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 and Systems Engineering
理學士(數據與系統工程)

Student Handbook
2021-2022

(Please note that the information given in this Handbook is accurate at the time of printing in August 2021. Changes to the information may be made from time to time without prior notification.)

For further information, please contact:

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BACHELOR OF SCIENCE IN

DATA AND SYSTEMS ENGINEERING (BSC DSE)

Student Handbook (2021-2022)

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1 AIMS OF MAJOR

This major aims at equipping students with strong analytical and decision-making skills in *analysing*, *managing*, and *improving* nowadays *enterprise class systems* via offering solid disciplines in data science and intelligent systems. An *enterprise* under consideration can mean an engineering, business, governmental, or service-oriented organization. The targets of management and improvement can be the strategies, *operations* and supply chain of an enterprise, and the *products* and *services* offered by an enterprise. A BSc DSE student is nurtured to become an analytical and versatile graduate, competent in collecting, analysing and interpreting large data and transforming the massive information into relevant insights for making better decisions in his or her organization.

In addition to the general education studies and language proficiency, to equip BSc DSE graduates with the competence needed, this Major includes the following core and elective components:

- University level mathematics and essential computer studies;
- Core components – (a) a broad understanding of the principles, techniques, and problem-solving skills in statistics, machine learning, artificial intelligence, optimization, and information technology, as a way to obtain and analyse information from large enterprise datasets, data streams and complex systems. (b) fundamental concepts and techniques in systems/enterprise engineering and management;
- Elective components – more advanced concepts and techniques in systems analytics, in internet of things, and in smart city;
- Problem solving, teamwork and integration skills development;
- Purposefully designed courses that infuse CityU's unique discovery-enriched curriculum (DEC) concept.

Intended Learning Outcomes of Major (MILOs)

Upon successful completion of this Major, a BSc DSE graduate should be able to:

1. Apply knowledge of mathematics, science and engineering into analysing and improving enterprise systems.
2. Design and conduct experiments, and analyse and interpret data that are relevant to processes including operations, marketing, finance, supply chain, etc. in an enterprise system.
3. Design processes, systems, products and services to meet desired needs within realistic constraints such as market, economics, technology, environment and sustainability.
4. Function effectively and responsibly in multi-disciplinary teams.
5. Identify, evaluate, formulate, solve problems relevant to the operations, logistics, finance, supply chain in an enterprise, and undertake projects of discovery and innovation.
6. Understand professional and ethical responsibility.
7. Communicate effectively.
8. Have knowledge in contemporary issues and an awareness of the impact of engineering and management solutions in a broad, global and societal context.
9. Recognise the need for, and an ability to engage in life-long learning.
10. Use necessary data science, engineering, and IT skills and tools for engineering and management practice, discovery and innovation.

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)	**Advanced Standing II (Senior-year Entry)** (Note 2)
Gateway Education requirement	30 credit units	21 credit units	12 credit units
College/School requirement	18 credit units	18 credit units	7 credit units
Major requirement	63 credit units (Core: 54 Elective: 9)	54 credit units (Core: 48 Elective: 6)	54 credit units (Core: 48; Elective: 6)
Free electives / Minor (optional)	9 credit units	N/A	N/A
Minimum number of credit units required for the award	**120 credit units**	**93 credit units**	**73 credit units**

Maximum number of credit units permitted	**144 credit units**	**114 credit units**	**84 credit units**

Normal Period of Study

	Normative 4-year Degree	**Advanced Standing I**	**Advanced Standing I**
Normal period of study	4 years	3 years	2 years
Maximum period of study	8 years	6 years	5 years

Note 1: For students holding 13-year school-leaving qualifications or equivalent.
Note 2: For Associate Degree/Higher Diploma graduates admitted to the senior year.

2.2 Gateway Education

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

Requirements	Normative 4-year Degree	Advanced Standing I	Advanced Standing II
University requirements			
English			
• GE1401 University English	3 credit units	3 credit units	Not a compulsory requirement
• Discipline-specific English	3 credit units	3 credit units	3 credit units
GE1501 Chinese Civilisation – History and Philosophy	3 credit units	3 credit units	Not a compulsory requirement
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)*	3 credit units
College/School-specified courses ^	9 credit units	6 credit units	6 credit units
Total	**30 credit units**	**21 credit units**	**12 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	
CS2315	Computer Programming	B2	3	
SDSC1001	Introduction to Data Science	B1	2	
Advanced Standing I				
CS2315	Computer Programming	B2	3	
Take any course not within the Major requirement (including Core Courses and Electives)			3	
Advanced Standing II				
Take any course not within the Major requirement (including Core Courses and Electives)			6	

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
Normative 4-year Degree and Advanced Standing I				
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	
Advanced Standing II				
MA1503	Linear Algebra with Applications	B1	4	
SDSC2001	Python for Data Science	B2	3	

2.6 Major Requirement

2.6.1 Core Courses

Normative 4- year Degree: 54 credit units
Advanced Standing I and II: 48 credit units

Course Code	Course Title	Level	Credit Units	Remarks
PHY1201	General Physics I	B1	3	
GE2339	Smart City – a Systems Engineering Perspective	B2	3	Waived for students admitted into ASI and ASII.
SDSC2002	Convex Optimization	B2	3	
SDSC2004	Data Visualization	B2	3	
SDSC2102	Statistical Methods and Data Analysis	B2	3	
SDSC3002	Data Mining	B3	3	
SDSC3006	Fundamentals of Machine Learning I	B3	3	
SDSC3008	Systems Dynamics and Control	B3	3	
SDSC3020	Engineering Economics	B3	3	Waived for students admitted into ASI and ASII.
SDSC3060	Operations Research	B3	3	
SDSC3102	Quality Technologies	B3	3	
CS4480	Data-Intensive Computing	B4	3	
SDSC4026	Systems Modelling and Simulation	B4	3	
SDSC4066	Professional Engineering Practice	B4	3	
SDSC4103	Decision Analytics and Risk Management	B4	3	
SDSC4107	Financial Engineering and Analytics	B4	3	
SDSC4116	Data Science Capstone	B4	6	

2.6.2 Electives

Normative 4-year Degree: 9 credit units
Advanced Standing I and II: 6 credit units

Course Code	Course Title	Level	Credit Units	Remarks
CS3201	Computer Networks	B3	3	Internet of Things
CS3273	Data Protection and System Security	B3	3	Internet of Things
LT3233	Computational Linguistics	B3	3	General
SDSC3001	Big Data: The Arts and Science of Scaling	B3	3	General
SDSC3003	Blockchain	B3	3	FinTech
SDSC3004	Computational Optimization	B3	3	Industrial Artificial Intelligence
SDSC3013	Introduction to Social Media Analytics	B3	3	General
SDSC3014	Introduction to Sharing Economy	B3	3	Internet of Things
SDSC3018	Introduction to Internet of Things	B3	3	Internet of Things
SDSC3022	Financial Data Analytics for Investments	B3	3	FinTech
SDSC3023	Data Science Applications in Portfolio Risk Analysis	B3	3	FinTech
SDSC3027	Smart Logistics and Transportation	B3	3	Smart City
SDSC3080	Internship	B3	3	General
SDSC3105	Bayesian Analysis	B3	3	General
CS4286	Internet Security and E-Commerce Protocols	B4	3	FinTech
CS4486	Artificial Intelligence	B4	3	Industrial Artificial Intelligence
SDSC4009	Data Intelligence in Action	B4	3	Industrial Artificial Intelligence
SDSC4016	Fundamentals of Machine Learning II	B4	3	Industrial Artificial Intelligence
SDSC4018	AI in Systematic Trading	B4	3	FinTech
SDSC4021	Advanced Internet of Things	B4	3	Internet of Things
SDSC4024	Project Management and Analysis	B4	3	Smart City
SDSC4051	Facilities and Distribution Management	B4	3	Smart City
SDSC4064	Reliability Engineering	B4	3	General
SDSC4109	Smart Manufacturing and Automation	B4	3	Smart City
SDSC4110	Statistical Design and Analysis of Experiments	B4	3	General

2.7 Classification of Award

For Students on Programmes of a Normal Study Duration of 4 Years and Advanced Standing I Students (Admitted in 2021/22)

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 II Students (Admitted in 2021/22)
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 2021** in order to access their course grades. For details, please refer to the 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 ZHANG, Zijun	3442-5328	zijzhang@cityu.edu.hk
Deputy Major Leader:	Dr HO, Chin Pang Clint	3442-4031	chinpho@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, select "Academics" from the top menu and click "Programme and Course Catalogues".

8.4 Course Registration for Semester A 2021-2022

For Semester A 2021-2022, 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 **27 July 2021**. 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 application via an electronic form available in AIMS. After logging-in AIMS, go to tab "Course Registration" and click "Application for Add/Drop of Non Web-enabled Course & Study Load Adjustment".

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 **23 August 2021** but you need to check your time ticket first from "AIMS".
iv) All add/drops end at **11:30pm, 6 September 2021**.

v) Details of course registration arrangements for Semester A 2021/22 will be available near the end of July 2021. 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 2021-2022, the application period is from **14 July to 28 August 2021**. 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

Model Study Path for BSc in Data and Systems Engineering 2021/2022 (normative 4-year)

For Reference Only

Yr	Sem	Major Requirements					University Requirements			CUs
2021 / 22 (Year 1)	**A**	School Specified - MA1508 Calculus (4)	School Specified - CS2315 Computer Programming (3)	School Specified - SDSC1001 Introduction to Data Science (2)			English 1 - GE1401 University English (3)	Gateway Education 1 (3)	Gateway Education 2 (3)	**18**
	B	School Requirement - MA1503 Linear Algebra with Applications (4)	GE2339 Smart City – a Systems Engineering Perspective (3)	SDSC2004 Data Visualization (3)			English 2 - Discipline-specific English GE2410 English for Engineering (3)	Gateway Education 3 (3)		**16**
	S									**0**
2022 / 23 (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)	PHY1201 General Physics I (3)			Gateway Education 4 (3)		**17**
	B	School Requirement - CS3402 Database Systems (3)	SDSC2002 Convex Optimization (3)	SDSC2102 Statistical Methods and Data Analysis (3)	SDSC3060 Operations Research (3)	SDSC3102 Quality Technologies (3)	GE1501 Chinese Civilisation – History and Philosophy (3)			**18**
	S									**0**
2023 / 24 (Year 3)	**A**	SDSC3006 Fundamentals of Machine Learning I (3)	SDSC3008 Systems Dynamics and Control (3)	SDSC3020 Engineering Economics (3)	SDSC4026 Systems Modelling and Simulation (3)	Major Elective 1 (3)				**15**
	B	SDSC3002 Data Mining (3)	SDSC4107 Financial Engineering and Analytics (3)	Major Elective 2 (3)	Free Elective 1 (3)					**12**
	S									**0**
2024 / 25 (Year 4)	**A**	SDSC4116 Data Science Capstone (3)	CS4480 Data-Intensive Computing (3)	SDSC4103 Decision Analytics and Risk Management (3)	Free Elective 2 (3)					**12**
	B	SDSC4116 Data Science Capstone (3)	SDSC4066 Professional Engineering Practice (3)	Major Elective 3 (3)	Free Elective 3 (3)					**12**
( ) indicates number of credit units							**Total credits required = 120**			

For Reference Only

Model Study Path for BSc in Data and Systems Engineering 2021/2022 (Advanced Standing I)

Yr	Sem	Major Requirements					University Requirements		CUs
2021 / 22 (Year 2)	A	School Specified - CS2315 Computer Programming (3)	School Requirement - MA2506 Probability and Statistics (4)	School Requirement - MA2508 Multi-variable Calculus (4)	PHY1201 General Physics I (3)		English 1 - GE1401 University English (3)		17
	B	School Requirement - MA1503 Linear Algebra with Applications (4)	School Requirement - CS3402 Database Systems (3)	SDSC2004 Data Visualization (3)	SDSC3102 Quality Technologies (3)		English 2 - Discipline-specific English GE2410 - English for Engineering (3)		16
	S								0
2022 / 23 (Year 3)	A	School Requirement - SDSC2001 Python for Data Science (3)	SDSC3006 Fundamentals of Machine Learning I (3)	SDSC4026 Systems Modelling and Simulation (3)			GE1501 Chinese Civilisation – History and Philosophy (3)	Gateway Education 1 (3)	15
	B	SDSC2002 Convex Optimization (3)	SDSC2102 Statistical Methods and Data Analysis (3)	SDSC3002 Data Mining (3)	SDSC3060 Operations Research (3)	SDSC4107 Financial Engineering and Analytics (3)	Gateway Education 2 (3)		18
	S								0
2023 / 24 (Year 4)	A	SDSC4116 Data Science Capstone (3)	SDSC3008 Systems Dynamics and Control (3)	SDSC4103 Decision Analytics and Risk Management (3)	CS4480 Data-Intensive Computing (3)	Major Elective 1 (3)			15
	B	SDSC4116 Data Science Capstone (3)	SDSC4066 Professional Engineering Practice (3)	Major Elective 2 (3)	School-specified course (3) *Any courses not within the Major Requirement (including core courses and electives) mentioned in Student Handbook*				12
( ) indicates number of credit units							**Total credits required = 93**		

[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
   SDSC4103 Decision Analytics and Risk Management
   Precursor MA1508 wavided for --
   SDSC3060 Operations Research
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

For Reference Only

Model Study Path for BSc in Data and Systems Engineering 2021/2022 (Advanced Standing II)

Yr	Sem	Major Requirements					University Requirements	CUs
2021 / 22 (Year 3)	A	School Requirement - MA2508 Multi-variable Calculus (4)	School Requirement - SDSC2001 Python for Data Science (3)	PHY1201 General Physics I (3)	SDSC3006 Fundamentals of Machine Learning I (3)	Major Elective 1 (3)		**16**
	B	SDSC2002 Convex Optimization (3)	SDSC2004 Data Visualization (3)	SDSC2102 Statistical Methods and Data Analysis (3)	SDSC3002 Data Mining (3)	SDSC3060 Operations Research (3)	Discipline-specific English GE2410 - English for Engineering (3)	**18**
	S						Gateway Education 1 (3)	**3**
2022 / 23 (Year 4)	A	SDSC4116 Data Science Capstone (3)	SDSC3008 Systems Dynamics and Control (3)	CS4480 Data-Intensive Computing (3)	SDSC4026 Systems Modelling and Simulation (3)	SDSC4103 Decision Analytics and Risk Management (3)	School-specified course (3) *Any courses not within the Major Requirement (including core courses and electives) mentioned in Student Handbook*	**18**
	B	SDSC4116 Data Science Capstone (3)	SDSC3102 Quality Technologies (3)	SDSC4066 Professional Engineering Practice (3)	SDSC4107 Financial Engineering and Analytics (3)	Major Elective 2 (3)	School-specified course (3) *Any courses not within the Major Requirement (including core courses and electives) mentioned in Student Handbook*	**18**
( ) indicates number of credit units							**Total credits required = 73**	

[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 ---
   MA2508 Multi-variable Calculus
   SDSC4103 Decision Analytics and Risk Management
   Precursor MA1508 wavided for --
   SDSC3060 Operations Research
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

Notes

Notes