Department of Computer Science and Engineering
計算機科學與工程學系

Artificial Intelligence: Systems and Technologies (AISTN) (JS4468)

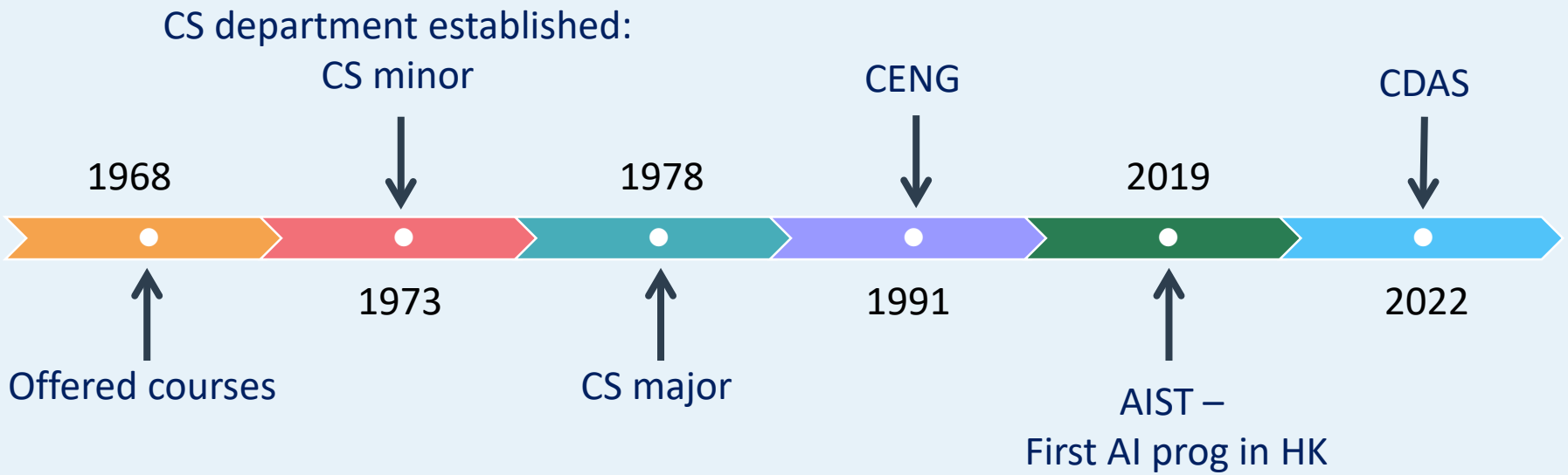
Agenda

1. Introduction of our Department
2. Introduction of the AIST Programme
3. Curriculum Structure
4. Other Learning Options Available
5. Admission Requirements
6. FAQ

Department of Computer Science and Engineering

A Long History

- The first computer science department in HK
- A strong alumni network



Strong Alumni Network

- High competitiveness in job market with 90% of CSE graduates employed within one month of graduation

IT Industry

Microsoft

Google

IBM

NOKIA

amazon.com

facebook

Education

CityU

NUS National University of Singapore

Georgia Tech

Banking

HSBC

citibank

Morgan Stanley

Deutsche Bank

Deloitte.

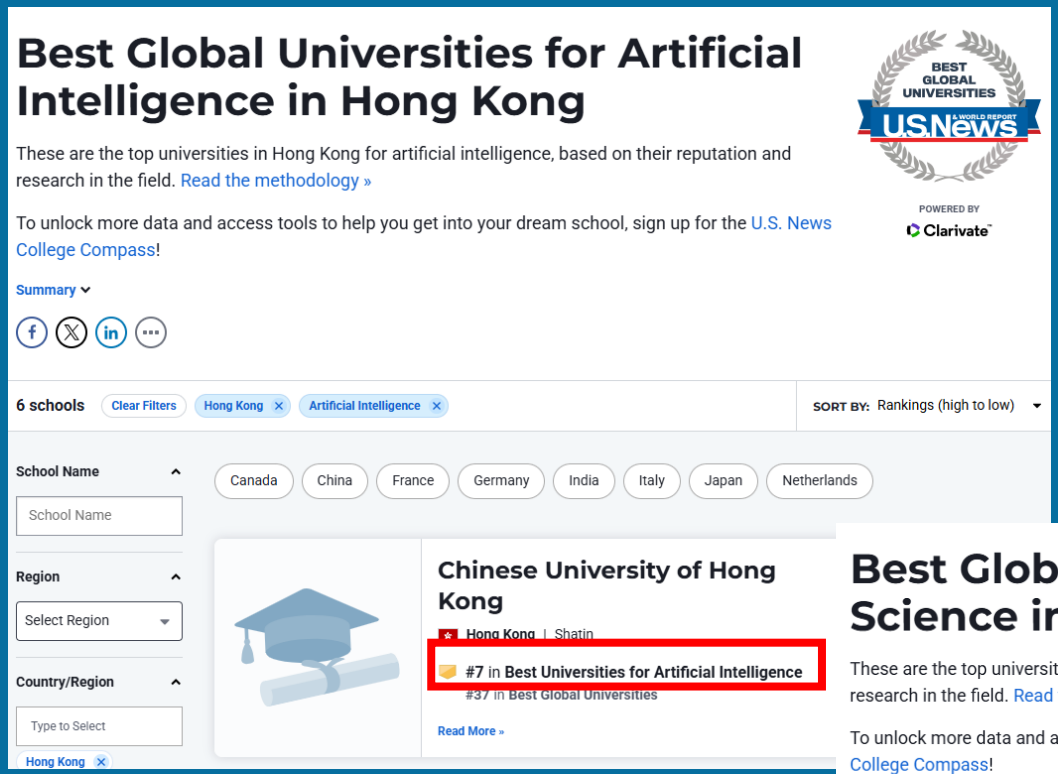
Goldman Sachs

Excellent Teaching and Research Team

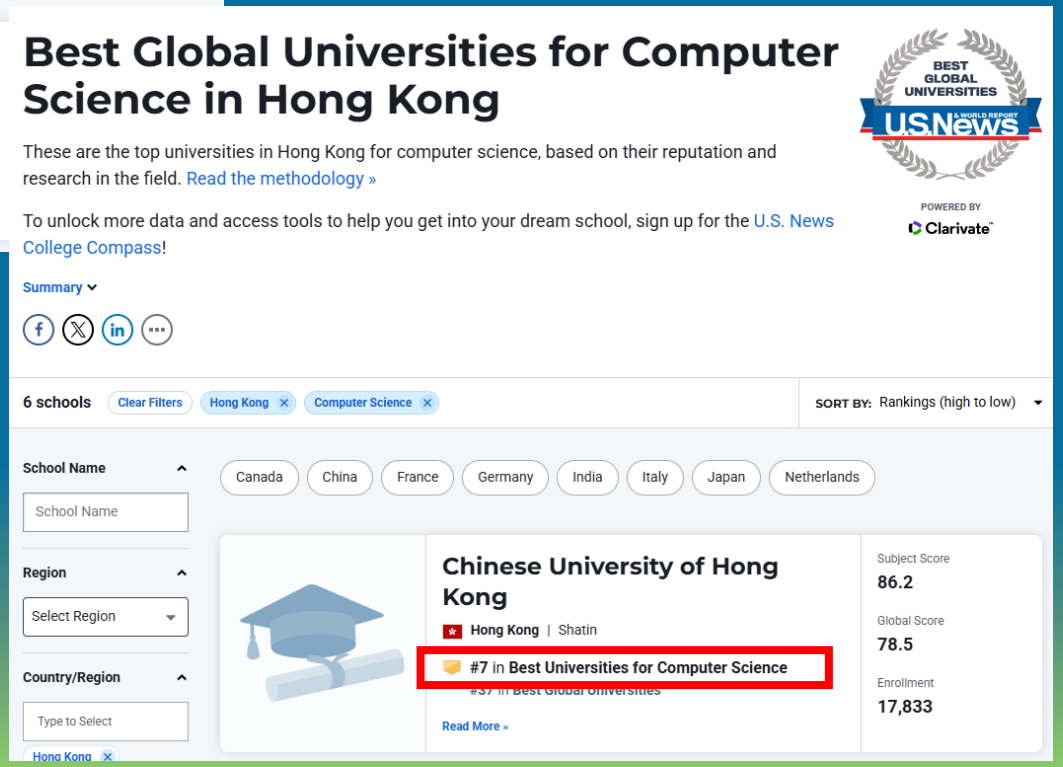
- **2021 Kyoto Prize Laureate and Turing Award Recipient**
  Prof. Andrew Yao
- **8 ACM Fellows**
  Prof. Benjamin Wah, Prof. John Lui, etc.
- **16 IEEE Fellows**
  Prof. Irwin King, Prof. Evangeline Young, etc.
- **MIT TR35 China 2024**
  Prof. Yu Li
- **DAC Under-40 Innovator Award 2024**
  Prof. Bei Yu
- **Editor-in-Chief (EiC) of ACM Transactions on Database Systems (TODS)**
  Prof. Yufei Tao

- CSE teachers usually have the highest teaching evaluation scores

Rankings



US News and World Report:
Best Universities in
Artificial Intelligence
2025-2026
#1 in Hong Kong
#7 Globally



US News and World Report:
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#1 in Hong Kong
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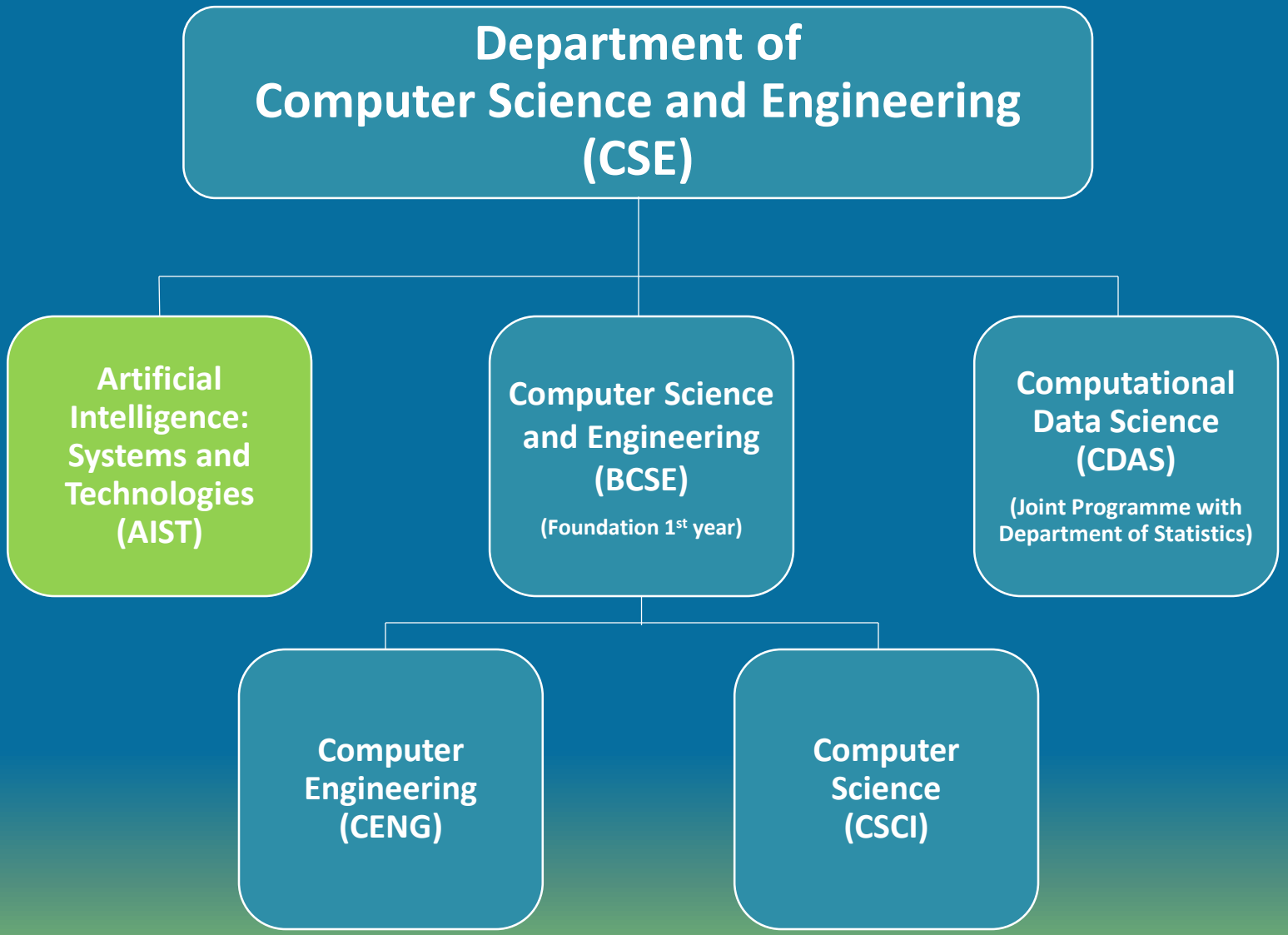
Overview of CSE's UG Programmes



AIST Programme

AI is transforming the way we live!

Many disciplines are changing

A – Automotive
B – Bioscience
C – Creative Services
D – Data
E – Education
F – Finance
G – Gaming (note: G may also mean Government)
H – Healthcare
I – Internet of Things

… …

創科鬥室 StartUpBeat

中大研發新系統 0.04秒完成評估

AI分析CT圖速驗新冠肺炎

由香港中文大學工程學院及醫學院組成的跨學科團隊，研發一款新型人工智能（AI）系統，可針對胸部電腦斷層掃描（CT）影像，快速檢測是否感染新冠肺炎，只需0.04秒內即完成分析，其準確度更高達96%。該研究成果已發表於*Nature*旗下綜合期刊*npj Digital Medicine*上。

中大醫學院影像及介入放射學系系主任余俊豪教授指出，坊間對新冠肺炎的早期檢測一般採用核酸測試或CT影像核酸測試靈敏度大約為70.6%至97.5%，惟本地曾經有人的測試結果呈陰性，後來卻成為隱形患者。

至於CT影像方面，準確度高達96%。惟醫生每檢查一個CT影像，需時5至10分鐘，診斷過程耗時且容易出錯；AI系統僅在0.04秒內即可準確評估整個三維CT影像，有望輔助醫生應付日常重複的診斷工作，提高臨床診斷效率。

200患者數據訓練模型

中大團隊在去年1月至4月採集來自本地及海外醫院的CT數據，當中包括本港威爾斯親王醫院、瑪嘉烈醫院、屯門醫院，以至北京大學深圳醫

■余俊豪教授（右二）強調，醫生日後用AI輔助診斷，須簽署相關文件承擔醫療責任；旁為寶琪（左二）。（朱美奇攝）

高AI的準確度。

在保護病人私隱的前提下，團隊成功採集的200名來自不同醫院的患者數據；另通過域特定特徵歸一化（Domain-specific feature

過，日後如有變異確診個案，團隊將分析有關數據。

助追蹤腫瘤放射診療

除了應用於新冠肺炎CT影像檢測，AI系統亦

Reference (Apr 2021):
http://startupbeat.hkej.com/?p=102056/

Growing Demand and Opportunities

- Many industries are now looking for the use and advancement of AI to boost up the work efficiency
  - » Opportunities for you to innovate and change the world!

- Many other possible occupations
  - » AI Specialist
  - » Data Scientist
  - » Software Developer
  - » Computer Engineer
  - » R&D for AI
  - » …

Programme Objective

- Equip students with the capabilities of building AI systems that can analyze and infer knowledge from massive information

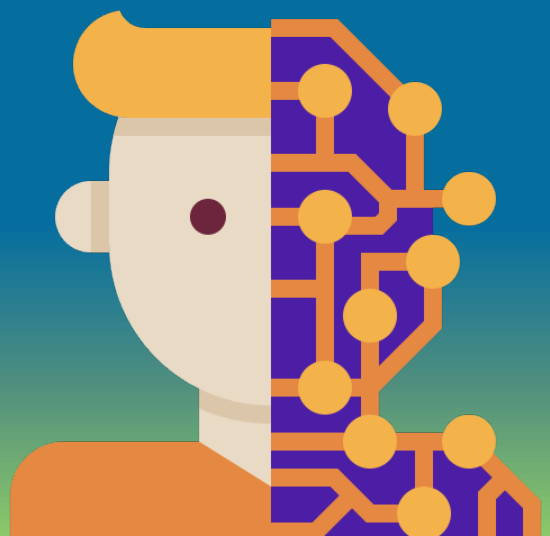
- Backed by rigorous foundations like data structures, statistics, machine learning and distributed computing

- Emphasize solid trainings on
  - » Mathematical analysis and reasoning on massive data
  - » Large-scale system design and implementation for processing massive data

Special Features

- 1st Bachelor of Engineering programme in AI in Hong Kong

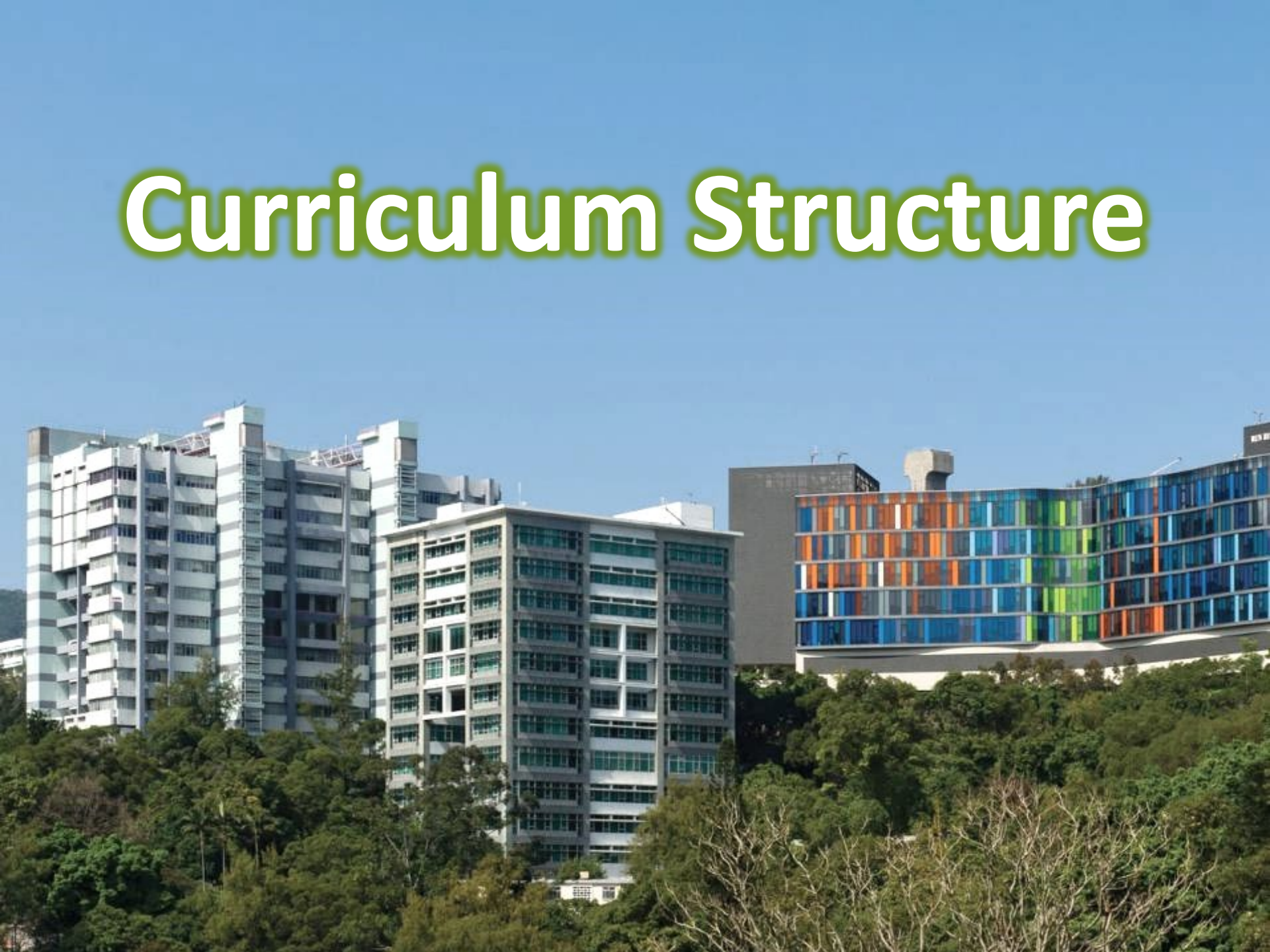
- 4 specialized streams
  - » Biomedical Intelligence
  - » Intelligent Multimedia Processing
  - » Large-scale Artificial Intelligence
    - – Theory and Systems
  - » Intelligent Manufacturing and Robotics



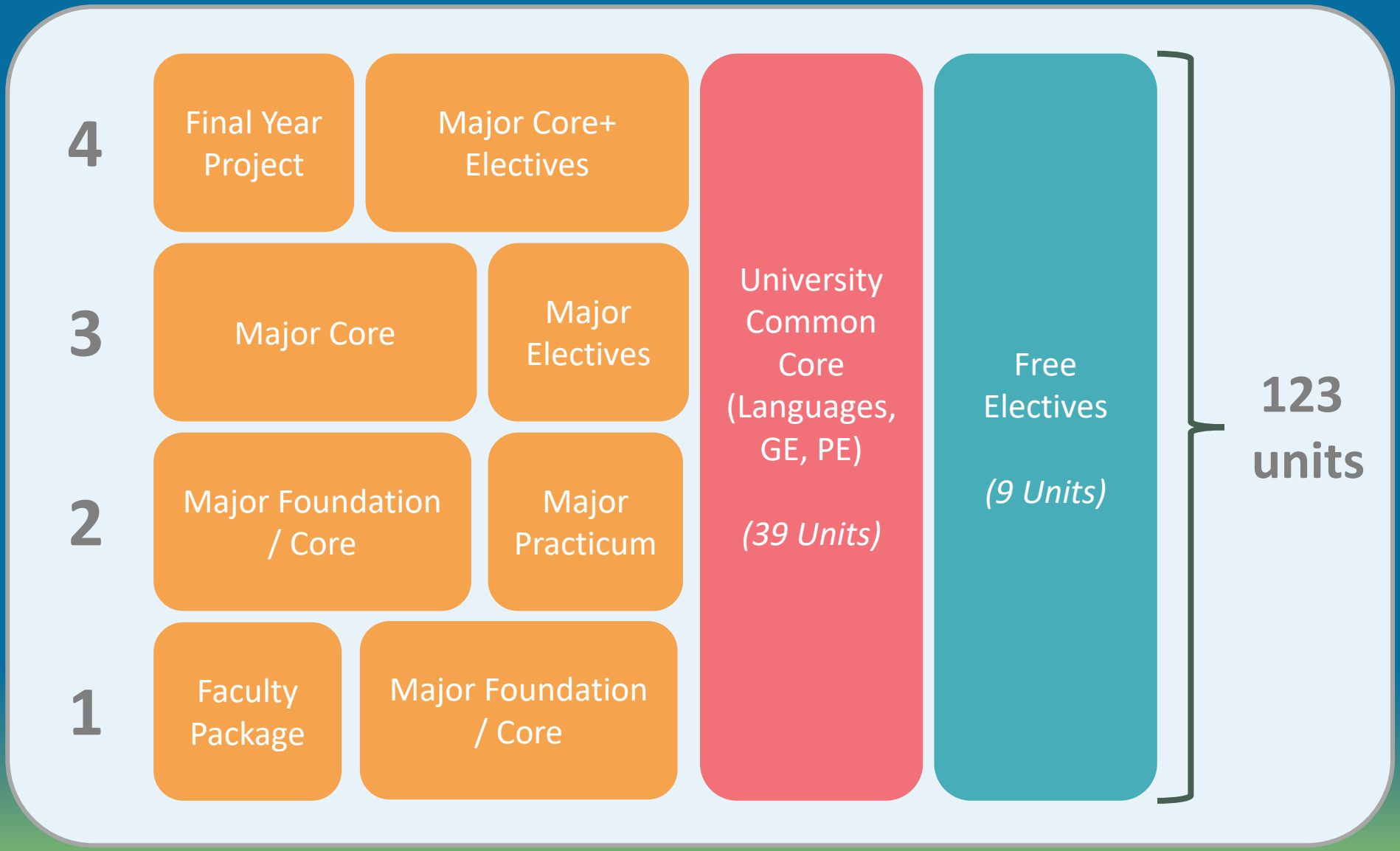
Mission

- Enable students to develop cutting-edge AI solutions that are of practical interest to academics, industry, and society
- Nurture local talents in AI related applications to meet today's tremendous need of well-trained talents in AI and related specializations

Curriculum Structure



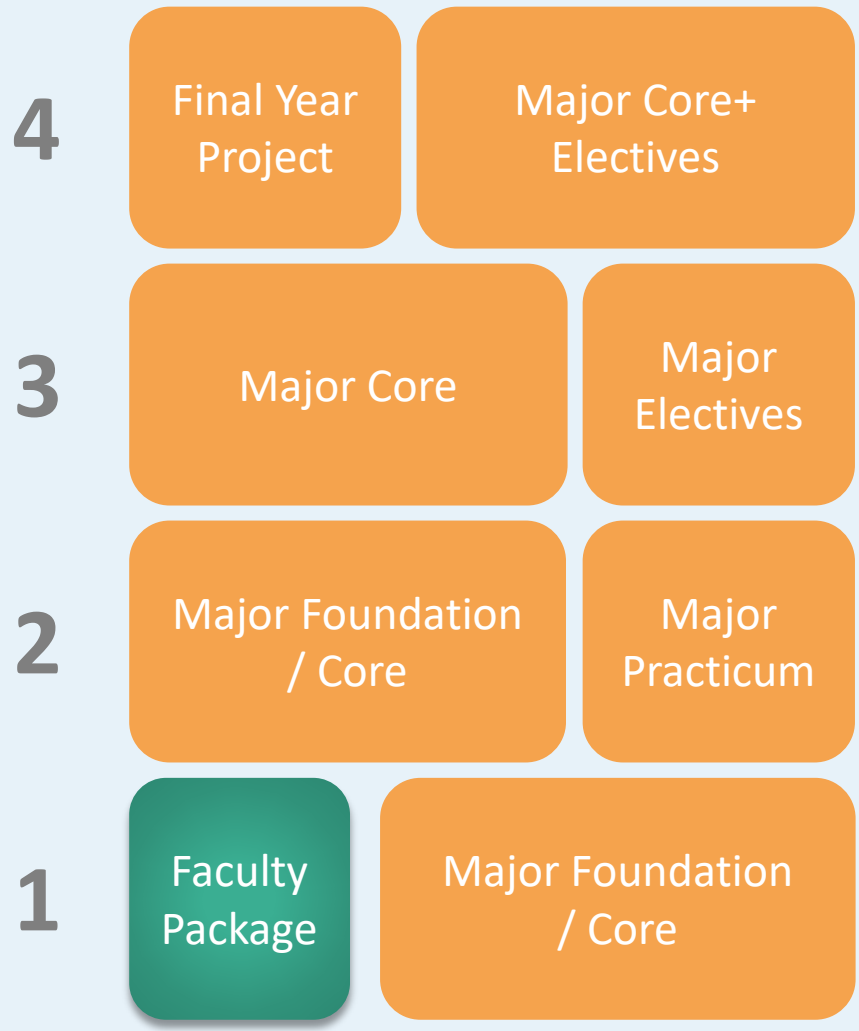
Curriculum – Overview



University Core Requirements

University Core Courses		Units Requirements
Language	English	8
	Chinese	5
General Education	University Foundation	6
	University GE	7 (At least 2 units in each Area A, C & D)
	College GE	6
Understanding China (UGCP1001) *(online course - complete before graduation in any one term, including summer term)*		1
Hong Kong in the Wider Constitutional Order (UGCP1002) *(online course - complete before graduation in any one term, including summer term)*		1
Digital Literacy and Computational Thinking (ENGG1003 or ENGG1004)		3
Physical Education		2
Total of units required		**39**

AIST Curriculum – Faculty Package



Faculty Package (9 units)

- Programming (ENGG1110)
- AI Literacy Workshop (ENGG1111)
- Linear Algebra for Engineers (ENGG1120)
- Single Variable Calculus for Engineers (ENGG1125)

AIST Curriculum – Major Foundation

4	Final Year Project	Major Core+ Electives
3	Major Core	Major Electives
2	Major Foundation / Core	Major Practicum
1	Faculty Package	Major Foundation / Core

Major Foundation / Core (10 units)

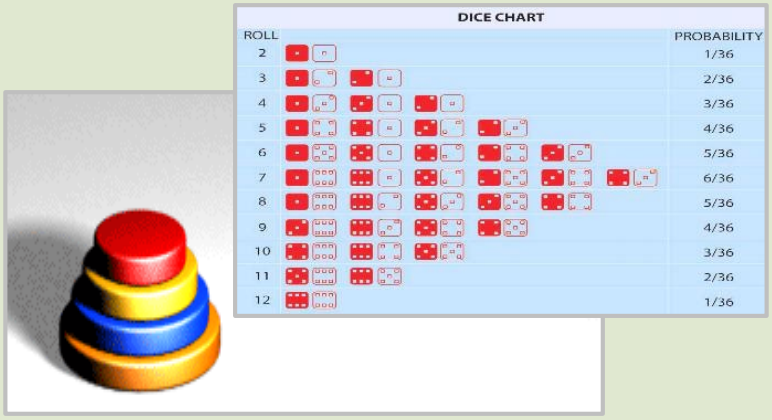
- Multivariable Calculus (ENGG1130)
- Physics (PHYS1003/1110)
- Intro to AI & ML (AIST1000)
- Intro to Computing Using Python (AIST1110)

AIST Curriculum – Major Foundation

4	Final Year Project	Major Core+ Electives
3	Major Core	Major Electives
2	Major Foundation / Core	Major Practicum
1	Faculty Package	Major Foundation / Core

Major Foundation / Core (10 units)

- Discrete Maths (ENGG2440)
- Probability (ENGG2760)
- Statistics (ENGG2780)
- Data Structures (CSCI2100)



no copyright infringement is intended

AIST Curriculum – Major Practicum

4	Final Year Project	Major Core+ Electives
3	Major Core	Major Electives
2	Major Foundation / Core	Major Practicum
1	Faculty Package	Major Foundation / Core

Major Practicum (3 units)

- Technology, Society and Engineering Practice (AIST2601)
- Engineering Practicum (AIST2602)

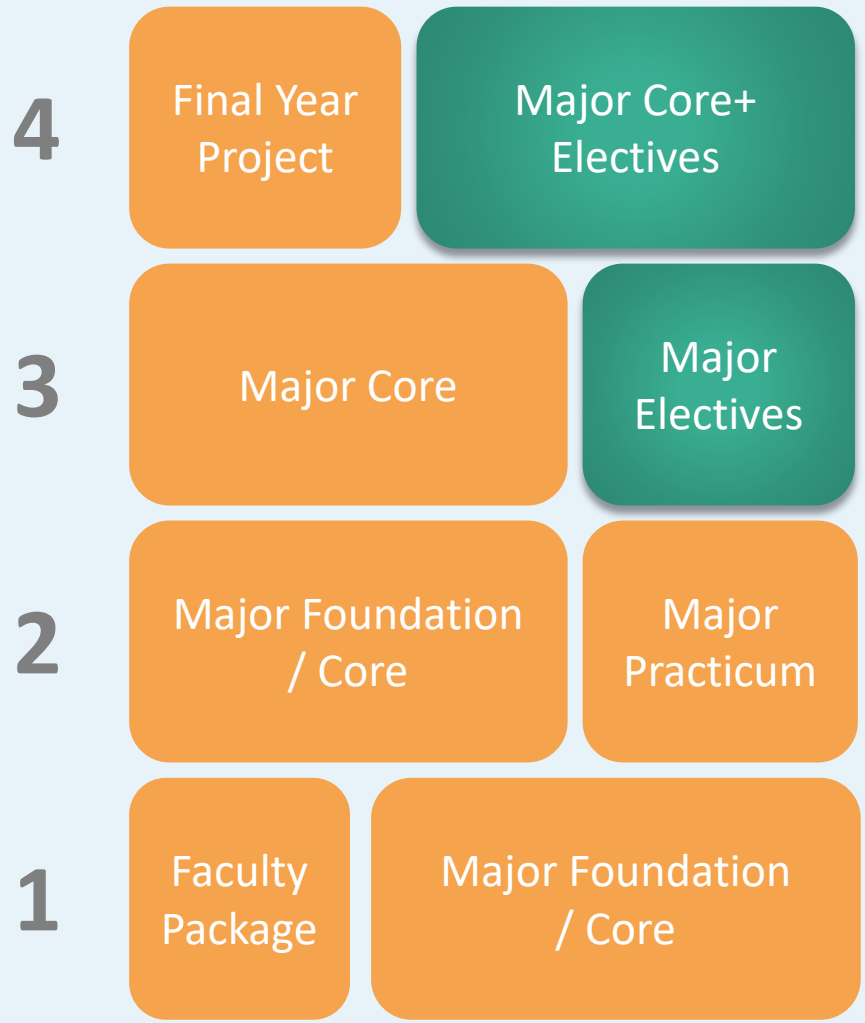
AIST Curriculum – Major Core

4	Final Year Project	Major Core+ Electives
3	Major Core	Major Electives
2	Major Foundation / Core	Major Practicum
1	Faculty Package	Major Foundation / Core

Major Core (12 units)

- Numerical Optimization (AIST3030)
- Design and Analysis of Algorithms (CSCI3160)
- Fundamentals of Artificial Intelligence (CSCI3230)
- Fundamentals of Machine Learning (CSCI3320)

AIST Curriculum – Major Electives



Major Core (3 units)

» Foundation of Applied Deep Learning (AIST4010)

Major Electives (22 units)

Streams

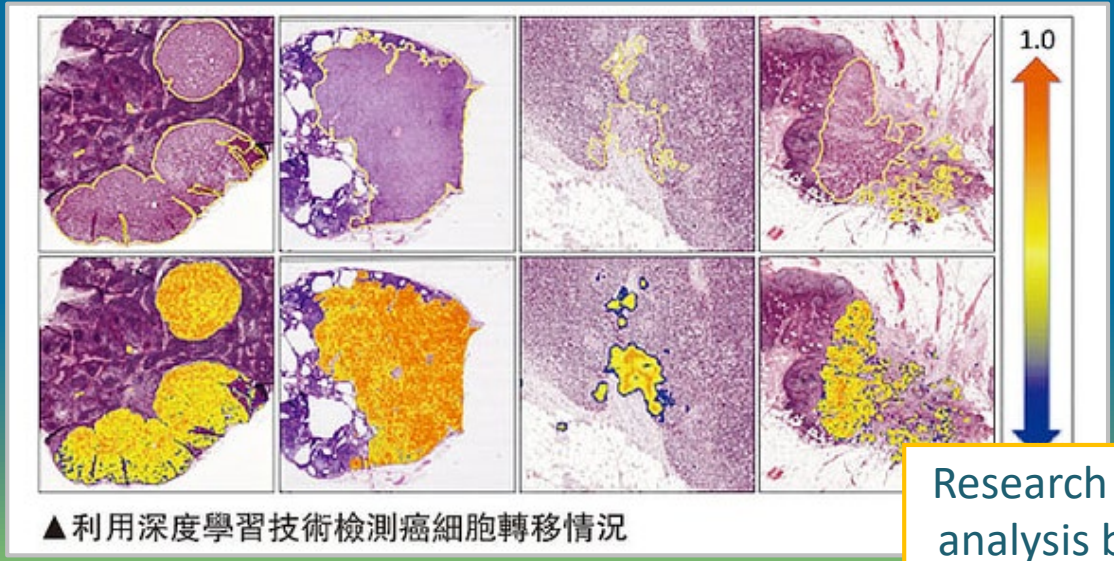
1. Biomedical Intelligence
2. Intelligent Multimedia Processing
3. Large-scale Artificial Intelligence – Theory and Systems
4. Intelligent Manufacturing and Robotics

Non-Stream

5. General Artificial Intelligence: Systems and Technologies

Stream 1: Biomedical Intelligence

- Study how to build intelligent biomedicine and healthcare applications
- Two emerging markets:
  - » Personalized genomics and precision medicine (*e.g.,* disease prevention, prediction, early diagnosis and treatment)
  - » Clinical record systems (*e.g.,* electronic medical records and pharmacy prescription information and insurance records)



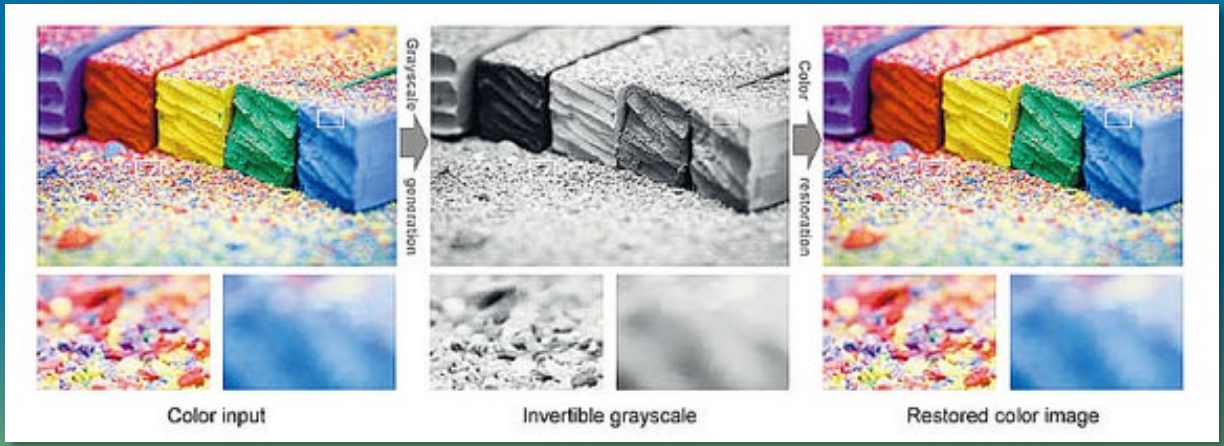
▲利用深度學習技術檢測癌細胞轉移情況

Research on medical image analysis by Prof. P.-A. Heng

Stream 2: Intelligent Multimedia Processing

- Study how to bridge AI and human brain functions and design models, algorithms, and systems for multimedia processing with high performance and high accuracy.

- Areas: digital image processing, face recognition, computer animation, human-computer interactions, speech and audio processing, computational linguistics

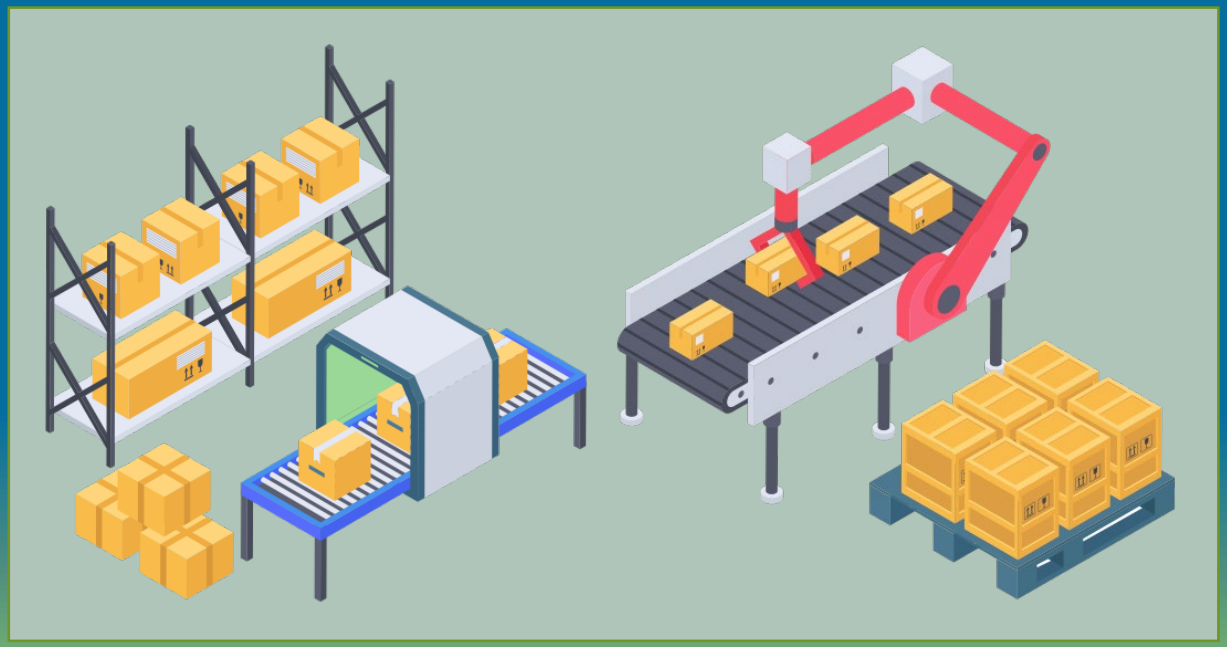


Stream 3: Large-scale AI – Theory and Systems

- Study the advanced techniques of realizing large-scale artificial intelligence from both theory and system perspectives
  - » **Theory**: machine learning theory, statistical inference, online algorithms, *etc.*
  - » **Systems**: high performance computing, distributed storage, big data management, *etc.*

Stream 4: Intelligent Manufacturing & Robotics

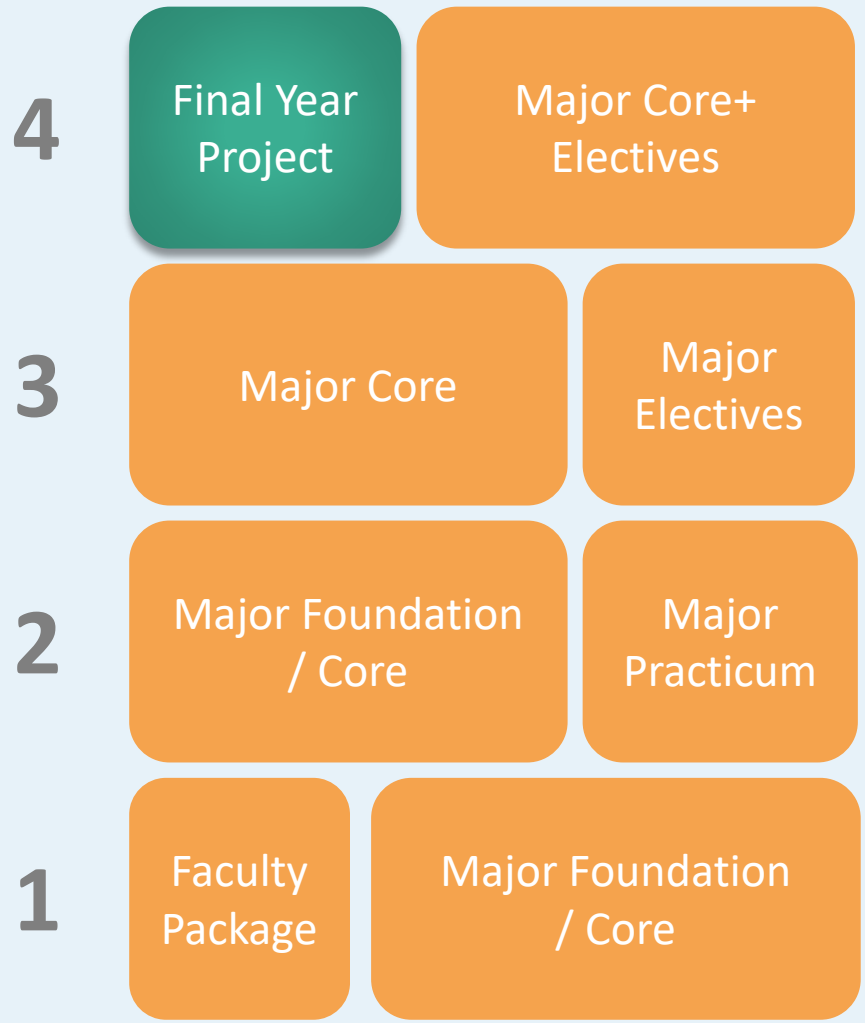
- Study how to integrate manufacturing and robotics with AI for different aspects of human activities.
- Focus on the topics of mechanics, sensing and control, design & manufacturing, human-robot interactions, *etc.*



Other Topics of Interest

- Many other practical and interesting courses in AI:
  - » Machine Learning
  - » Deep Learning
  - » Large Scale Distributed Computing
  - » Intelligent Embedded Systems
  - » Knowledge Representation/Inference
  - » Human-Computer Interactions
  - » Natural Language Processing
  - » Big Data Analytics
  - … …

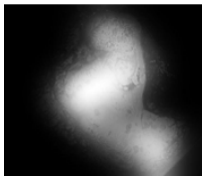
AIST Curriculum – Final Year Project (FYP)



Final Year Project (6 units)

- Pick an interesting topic
- Interdisciplinary nature
- Apply the knowledge learnt in the previous courses
- Many open topics. Your creativity and discussion with the supervisor
- Complete a project under the supervision of an advisor

FYP Example (Human-AI Interaction for Efficient Medical Image Analysis)



Gaze heatmap

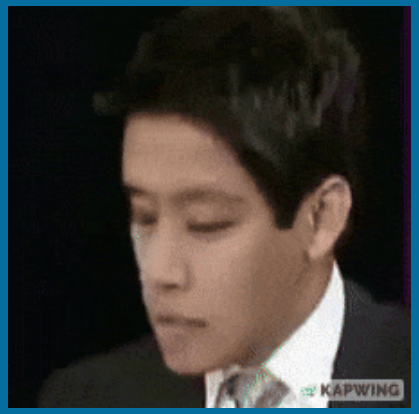
Sample from current CE/CS students (FYP DOU2401))

FYP Example (Deepfake Detection)

Real
Confidence:
0.8388

Confidence:
0 is Fake
1 is Real

Fake
Confidence:
2.29e-05
The facial optical illumination was adjusted to enhance brightness.

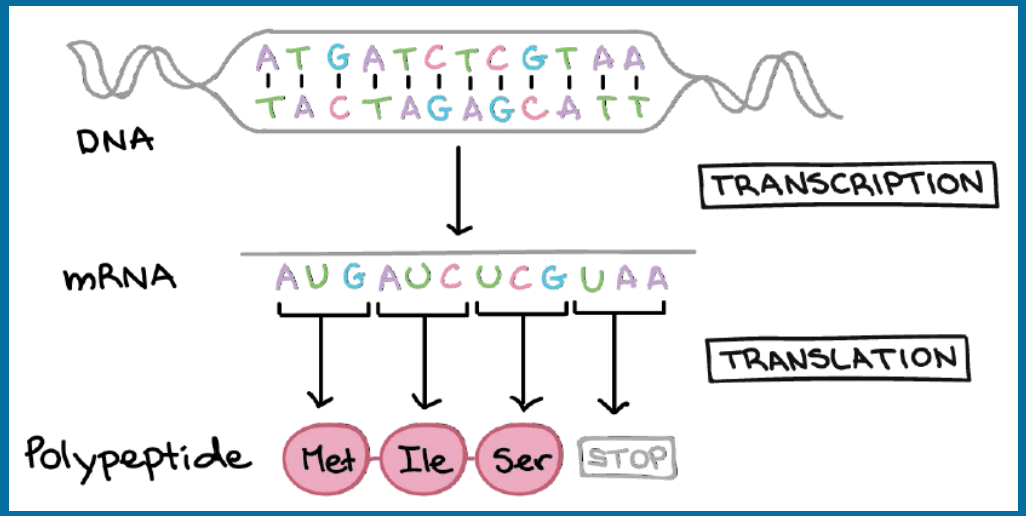


Fake
Confidence:
1.93e-05
It is changed to a totally different face

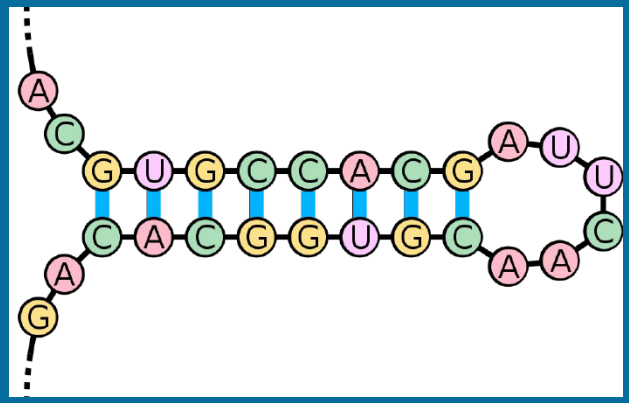
Sample from current CE/CS students (FYP KWS2402)

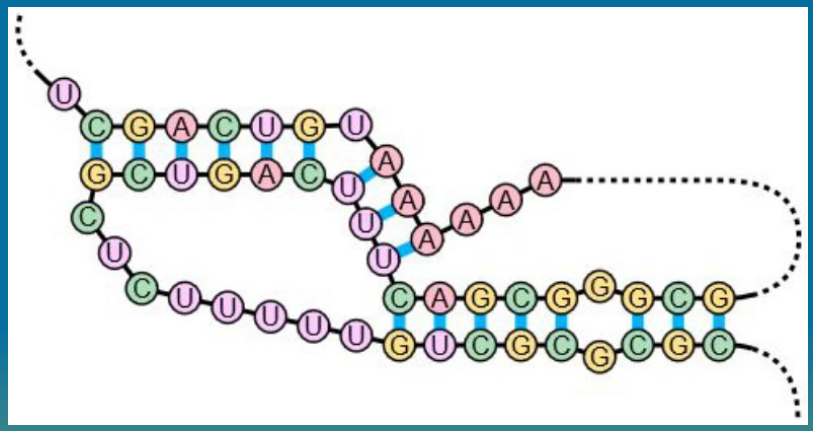
FYP Example (AI + Bioinformatics)

- Apply machine learning to predict RNA-protein interaction



RNA-binding protein (RBP)



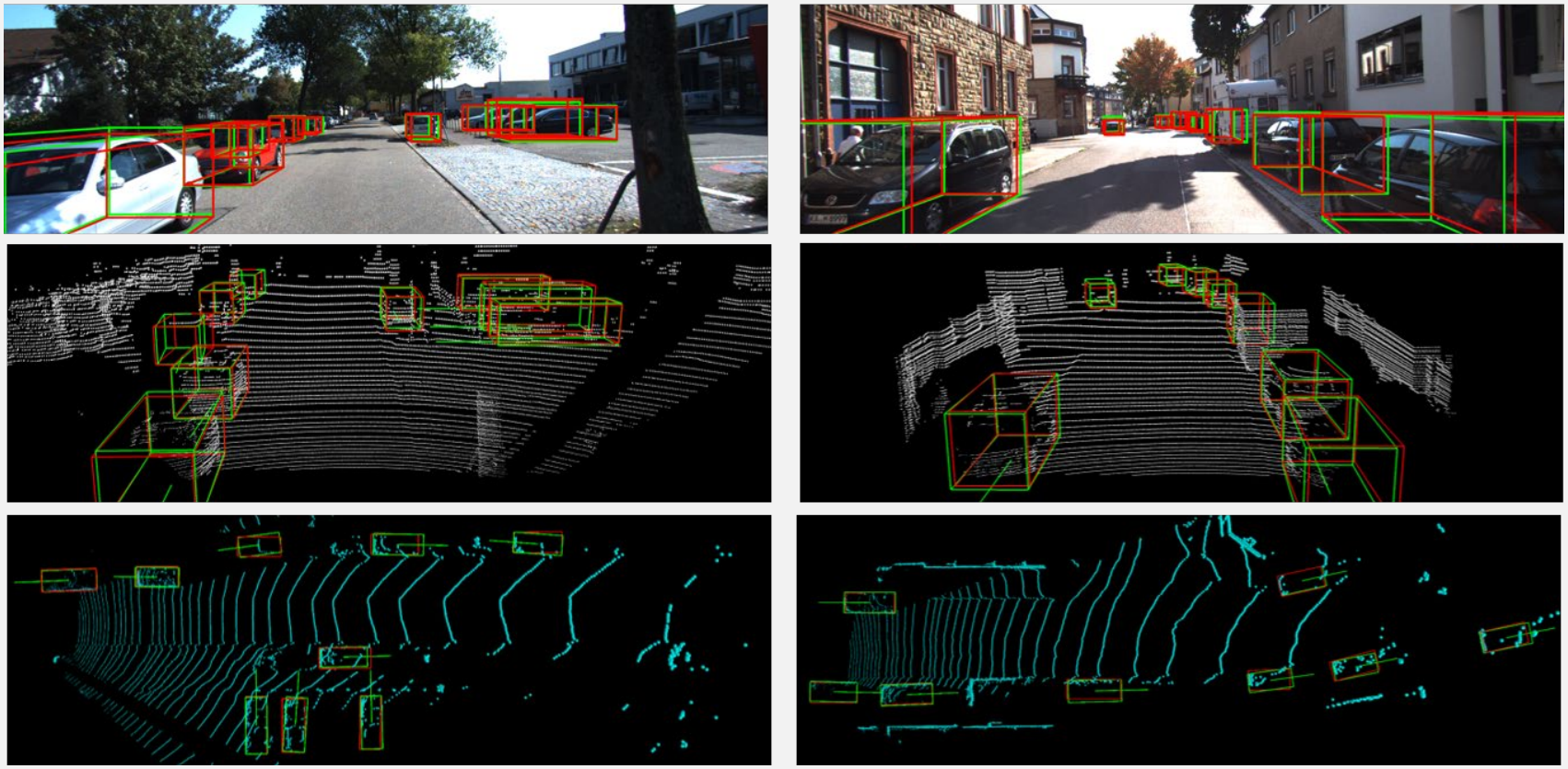


RNA folds to a specific structure to fit into the protein binding site

Sample from current CE/CS students (FYP KY1804)

FYP Example (AI + 3D Vision)

- Design the best neural network for 3D car detection



Sample from FYP CWF2002 (The UG student co-authored "**research papers**" in AAAI 2021 & CVPR 2021)

Diverse Learning Experience and Other Learning Options

International / Local Competitions

High Honors in the 48th International Collegiate Programming Contest (ICPC) World Finals 2024, ranked **31st amongst the 141** top university programming teams worldwide

Championship in ACM-HK Programming Contest 2024

Industrial Visits

- Visit to companies to learn latest development in industry

Cathay Pacific

The Hong Kong Productivity Council

PwC

Work-Study Scheme

3 years study + 1 year work-study + 1 final year study

Google

Microsoft

hp

FUJITSU

HSBC

恒生銀行 HANG SENG BANK

新鴻基地產 Sun Hung Kai Properties

ASM Pacific Technology

HKSTP 香港科技園

Exchange Opportunities

Students are encouraged to join an exchange programme to broaden their horizon and learn with peers from diverse background

Some examples of exchange opportunities to world-class universities:

- The University of Sydney, Australia
- University of Toronto, Canada
- University of Waterloo, Canada
- Tsinghua University, China
- National University of Singapore, Singapore
- University College London (UCL), UK
- Georgia Institute of Technology, USA
- University of Illinois at Urbana-Champaign, USA
- Telecom & Management SudParis, France
- ETH Zurich, Switzerland
- Royal Institute of Technology (KTH), Sweden

Admission Requirements

AIST Admission Requirements for JUPAS

HKDSE Subject	*Minimum Level*	*Subject Weighting*
HKDSE Core Subjects		
English Language	4	1.25
Chinese Language	3	1.25
Mathematics (Compulsory Part)	5^	1.75
Citizenship and Social Development	A (Attained)	-
HKDSE Elective Subjects		
Any two subjects	3	#

^ *Applicants with level 4 in Mathematics (Compulsory Part) and good results in other HKDSE subjects will be exceptionally considered on a case-by-case basis.*

\# *The AIST programme accepts any subject as elective, with subject weighting of **1.75** for Mathematics M1/M2; **1.5** for Biology, Chemistry, ICT, and Physics; and **1** for any other subjects.*

Selection is based on the Best 5 HKDSE subjects with subject weighting applied. Bonus points will be awarded to the 6th and 7th subjects, if any.

AIST Admission Grades (2024 Entry)

Percentile	CHI	ENG	MATHS	Citizenship and Social Dev	M1/M2	1st Elective	2nd Elective	3rd Elective	2024 Programme Weighted Total^
Upper Quartile	5	4	5**	Attained	5*	5**	5*		57.25
Median	5**	4	5*	Attained	5	5*	5*		53.5
Lower Quartile	5	4	5*	Attained	5	5*	5*	5	51.125

^ *Category A subjects score conversion scale: 5** = 8.5 | 5* = 7 | 5 = 5.5 | 4 = 4 | 3 = 3 | 2 = 2 | 1 = 1;*
Category C subjects score conversion scale: A = 5 | B = 4 | C = 3 | D = 2 | E = 1;
Subject Weighting: Eng (x 1.25); Chi (x 1.25); Math (x 1.75); M1 or M2 (x 1.75);
Bio, Chem, ICT, Phy (x 1.5).

Note: Admission grades of 2025 entry will be published by the JUPAS Office soon. Please stay tuned.

AIST Admission Requirements for Non-JUPAS & International Applicants

- Applicants seeking admission on the strength of qualifications other than HKDSE examination results (*e.g.*, IB, GCE-AL, overseas qualifications) can apply through Non-JUPAS channels

- Will be considered on the basis of their education background and academic achievements

- Will be expected to demonstrate outstanding abilities in English, mathematics and science subjects

Check out details on the website of CUHK's Office of Admissions and Financial Aid:
Non-JUPAS Applications: http://admission.cuhk.edu.hk/non-jupas-yr-1/requirements.html
International Applications: http://admission.cuhk.edu.hk/international/requirements.html

FAQ

Q: Will there be any interview?

Interview Arrangements for JUPAS Applicants

- Interviews will be arranged in June every year.
- Not all applicants will be interviewed. We only consider Band A applications when shortlisting interviewees.
- Shortlisted applicants will receive an invitation email by early June for the details, *e.g., date, time, format, etc.*
- Stay tuned! Check your email regularly for the latest update!

Interview Arrangements for Non-JUPAS & International Students

- Interviews will be conducted in batches from ~Dec. every year.
- You are encouraged to attach adequate supporting documents, *e.g., transcripts, predicted grade, certificates, etc.,* in your application for our holistic review.
- Shortlisted applicants will receive an invitation email for the details, *e.g., date, time, format, etc.*
- Stay tuned! Check your email regularly for the latest update!

Q: How many students will be admitted to AIST?

Local Intake Quota (for reference only)

- **30**

Note: There is no fixed quota for international students and Mainland students attempting Gao Kao.

Q: Will there be any scholarship or financial aid?

Scholarships and Financial Aids

- The Government and the University offer various scholarships and financial aids depending on student's financial situation, or their outstanding performance in academic or other areas

- List of some scholarships and financial aids
  - » Admission Scholarships
  - » Scholarships for Overseas Studies
  - » Government or University Financial Aid
  - » Summer Subsistence and Travel Loan Scheme
  - » Student Residence Bursary Scheme
  - …

Check out more details on the website of CUHK's Office of Admissions and Financial Aid: https://admission.cuhk.edu.hk/finance.html

Q: What are the differences between AIST and CSCI?

AIST vs CSCI ?

- AIST and CSCI have related foundation & basic theories
- AIST requires stronger Math foundation since it involves statistics, probability, calculus, linear algebra, etc., which are basis for machine learning and deep learning
- CSCI focuses more on software design and computing solutions, taking care of coding and software architecture

Q: What are the career prospects of AIST graduates?

Career Prospects

- Employers of our graduates include:
  - » Google
  - » Intel
  - » Microsoft
  - » IBM
  - » Apple
  - » Facebook
  - » Yahoo
  - » Deloitte
  - » Hong Kong Government
  - » Investment Banking Institutes
  - … …

Many disciplines are changing

- A – Automotive
- B – Bioscience
- C – Creative Services
- D – Data
- E – Education
- F – Finance
- G – Gaming (note: G may also mean Government)
- H – Healthcare
- I – Internet of Things

Q: I am still struggling to choose between AIST / CENG / CSCI /CDAS. What can I do?

If you are still struggling to choose…

- You can go through our website and admission materials for a better understanding before applying, and write to us via email at ug-admiss@cse.cuhk.edu.hk if you have any further queries.

- You can join our outreach activities in the future and chat with our teachers and student ambassadors.

Contact Us

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Hope to see you in class
In 2026 !