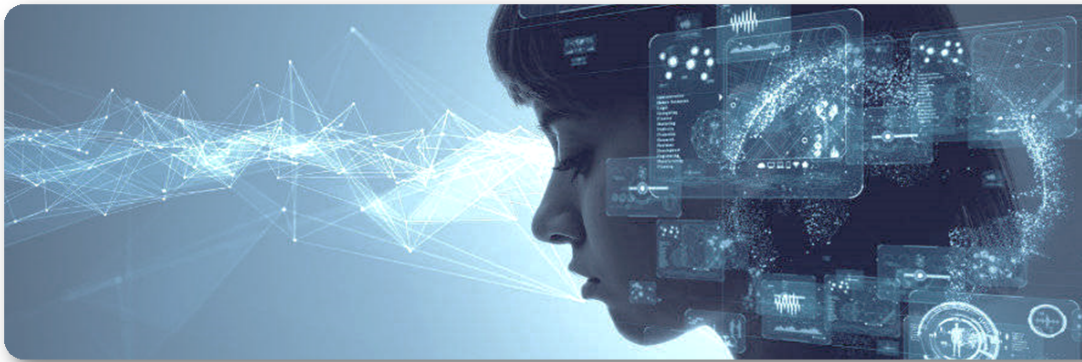


COMP 2211 Exploring Artificial Intelligence

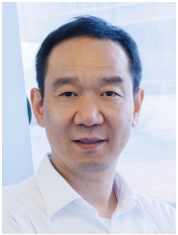
Course Logistics

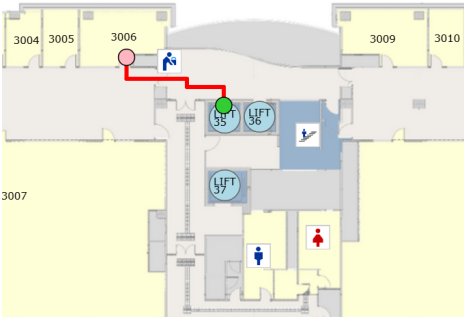
Prof. Song Guo, Dr. Desmond Tsoi & Dr. Huiru Xiao

Department of Computer Science & Engineering
The Hong Kong University of Science and Technology, Hong Kong SAR, China

Instructor

Prof. Song GUO





- Personal website: http://www.cse.ust.hk/∼songguo
- E-mail: songguo@ust.hk
- Office: CYT Rm 3006A
- Work phone: 2358-8833
- Office hours: To be confirmed

Teaching Assistants

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  - Office: Rm 3543
  - E-mail: briantwc@ust.hk

Postgraduate Teaching Assistants (TAs)

- CHEN, Yiwei (Jackson)
  - Office: Rm 1001-07 (RPG Research Hub)
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- GEEVE.
  - Office: RPG Research Hub
  - E-mail: geeve@connect.ust.hk
- HUANG, Runxi
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  - E-mail: dliuak@connect.ust.hk
- SON, Moo Hyun (Kyle)
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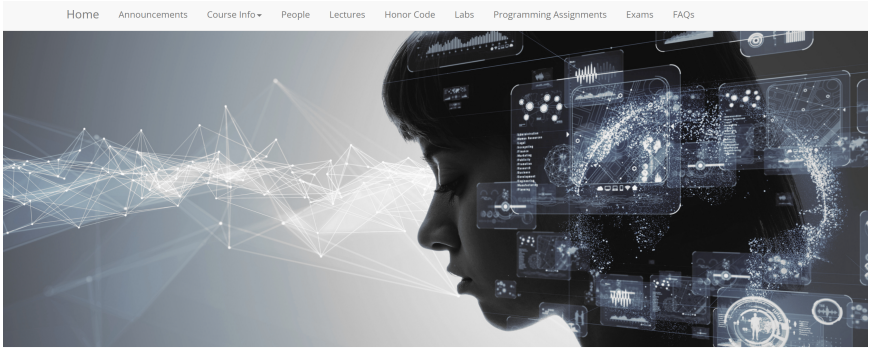
  - Office: Rm 1007 (RPG Research Hub)
  - E-mail: fzhuah@connect.ust.hk

Undergraduate Teaching Assistants (TAs)

- DING, Yuyi (Tony)
- SO, Chun Hin (William)
- XIE, Zeyuan

Course Website

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

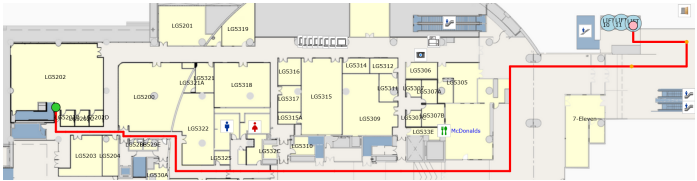


- Canvas site (For Grades and Discussion via Piazza)
  `https://canvas.ust.hk/courses/60961`

Lectures

- Section L1 (Dr. TSOI, Desmond)
  Monday, 01:30pm - 02:50pm,
  Friday, 09:00am - 10:20am,
  G010, CYT Bldg (Lift 35-36)
- Section L2 (Prof. GUO Song)
  Monday/Wednesday, 09:00am - 10:20am,
  LG 5202 (Lift 12)
- Section L3 (Dr. XIAO, Huiru)
  Tuesday/Thursday, 10:30am - 11:50am,
  Rm 2407 (Lift 17-18)

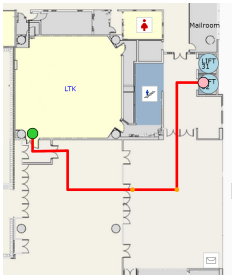




Labs

- Section LA1
  Fri, 03:00pm - 04:50am, LTK (Lift 31-32)
- Section LA2
  Fri, 10:30am - 12:20pm, Rm 2504 (Lift 25-26)
- Section LA3
  Wed, 04:00pm - 05:50pm, LTK (Lift 31-32)

Check the lab page in the course website: `https://course.cse.ust.hk/comp2211/`



Labs

Note

- There will be no labs in the first two teaching weeks (February 5, 7, 12 & 14).
- The first lab starts in Week 3 (February 19 & 21).

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 8 lab meetings, the maximum attendance point you can earn is 8.
- 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)/48) * 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.
- The lab materials will be made available approximately three days prior to the lab session.
- Holiday policy.

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 (24 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:

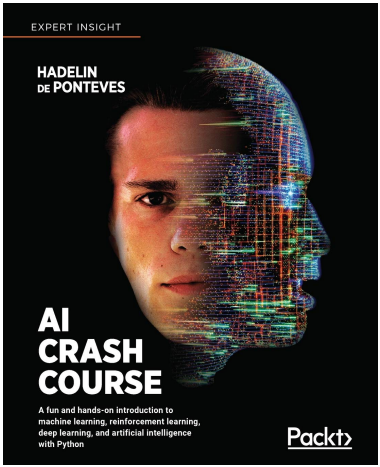
1. Demonstrate understanding of the historical perspective and development of artificial intelligence (AI)
2. Demonstrate understanding of the basic elements of AI thinking
3. Demonstrate proficiency in applying basic principles and techniques of AI and using AI software tools to solve problems in a 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

URL

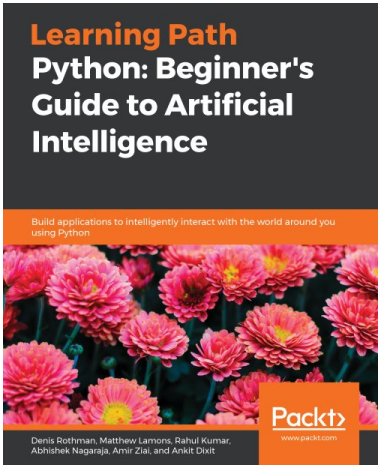
`https://lbdiscover.ust.hk/bib/99102881204303412`



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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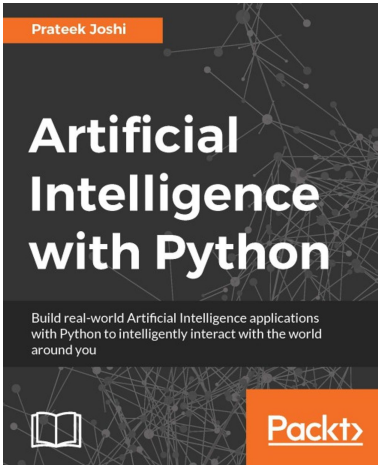
`https://lbdiscover.ust.hk/bib/991012884447803412`



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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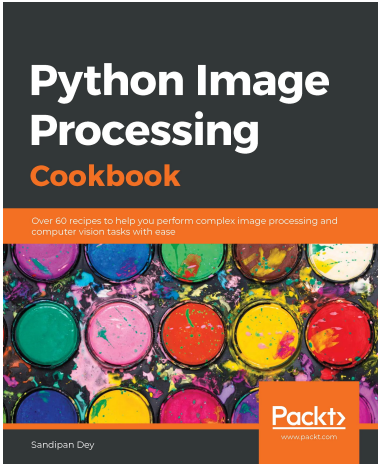
`https://lbdiscover.hkust.edu.hk/bib/991012888737803412`



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 to Artificial Intelligence	2	2
Advanced Python for AI	4.5	6.5
Naive Bayes	2	8.5
K-Nearest Neighbours	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

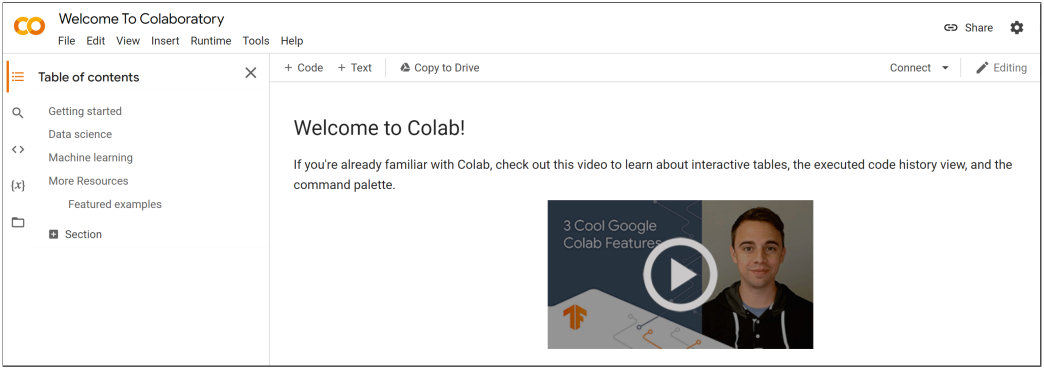
- The schedule is subject to change according to the teaching and learning progress!
- Makeup classes may be offered
  - L1: April 18 (Friday): Good Friday
  - L1, L2: April 21 (Monday): Easter Monday
  - L3: May 1 (Thursday): Labor Day
  - L1, L2: May 5 (Monday): The Birthday of the Buddha

Additional Classes

- To develop your AI programming skills, two additional lecture classes will be offered in mixed-mode (both in a physical venue and on Zoom) during lab time.
  (No attendance will be taken!)
  - L1:
    - Date: February 7 & 14, 2025 (Friday)
    - Time: 03:00PM - 04:50PM
    - Venue: LTK + Zoom
  - L2:
    - Date: February 7 & 14, 2025 (Friday)
    - Time: 10:30AM - 12:20PM
    - Venue: Rm 2504 + Zoom
  - L3:
    - Date: February 5 & 12, 2025 (Wednesday)
    - Time: 04:00PM - 05:50PM
    - Venue: LTK + Zoom

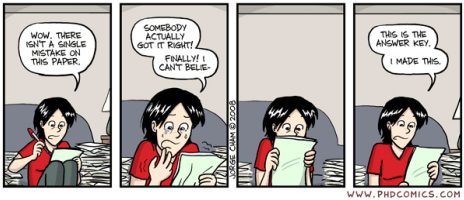
Python Version and Software

- We use Python 3.11.11 as the programming standard for this course
- Integrated Development Environment (IDE)
  - Google Colaboratory



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%)



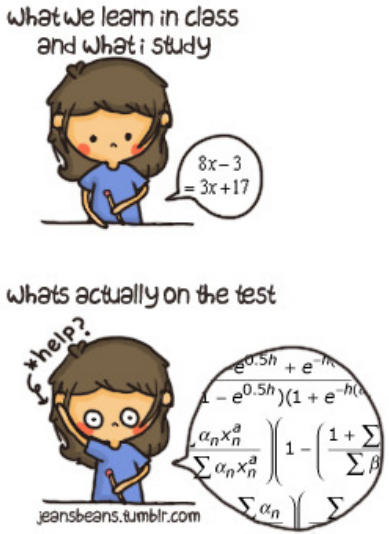
Note

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

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

Midterm Exam

- The midterm examination is scheduled on April 12, 2025 (Saturday), 2pm - 4pm
- Venue: LTA & LTE
- Coverage: To be confirmed



Academic Dishonesty

- 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 Honor code:
    `http://ugadmin.ust.hk/integrity/student-1.html`
  - University's Penalties for Cheating:
    `http://ugadmin.ust.hk/integrity/student-5.html`

Academic Dishonesty (Cont'd)

- 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.

That's all!

Any question?

Welcome Back!