Computer Science
Applicable to students admitted in 2020-21

Major Programme Requirement

Students are required to complete a minimum of 75 units of courses as follows:

		Units
1.	Faculty Package: ENGG1110/ESTR1002, ENGG1120/ESTR1005, ENGG1130/ ESTR1006	9
2.	Foundation Courses:	
(a)	Any one course from the following: Chemistry Courses: CHEM1380 Life Science Courses: LSCI1001, 1003 Physics Courses[a]: ENGG1310/ESTR1003, PHYS1003, 1110	3
(b)	CSCI1130/ESTR1102[b]	3
(c)	ENGG2440/ESTR2004, ENGG2760/ESTR2018, ENGG2780/ ESTR2020, MATH1510[c]	10
3.	Required Courses:	
(a)	CENG3420, CSCI2100/ESTR2102, CSCI3100, 3130, CSCI3150/ESTR3102, CSCI3160/ESTR3104, CSCI3180/ ESTR3106, CSCI3250, 3251, ENGG2020/ESTR2104	27
(b)	Research Component Courses[d]: CSCI4998, 4999	6
4.	Choose any ONE from the following seven options:	17

(a) <u>General Computer Science</u>
Elective Courses:
Choose 17 units from CSCI3230/ESTR3108, CSCI4180/ ESTR4106, CSCI4430/ESTR4120, ENGG1820, (ENGG3802 and 3803), IERG4300/ESTR4300, STAT2004, 2006 and the AIST/CENG/CSCI courses of which at least 15 units must be from courses at 3000 or above level

(b) <u>Stream 1: Intelligence Science</u>
Required Courses:
CSCI3230/ESTR3108
Elective Courses:
Choose at least 9 units from the following:
AIST3510/SEEM3510, CSCI3220, 3320, 4190, 4230, 5030, 5050, 5150, CSCI5160/ENGG5102, CSCI5170, CSCI5180/ENGG5103, CSCI5240, CSCI5250/ENGG5106, CSCI5280/ENGG5104, CSCI5350, 5390, CSCI5510/ENGG5108, CSCI5580, ENGG5781, IERG3320, IERG4300/ESTR4300
Remaining units can be chosen from the following:
AIST/CENG/CSCI courses at 2000 or above level, ENGG1820, (ENGG3802, 3803), STAT2004, 2006

(c) <u>Stream 2: Database and Information Systems</u>
Required Courses:
CSCI3170
Elective Courses:
Choose at least 9 units from the following:
CSCI3220, CSCI3230/ESTR3108, CSCI3320, 4140, CSCI4160/ESTR4104, CSCI4180/ESTR4106, CSCI4190, CSCI4430/ESTR4120, CSCI5010, 5120, CSCI5180/ENGG5103, CSCI5250/ENGG5106, CSCI5470/ENGG5105, CSCI5510/ ENGG5108, CSCI5550, 5570, 5590, ENGG5781, IERG4300/ ESTR4300, IERG4330, SEEM3490, 4630, 5010
Remaining units can be chosen from the following:
AIST/CENG/CSCI courses at 2000 or above level, ENGG1820, (ENGG3802 and 3803), STAT2004, 2006

(d) <u>Stream 3: Rich Media</u>
Required Courses:
CSCI3260, 3280
Elective Courses:
Choose at least 6 units from the following:
AIST2010, AIST3510/SEEM3510, CSCI3230/ESTR3108, CSCI3290, 4120, CSCI4160/ESTR4104, CSCI4430/ESTR4120, CSCI5210, CSCI5280/ENGG5104, CSCI5390, 5460, CSCI5510/ ENGG5108

Remaining units can be chosen from the following:
AIST/CENG/CSCI courses at 2000 or above level, ENGG1820, (ENGG3802 and 3803), IERG4300/ESTR4300, STAT2004, 2006

(e) Stream 4: Distributed Systems, Networks and Security
Required Courses:
CSCI4180/ESTR4106, CSCI4430/ESTR4120
Elective Courses:
Choose at least 6 units from the following:
CSCI3310, CSCI4130/IERG4130/ESTR4306, CSCI4140, CSCI4160/ESTR4104, CSCI4190, 5080, 5390, 5440, CSCI5470/ENGG5105, CSCI5510/ENGG5108, CSCI5550, 5570, 5590, 5600, IERG4210, IERG4300/ESTR4300, IERG4350
Remaining units can be chosen from the following:
AIST/CENG/CSCI courses at 2000 or above level, ENGG1820 (ENGG3802 and 3803), STAT2004, 2006

(f) Stream 5: Algorithms and Complexity
Elective Courses:
Choose at least 12 units from the following:
CSCI3220, 4230, 5010, CSCI5160/ENGG5102, CSCI5170, 5240, 5320, 5350, 5440, 5450, 5560, 5580, IERG3300/ESTR3304, IERG5154, MATH3260, 4230, 4260
Remaining units can be chosen from the following:
AIST/CENG/CSCI courses at 2000 or above level, ENGG1820, (ENGG3802 and 3803), IERG4300/ESTR4300, STAT2006

(g) Stream 6: Data Analytics
Required Courses:
CSCI3320, STAT2006
Elective Course 1:
Choose at least 6 units from the following:
CSCI3170, 3220, CSCI4180/ESTR4106, CSCI4190, 4230, 5030, 5050, 5120, 5150, CSCI5180/ENGG5103, CSCI5510/ENGG5108, CSCI5550, 5570, 5580, IERG4230, IERG4330/ESTR4316
Elective Course 2:
Choose at least 3 units from the following:
RMSC4002, STAT3004, 4002, 4003, 4006
Remaining units can be chosen from the following:
AIST/CENG/CSCI courses at 2000 or above level, ENGG1820, (ENGG3802 and 3803), IERG4300/ESTR4300, STAT2003, 2004

Total: **75**

In addition to fulfilling the above Major Programme Requirement, students may also challenge themselves by taking the following stream offered by the Faculty:

Engineering Leadership, Innovation, Technology and Entrepreneurship (ELITE) Stream[e]
Elective Courses:
15 units of courses[f]:
i)   12 units of ESTR courses of which at most 6 units of courses at 1000 or 2000 level and at least 6 units of courses at 3000 or 4000 level[g]
ii)   3 units of BMEG/CENG/CSCI/ELEG/ENGG/IERG/MAEG/SEEM courses at 5000 level[h]

Explanatory Notes:
1.   Students who have fulfilled the Major Programme Requirements of their respective Engineering programmes (or equivalent courses as approved by the Sub-Committee on Education Technologies) will be eligible to apply for exemption of 1 unit of University Core IT Requirement.
     Students are required to apply for the exemption. When exemption from a particular course is recognized, students can only be exempted from the course but not the units. Please follow the application procedures as announced by the IT Foundation Course Office at https://engg1000.cse.cuhk.edu.hk.
2.   AIST/BMEG/CENG/CSCI/EEEN/ELEG/ENER/ENGG/ESTR/IERG/MAEG/SEEM courses at 2000 and above level will be included in the calculation of Major GPA for honours classification, excluding courses in Faculty Package and Foundation courses.
[a]   The Physics course shall be taken in accordance with students' HKDSE results or placement test results as follows:
     i)   Students who have attained Level 4 or above in HKDSE Mathematics (Compulsory Part) AND Level 4 or above in Physics or Level 5 or above in Combined Science with Physics Component shall take ENGG1310/ESTR1003 or PHYS1110.
     ii)   Students with HKDSE results but did not attain the academic levels as stated in (i) shall take PHYS1003.

| | | iii) | Students without HKDSE results shall sit for the placement test arranged by the Department of Physics. Students who pass the placement test shall take ENGG1310/ESTR1003 or PHYS1110. Students who fail or are absent from the placement test shall take PHYS1003. |

[b] CSCI1130/ESTR1102 shall be taken in Term 1 of Year 2.

[c] i) Non-JUPAS admittees and JUPAS admittees with HKDSE Mathematics Extended Modules I or II are required to attend a Mathematics Placement Test. Students who fail or are absent from the Placement Test will be required to take MATH1020 in the same term when they take MATH1510.

   ii) JUPAS admittees without HKDSE Mathematics Extended Modules I or II are required to take MATH1020 concurrently with MATH1510.

   iii) Students who fail MATH1510 in Term 1 will have to retake the course in Term 2. The pre-assigned course, ENGG1130, will also be dropped.

[d] Students who have declared to specialize in the ELITE Stream will be required to complete 6 units of ESTR4998 and 4999 to substitute for CSCI4998 and 4999.

[e] Details of the entrance and coursework requirements, and declaration procedures for the ELITE Stream can be found at the ELITE website (www.erg.cuhk.edu.hk/elite).
Non-ELITE Engineering students may be allowed to take ESTR courses. Students are required to seek approval from their respective Major Programmes for using ESTR courses taken to fulfill the Major Programme Requirement. Details are available at the ELITE website.

[f] Students can use up to 9 units of courses which have been taken to fulfill the requirements of items 1 to 4 above to fulfill the elective requirements of the ELITE Stream. Item 3(b) Research Component Courses will not be included in these 9 units. A full list of ESTR courses is available at the ELITE website.

[g] Students can use BMEG/CENG/CSCI/ELEG/ENGG/IERG/MAEG/SEEM courses at 5000 level to substitute for ESTR courses at 3000 or 4000 level, subject to the approval of the Stream Director and the Associate Dean (Education).

[h] The requirement of at least 3 units of Engineering courses at 5000 level is a requirement for the ELITE Stream only. It should not be interpreted as a requirement of the Major Programme.

	Recommended Course Pattern	Units
First Year of Attendance	1st term Faculty Package: ENGG1110/ESTR1002 Major Required: CHEM1380/ENGG1310/ESTR1003/LSCI1001/1003/ PHYS1003/1110, MATH1510 Major Elective(s):	3 3-6
	2nd term Faculty Package: ENGG1120/ESTR1005, ENGG1130/ESTR1006 Major Required: CHEM1380/ENGG1310/ESTR1003/LSCI1001/1003/ PHYS1003/1110 Major Elective(s):	6 0-3
Second Year of Attendance	1st term Major Required: CSCI1130/ESTR1102, ENGG2020/ESTR2104, ENGG2440/ESTR2004, ENGG2760/ESTR2018 Major Elective(s):	11
	2nd term Major Required: CENG3420, CSCI2100/ESTR2102, ENGG2780/ ESTR2020 Major Elective(s):	8
Third Year of Attendance	1st term Major Required: CSCI3130, CSCI3150/ESTR3102, CSCI3160/ ESTR3104 Major Elective(s): 3 units from stream required course / major elective courses	9 3
	2nd term Major Required: CSCI3100, CSCI3180/ESTR3106, CSCI3250, 3251 Major Elective(s): 3 units from stream required course / major elective courses	9 3
Fourth Year of Attendance	1st term Major Required: CSCI4998 Major Elective(s): 6 units from major elective courses / stream elective courses	3 6
	2nd term Major Required: CSCI4999 Major Elective(s): 5 units from major elective course / stream elective course	3 5
Total (including Faculty Package):		**75**

Course List		
Course Code	*Course Title*	*Unit(s)*
CSCI1020	Hands-on Introduction to C++	1
CSCI1030	Hands-on Introduction to Java	1
CSCI1040	Hands-on Introduction to Python	1
CSCI1110	Introduction to Computing Using C	3
CSCI1120	Introduction to Computing Using C++	3
CSCI1130	Introduction to Computing Using Java	3
CSCI1140	Programming Laboratory	1
CSCI1510	Computer Principles and C Programming	3
CSCI1520	Computer Principles and C++ Programming	3
CSCI1530	Computer Principles and Java Programming	3
CSCI1540	Fundamental Computing With C++	3
CSCI1580	Visual Programming	3
CSCI2100	Data Structures	3
CSCI2120	Introduction to Software Engineering	2
CSCI2510	Computer Organization	3
CSCI2520	Data Structures and Applications	3
CSCI2720	Building Web Applications	3
CSCI3100	Software Engineering	3
CSCI3120	Compiler Construction	3
CSCI3130	Formal Languages and Automata Theory	3
CSCI3150	Introduction to Operating Systems	3
CSCI3160	Design and Analysis of Algorithms	3
CSCI3170	Introduction to Database Systems	3
CSCI3180	Principles of Programming Languages	3
CSCI3190	Introduction to Discrete Mathematics and Algorithms	3
CSCI3220	Algorithms for Bioinformatics	3
CSCI3230	Fundamentals of Artificial Intelligence	3
CSCI3250	Computers and Society	2
CSCI3251	Engineering Practicum	1
CSCI3260	Principles of Computer Graphics	3
CSCI3270	Advanced Programming Laboratory	2
CSCI3280	Introduction to Multimedia Systems	3
CSCI3290	Computational Imaging and Vision	3
CSCI3310	Mobile Computing and Applications Development	3
CSCI3320	Fundamentals of Machine Learning	3
CSCI4120	Principles of Computer Game Software	3
CSCI4130	Introduction to Cyber Security	3
CSCI4140	Open-Source Software Project Development	3
CSCI4160	Distributed and Parallel Computing	3
CSCI4180	Introduction to Cloud Computing and Storage	3
CSCI4190	Introduction to Social Networks	3
CSCI4230	Computational Learning Theory	3
CSCI4430	Data Communication and Computer Networks	3
CSCI4998	Final Year Project I	3
CSCI4999	Final Year Project II	3
CSCI5010	Practical Computational Geometry Algorithms	3
CSCI5030	Machine Learning Theory	3
CSCI5050	Bioinformatics and Computational Biology	3
CSCI5080	Advanced System Security	3
CSCI5120	Advanced Topics in Database Systems	3
CSCI5150	Machine Learning Algorithms and Applications	3
CSCI5160	Advanced Algorithms	3
CSCI5170	Theory of Computation Complexity	3
CSCI5180	Techniques for Data Mining	3
CSCI5210	Advanced Computer Graphics and Visualization	3
CSCI5240	Combinatorial Search and Optimization with Constraints	3
CSCI5250	Information Retrieval and Search Engines	3
CSCI5280	Image Processing and Computer Vision	3

CSCI5320	Topics in Graph Algorithms	3
CSCI5350	Advanced Topics in Game Theory	3
CSCI5390	Advanced GPU Programming	3
CSCI5440	Theory of Cryptography	3
CSCI5450	Randomness and Computation	3
CSCI5460	Virtual Reality	3
CSCI5470	Computer and Network Security	3
CSCI5510	Big Data Analytics	3
CSCI5550	Advanced File and Storage Systems	3
CSCI5560	Analysis of Boolean Functions	3
CSCI5570	Large Scale Data Processing Systems	3
CSCI5580	Online Algorithms for Machine Learning and Optimizations	3
CSCI5590	Advanced Topics in Blockchain	3
CSCI5600	Advanced Topics in Distributed Systems	3
CSCI5610	Advanced Data Structures	3
ENGG1310	Engineering Physics: Electromagnetics, Optics and Modern Physics	3
ENGG1820	Engineering Internship	1
ENGG2020	Digital Logic and Systems	3
ENGG2440	Discrete Mathematics for Engineers	3
ENGG2760	Probability for Engineers	2
ENGG2780	Statistics for Engineers	2
ENGG3802	Introduction to Engineering Entrepreneurship	1
ENGG3803	Engineering Entrepreneurship Development Project	2
ENGG5102	Advanced Algorithms	3
ENGG5103	Techniques for Data Mining	3
ENGG5104	Image Processing and Computer Vision	3
ENGG5105	Computer and Network Security	3
ENGG5106	Information Retrieval and Search Engines	3
ENGG5108	Big Data Analytics	3
ENGG5781	Matrix Analysis and Computations	3
ESTR1003	Engineering Physics: Electromagnetics, Optics and Modern Physics	3
ESTR1100	Introduction to Computing Using C++	3
ESTR1102	Introduction to Computing Using Java	3
ESTR2004	Discrete Mathematics for Engineers	3
ESTR2018	Probability for Engineers	2
ESTR2020	Statistics for Engineers	2
ESTR2102	Data Structures	3
ESTR2104	Digital Logic and Systems	3
ESTR3102	Introduction to Operating Systems	3
ESTR3104	Design and Analysis of Algorithms	3
ESTR3106	Principles of Programming Languages	3
ESTR3108	Fundamentals of Artificial Intelligence	3
ESTR4104	Distributed and Parallel Computing	3
ESTR4106	Introduction to Cloud Computing and Storage	3
ESTR4120	Data Communication and Computer Networks	3