

The Hong Kong University of Science and Technology (Guangzhou)

UG Course Syllabus Template

[Course Title] : Introduction to Artificial Intelligence

[Course Code]: AIAA2205

[No. of Credits]: 3

[Any pre-/co-requisites] [(C ++ Programming) AND (Data Structure and Algorithm Design)]

It is highly recommended to attend C ++ Programming before participating in this course !

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Course Description

The objective of this course is to present an overview of the principles and practices of AI and to address complex real-world problems. The course is designed to develop a basic understanding of problem solving, search, theorem proving, knowledge representation, reasoning and planning methods of AI; to develop practical applications in audio, vision, language, and so on. This course will introduce AI tools and techniques. Topics include foundations (search, knowledge representation, machine learning and natural language understanding) and applications (data mining, decision support systems, adaptive web sites).

Intended Learning Outcomes (ILOs)

By the end of this course, students should be able to:

1. Demonstrate a comprehension of advanced knowledge of Artificial Intelligence.
2. Demonstrate a comprehension of various applications of Artificial Intelligence.
3. Recognize the limitations of current methods of Artificial Intelligence.
4. Apply programming and Artificial Intelligence skills.
5. Develop a broad interest in the Artificial Intelligence and connect the knowledge to their major study.
6. Communicate effectively in written format to convey scientific knowledge and the application of modern technologies.

Assessment and Grading

This course will be assessed using criterion-referencing and grades will not be assigned using a curve. Detailed rubrics for each assignment are provided below, outlining the criteria used for evaluation.

Assessments:

[List specific assessed tasks, exams, quizzes, their weightage, and due dates; perhaps, add a summary table as below, to precede the details for each assessment.]

Assessment Task	Contribution to Overall Course grade (%)	Due date
Homework 1	30%	dd/mm/yyyy *
Homework 2	30%	dd/mm/yyyy *
Final Project	40%	dd/mm/yyyy

* Assessment marks for individual assessed tasks will be released within two weeks of the due date.

Mapping of Course ILOs to Assessment Tasks

Assessed Task	Mapped ILOs	Explanation
Homework 1	ILO1, ILO3, ILO4, ILO6	Students will understand the principles of classic AI algorithms that solve real-world problems. They will also analyze the usefulness of the DNN methods. Alignment with ILOs: ILO 1: By coding Deep learning methods, students demonstrate comprehension of foundational AI principles. ILO 3: Through theoretical analysis, students identify limitations (e.g., gradient vanishing). ILO 4: Hands-on programming tasks (Python) develop applied AI skills, and ILO 6: A written report evaluates their solution's efficiency and societal impact, enhancing technical communication.
Homework 2	ILO2, ILO4, ILO5, ILO6	Students will build a practical AI application (e.g., a simple NLP chatbot, image classifier using CNNs, or automatic speech recognition). They must integrate at least two AI techniques and test their system on real datasets (e.g., MNIST or LibriSpeech). Alignment with ILOs: ILO 2: Developing applications in vision/NLP showcases diverse AI use cases. ILO 4: Programming tasks (TensorFlow/PyTorch) reinforce coding proficiency. ILO 5: Students connect AI to different application scenarios (e.g., text to video generation, NLP or speech processing). ILO 6: A technical report documents system design, results, and interdisciplinary relevance.
Final Project	ILO1, ILO2, ILO3, ILO5, ILO6	Students will select and analyze one research papers from a pool. It may contain papers with theoretical advancements (e.g., transformer limitations, neurosymbolic AI) or applied innovations (e.g., AlphaFold, GPT-4). They will present their paper by making slides and submit a written report . Alignment with ILOs: ILO 1: Critiquing cutting-edge papers deepens understanding of advanced AI concepts. ILO 2/ILO 3: Comparing theoretical vs. applied work highlights both AI's capabilities and current bottlenecks (e.g., data bias in LLMs). ILO 5: Relating papers to their disciplines (e.g., healthcare majors analyzing AI diagnostics) bridges AI and specialized fields. ILO 6: Structured academic writing (abstract, lit review, critical evaluation) hovers written communication of technical content.

Grading Rubrics

1. Final group project will be graded based on the presentation (20%) and the report (20%). Presentation will be graded according to the evaluation and feedback from the audiences (the instructor, and GTAs) from clarity and accuracy of the presentation. The report will be graded according to the completeness, clarity, accuracy, and correctness in format.

Final Grade Descriptors:

Grades	Short Description	Elaboration on subject grading description
A	Excellent Performance	Students earning an A demonstrate exceptional mastery of AI principles and applications. They exhibit deep comprehension of teaching contents (ILO1). Their homework submissions showcase innovative problem-solving in real-world scenarios (e.g., implementing heuristic search or basic ML models) with flawless code execution (ILO4). The paper reading project demonstrates critical analysis of cutting-edge AI research, synthesizing connections across domains like computer vision and speech processing (ILO2-3). Written work is exceptionally clear, logically structured, and reflects advanced ability to contextualize AI concepts within their major field (ILO5-6).
B	Good Performance	Students receiving a B show strong understanding of core AI methodologies. Homework solutions address problems competently but may lack optimization sophistication in areas like theorem proving or planning algorithms. Practical implementations function correctly but might miss edge-case handling. The paper reading project identifies key contributions in assigned readings while showing limited ability to critique methodological limitations (ILO3). Written communication effectively conveys technical content though arguments occasionally lack depth when connecting AI applications to broader disciplines.
C	Satisfactory Performance	Work at the C level meets basic requirements without exceeding expectations. Homework submissions solve standard problems through formulaic approaches but struggle with complex cases requiring adaptive reasoning techniques. Programming tasks achieve partial functionality despite inefficiencies or minor errors. Paper analyses summarize content adequately but display superficial engagement with ethical implications or technical constraints (ILO3/6). Writing demonstrates rudimentary grasp of terminology but lacks nuanced connections between theory/practice.
D	Marginal Pass	D-grade work shows minimal competency thresholds met inconsistently. Homework contains fundamental misunderstandings about foundational topics (ILO1/4). Project reports describe papers superficially without demonstrating meaningful synthesis; written explanations contain persistent grammatical errors that obscure technical meaning (ILO6).
F	Fail	An F indicates failure to meet course standards due to significant gaps: Homework shows inability to implement basic algorithms; No evidence of understanding the basic content of ML and DNNs in assessments; Paper reading project merely paraphrase abstracts without analytical depth; Systematic failures in

		applying programming/AI tools; Written submissions lack coherent structure/science communication skills.
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Course AI Policy

Three-always principles for using (generative) AI in the course:

- **Always Acknowledge AI Contributions:** When AI tools are deployed in coursework, it is essential to always cite and acknowledge their contributions. Transparency in the use of AI not only upholds academic integrity but also provides clarity on the sources of information and insights.
- **Always Critically Evaluate AI-Generated Information:** AI tools can be powerful resources, but their outputs must be always assessed for accuracy and relevance. It is important to verify the information generated by AI against credible sources and apply independent judgment to ensure its validity and reliability in the coursework.
- **Always Prioritize Academic Integrity:** AI should always only serve as a supplementary tool in the learning and research process, but not replacing personal efforts, understanding, and analysis in the coursework.

Communication and Feedback

Assessment marks for individual assessed tasks will be communicated via Canvas within two weeks after the submission deadline. Feedback on assignments will include the grades of the assessment. Students who have further questions about the feedback including marks should consult the instructor within five working days after the feedback is received.

Resubmission Policy

Resubmission is not allowed.

Required Texts and Materials

Goodfellow, Ian, Yoshua Bengio, Aaron Courville, and Yoshua Bengio. *Deep learning*. Cambridge: MIT press, 2016.

Academic Integrity

Students are expected to adhere to the university's academic integrity policy. Students are expected to uphold HKUST(GZ)'s Academic Honor Code and to maintain the highest standards of academic integrity. The University has zero tolerance of academic misconduct. Please refer to Regulations for Academic Integrity and Student Conduct for the University's definition of plagiarism and ways to avoid cheating and plagiarism.

[Optional] Additional Resources

1. University Press, <https://mml-book.github.io/> 神经网络与深度学习. 邱锡鹏, 机械工业出版社, <https://nndl.github.io/>
2. Christopher M. Bishop, Pattern Recognition and Machine Learning