BNU-HKBU

UNITED INTERNATIONAL COLLEGE

UNDERGRADUATE HANDBOOK

2021-2022

Division of Science and Technology

Data Science Programme

Contents

1. Introduction

This student handbook provides some general information about the **Data Science Programme** in the Division of Science and Technology, BNU-HKBU United International College. Students can also find specific information about the programme curriculum, structure, degree requirements, etc. in this handbook. Students should read this handbook carefully and talk to their mentors, teachers, Programme Director, or the Division Dean if they have any queries. The content of this handbook is for reference only, and is subject to change without prior notice.

2. The Division of Science and Technology

The primary academic objective of the Division is to provide students with a number of four-year Honours Degree Programmes. Nine major programmes are currently offered:

Programme	Degree[i]	Years of Study
Applied Mathematics 应用数学	BSc (Hons) (i) 理学士（荣誉）	
Applied Psychology 应用心理学	BSc (Hons) (ii) 理学士（荣誉）	4
Artificial Intelligence 人工智能	BSc (Hons) (iii) 理学士（荣誉）	4
Computer Science and Technology 计算机科学与技术	BSc (Hons) (iv) 理学士（荣誉）	4
Data Science 数据科学	BSc (Hons) (v) 理学士（荣誉）	4
Environmental Science 环境科学	BSc (Hons) (vi) 理学士（荣誉）	4
Financial Mathematics 金融数学	BSc(Hons) (vii) 理学士（荣誉）	4
Food Science and Technology 食品科学与工程	BSc (Hons) (viii) 理学士（荣誉）	4
Statistics 统计学	BSc (Hons) (ix) 理学士（荣誉）	4

3. The Data Science Programme

The Data Science Programme at UIC is committed to quality, leading-edge education, and research. It offers the Bachelor of Science (Honours) in Data Science.

[i] The following degrees will be awarded by the Hong Kong Baptist University: (i) Bachelor of Science (Honours) in Applied Mathematics 应用数学理学士（荣誉）; (ii) Bachelor of Science (Honours) in Applied Psychology 应用心理学理学士（荣誉）; (iii) Bachelor of Science (Honours) in Artificial Intelligence 人工智能理学士（荣誉）; (iv) Bachelor of Science (Honours) in Computer Science and Technology 计算机科学与技术理学士（荣誉）; (v) Bachelor of Science (Honours) in Data Science数据科学理学士（荣誉）; (vi) Bachelor of Science (Honours) in Environmental Science 环境科学理学士（荣誉）; (vii) Bachelor of Science (Honours) in Financial Mathematics 金融数学理学士（荣誉）; (viii) Bachelor of Science (Honours) in Food Science and Technology 食品科学与工程理学士（荣誉）; (ix) Bachelor of Science (Honours) in Statistics 统计学理学士（荣誉）.

3.1. Teaching Methods and Medium of Instruction

Teaching will be mainly by formal lectures. Tutorials and laboratory sessions will also be organised to complement formal lectures. The most up-to-date IT tools will be used to aid teaching and learning. English is the medium of instruction for lectures, tutorials and laboratory classes.

3.2. Programme Aims, Objectives and Learning Outcomes

The general aim of the Bachelor of Science (Honours) in the Data Science Degree Programme is to prepare students for a career in Data Science or information technology and related areas. Students will be equipped to work in industry, business, etc., or to pursue postgraduate study in China or abroad. Graduates will have developed learning skills and be able to meet the challenges in the rapidly changing world of data science and information technology.

Specifically, the objectives of the Programme are to equip students with:

(1) A solid and broad foundation in Data Science;
(2) An in-depth knowledge in selected data processing application areas;
(3) Quality problem solving skills; and
(4) Proficient communication and effective interpersonal skills.

In order to achieve the above objectives, the Data Science curriculum has been carefully designed to enable students to achieve the following Programme Intended Learning Outcomes (PILOs). Upon completion of the programme, students should be able to:

PILO 1: Describe and explain the fundamental knowledge required to support the study and applications of Data Science;
PILO 2: Competently apply a wide range of programming concepts to software development in data collection and analysis;
PILO 3: Formulate novel methods in data information gathering and analysis to solve real world problems;
PILO 4: Collaborate and function effectively in team work with proficient communication and effective interpersonal skills;
PILO 5: Stay abreast of contemporary issues in Data Science and develop life-long effective learning skills to meet the needs of the Data Science discipline.

As students of the programme will receive HKBU degrees upon successful completing the graduation requirements, the above PILOs are in line with HKBU's graduates attributes (GAs):

GA 1: **Citizenship**: Be a responsible citizen with an international outlook and a sense of ethics and civility;
GA 2: **Knowledge**: Have up-to-date, in-depth knowledge of an academic specialty, as well as a broad range of general knowledge;
GA 3: **Learning**: Be an independent, lifelong learner with an open mind and an inquiring spirit;
GA 4: **Skills**: Have the necessary information literacy and IT skills, as well as numerical and problem-solving skills, to function effectively in work and everyday life;
GA 5: **Creativity**: Be able to think critically and creatively;
GA 6: **Communication**: Have trilingual and biliterate competence in Chinese and English, and the

ability to articulate ideas clearly and coherently;

GA 7: **Teamwork**: Be ready to serve, lead and work in a team, and to pursue a healthy lifestyle.

The OBTL GAs – PILOs Mapping Matrix

GAs / PILOs	Citizen-ship	Know-ledge	Learn-ing	Skills	Creati-vity	Communi-cation	Team-work	**No. of GAs addressed by this PILO**
PILO 1		X	X					**2**
PILO 2		X		X				**2**
PILO 3				X	X		X	**3**
PILO 4						X	X	**2**
PILO 5	X	X	X					**3**
No. of PILOs addressing this GA	**1**	**3**	**2**	**2**	**1**	**1**	**2**	**---**

4. Teaching Staff

Full-time teaching staff are recruited from all over the world. All teachers recruited must possess a Ph.D. and have relevant research experience. Experts or specialists in the field of Data Science, with exceptional skills and experience, are also recruited.

5. Programme Structure

The Bachelor of Science (Honours) in Data Science is a four-year full-time degree programme, with considerable departure from traditional single discipline programmes. In addition to the courses of the main discipline, students are required to take supporting, interdisciplinary, general education courses and the whole person education experiential learning modules of their own choice. In the final year of study, students are required to complete individual or group research projects (depending on the nature), in which they can gain in-depth knowledge, develop basic research techniques, and experience during the course of thesis preparation.

Students are expected to complete 147 units within the curriculum structure below:

Course Category	Units
Major Required Courses (专业必修课)	54
Major Elective Courses (专业选修课)	15
University Core Courses (大学核心课)	36
General Education Programme (通识教育课)	18
Free Elective Courses (自由选修课)	24

Course Category	Units
Total	**147**

5.1. Major Required Courses

Code	English Title	Chinese Title	Unit(s)
COMP1023	Foundations of C Programming	C 编程基础	3
COMP2003	Data Structures and Algorithms	数据结构和算法	3
COMP2013	Object-Oriented Programming	面向对象编程	3
COMP3013	Database Management Systems	数据库管理系统	3
COMP3023	Design and Analysis of Algorithms	算法设计和分析	3
COMP4163	Neural Networks and Deep Learning	神经网络与深度学习	3
DS1023	Advanced Mathematics for Data Science	数据科学中的高等数学	3
DS2043	Data Processing Workshop I	数据处理工作坊 I	3
DS3043	Data Processing Workshop II	数据处理工作坊 II	3
DS4004	Final Year Project I (DS)	毕业论文 I	3
DS4023	Machine Learning	机器学习	3
MATH1003	Linear Algebra	线性代数	3
MATH1123	Calculus For Science and Engineering	微积分（科学工程）	3
MATH2003	Discrete Structures	离散结构	3
OR4023	Optimization	最优化方法	3
STAT2003	Advanced Statistics	高等统计学	3
STAT2013	Regression Analysis	回归分析	3
STAT4073	Data Mining	数据挖掘	3
---	**Total**	**合计**	**54**

5.2. Major Elective Courses

Students are required to select 5 courses (15 units) from the list below. However, they are encouraged to choose more major elective courses as free electives based on their interests and plans for future development.

Code	English Title	Chinese Title	Units
COMP1003	Computer Organisation	计算机组织	3
COMP3003	Data Communications and Networking	数据通讯和网络	3
COMP3033	Operating Systems	操作系统	3
COMP3063	Software Engineering	软件工程	3
COMP3073	Introduction to Robotics	机器人技术导论	3
COMP3083	Numerical Computation	数值计算	3
COMP3103	Design Patterns	设计模式	3
COMP3123	Software Testing	软件测试	3

Code	English Title	Chinese Title	Units
COMP3163	Mobile Application Development	移动平台应用开发	3
COMP3173	Compiler Construction	编译原理	3
COMP3183	Financial Computing	金融计算	3
COMP4003	Theory of Computation	计算理论	3
COMP4023	Computer and Network Security	计算机和网络安全	3
COMP4033	Computer Graphics	计算机图形	3
COMP4053	Database System Implementation	数据库系统开发	3
COMP4063	Digital Media Computing	数字媒体计算	3
COMP4073	Distributed Computing Systems	分布式计算系统	3
COMP4093	Internet and the World Wide Web	互联网及万维网	3
COMP4113	Computer Vision and Pattern Recognition	计算器视觉和模式识别	3
COMP4123	Information Retrieval and Search Engine	信息检索及搜索引擎	3
COMP4143	Introduction to Web Intelligence	万维网智能介绍	3
COMP4153	Quantum Finance and Intelligent Financial Trading Systems	量子金融和智能金融交易系统	3
COMP4173	Digital Image Processing	数字图像处理	3
DS2033	Linux System Management and Programming	Linux 系统管理与编程	3
DS3023	Digital Logic Design	数字逻辑设计	3
DS3033	Technical Communication	科技写作与沟通	3
DS4005	Final Year Project II (DS)*	毕业论文 II	3
DS4033	Text Mining and Analytics	文本挖掘与分析	3
DS4053	Introduction to Bioinformatics	生物信息学	3
DS4063	Social Computing	社会计算	3
DS4073	Introduction to Data Visualisation	数据可视化基础	3
DS4083	Big Data Analytics	大数据分析	3
DS4093	Introduction to Recommender System	智能推荐系统概论	3
MATH1143	Advanced Calculus	高等微积分	3
STAT3003	Survey Sampling	抽样调查	3
STAT3033	Bayesian Statistics	贝叶斯统计	3
STAT3073	Statistical Computing	统计计算	3
STAT4003	Experimental Design	试验设计	3
STAT4013	Multivariate Analysis	多元统计分析	3
STAT4043	Categorical Data Analysis	属性数据分析	3
STAT4063	Time Series Analysis	时间序列分析	3

** Students who continue with the final year project in the second semester of Year 4 should register Final Year Project II (DS) as a major elective during the Online Course Selection (or Course Add/Drop) period as informed by the Academic Registry.*

The availability of major elective courses each semester is subject to minor changes and adjustments

depending on staff availability.

5.2. University Core Courses

All students should complete 36 units of University Core Courses to fulfil the graduation requirements, which consists of 9 units of English course, 3 units of Chinese course, 16 units of Philosophy, Politics and Economics course, 3 units of Healthy Lifestyle, 3 units of Whole Person Education Experiential Learning Modules, and 2 units of Military Training. Please refer to Appendix I of this handbook for the details.

5.3. General Education Programme

All students should complete 18 units of General Education (GE) Courses to fulfil the graduation requirements. The GE Programme consists of (a) 9 units of Foundational Courses, (b) 6 units of Interdisciplinary Thematic Courses and (c) 3 units of GE Capstone Courses. Please see Appendix II for detailed information about the GE Programme.

5.4. Free Elective Courses

The 24 units of Free Electives could be used by students to (a) spend a semester abroad; (b) take a minor or (c) take more courses offered by the teaching units.

5.5. The PILOs – Major Courses Mapping Matrix

Each course offered by the Data Science Programme, either required or elective course, is designed to meet certain PILOs as listed below.

The PILOs – Major Courses Mapping Matrix

PILOs / Courses	PILO 1	PILO 2	PILO 3	PILO 4	PILO 5
Major Required Courses					
COMP1023 Foundations of C Programming	X	X		X	
COMP2003 Data Structures and Algorithms	X	X	X		
COMP2013 Object-Oriented Programming	X	X			
COMP3013 Database Management Systems	X	X		X	
COMP3023 Design and Analysis of Algorithms	X	X	X		
COMP4163 Neural Networks and Deep Learning	X		X	X	
DS1023 Advanced Mathematics for Data Science	X	X		X	
DS2043 Data Processing Workshop I		X		X	X
DS3043 Data Processing Workshop II	X		X		
DS4004 Final Year Project I (DS)			X	X	X
DS4023 Machine Learning	X	X	X		
MATH1003 Linear Algebra	X			X	
MATH1073 Calculus I	X		X		
MATH1123 Calculus For Science and Engineering	X	X			

Courses \ PILOs	PILO 1	PILO 2	PILO 3	PILO 4	PILO 5
OR4023 Optimization	X	X	X		
MATH2003 Discrete Structures	X	X	X		
STAT2003 Advanced Statistics	X	X			
STAT2013 Regression Analysis	X	X	X		
STAT4073 Data Mining		X	X		X
Major Elective Courses					
COMP1003 Computer Organisation	X	X	X		
COMP3003 Data Communications and Networking	X		X		X
COMP3033 Operating Systems	X	X			X
COMP3063 Software Engineering	X	X			X
COMP3073 Introduction to Robotics	X	X			X
COMP3083 Numerical Computation	X	X	X		
COMP3103 Design Patterns		X	X		X
COMP3123 Software Testing		X	X		X
COMP3163 Mobile Application Development	X	X			X
COMP3173 Compiler Construction	X	X			X
COMP3183 Financial Computing	X			X	
COMP4003 Theory of Computation	X	X			
COMP4023 Computer and Network Security	X	X	X		
COMP4033 Computer Graphics	X	X	X		
COMP4053 Database System Implementation	X	X		X	
COMP4063 Digital Media Computing	X	X		X	
COMP4073 Distributed Computing Systems	X	X		X	
COMP4093 Internet and the World Wide Web	X		X	X	
COMP4113 Computer Vision and Pattern Recognition		X		X	
COMP4123 Information Retrieval and Search Engine	X	X	X		
COMP4143 Introduction to Web Intelligence	X	X		X	
COMP4153 Quantum Finance and Intelligent Financial Trading Systems	X		X	X	
COMP4173 Digital Image Processing	X		X		X
DS2033 Linux System Management and Programming	X	X			X
DS3023 Digital Logic Design	X		X	X	
DS3033 Technical Communication	X		X	X	
DS4005 Final Year Project II (DS)			X	X	X
DS4033 Text Mining and Analytics	X	X		X	
DS4053 Introduction to Bioinformatics	X		X	X	
DS4063 Social Computing	X	X	X		

Courses \ PILOs	PILO 1	PILO 2	PILO 3	PILO 4	PILO 5
DS4073 Introduction to Data Visualisation	X		X		X
DS4083 Big Data Analytics	X	X	X		
DS4093 Introduction to Recommender System		X	X		X
MATH1083 Calculus II	X		X		
MATH1143 Advanced Calculus		X		X	X
STAT3003 Survey Sampling	X		X	X	
STAT3033 Bayesian Statistics	X		X	X	
STAT3073 Statistical Computing	X		X		
STAT4003 Experimental Design	X	X	X		
STAT4013 Multivariate Analysis	X		X	X	
STAT4043 Categorical Data Analysis	X		X	X	
STAT4063 Time Series Analysis	X		X	X	

6. Four-Year Study Plan

6.1. Year One

Semester 1	Unit(s)	Semester 2	Unit(s)
UCLC1013 English I 大学英文 I	3	UCLC1023 English II 大学英文 II	3
UCLC1003 University Chinese 大学国文	3	CHI1073 Contemporary Chinese Society and Thoughts (Theories) 毛泽东思想和中国特色社会主义理论体系概论（理论部分）	3
CHI1193 Contemporary World and China① 形势与政策	--	CHI1193 Contemporary World and China① 形势与政策	--
GE-Foundational Course: Quantitative Reasoning② 基础课程：量化推理	3	GE-Foundational Course: Values and the Meaning of Life② 基础课程：价值与人生	3
Healthy Lifestyle② 健康生活方式	1	Healthy Lifestyle② 健康生活方式	1
COMP1023 Foundations of C Programming C 编程基础	3	WPEX1013 Emotional Intelligence 情绪智能	1
MATH1003 Linear Algebra 线性代数	3	COMP2013 Object-Oriented Programming 面向对象编程	3
MATH1123 Calculus For Science and Engineering 微积分 (科学工程)	3	DS1023 Advanced Mathematics for Data Science 数据科学中的高等数学	3

Semester 1	Unit(s)	Semester 2	Unit(s)
---	---	MATH2003 Discrete Structures 离散结构	3
Total	**19**	**Total**	**20**

① *This 2-unit course requires student to attend at least 10 lectures within his/her first two years of study. The units gained will be recorded in the transcript of the particular semester when the requirement is met by the end of that semester.*

② *This denotes a course category in which a list of courses may be developed for students' selection. Students are expected to refer to the Online Course Selection System for courses available under each category.*

6.2. Winter/Summer Study of Year One

Winter Study	Unit(s)	Summer Study	Unit(s)
CHI1103 Introduction to Modern Social Theories 马克思主义基本原理概论	3	CHI1183 Contemporary Chinese Society and Thoughts (Social Practice) 毛泽东思想和中国特色社会主义理论体系概论（实践部分）	2
MT1003 Military Training 军事课	2	--	--
Total	**5**	**Total**	**2**

6.3. Year Two

Semester 1	Unit(s)	Semester 2	Unit(s)
CHI1203 Morality and Foundations of Law 思想道德修养与法律基础	3	CHI1063 Chinese Culture and Modern China 中国近现代史纲要	3
CHI1193 Contemporary World and China① 形势与政策	--	UCLC1033 English III 大学英文 III	3
GE-Foundational Course: History and Civilisation② 基础课程：历史与文明	3	CHI1193 Contemporary World and China① 形势与政策	--
WPEX2023 Voluntary Service② or WPEX2033 Environmental Awareness② 义工服务 或 环境意识	1	GE-Interdisciplinary Thematic Course② 跨学科主题课程	3
COMP2003 Data Structures and Algorithms 数据结构和算法	3	Healthy Lifestyle② 健康生活方式	1
DS2043 Data Processing Workshop I 数据处理工作坊 I	3	WPEX2013 Experiential Arts② 艺术体验	1
STAT2003 Advanced Statistics 高等统计学	3	COMP3013 Database Management Systems 数据库管理系统	3

Semester 1	Unit(s)	Semester 2	Unit(s)
Free Electives 自由选修课	3	DS3043 Data Processing Workshop II 数据处理工作坊 II	3
---	---	STAT2013 Regression Analysis 回归分析	3
Total	**19**	**Total**	**20**

① *This 2-unit course requires student to attend at least 10 lectures within his/her first two years of study. The units gained will be recorded in the transcript of the particular semester when the requirement is met by the end of that semester.*

② *This denotes a course category in which a list of courses may be developed for students' selection. Students are expected to refer to the Online Course Selection System for courses available under each category.*

6.4. Year Three

Semester 1	Unit(s)	Semester 2	Unit(s)
GE-Interdisciplinary Thematic Course② 跨学科主题课程	3	GE-Capstone Course② 通识总整课程	3
STAT4073 Data Mining 数据挖掘	3	DS4023 Machine Learning 机器学习	3
COMP3023 Design and Analysis of Algorithms 算法设计和分析	3	Major Electives 专业选修课	6
OR4023 Optimization 最优化方法	3	Free Electives 自由选修课	6
Major Electives 专业选修课	3	--	--
Free Electives 自由选修课	6		
Total	**21**	**Total**	**18**

② *This denotes a course category in which a list of courses may be developed for students' selection. Students are expected to refer to the Online Course Selection System for courses available under each category.*

6.5. Year Four

Semester 1	Unit(s)	Semester 2	Unit(s)
DS4004 Final Year Project I (DS) 毕业论文 I	3	Major Electives③ 专业选修课	3
COMP4163 Neural Networks and Deep Learning	3	Free Electives 自由选修课	3
Major Electives 专业选修课	3	--	---
Free Electives 自由选修课	6		

Semester 1	Unit(s)	Semester 2	Unit(s)
Total	**15**	**Total**	**6**

③ *Students who continue with the final year project in the second semester of Year 4 should register Final Year Project II (DS) 毕业论文II as a major elective during the Online Course Selection (or Course Add/Drop) period as informed by the Academic Registry.*

Notes:

a. In the event of uneven distribution of staff resources in the two semesters, the actual study plans may vary slightly from the version here.
b. Students are advised to consult their Programme Director for any variation of the study plan.
c. Students will be classified as full-time students when registering for a minimum of 15 units per semester. However, in order to facilitate their job hunting in the second semester of Year 4, some courses of that semester are taught in earlier semesters. Under such circumstances, Year-4 students with a study load of less than 15 units are also classified as full-time students.

7. Internship, Placement and Overseas Visits

In order to provide students with practical experience and broaden their minds and horizons, UIC will try to arrange internships and placement in industries, companies and enterprises, and overseas visits for students.

8. Research Institute

In 2006, the Division of Science and Technology established the Institute of Statistics and Computational Intelligence (for details, see UIC website). The Director of the Institute is Prof. K. T. Fang (IMS and ASA Fellow).