectures	Cumulative # Lectures
Course Logistics & Introduction	2	2
Advanced Python for AI	4.5	6.5
Naive Bayes	2	8.5
K-Nearest Neighbor	2	10.5
K-Means Clustering	1.5	12
Perceptron	2	14
Multi-layer Perceptron	4.5	18.5
Fundamentals of Image Processing	2.5	21
Convolution Neural Networks	2.5	23.5
Minimax and Alpha-beta Pruning	2.5	26
AI Ethics	1	27

- The schedule is subject to change according to the teaching and learning progress!
- Additional Classes will be offered to develop your AI programming skills in Week 2.
  - Sep 9, 2025 (Tuesday), 7PM - 9PM, Venue: LTB.

# Python Version and Software

- We use [Python 3.11.13](#) as the programming standard for this course
- Integrated Development Environment (IDE)
  - [Google Colaboratory](#)

The screenshot shows the Google Colaboratory interface. At the top, there's a navigation bar with 'File', 'Edit', 'View', 'Insert', 'Runtime', 'Tools', and 'Help' menus. To the right of the menu are 'Share' and 'Settings' icons. Below the menu is a toolbar with '+ Code', '+ Text', and 'Copy to Drive' buttons. A 'Connect' dropdown and an 'Editing' button are also present. On the left, a 'Table of contents' sidebar lists sections: 'Getting started', 'Data science', 'Machine learning', 'More Resources', 'Featured examples', and 'Section'. The main content area displays a 'Welcome to Colab!' message with a video thumbnail titled '3 Cool Google Colab Features' featuring a man speaking.

# Grading Scheme

- Coursework (40%)
  - 10 Lab Exercises (10%),  
5 of them will be graded and only  
the **best 4 will count** towards the  
final grade
  - 2 Individual Programming  
Assignments (30%)
- Examination (60%)
  - Mid-term Exam (20%)
  - Final Exam (40%)

Coursework (40%) + Examination (60%) = Total (100%)



## Note

No make-up exams will be given unless under very unusual circumstances, e.g., sickness, with letters of proof

# Academic Integrity

- Honesty and integrity are central to academic work. You must observe and uphold the highest standards of academic integrity and honesty in all the work (lab exercises, programming assignments, exams, etc.) you do in this course.
- We deal with cheating cases seriously and the maximum penalty is a FAIL in the course plus additional disciplinary actions from the CSE Department as well as from the University.
- Both the copier(s) and the copiee will be punished, and the penalty will be more than just a zero mark in your assignments/exams.
- Links:
  - University's Academic Honor Code:  
[https://registry.hkust.edu.hk/resource-library/  
academic-honor-code-and-academic-integrity](https://registry.hkust.edu.hk/resource-library/academic-honor-code-and-academic-integrity)
  - University's Investigation & Procedures for Academic Misconduct:  
[https://  
registry.hkust.edu.hk/resource-library/academic-integrity](https://registry.hkust.edu.hk/resource-library/academic-integrity)

# Academic Integrity

- We will use a software to check your codes with others' program, and even with previous assignments. The tool is hard to beat. The suspected cases will be further studied by the instructors and the TAs.



# If you are not sure what is considered plagiarism

- **DO NOT** use generative artificial intelligence tools like ChatGPT or similar software for your labs and programming assignments.
- **DO NOT** copy program codes from another student/person.
- **DO NOT** look at the actual program codes of another student.
- **DO NOT** share actual program codes with other students/people (by paper, emails, blogs, FB, Google Doc, etc.).
- **DO NOT** give your program codes to other students who ask for it, and do not ask for a copy of their code either.
- **DO NOT** post your program codes anywhere online.
- **DO NOT** leave your finished/unfinished program codes unattended.
- While we encourage discussion among students, you have to write codes on your own.
- During discussion, you **SHOULD NOT** go to the details such that everyone will end up in the same code.

The list is by no means exhaustive, and you will need to use your own discretion.

# How Hard Should I Work?

- Some people say that a 3-unit course takes 8 hours/week.
- Guideline:
  - Pre-study (1 hour): what topic/materials will the coming lecture be covering?
  - Attend class (3 hours): The A+ students tell you that they pay FULL attention in class and try to understand everything in the class so that it is easy to review the class materials.
  - Attend labs (1 hour)
  - Post-study (2 hours): Re-reading the notes, book reading.



# Acknowledgments

- The lecture notes are developed based on Dr. Desmond Tsoi's lecture slides.