



香港中文大學計算機科學與工程學系
Department of Computer Science and Engineering
The Chinese University of Hong Kong



香港中文大學統計學系
Department of Statistics
THE CHINESE UNIVERSITY OF HONG KONG

Joint Programme: Computational Data Science (CDAS)

(JS4416)



What's Computational Data Science?



Computer Science

Statistics



Power of Computational Data Science

How can we know the average salary in Hong Kong?

$$\frac{1}{7 \text{ Million}} \sum_{i=1}^{7 \text{ Million}} X_i$$



- Computer Science Approach:

Distribute to m computers $\rightarrow \frac{1}{7 \text{ Million}} \left(\sum_{i \in \text{Group 1}} X_i + \sum_{i \in \text{Group 2}} X_i + \dots + \sum_{i \in \text{Group } m} X_i \right)$

Skills: Parallel computing, cloud computing, distributed system

- Statistics Approach:

Strategically sample $X_{(1)}, \dots, X_{(m)} \rightarrow \frac{1}{m} \sum_{i=1}^m X_{(i)}$

Skills: Sampling theory

- Computational Data Science Approach: Statistics + Computer Science



Ranking

➤ QS World University

CUHK: **#5** (#26) in QS 2022 in
Computer Science in Asia (World)

CUHK: **#14** (#51-100) in QS 2022 in
Statistics & Operational Research in Asia (World)

➤ U.S. News Best Global Universities

#5 (#10) in 2022 Best Global Universities for
Computer Science in Asia (World)



Recent News

Thursday, January 28, 2021, 19:45

Data Technology Hub debuts as cornerstone of data economy

By Oswald Chan in Hong Kong



The iconic Charles K Kao Auditorium stands among buildings in Hong Kong Science Park. The Science Park is a hub for innovation in the city. (JUSTIN CHIN / BLOOMBERG)

Hong Kong Science and Technology Parks Corp launched its Data Technology Hub on Thursday in a bid to fortify the development of the data economy, which is crucial for implementing the government's reindustrialization initiative.

References:

<https://www.chinadailyhk.com/article/156335>

<https://www.edigest.hk/article/136089/職場/最有前景行業-網絡保安-大數據分析-缺人才/>



5大最有前景行業2020 網絡保安、大數據分析缺人才 轉工薪酬可高3成!

職場 | Jan 12 2020 - 10:43



2020年伊始，打工仔當然期望升職加薪，惟近期遇上經濟不穩，大圖環境未必樂觀，雖然如此，始終有某些行業無懼經濟起伏，勢頭依然良好。今期找來安俊人力資源顧問有限公司董事總經理周綺萍及合眾人顧問有限公司總經理蘇偉忠，為讀者解構2020年數個最有前景的行業，分析來龍去脈，讓打工仔審視度勢，看看自己現時工作前景如何，或者有沒有機會跳槽至前景更佳的行業。



Recent News

InnoHK Clusters Being Developed by the Government

POSTED ON: 1st April 2020

CATEGORIZED IN: News and Happenings

According to The 2020-21 Budget, the Government is developing two InnoHK research clusters at the Hong Kong Science Park (Science Park), one focusing on healthcare technologies and the other on artificial intelligence and robotics technologies.

InnoHK is a major initiative of the Hong Kong Special Administrative Region Government to develop Hong Kong as the hub for global research collaboration. This involves the establishment of world-class research clusters at the Hong Kong Science Park with research laboratories set up by world renowned institutions and / or commercial entities to conduct collaborative researches.

Health@InnoHK and **AIR@InnoHK** will be the first two research clusters to be established progressively in the next few months.

Health@InnoHK will focus on all types of healthcare-related technologies, including for instance drug discovery, personalized medicine, molecular diagnostics, bioengineering, chemical biology, bioinformatics, vaccine development, medical instrumentation, alternative medicine etc.

AIR@InnoHK will focus on the development of Artificial Intelligence and Robotics technologies, as applied to areas like financial services, smart city and advanced manufacturing. Research focuses may cover big data analytics, machine learning, cognitive systems, intelligent agents, classification for diagnosis, medical robotics, mobile robots and assistive / service / construction robots etc.

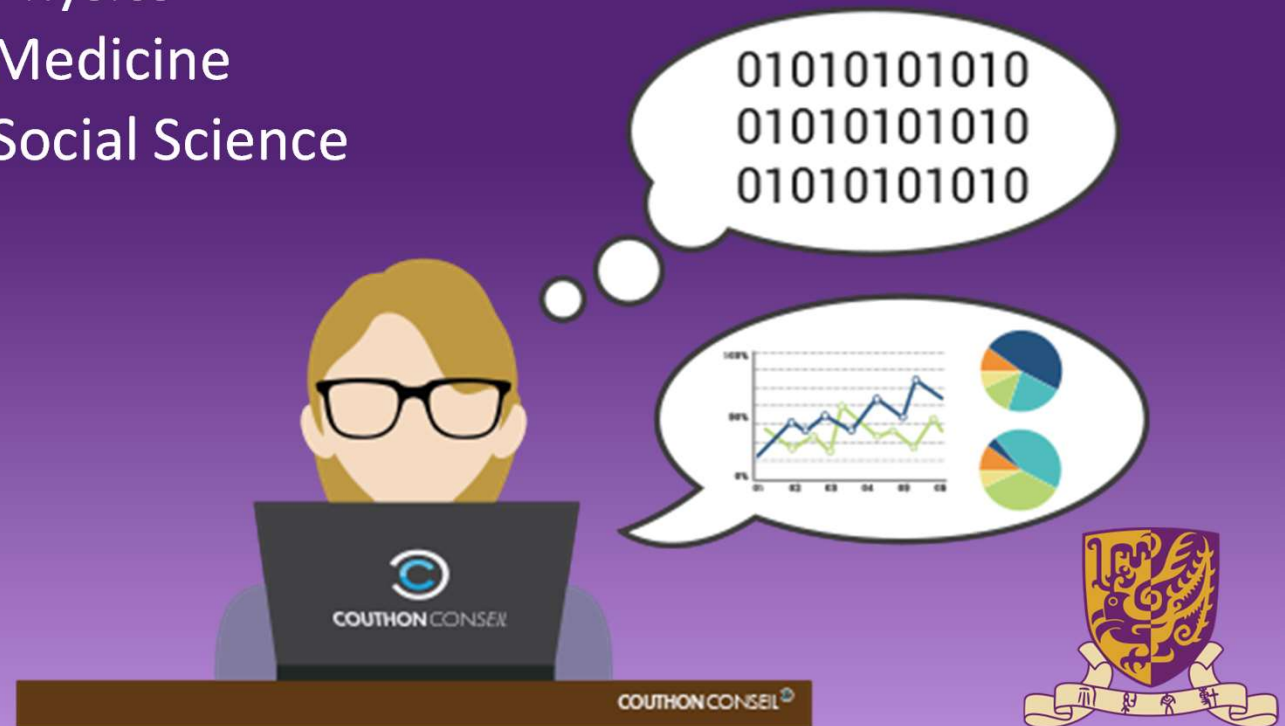
Reference:

<https://www.startmeup.hk/zh-hant/innohk-clusters-being-developed-by-the-government/>



Special Features

- A "Computer Science/Statistics + X" programme (i.e., the X component)
- 3 specialized streams
 - » Computational Physics
 - » Computational Medicine
 - » Computational Social Science



Mission

- Enable students to develop cutting-edge massive data analytics and management solutions that are of practical interest to academics, industry, and society
- Nurture local talents in computational statistics related applications to meet rising demand for data driven in the Information Age



Programme Objective

- Equip students with the **capabilities of developing mathematical, analytical and technical skills to create solutions** to guide data-driven decision making from massive information
- Backed by **rigorous foundations** like data structures, algorithms, statistical modeling and analysis and distributed computing system programming.



**Department of
Computer Science and
Engineering**

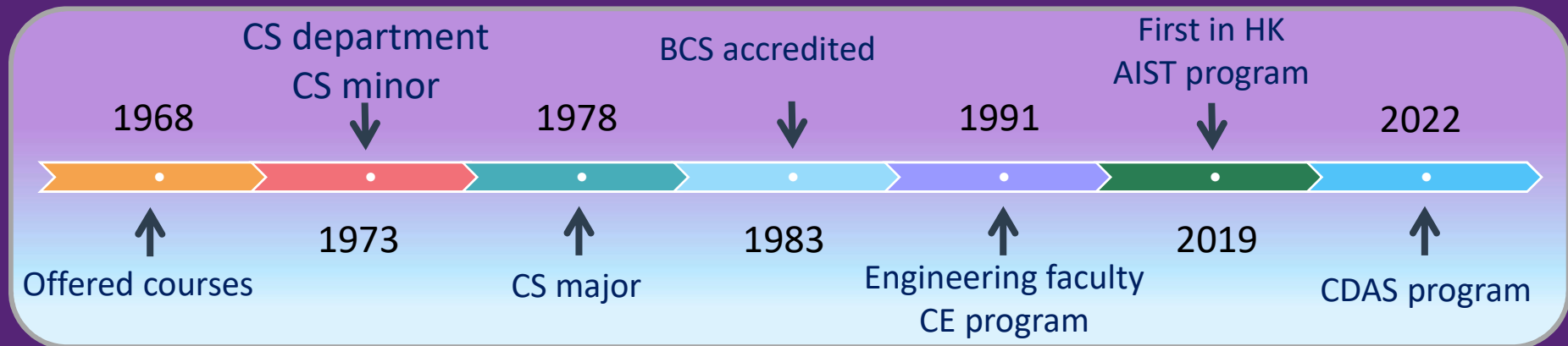
**Department of
Statistics**





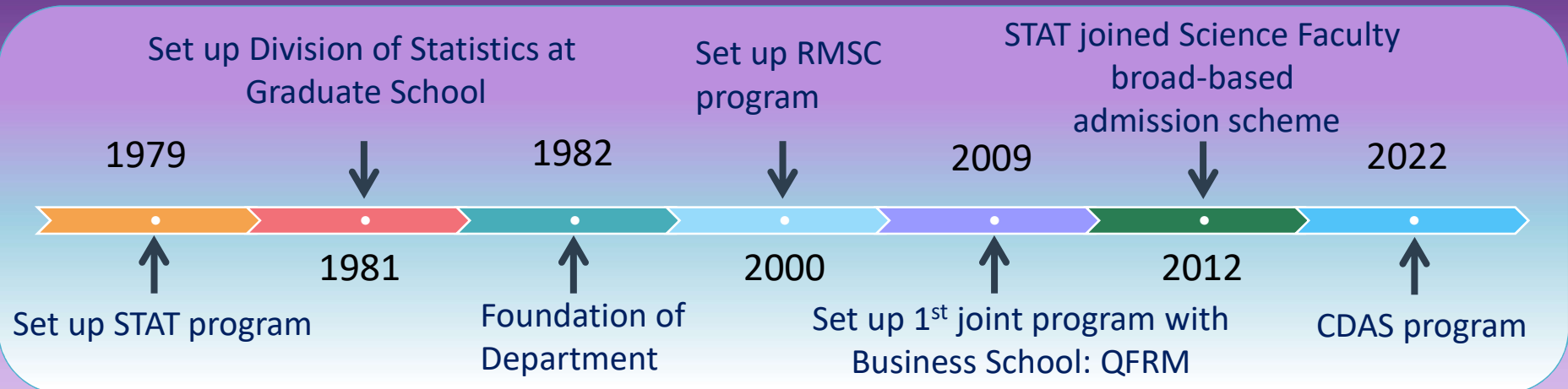
Department of Computer Science and Engineering

- The first “Computer Science” department in Hong Kong
- Offering **AIST**, **CENG** and **CSCI** programmes



Department of Statistics

- Statistics (STAT) was set up as an individual programme of study in 1979
- Offering **STAT**, **RMSC** and **QFRM** programmes



Excellence in Research and Teaching



2021 Kyoto Prize Laureate and Turing Award Recipient

Prof. Andrew Yao

State Natural Science Award (Second class)

Prof. Qiman Shao

ACM Fellows

Prof. Martin Wong, Prof. Irwin King, Prof. Michael Lyu, Prof. John Lui, Prof. Yufei Tao, etc.

ASA Fellows

Prof. Ngai Hang Chan

IEEE Fellows

Prof. Irwin King, Prof. John Lui, Prof. Leo Jia, etc.

IMS Fellows

Prof. Ngai Hang Chan, Prof. Qiman Shao

AI 2000 Most Influential Scholar Annual List (2021)

Prof. Irwin King, Prof. Jiaya Jia, Prof. Yufei Tao, and some professors are named in the list, recognizing their research excellence in AI fields

Outstanding Fellow of the Faculty of Science

Prof. Isabella Wai Yin Poon

Prof. Hoi Ying Wong

UGC - Early Career Award 2019/20

Prof. Kin Wai Chan



Excellence in Research and Teaching



**Hong Kong Academy of
Engineering Sciences Fellows 2021**
Prof. Michael Lyu

2021 INNS Dennis Gabor Award
Prof. Irwin King

**Journal of Time Series Analysis Distinguished
Author Award**
Prof. Ngai Hang Chan (2020)

**The IMA Journal of Management Mathematics
Best Paper of 2018**
Prof. Hoi Ying Wong

Vice-Chancellor's Exemplary Teaching Award
Prof. Hoi Ying Wong (2015, 2020)
Mr. Michael Fung, Senior Lecturer (2019)
Prof. Yuanyuan Lin (2016)
Prof. Irwin King (2016)
Prof. Jimmy Lee (2015)
Prof. Isabella Wai Yin Poon (2013)

CUHK University Education Award 2020
Prof. Irwin King



Recent Achievements in Intl'/local Competitions

International Collegiate Programming Contest (ICPC) *(formerly named as ACM Programming Competition)*

- 2019: ranked 12th
- (over 3000 universities)
- 2012: ranked 8th
- 2011: ranked 13th
- 2001: ranked 8th



3 Awards in International Conference on Computer-Aided Design (ICCAD)

- 1st place for topic "GPU-Accelerated Logic Rewriting"
- and 2nd place for "Routing with Cell Movement Advanced" in 2021 CAD Contest
- 2nd place in 2021 CADathlon

PwC's HackaDay 2019

- 2nd place



Student Training

CUHK Amazon Deep Learning Workshop 2019 & AWSome Day - 2020

- Cooperated with Amazon to offer student training in deep neural networks and machine learning



City Challenge – Bridge to a Smarter City 2016

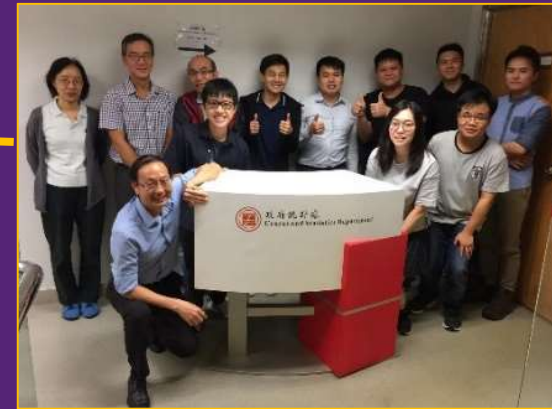
Designed technology-based living applications for the elderly and won the second runner-up



Student Internship

Internship

- Census and Statistics Department, HKSAR
- Centre for Clinical Research and Biostatistics
- New Media Group
- Beta Labs under
The Lane Crawford Joyce Group
- Hong Kong Monetary Authority
- Office of the Government Chief Information Officer
- HSBC
- The Bank of East Asia Limited
- IBM China/Hong Kong Limited
- Information Technology and Health Informatics Division, Hospital Authority
- Cisco Systems, Inc.
- Fujitsu Hong Kong Limited
- SenseTime Group Limited
- Solomon Systech Limited
- Madhead Limited



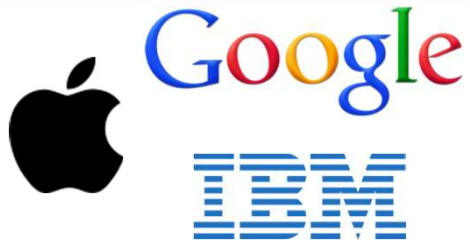
Industrial Visits

- Visit to companies / relevant Government Departments to learn latest market development



Strong Alumni Network

IT Industry



Education/ Government



Banking



HSBC



BNP PARIBAS



Morgan Stanley



J.P.Morgan

Deutsche Bank



What's More?

- Chances to **create your own project and innovation** with support and advice from CSE and STA professors
- **Exchange opportunities** to world-class universities
- **High competitiveness** in job market with **90%** of CSE and STA graduates employed within one month of graduation
- CSE and STA teachers usually have the **highest teaching evaluation scores**



Admission Requirements for JUPAS Applicants



Admission Requirements (2023 Entry) of CDAS

Planned number of students Intake: 20

<i>HKDSE Subject</i>	<i>Minimum Level</i>	<i>Subject Weighting</i>
<i>HKDSE Core Subjects</i>		
English Language	4	1.5
Chinese Language	3	1
Mathematics (Compulsory Part)	4	2
Liberal Studies	2	1
<i>HKDSE Elective Subjects</i>		
Any two subjects	3	#

The CDAS programme accepts any subject as elective,

The programme accepts any subject as elective. The preferred subjects (with a subject weighting of "2") include Mathematics Extended Module 1 or 2, Physics, Chemistry, Economics, Information and Communication Technology, Biology, Combined Science; "1" is given to any other subjects.

Selection is based on the Best 5 HKDSE subjects with subject weighting applied.



Admission Requirements for JUPAS applicants



Grade Point Conversion

Level	5**	5*	5	4	3	2	1
Score	8.5	7	5.5	4	3	2	1

Example: Weighted Best 5 Score

HKDSE	CHI	ENG	MATH	LS	M1/M2	Best Elective	2 nd Elective
Candidate's grade	4	5	5**	4	5*	5**	5*
Weighting	1	1.5	2	1	2	2 (Physics, Chemistry, Economics, Biology, Combined Science, ICT)	1
Weighted Score	4	8.25✓	17✓	4	14✓	17✓	7✓

Programme Best 5 Score:
$$\frac{5.5 \times 1.5 + 8.5 \times 2 + 7 \times 2 + 8.5 \times 2 + 7 \times 1}{1.5 + 2 + 2 + 2 + 1} = 7.44 \text{ (Admission Score)}$$

(Maximum possible total weighting)

Admission Grades of our other elite programmes (2021 Entry)



Artificial Intelligence: Systems and Technologies (AIST)

JUPAS Catalogue No.	Program	Target Percentile	CHI	ENG	MATH	LS	M1/M2	Best Elective	2 nd Best Elective	3 rd Best Elective	Total Ref. Score
JS4468	AIST	UQ	4	5**	5**	4	5*	5*	5*	5*	32
		M	3	5	5**	3	5**	5*	5	5	30
		LQ	3	5	5**	4	5	5*	5*	5	29

Quantitative Finance and Risk Management Science (QFRM)

JUPAS Catalogue No.	Program	Target Percentile	CHI	ENG	MATH	LS	M1/M2	Best Elective	2 nd Best Elective	3 rd Best Elective	Total Ref. Score
JS4276	QFRM	UQ	5	5	5**	4	5**	5**	5**	5*	34
		M	4	4	5**	4	5*	5**	5**	5**	34
		LQ	3	4	5**	4	5**	5**	5*	5*	33

Please visit the website of CUHK's Office of Admissions and Financial Aid later to check the latest admission grades of 2022 Entry

Admission Requirements for Non-JUPAS Applicants



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 more details at OAFA's website!

Non-JUPAS Applications: <http://admission.cuhk.edu.hk/non-jupas-yr-1/requirements.html>

International Applications: <http://admission.cuhk.edu.hk/international/requirements.html>



Curriculum Structure



CDAS Curriculum – Overview

Year

4

Final Year
Project

Major Electives

3

Major Core

Major
Electives

2

Major
Foundation

Major Core

1

Faculty
Package

Major
Foundation

University
Common
Core
(Languages,
GE, PE)
(39 Units)

Free
Electives
(9 Units)

**123
units**



CDAS Curriculum – Major Requirements

Year

4

Final Year
Project

Major Electives

3

Major Core

Major
Electives

2

Major
Foundation

Major Core

1

Faculty
Package

Major
Foundation

75 units



CDAS Curriculum – Faculty Package and Foundation

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

Faculty Package (9 units):

- ★ Advanced Calculus
- ★ Linear Algebra
- ★ Programming

- » Programming (ENGG1110 / ESTR1002)
- » Linear Algebra (ENGG1120 / ESTR1005 / MATH1030)
- » Calculus for Engineers (MATH1510) or University Mathematics (MATH1010)



CDAS Curriculum – Major Foundation

Year

4

Final Year
Project

Major Electives

3

Major Core

Major
Electives

2

Major
Foundation

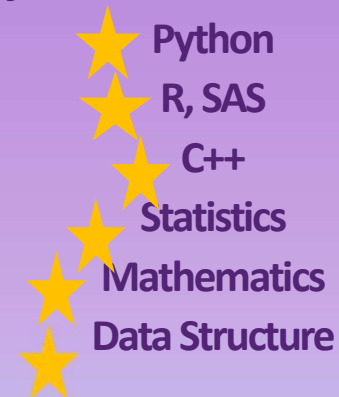
Major Core

1

Faculty
Package

Major
Foundation

Major Foundation (18 units)



- » Intro to Computing Using C++ (CSCI1120 / ESTR1100)
- » Data Structures (CSCI2100 / ESTR2102)
- » Discrete Mathematics (ENGG2440 / ESTR2004)
- » Basic Concepts in Statistics and Probability I & II (STAT2001 & STAT2006)
- » Programming Languages for Statistics (R and SAS) (STAT2005)



CDAS Curriculum – Major Core

Year

4

Final Year
Project

Major Electives

3

Major Core

Major
Electives

2

Major
Foundation

Major Core

1

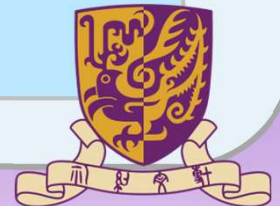
Faculty
Package

Major
Foundation

Major Core (27 units)

- ★ Parallel Computing
- ★ Artificial Intelligence
- ★ Machine Learning
- ★ Statistical Learning
- ★ Data Mining

- » Algorithms and computer systems
- » Machine learning
- » Operating systems
- » Sampling
- » Statistical Inference
- » Statistical Modeling



CDAS Curriculum – Major Electives

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

Major Electives (15 units)

Streams

1. Computational Data Science (General stream) ★
2. Computational Physics ★
3. Computational Medicine ★
4. Computational Social Science ★



CDAS Curriculum – Final Year Project (FYP)

Year

4

Final Year Project

Major Electives

3

Major Core

Major Electives

2

Major Foundation

Major Core

1

Faculty Package

Major Foundation

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

Open topic FYP – you may also propose a project to a professor



Curriculum Comparison Between AIST, CDAS and QFRM

Table 1(a): Typical course structures in the general streams

		Faculty of Engineering			Faculty of Science				Faculty of Business Administration			
		AIST	ENGG	CSCI	PHYS	MATH	STAT	RMSC	FINA	DSME	ACCT	Other
AIST	Faculty Required	18	9	12	3	6						
	Elective	v	v	v			v					v
CDAS	Faculty Required	6	3	27		6	18					
	Elective			v			v	v				v
QFRM	Faculty Required			6		3	12	9	12	6	3	
	Elective			v		v	v	v	v	v	v	v
Mainly about		Computer science & programming			Statistics & mathematics				Finance & business			

AIST: Artificial Intelligence: Systems and Technologies

CDAS: Computational Data Science

QFRM: Quantitative Finance and Risk Management Science



Curriculum Comparison Between AIST, CDAS and QFRM

Table 1(b): Course summary

		ENGG	SCI	BA
AIST	Faculty & Required Elective	46 Mainly	0 Some	0
CDAS	Faculty & Required Elective	6 Mainly	0 Mainly	0
QFRM	Faculty & Required Elective	6 Some	0 Mainly	0 Mainly

Table 2: Administrative department(s) and degree

	Administrative department(s)			Degree
	Department of Computer Science and Engineering	Department of Statistics	Department of Finance	
AIST	✓			Bachelor of Engineering
CDAS	✓	✓		Bachelor of Science
QFRM		✓	✓	Bachelor of Science

AIST: Artificial Intelligence: Systems and Technologies

CDAS: Computational Data Science

QFRM: Quantitative Finance and Risk Management Science



Curriculum Comparison Between AIST, CDAS and QFRM

- Computer Science
- Programming
- Statistics
- Risk Mangement Science
- Mathematics
- Finance
- Business
- Others

	AIST	CDAS	QFRM	
Faculty Package	Programming	Programming	Mathematics	
	Linear Algebra	Linear Algebra	Economics for Business Studies	
	Multivariable Calculus	Advanced Calculus		
Major Foundation	Discrete Mathematics	Discrete Mathematics		
	Advanced Calculus	Data Structure		
	Probability	Probability		
	Statistics	Statistics		
	Python	Python		
	Physics		R, SAS	
			C++	

AIST: Artificial Intelligence: Systems and Technologies

CDAS: Computational Data Science

QFRM: Quantitative Finance and Risk Management Science



Curriculum Comparison Between AIST, CDAS and QFRM

- Computer Science
- Programming
- Statistics
- Risk Mangement Science
- Mathematics
- Finance
- Business
- Others

	AIST	CDAS	QFRM	
Required courses	Algorithms & Computer Systems	Algorithms & Computer Systems Artificial Interlligence	Financial Management Financial Markets Investment Analysis and Portfolio Management Risk Management and Insurance	
	Artificial Intelligence	Operating Systems	Risk Mangement Simulation Methods for Risk Management Science and Finance Statistical Modelling in Financial Markets	
	Machine Learning	Machine Learning / /Data Mining / Statistical Learning	Financial Accounting	
	Data Structure	Survey Methods / Statistical Computing / Bayesian Learning	Statistics Probability Stochastic Processes Applied Regression Analysis	
	Numerical Optimization		Statistical Inference / Applied Regression Analysis	Linear Algebra Advanced Calculus
			Nonparametric Statistics / Categorical Data Analysis	Programming C / C++ / Java Data Structures / Business Information Systems / Information Systems

AIST: Artificial Intelligence: Systems and Technologies

CDAS: Computational Data Science

QFRM: Quantitative Finance and Risk Management Science



Curriculum Comparison Between AIST, CDAS and QFRM

	AIST	CDAS	QFRM
Research	Final Year Project	Final Year Project	Capstone / Research / Practicum
Practicum	Practicum		
	Stream	Stream	
Elective courses	General Artificial Intelligence: Systems and Technologies	Computational Data Science	Business: Courses from Accountancy, Finance, Management, Marketing
	Biomedical Intelligence	Computational Physics	Quantitative Finance: Courses from Finance
	Intelligent Multimedia Processing	Computational Medicine	Risk Management Science: Courses from Risk Management Science, Computer Science, Economics, Mathematics, Statistics
	Large-scale Artificial Intelligence - Theory and Systems	Computational Social Science	
	Intelligent Manufacturing and Robotics	<i>*Engineering Leadership, Innovation, Technology and Entrepreneurship (ELITE) Stream (Faculty of Engineering)</i>	
	<i>*Engineering Leadership, Innovation, Technology and Entrepreneurship (ELITE) Stream (Faculty of Engineering)</i>		

AIST: Artificial Intelligence: Systems and Technologies

CDAS: Computational Data Science

QFRM: Quantitative Finance and Risk Management Science



FAQs



FAQ Contents:

Q: Will there be any interview?

Q: Will there be any exchange opportunity?

Q: Will there be any scholarship or financial aid?

Q: How can I declare the specialized stream?

Q: What are the differences between CDAS,
AIST and QFRM?

Q: I am still struggling to choose
AIST / CSCI / CENG / RMSC / QFRM
What can I do?



**Q: Will there be any
interview?**



Interview Arrangement (JUPAS)

- We plan to arrange interviews in **mid-/late June, 2023**.
- We only consider **Band A applications** for shortlisting.
- 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!



Interview Arrangement (Non-JUPAS)

- Interviews will be conducted in batches from ~Jan. 2023.
- 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: Will there be any
exchange opportunity?**



Exchange to Overseas Universities

- You are encouraged to join the exchange programme to **broaden your horizon** and **learn with peers from diverse background**
- List of some overseas universities for the exchange
 - » Macquarie University, Australia
 - » University of Toronto, Canada
 - » Shanghai Jiao Tong University, China
 - » Telecom & Management SudParis, France
 - » Royal Institute of Technology (KTH), Sweden
 - » University of California, Davis, USA

Submit you application via [Office of Academic Links \(OAL\)](#) !



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 via

[Office of Admissions and Financial Aid \(OAFA\)](#)!



Q: How can I declare the specialized stream?



Stream Declaration

- You should check and **complete the required courses** of the respective stream.
- You will be invited for the stream declaration in the **final year** of study.
- You can declare in **at most one stream**

Major Electives (15 units)

Streams

1. Computational Data Science (General stream)
2. Computational Physics
3. Computational Medicine
4. Computational Social Science



Q: What are the differences between CDAS, AIST and QFRM?



CDAS vs AIST vs QFRM ?



		AIST	CDAS	QFRM
Administrated by	Department of Computer Science and Engineering	V	V	
	Department of Statistics		V	V
	Department of Finance			V
Major Knowledge	AI & Machine Learning	V	V	
	High-performance computing	V	V	
	Statistical Modelling		V	V
	Data Analytics		V	V
	Risk Management		V	V
	Quantitative Finance Business			V
Courses offered by	Faculty of Engineering	V	V	
	Faculty of Science		V	V
	Faculty of Business Administration			V
	Degree	B.Eng.	B.Sc.	B.Sc.

**Q: I am still struggling to
choose AIST / CSCI / CENG /
RMSC / QFRM
What can I do?**



If you are still struggling to choose...

- You can go through our websites and admission materials for a better understanding before submission, and write to us via email to statdept@cuhk.edu.hk or ug-admiss@cse.cuhk.edu.hk whenever you have any queries.
- You can join our outreach activities in the future and chat with our teachers.
- You can also subscribe our social media channels to receive the latest updates from us! Stay tuned!



Contact Us



(852) 3943 7931

(852) 3943 4269



statdept@cuhk.edu.hk

ug-admiss@cse.cuhk.edu.hk

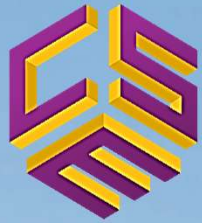


www.sta.cuhk.edu.hk/CDAS

www.cse.cuhk.edu.hk/admission/cdasn/



See you in Fall 2023 !



香港中文大學計算機科學與工程學系
Department of Computer Science and Engineering
The Chinese University of Hong Kong



香港中文大學統計學系

Department of Statistics
THE CHINESE UNIVERSITY OF HONG KONG

