School of Data Science
數據科學學院

香港城市大學
City University of Hong Kong

Bachelor of Science in Data Science
理學士(數據科學)

Student Handbook
2020–2021

(Please note that the information given in this Handbook is accurate at the time of printing in August 2020. Changes to the information may be made from time to time without prior notification.)

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BACHELOR OF SCIENCE IN

DATA SCIENCE
(BSC DS)

Student Handbook (2020-2021)

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1 AIMS OF MAJOR

This major is to provide graduates in data science with essential training of quantitative knowledge, statistical theory, machine learning technology for the effective use and analysis of big and complex data for real-world applications. The primal goal of this data science major is to train a generation of students who are equally versed in data processing, data analysis, predictive modeling, and computational techniques and enable them the skills for the challenges in future that involve making sense of complex data to realize planning and decision making. The major offers a suite of courses and programs to equip and empower students of quantitative background to become professionals and practitioners of rigorous, actionable, and ethical data science. To this end, besides providing rigorous education about data science models and methods, the major also emphasizes the interdisciplinary training and the expertise of particular subject domains as well as communication skills and ethical awareness.

Intended Learning Outcomes of Major (MILOs)

Upon successful completion of this Major, a BSC DS graduate should be able to:

1. Integrate the theories and principles of mathematical, statistical, computing foundations for the data science;
2. Gain computing expertise with data collection, data analysing, data visualization, statistical analysis and machine learning.
3. Build skills and intelligence of organizing and analysing data with a level of flexibility within different application modules.
4. Use a variety of software packages to conduct data curation, modeling, computation and inference and draw conclusions and actionable insights.
5. Create and formulate the data-driven models in practice; master the spectrum of the data science life cycle and the connection to specific domain knowledge and business models.
6. Acquire work related experience and effective communication skills necessary to work within a team in an international and culturally diverse workplace.
7. Recognize the social responsibility and ethic awareness for the development of the data-driven technologies in the modern era of big data.

2 DEGREE REQUIREMENT

2.1 Minimum Number of Credit Units Required for the Award

Degree Requirement	**Normative 4-year Degree**	**Advanced Standing I** (Note 1)
Gateway Education requirement	30 credit units	21 credit units
College/School requirement	18 credit units	18 credit units
Major requirement	54 credit units (Core: 33 Elective: 21)	45 credit units (Core: 33 Elective: 12)
Free electives / Minor (optional)	18 credit units	6 credit units
Minimum number of credit units required for the award	**120 credit units**	**90 credit units**

Maximum number of credit units permitted	**144 credit units**	**114 credit units**

Normal Period of Study

	Normative 4-year Degree	**Advanced Standing I**
Normal period of study	4 years	3 years
Maximum period of study	8 years	6 years

Note 1: For students holding 13-year school-leaving qualifications or equivalent.

2.2 Gateway Education

(Please refer to *https://www.cityu.edu.hk/edge/ge*)

Requirements	**Normative 4-year Degree**	**Advanced Standing I**
University requirements		
English		
• GE1401 University English	3 credit units	3 credit units
• Discipline-specific English	3 credit units	3 credit units
GE1501 Chinese Civilisation – History and Philosophy	3 credit units	3 credit units
Distributional requirements Area 1: Arts and Humanities Area 2: Study of Societies, Social and Business Organisations Area 3: Science and Technology	12 credit units *(At least one course from each of the three areas)*	6 credit units *(From two different areas)*
College/School-specified courses ^	9 credit units	6 credit units
Total	**30 credit units**	**21 credit units**

^College/School-specified courses for fulfilling the Gateway Education requirement

Course Code	**Course Title**	**Level**	**Credit Units**	**Remarks**
Normative 4-year Degree				
MA1508	Calculus	B1	4	
CS2311/CS2315	Computer Programming	B2	3	
SDSC1001	Introduction to Data Science	B1	2	
Advanced Standing I				
CS2311/CS2315	Computer Programming	B2	3	
Take any course not within the Major requirement (including Core Courses and Electives)			3	

2.3 English Language Requirement

Normative 4-year degree students who passed the 6 credit units of specified GE English courses are recognized as fulfilling the University's English Language Requirement.

Students scoring below Level 4 in HKDSE English Language or Grade D in HKALE AS-level Use of English or students who do not possess an equivalent qualification are required to complete two 3-credit unit courses, EL0200A English for Academic Purposes 1 and EL0200B English for Academic Purposes 2, prior to taking the GE English courses. Students who demonstrate that they have achieved a grade B or above in their overall course results for EL0200A will achieve 3 credits and also be considered to have satisfied the pre-requisite for entry to the GE English courses without needing to take EL0200B. The credit units of EL0200A and EL0200B will not be counted towards the minimum credit units required for graduation and will not be included in the calculation of the cumulative grade point average (CGPA). However, they will be counted towards the maximum credit units permitted.

2.4 Chinese Language Requirement

Students scoring below Level 4 in HKDSE Chinese Language, or below Grade D in HKALE AS-level Chinese Language and Culture will be required to complete a 3-credit unit course CHIN1001 University Chinese I. The 3 credit units will not be counted towards the minimum credit units required for graduation and will not be included in the calculation of the cumulative grade point average (CGPA). However, they will be counted towards the maximum credit units permitted.

2.5 College/School Requirement

Course Code	Course Title	Level	Credit Units	Remarks
MA1503	Linear Algebra with Applications	B1	4	
MA2506	Probability and Statistics	B2	4	
MA2508	Multi-variable Calculus	B2	4	
SDSC2001	Python for Data Science	B2	3	
CS3402	Database Systems	B3	3	

2.6 Major Requirement

2.6.1 Core Courses

Normative 4- year Degree and Advanced Standing I: 33 credit units

Course Code	Course Title	Level	Credit Units	Remarks
SDSC2102/ MS2602	Statistical Methods and Data Analysis/ Statistical Inference	B2	3	
SDSC2002	Convex Optimization	B2	3	
SDSC2003	Human Contexts and Ethics in Data Science	B2	3	
SDSC2004	Data Visualization	B2	3	
SDSC2005	Introduction to Computational Social Science	B2	3	
CS3273	Data Protection and System Security	B3	3	
CS3334	Data Structures	B3	3	
SDSC3006	Fundamentals of Machine Learning I	B3	3	
SDSC3007	Advanced Statistics	B3	3	
SDSC4116	Data Science Capstone	B4	6	

2.6.2 Electives

Students may choose available elective courses from any modules for specialization.
Normative 4-year Degree: 21 credit units
Advanced Standing I: 12 credit units

(Must earn at least 12 credit units from B4 level courses)

Course Code	Course Title	Level	Credit Units	Module(s)
GE2339	Smart City – a Systems Engineering Perspective	B2	3	Artificial Intelligence Module
IS2505	E-Business	B2	3	General
CS3201	Computer Networks	B3	3	General
EE3919	Medical Imaging and Signal Processing	B3	3	General
LT3233	Computational Linguistics	B3	3	General
SDSC3001	Big Data: The Arts and Science of Scaling*	B3	3	Artificial Intelligence Module
SDSC3002	Data Mining	B3	3	Artificial Intelligence Module and Statistical Learning Module
SDSC3003	Blockchain	B3	3	General
SDSC3004	Computational Optimization	B3	3	Statistical Learning Module
SDSC3005	Computational Statistics	B3	3	Statistical Learning Module
SDSC3008	Systems Dynamics and Control	B3	3	Artificial Intelligence Module
SDSC3009	Behavioural Analytics	B3	3	Social Media Analytics Module
SDSC3010	Digital Trace Analytics	B3	3	Social Media Analytics Module
SDSC3011	Social Data Processing and Modelling	B3	3	Social Media Analytics Module
SDSC3013	Introduction to Social Media Analytics*	B3	3	Social Media Analytics Module
SDSC3014	Introduction to Sharing Economy	B3	3	General
SDSC3015	Knowledge Graph and Cognitive Computing	B3	3	Artificial Intelligence Module
SDSC3016	Social Network Analysis	B3	3	Social Media Analytics Module
SDSC3017	Game Theory and Its Application	B3	3	Artificial Intelligence Module
SDSC3018	Introduction to Internet of Things	B3	3	General
SDSC3022	Financial Data Analytics for Investments	B3	3	General
SDSC3023	Data Science Applications in Portfolio Risk Analysis	B3	3	General
SDSC3060	Operation Research	B3	3	General

Course Code	Course Title	Level	Credit Units	Module(s)
SDSC3105	Bayesian Analysis*	B3	3	Statistical Learning Module
COM4511	Social Media and Communication	B4	3	Social Media Analytics Module
CS4186	Computer Vision and Image Processing	B4	3	General
CS4286	Internet Security and E-Commerce Protocols	B4	3	General
CS4296	Cloud Computing	B4	3	General
CS4480	Data-Intensive Computing	B4	3	General
CS4486	Artificial Intelligence	B4	3	Artificial Intelligence Module
CS4487	Machine Learning	B4	3	Artificial Intelligence Module
SDSC4001	Foundation of Reinforcement Learning	B4	3	Artificial Intelligence Module
SDSC4008	Deep Learning	B4	3	Artificial Intelligence Module and Statistical Learning Module
SDSC4009	Data Intelligence in Action	B4	3	Artificial Intelligence Module
SDSC4010	Projects in Data Science (research)	B4	3	General
SDSC4011	Experimental Research for Social Media	B4	3	Social Media Analytics Module
SDSC4016	Fundamentals of Machine Learning II*	B4	3	Artificial Intelligence Module and Statistical Learning Module
SDSC4018	AI in Systematic Trading	B4	3	Artificial Intelligence Module
SDSC4019	Stochastic Processes and Applications	B4	3	Statistical Learning Module
SDSC4026	Systems Modelling and Simulation	B4	3	General
SDSC4107	Financial Engineering and Analytics	B4	3	General
SDSC4110	Statistical Design and Analysis of Experiments	B4	3	Statistical Learning Module

*Remark: To complete the study of one module, students are required to take the module required course (with * mark) AND take at least 4 courses in total in this module.*

2.7 Classification of Award

For Students on Programmes of a Normal Study Duration of 4 Years or More (Admitted from 2020/21)

Degrees with Distinction are awarded based on the CGPA ranking for students in the respective departments/schools graduating in the same semester/term.

Classification	**CGPA**
summa cum laude (Highest Distinction)	the top 2%
magna cum laude (High Distinction)	the next 5%
cum laude (Distinction)	the next 8%

For Advanced Standing I Students (Admitted in 2020/21)

The University grants bachelor's degree awards with the following classifications:

Classification	**CGPA**
1st Class	CGPA 3.5 or above
2nd Upper	CGPA 3.00 – 3.49
2nd Lower	CGPA 2.50 – 2.99
3rd Class	CGPA 2.00 – 2.49
Pass	CGPA 1.70 – 1.99

For more details, please go to https://www.cityu.edu.hk/arro/content.asp?cid=405

2.8 Bonus Features

Student Exchange/Internship

The School provides student exchange and internship opportunities to our students to gain international perspectives, global engagement and industry experience.

Students may choose between the overseas student exchange opportunities at world-leading institutions provided by the School or the University. Paying the tuition at CityU, students will spend a study semester abroad and may transfer the academic credits earned at the host institution to fulfil the graduation requirement.

The School also partners with premier corporates in a wide range of sectors to offer internship opportunities relevant to our majors. With these placements, students are expected to gain practical knowledge and hands-on experience in real-world applications.

3 ACADEMIC REGULATIONS AND GUIDELINES

Students should observe the University's academic regulations and guidelines at all times. More information can be available by referring to the following websites maintained by the Academic Regulations and Records Office (ARRO).

ARRO Homepage: *http://www.cityu.edu.hk/arro/*

4 ACADEMIC HONESTY

Academic honesty is central to the conduct of academic work. Students are responsible for knowing and understanding the Rules on Academic Honesty. To enhance students' understanding on academic honesty, all students are required to complete a tutorial on academic honesty and make a declaration on their understanding of this core academic principle online on or before **30 November 2020** in order to access their course grades. For details, please refer to ARRO website: *http://www.cityu.edu.hk/provost/academic_honesty/*.

5 STUDENT DEVELOPMENT SERVICES (SDS)

The SDS offers many student-centred services to students. It provides support and assistance for students in the following areas:

- Attainment of an all-round development
- Enrichment of campus life
- Development of career plans and choices
- Solving personal problems
- Enhancement of physical and mental well-being
- Provision of financial assistance
- Scholarship application
- Welfare provisions

6 COMMUNICATIONS

Listed below are the normal channels of communication between students and courses / major / School :

a) Students having difficulties in a course of study should first talk to the course instructor concerned.
b) A student who wishes to discuss the overall organization of the major should speak to the Major Leader or Deputy Major Leader.
c) The SDSC Joint Staff & Student Consultative Committee helps to facilitate consultation and communication. A student from each entry cohort will be elected to sit in the Committee.
d) In addition, a student from each entry catalogue term will be elected to sit in the Major Programme Committee which meets every semester to discuss major-related matters.
e) Students should feel free to approach their respective academic advisors for advice regarding their study plan or personal and career development.

7 MAJOR LEADERS

Major Leader:	Dr ZHOU, Xiang	3442-6421	xizhou@cityu.edu.hk
Deputy Major Leader:	Dr ZHANG, Qingpeng	3442-4727	qingpeng.zhang@cityu.edu.hk

8 INFORMATION TO NEW STUDENTS

8.1 How to access your Personal Class Schedule

i) Go to ***http://www.cityu.edu.hk*** from any terminal on campus or off campus, then point to "**Quick Links**" at the top and click "**AIMS**".
ii) Log onto AIMS.
iii) Click "Course Registration" menu.
iv) Click "Weekly Schedule", choose the appropriate term and press "Submit".
v) You will find your class schedule in matrix form.
vi) Press the "View Detail Schedule" button at the bottom of your matrix timetable to display details of your class schedule.

8.2 How to get Instructors' handouts through Canvas

i) Log onto the CityU e-Portal from any terminal on campus or off campus.
ii) Enter the course under "My Courses"
iii) Click " Files".

8.3 How to check Major Programme Requirement and Course Syllabi

Go to the CityU home page and click "Academic Programmes".

8.4 Course Registration for Semester A 2020-2021

For Semester A 2020-2021, students will be pre-registered in required courses and major electives in most cases if possible.

i) The date for release of your class schedule is **28 July 2020**. Please check your curriculum requirements, review your study plan and then make appropriate adjustments to your pre-registered courses.
ii) Add/Drop of courses can be made through AIMS for web-enabled courses during the web registration period. For non-web-enabled courses, approval is required from the major department and you can submit your change request by using the paper Add/Drop Form.

How to do the Add/Drop:
- Go to *http://www.cityu.edu.hk* from any terminal on campus or off campus and click "AIMS".
- Log onto "AIMS" and then click "Course Registration".
- Choose "Add or Drop Classes".
- Select and choose the correct term.

iii) Web registration begins on **24 August 2020** but you need to check your time ticket first from "AIMS".
iv) All add/drops end at **11:30pm, 7 September 2020**.
v) Details of course registration arrangements for Semester A 2020/21 will be available near the end of July 2020. For details, please refer to ARRO website: *http://www.cityu.edu.hk/arro/content.asp?cid=163*

8.5 How to access your Student Email Account

i) Access **http://www.cityu.edu.hk** and point to "**Quick Links**" at the top of the screen and select "**Email**".
ii) In the Email Services home page, click **"@my.cityu.edu.hk**" under column of "**Student**" to go to **M365 Web Logon**.
iii) Read through the whole page if you are not familiar with webmail. Then click button "**M365 Sign-in page**" at the bottom.
iv) Enter Sign-in ID in such format "**YourEID-c@my.cityu.edu.hk**" and click "Next".
v) Click "Sign in" after keying in password.

Important notes:

For email communication:
Please state your ***student name, number and contact telephone number***.

8.6 Credit Transfer / Course Exemption

Applications for credit exemption must be made before the first semester of the student's admission. Students granted course exemption are required to take other courses to make up the credits required for fulfilling the award requirements. For Semester A 2020-2021, the application period is from **15 July to 29 August 2020**. For details, please refer to ARRO website: *http://www6.cityu.edu.hk/arro/content.asp?cid=10*.

8.7 Administrative Support from General Office

Mon to Fri	9:00am to 5:30 pm
Lunch Break	*12:30pm to 1:45pm*
Sat, Sun & Public Holiday	Closed
Inquiry:	3442-7887
Fax:	3442-0173
Email:	sdscgo@cityu.edu.hk

Appendix I : Model Study Path

For Reference Only

Model Study Path for BSc in Data Science 2020/2021 (normative 4-year)

Yr	Sem	Major Requirements					University Requirements			CUs
2020 / 21 (Year 1)	A	School Specified - MA1508 Calculus (4)	School Specified - CS2311/CS2315 Computer Programming (3)				English 1 - GE1401 University English (3)	Gateway Education 1 (3)	Gateway Education 2 (3)	16
	B	School Specified - SDSC1001 Introduction to Data Science (2)	School Requirement - MA1503 Linear Algebra with Applications (4)	SDSC2004 Data Visualization (3)			English 2 - Discipline-specific English GE2401 English for Science (3)	GE1501 Chinese Civilisation – History and Philosophy (3)	Gateway Education 3 (3)	18
	S									0
2021 / 22 (Year 2)	A	School Requirement - MA2506 Probability and Statistics (4)	School Requirement - MA2508 Multi-variable Calculus (4)	School Requirement - SDSC2001 Python for Data Science (3)	CS3334 Data Structures (3)	Free Elective 1 (3)				17
	B	School Requirement - CS3402 Database Systems (3)	SDSC2002 Convex Optimization (3)	SDSC2005 Introduction to Computational Social Science (3)	SDSC2102 Statistical Methods and Data Analysis (3)				Gateway Education 4 (3)	15
	S									0
2022 / 23 (Year 3)	A	SDSC3006 Fundamentals of Machine Learning I (3)	SDSC3007 Advanced Statistics (3)	Major Elective 1 (3)	Major Elective 2 (3)	Free Elective 2 (3)				15
	B	SDSC2003 Human Contexts and Ethics in Data Science (3)	CS3273 Data Protection and System Security (3)	Major Elective 3 (3)	Major Elective 4 (3)	Free Elective 3 (3)				15
	S									0
2023 / 24 (Year 4)	A	SDSC4116 Data Science Capstone (3)	Major Elective 5 (3)	Major Elective 6 (3)	Free Elective 4 (3)					12
	B	SDSC4116 Data Science Capstone (3)	Major Elective 7 (3)	Free Elective 5 (3)	Free Elective 6 (3)					12
( ) indicates number of credit units									**Total credits required = 120**	

For Reference Only

Model Study Path for BSc in Data Science 2020/2021 (Advanced Standing I)

Yr	Sem	Major Requirements					University Requirements	CUs
2020 / 21 (Year 2)	A	School Specified - CS2311/CS2315 Computer Programming (3)	School Requirement - MA2506 Probability and Statistics (4)	School Requirement - MA2508 Multi-variable Calculus (4)	School Requirement - SDSC2001 Python for Data Science (3)		English 1 - GE1401 University English (3)	**17**
	B	School Requirement - MA1503 Linear Algebra with Applications (4)	School Requirement - CS3402 Database Systems (3)	MS2602 Statistical Inference (3) / SDSC2102 Statistical Methods and Data Analysis (3)	SDSC2004 Data Visualization (3)		English 2 - Discipline-specific English GE2401 English for Science (3)	**16**
	S							**0**
2021 / 22 (Year 3)	A	SDSC3006 Fundamentals of Machine Learning I (3)	SDSC3007 Advanced Statistics (3)	CS3334 Data Structures (3)	Major Elective 1 (3)		GE1501 Chinese Civilisation – History and Philosophy (3)	**15**
	B	SDSC2002 Convex Optimization (3)	SDSC2003 Human Contexts and Ethics in Data Science (3)	SDSC2005 Introduction to Computational Social Science (3)	CS3273 Data Protection and System Security (3)	Major Elective 2 (3)	Gateway Education 1 (3)	**18**
	S							**0**
2022 / 23 (Year 4)	A	SDSC4116 Data Science Capstone (3)	Major Elective 3 (3)	Free Elective 1 (3)			School-specified course (3) *Any courses not within the Major Requirement (including core courses and electives) mentioned in Student Handbook*	**12**
	B	SDSC4116 Data Science Capstone (3)	Major Elective 4 (3)	Free Elective 2 (3)			Gateway Education 2 (3)	**12**
( ) indicates number of credit units							**Total credits required = 90**	

[Note]

1. For courses that required MA1508 Calculus as pre-requisite/precursor, this requirement is waived as MA1508 is not in the Advanced Student curriculum –
   Pre-requisite MA1508 wavied for ---
   MA2506 Probability and Statistics
   MA2508 Multi-variable Calculus

2. For courses that required SDSC1001 Introduction to Data Science as pre-requisite/precursor, this requirement is waived as SDSC1001 is not in the Advanced Student curriculum –
   Pre-requisite SDSC1001 wavied for ---
   SDSC2001 Python for Data Science
   SDSC2003 Human Contexts and Ethics in Data Science
   SDSC2005 Introduction to Computational Social Science