Joint Programme:
Computational Data Science (CDASN)
Academic Counselling for New Students 2022
1. Introduction of CSD & STA Department
2. Introduction of CDAS programme
3. Diverse Experiential Learning
4. Facilities
5. Curriculum Structure
6. Faculty Package
7. Useful links
Introduction of CSD & STA Department
Department of Computer Science and Engineering

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

1968
CS department
1973
Offered courses
1978
CS major
1983
BCS accredited
1991
Engineering faculty
2019
First in HK
AIST program

Department of Statistics

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

1979
Set up STAT program
1981
Foundation of Department
1982
Set up RMSC program
2000
Set up 1st joint program wz Business School: QFRM
2009
STAT joined Science Faculty
2012
broad-based admission scheme
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

Outstanding Fellow of the Faculty of Engineering
Prof. Yip Yuk Lap

UGC - Early Career Award 2019/20
Prof. Kin Wai Chan
Excellence in Research and Teaching

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

W. J. Youden Award in Interlaboratory Testing in JSM 2019
Prof. Yingying Wei

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

University Education Award 2017
Prof. Jimmy Lee
Ranking

- **QS World University**
  
  CUHK: **#7 (#30)** in QS 2020 in Computer Science in Asia (World)
  
  CUHK: **#14 (#51-100)** in QS 2020 in Statistics & Operational Research in Asia (World)

- **U.S. News Best Global Universities**
  
  #4 (#11) in Best Global Universities for Computer Science in Asia (World)
Introduction of CDAS programme
What’s Computational Data Science?

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 \( \rightarrow \) \[
\frac{1}{7 \text{ Million}} \left( \sum_{i \in \text{Group 1}} X_i + \sum_{i \in \text{Group 2}} X_i + \cdots + \sum_{i \in \text{Group } m} X_i \right)
\]
Skills: Parallel computing, cloud computing, distributed system

• **Statistics Approach:**

Strategically sample \( X_{(1)}, \ldots, X_{(m)} \) \( \rightarrow \) \[
\frac{1}{m} \sum_{i=1}^{m} X_{(i)}
\]
Skills: Sampling theory

• **Computational Data Science Approach:** Statistics + Computer Science
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 reindustrialisation initiative.

References:
https://www.chinadailyhk.com/article/156335
InnoHK Clusters Being Developed by the Government

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 AI@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.

AI@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:
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.
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
Special Features

• A "Computer Science/Statistics + X" programme (i.e., the X component)

• 3 specialized streams
  » Computational Physics
  » Computational Medicine
  » Computational Social Science
Every student is assigned an academic advisor who meets with the students at least once per term for purposes of general supervision such as course selection, guided study, adaptation to University learning modes and disciplinary fundamentals, etc.

Students with academic problems or on academic probation / extended probation are required to have a regular meeting with the academic advisor.
Academic Honesty

• https://www.cuhk.edu.hk/policy/academicichonesty/

• Guideline from the Faculty of Engineering
Diverse Experiential Learning
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 your application via **Office of Academic Links (OAL)**!
Student 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
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

PwC’s HackaDay
- 2021: champion
- 2019: 2nd place

International Quant Championship 2018
- National Winner
- competed in the Global Final in Singapore
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
Industrial Visits

• Visit to companies / relevant Government Departments to learn latest market development
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**
Facilities
## CSD Lab Facilities

<table>
<thead>
<tr>
<th>Room no.</th>
<th>Teaching and research lab</th>
<th>Area (sq. m.)</th>
<th>Capacity</th>
<th>No. of PC / Mac / workstation</th>
</tr>
</thead>
<tbody>
<tr>
<td>101</td>
<td>Video Over Internet and Wireless Technologies Lab</td>
<td>50</td>
<td>5</td>
<td>18</td>
</tr>
<tr>
<td>102</td>
<td>Microprocessor Systems Lab</td>
<td>131</td>
<td>70</td>
<td>36</td>
</tr>
<tr>
<td>116</td>
<td>Computer Game Technology Centre</td>
<td>36</td>
<td>20</td>
<td>14</td>
</tr>
<tr>
<td>122</td>
<td>PC Lab</td>
<td>133</td>
<td>78</td>
<td>60</td>
</tr>
<tr>
<td>123</td>
<td>Teaching and General Computing Lab</td>
<td>109</td>
<td>52</td>
<td>50</td>
</tr>
<tr>
<td>901</td>
<td>Virtual Reality, Visualization &amp; Imaging Research Centre</td>
<td>80</td>
<td>17</td>
<td>21</td>
</tr>
<tr>
<td>904</td>
<td>Teaching and General Computing Lab</td>
<td>105</td>
<td>62</td>
<td>60</td>
</tr>
<tr>
<td>924</td>
<td>Teaching and General Computing Lab</td>
<td>248</td>
<td>128</td>
<td>128</td>
</tr>
<tr>
<td>1004</td>
<td>Student Project Lab</td>
<td>105</td>
<td>40</td>
<td>15</td>
</tr>
</tbody>
</table>
CSD Lab Facilities
Important reminders

• A CSE lab account will be given to you in early Sep. This allows you to use the CSD lab facilities

(***@cse.cuhk.edu.hk)**
## STA Facilities

<table>
<thead>
<tr>
<th>Room no.</th>
<th>Teaching and research lab</th>
<th>Area (sq. m.)</th>
<th>Capacity</th>
<th>No. of PC</th>
</tr>
</thead>
<tbody>
<tr>
<td>125-127</td>
<td>STAT Lab</td>
<td>N/A</td>
<td>56</td>
<td>56</td>
</tr>
<tr>
<td>G25-G27</td>
<td>RMSC Lab</td>
<td>N/A</td>
<td>56</td>
<td>56</td>
</tr>
</tbody>
</table>

Including:

- Bloomberg terminals
- Digital Blackboard
- High-Performance Computing (HCP)
Other facilities/support

- Data Resources
- STAT Society Room
- STA Job Post Intranet
- Printing Quotas
Curriculum Structure
# University Core Requirements

<table>
<thead>
<tr>
<th>University Core Courses</th>
<th>4-year</th>
<th>Advance Standing</th>
</tr>
</thead>
<tbody>
<tr>
<td>Language</td>
<td></td>
<td></td>
</tr>
<tr>
<td>English</td>
<td>8</td>
<td>2-5</td>
</tr>
<tr>
<td>Chinese</td>
<td>5</td>
<td>0</td>
</tr>
<tr>
<td>General Education</td>
<td></td>
<td></td>
</tr>
<tr>
<td>University Foundation</td>
<td>6</td>
<td>3-6</td>
</tr>
<tr>
<td>University GE</td>
<td></td>
<td></td>
</tr>
<tr>
<td>University GE (At least 2 units in Area A + 1 course (2-3 units) in each Area C &amp; D)</td>
<td>7</td>
<td>2 (in Area A)</td>
</tr>
<tr>
<td>College GE</td>
<td>6</td>
<td>6</td>
</tr>
<tr>
<td>Understanding China (UGCP1001)</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>(online course - complete before graduation in any one term, including summer term)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hong Kong in the Wider Constitutional Order (UGCP1002)</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>(online course - complete before graduation in any one term, including summer term)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Digital Literacy and Computational Thinking (ENGG1003 or ENGG1004)</td>
<td>3</td>
<td>0</td>
</tr>
<tr>
<td>Physical Education</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td><strong>Total of units required</strong></td>
<td><strong>39</strong></td>
<td><strong>16-22</strong></td>
</tr>
</tbody>
</table>
CDAS Curriculum – Overview

- **Year 4**: Final Year Project, Major Electives
- **Year 3**: Major Core, Major Electives
- **Year 2**: Major Foundation, Major Core
- **Year 1**: Faculty Package, Major Foundation

**Major Core**

- University Common Core (Languages, GE, PE) (39 Units)
- Free Electives (Remaining Units)

Total Units: 123 units
CDAS Curriculum – Major Requirements

Year 4
- Final Year Project
- Major Electives

Year 3
- Major Core
- Major Electives

Year 2
- Major Foundation
- Major Core

Year 1
- Faculty Package
- Major Foundation

75 units
CDAS Curriculum – Faculty Package and 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

Major Foundation (18 units)

- Python
- R, SAS
- C++
- Statistics
- Mathematics
- Data Structure

» Intro to Computing Using C++ (CSCI1120 / ESTR1100)
» Data Structures (CSCI2100 / ESTR2102)
» Discrete Mathematics (ENGG2440 / ESTR2004)
» Programming Languages for Statistics (R and SAS) (STAT2005)
CDAS Curriculum – Major Core

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

<table>
<thead>
<tr>
<th>Year</th>
<th>Final Year Project</th>
<th>Major Electives</th>
<th>Major Electives (15 units)</th>
</tr>
</thead>
<tbody>
<tr>
<td>4</td>
<td></td>
<td></td>
<td>Streams</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>1. Computational Data Science (General stream) ★</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>2. Computational Physics ★</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>3. Computational Medicine ★</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>4. Computational Social Science ★</td>
</tr>
<tr>
<td>3</td>
<td>Major Core</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Major Foundation</td>
<td>Major Core</td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>Faculty Package</td>
<td>Major Core</td>
<td></td>
</tr>
</tbody>
</table>
## CDAS Curriculum – Final Year Project (FYP)

<table>
<thead>
<tr>
<th>Year</th>
<th>Course</th>
</tr>
</thead>
<tbody>
<tr>
<td>4</td>
<td>Final Year Project</td>
</tr>
<tr>
<td></td>
<td>Major Electives</td>
</tr>
<tr>
<td>3</td>
<td>Major Core</td>
</tr>
<tr>
<td></td>
<td>Major Electives</td>
</tr>
<tr>
<td>2</td>
<td>Major Foundation</td>
</tr>
<tr>
<td></td>
<td>Major Core</td>
</tr>
<tr>
<td>1</td>
<td>Faculty Package</td>
</tr>
<tr>
<td></td>
<td>Major Foundation</td>
</tr>
</tbody>
</table>

### 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
Faculty Package
CDAS Curriculum – Year 1 units requirements

**Term 1**
- **CDAS Major courses:** 9 units
  - University Core courses:
    - Chinese Language: 3 units
    - Digital Literacy: 3 units
    - College GE: 0-3 units
    - PE: 1 unit

Max units taken: 19

**Term 2**
- **CDAS Major courses:** 9 units
  - University Core courses:
    - English Language: 3 units
    - GE Foundation (UGFH / UGFN): 3 units
    - PE: 1 unit
    - College GE: 0-3 units

Max units taken: 18
CDAS Curriculum – Faculty Package

Term 1

ENGG1110
Problem Solving By Programming
(Pre-assigned course)

MATH 1010 University Mathematics
Or
MATH 1510 Calculus for Engineers *

Term 2

ENGG 1120 linear Algebra for Engineers
Or
MATH 1030 - Linear Algebra I

- A placement test (on Aug 19) is required before enrolling MATH1510.
  If student failed the placement test, s/he is required to take MATH1020
  in addition to MATH1510.
CDAS Curriculum – Year 1 recommended major courses

**Term 1**
- **ENGG1110**
  Problem Solving By Programming
- **MATH 1010 University Mathematics**
  Or
  **MATH 1510 Calculus for Engineers** *
- **STAT 2001 Basic Concepts in Statistics and Probability I**

**Term 2**
- **ENGG 1120 linear Algebra for Engineers**
  Or
  **MATH 1030 Linear Algebra I**
- **STAT 2005 Programming Languages for Statistics**
- **STAT 2006 Basic Concepts in Statistics and Probability II**

• A placement test (on Aug 19) is required before enrolling MATH1510. If student failed the placement test, s/he is required to take MATH1020 in addition to MATH1510.
Where can I find course information?

CUSIS

- Study scheme: [Browse Program Information]
- Course syllabus, learning outcomes: [Browse Course Catalog]
- Teaching Timetable: [Teaching timetable by Subj/Dept]
Useful Links

• Student Handbook

• Registration and Examinations Section
  http://www.res.cuhk.edu.hk/

• Office of Academic Links (OAL)
  https://www.oal.cuhk.edu.hk/

• Office of Student Affairs (OSA)
  http://www.osa.cuhk.edu.hk/

• Financing Your Studies by the Office of Admissions and Financial Aid
  http://admission.cuhk.edu.hk/finance.html

• ITSC
  https://www.itsc.cuhk.edu.hk/

• Library
  https://www.lib.cuhk.edu.hk/
FAQs
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
Contact Us

(852) 3943 9422 (STA) / (852) 3943 8402 (CSD)
statdept@cuhk.edu.hk / dept@cse.cuhk.edu.hk
www.sta.cuhk.edu.hk/cdas2021/
www.cse.cuhk.edu.hk/academics/cdasn/