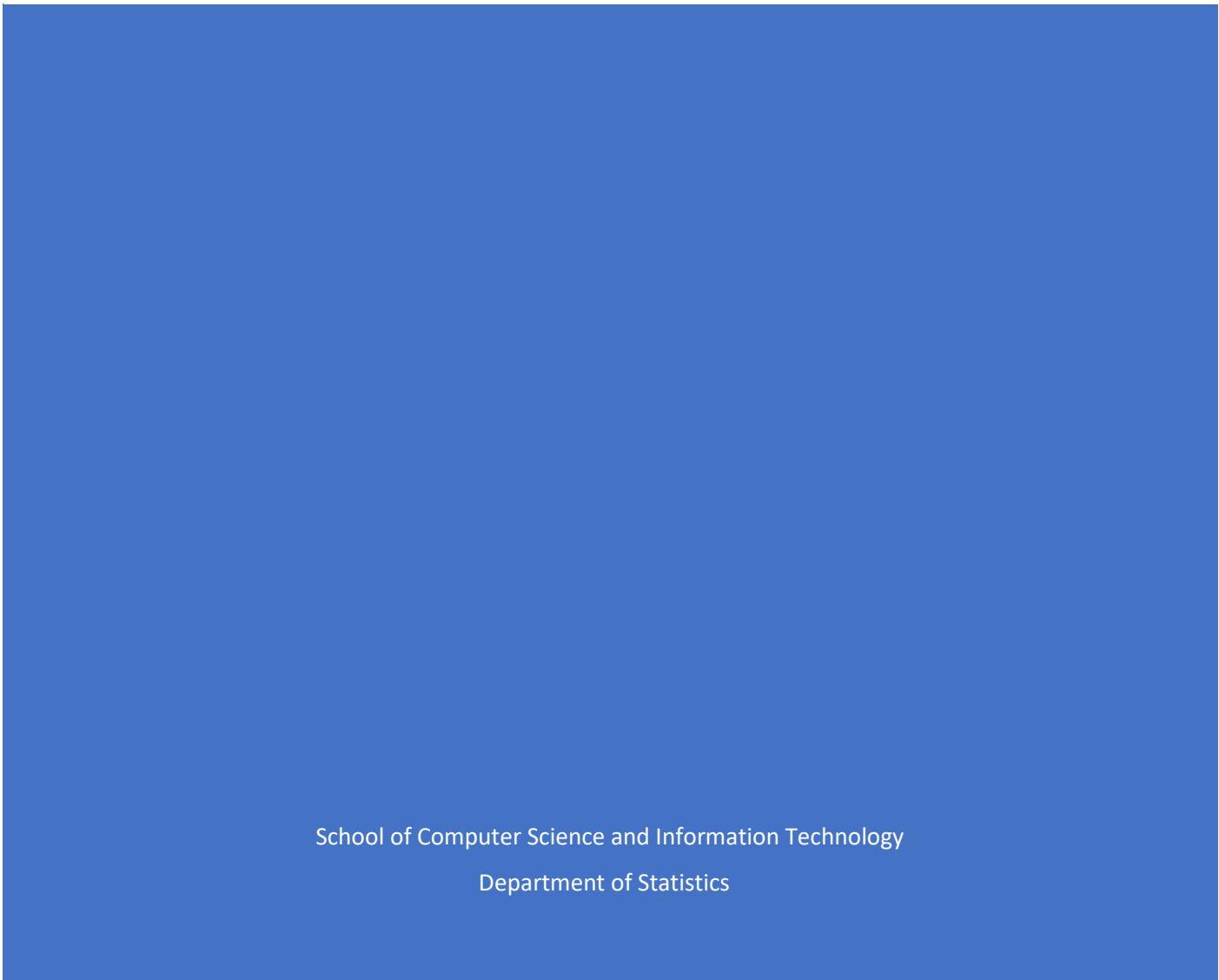# BSc Data Science and Analytics (CK411) Handbook

School of Computer Science and Information Technology

Department of Statistics

Contents

Introduction

University College Cork (UCC) has a very important place in the history of Information Technology as Boolean algebra, which provides the mathematical basis for computer design, was named after George Boole, the first Professor of Mathematics in UCC.

Data Science & Analytics focuses on new ways to capture and understand data from the world around us, to make better decisions for people, communities and industry. The BSc in Data Science & Analytics at UCC provides an education in data storage, manipulation and interpretation using mathematical sciences and computational methods to solve complex real-world problems.

The BSc Data Science and Analytics is jointly coordinated by the School of Computer Science and Information Technology and the Department of Statistics, within the School of Mathematical Sciences.

Both Schools are located in the five-storey Western Gateway Building. The building includes state-of-the-art teaching laboratories, world-class research laboratories and is designed to achieve an environment that will encourage staff and students to be both productive and creative.

Course Outline

In first and second year, students study the statistical, mathematical and computational foundations of data science and analytics.

In third year, students begin applying the fundamentals of data science and analytics to real life problems and data. That year is then completed with a six-month work placement (paid in most cases) providing an opportunity to apply the skills learnt in a work-place environment.

In fourth year, students choose specialised modules and undertake an independent project which enables them to investigate more applied elements of the discipline.

Course Coordinators

The course has a coordinator from both Schools who work together to ensure that modules, timetables etc. are synchronised.

School of Computer Science and Information Technology: Professor Gregory Provan, Office No. 1.71, ext. 5928/5892.

Department of Statistics: Dr Michael Cronin, Office No. 1.47, ext. 5825.

Email: bscdsacoordinator@cs.ucc.ie

Semester Dates

First Semester Period	1 WEEK STUDY/ REVIEW	EXAM PERIOD	CHRISTMAS RECESS	SECOND SEMESTER PERIOD	EASTER RECESS	1 WEEK STUDY/ REVIEW	EXAM PERIOD
09.09.2019 to 29.11.2019	02.12.2019 to 06.12.2019	09.12.2019 to 20.12.2019	21.12.2019 to 12.01.2020	13.01.2020 to 03.04.2020	04.04.2020 to 19.04.2020	20.04.2020 to 24.04.2020	27.04.2020 to 08.05.2020

Course Details

The BSc Data Science and Analytics is a four-year honours degree programme with a six-month mandatory work placement in third year running from spring until August.

Year 1 Modules – 60 credits

Core Modules - 55 credits	Credits	Lecturer	Elective Modules – 5 credits	Credits	Lecturer
CS1106 Introduction to Relational Databases	5	Dr Kieran Herley	AM1053 Introduction to Mathematical Modelling	5	Dr Sebastian Wieczorek
CS1112 Foundations of Computer Science I	5	Prof. Barry O'Sullivan	ST1401 Introduction to Operations Research	5	Dr Brett Houlding
CS1113 Foundations of Computer Science II	5	Prof. Barry O'Sullivan			
CS1117 Introduction to Programming	15	Dr Jason Quinlan			
AM1054 Mathematical Software	5	Dr Andreas Amann			
MA1058 Introduction to Linear Algebra	5	Dr Stephen Wills			
MA1059 Calculus	5	Dr Martin Kilian			
ST1050 Statistical Programming in R	5	Dr Fengyun Gu			
ST1051 Introduction to Probability and Statistics	5	Dr Shirin Moghaddam			

Year 2 Modules – 60 credits

Core Modules - 55 credits	Credits	Lecturer	Elective Modules – 5 credits	Credits	Lecturer
CS2208 Information Storage and Management	5	Dr Alejandro Arbaelez	AM2052 Mathematical Modelling	5	Dr Andreas Amann
CS2209 Information Storage and Management II	5	Dr Alejandro Arbaelez	ST2402 Modelling and Systems for Decision Making	5	Dr Brett Houlding
CS2513 Intermediate Programming	5	Dr Laura Climent			
CS2514 Introduction to Java	5	Dr Marc Van Dongen			
CS2515 Algorithms and Data Structures I	5	Dr Ken Brown			
CS2516 Algorithms and Data Structures II	5	Dr Ken Brown			
MA2055 Linear Algebra	5	Dr Andrei Mustata			
MA2071 Multivariable Calculus	5	Dr Martin Kilian			
ST2054 Probability and Mathematical Statistics	10	Dr Liang Chen			

Year 3 Modules – 60 credits

Core Modules – 60 credits	Credits	Elective Modules – 0 credits	Credits
CS3204 Cloud Infrastructure and Services	5		
CS3205 Data Visualization for Analytics Applications	5		
CS3220 Work Placement DSA	10		
CS3306 Workplace Technology and Skills	10		
CS3318 Advanced Programming with Java	5		
CS3509 Theory of Computation	5		
ST3053 Stochastic Modelling I	5		
ST3061 Statistical Theory of Estimation	5		
ST3069 Generalised Linear Models	5		
ST3070 Statistical Theory of Hypothesis Testing	5		

Year 4 Modules – 60 credits

Core Modules – 45 credits	Credits	Elective Modules – 15 credits	Credits
CS4701 Analytics Project for Computer Science	15	AM2061 Computer Modelling and Numerical Techniques	5
OR		AM3064 Computational Techniques	5
ST4092 Data Analytics Project	15	AM4006 Mathematical Modelling of Biological Systems with Differential Equations	5
AND		AM4010 Topics in Applied Mathematical Modelling	5
CS4704 Algorithms and Data Structures for Analytics	5	CS4150 Principles of Compilation	5
CS4705 Computational Machine Learning	5	CS4405 Multimedia Compression and Delivery	5
ST4060 Statistical Methods for Machine Learning I	5	CS4407 Algorithm Analysis	5
ST4061 Statistical Methods for Machine Learning II	5	CS4413 Future and Emerging Technologies	5
ST4069 Multivariate Methods for Data Analysis	10	CS4614 Introductory Network Security	5
		CS4615 Computer Systems Security	5
		CS4616 Distributed Algorithms	5
		CS4620 Functional Programming I	5
		CS4626 Constraint Programming and Optimisation	5
		CS4710 Programming Paradigms for Big Data	5
		ST3054 Survival Analysis	5
		ST4064 Time Series	5
		ST4090 Current Topics in Statistics I	5

Course Practicalities

This is a full-time course expecting a full-time commitment. The annual 60-credits workload typically equates to 12 hours of lectures per week and a comparable amount for laboratory work and tutorials.

Expected reading/practical hours: The course also demands a significant amount of additional time for study, reading, completion of project and assignment work.

Timetables

The BSc Data Science and Analytics start on **9ᵗʰ September 2019**. Timetables are available at http://timetable.ucc.ie , select College of Science, Engineering, Food Science and Semester 1/2.

Please note that the timetables may be altered and updated over the first weeks of Semesters I and II; laboratory timetables are scheduled later.

Plagiarism

Plagiarism is the presentation of someone else's work as your own. When done deliberately, it is cheating, since it is an attempt to claim credit for work not done by you and fails to give credit for the work of others. Plagiarism applies not just to text, but to software, graphics, tables, formulae, or any representation of ideas in print, electronic or any other media.

UCC policy on plagiarism

All students are required to read, to understand, and to comply with the UCC Policy on Plagiarism, which may be found on line at www.ucc.ie/en/exams/procedures-regulations/

Submitting Original and Existing Work

In general, you should write all coursework in your own words.

Coursework includes but not limited to:
- Programming assignments;
- Literature reviews;
- Abstracts and summaries;
- Thesis.

Submitting existing software

As a general rule:
- For assignments you are not allowed to submit existing software unless the lecturer clearly indicates that this is allowed. Please consult with your course lecturer if you are unsure whether you are allowed to submit existing software for assignments.
- For your thesis, you are usually allowed to submit (small) parts of existing software. Please consult with your project supervisor if you are unsure whether you are allowed to re-use existing software for your thesis.

Submitting work from others

If you wish to quote small portions of text, include images, software, or other work created by others, you need to make it clear that you are doing so. You usually do this by putting

quotation marks around quoted text and by including citations. Please note that pictures and diagrams in books and papers may be copyrighted, in which case you need explicit permission from the copyright holder.

Please note that if you acknowledge the original source, your lecturers/examiners will know that you are aware of the source, for which you can receive credit in the form of marks. If you fail to acknowledge the source, your lecturers/examiners cannot give you any credit for using the source. When failing to acknowledge the source is a deliberate, this is a form of cheating, which may result in awarding a zero mark.

Citing existing software

As with any work written by others, if you submit (parts of) existing software as part of your coursework, you should always give proper credit to the original author(s). In addition, you should clearly indicate which parts of these software are yours and which are not.
- In a program listing you should indicate this using comments;
- In a report, literature review, or thesis you should also indicate the source of the software in the running text, which should include a proper citation.

Attendance

Every registered student is **expected to attend all teaching elements of their programme**, including, but not limited to, lectures, tutorials, laboratory classes, placements, etc.
In the case of absence through illness, a student must, if possible, give notice of each absence in writing to the Lecturer concerned and/or Head of School/Department responsible.
In the case of such absence for more than four lecture days, the student must, on resuming attendance, notify the Lecturer concerned and/or Head of School/Department in writing and, if appropriate, lodge a medical certificate with the Head of School/Department, who will provide a copy for the Student Records and Examinations Office.
A student will not be permitted to enter for an examination if a specified attendance requirement of a module has not been met, or if attendance by the student is not considered satisfactory by the Deputy President and Registrar following a report by the Lecturer and/or Head of School/Department responsible for the module. The decision of the Deputy President and Registrar is subject to appeal to Academic Council.

IT Support for BSc DSA

You will be provided with a Login ID and Password in your first lab session to access the CS and Statistics laboratory machines and the main servers.

Entry to our computer laboratories is by Swipe Access, for which you will need a valid Student ID Card, which you will receive at Registration.

As a BSc DSA student you will have classes in both the School of Computer Science labs and in the Department of Statistics labs.

Computer Science Lab Support

If you have any IT queries regarding the Computer Science Labs you should contact the Computer Science IT Support Desk via email at help@cs.ucc.ie. The Computer Science IT Support Desk is situated in Room 1.25, First Floor, Western Gateway Building. The Computer Science IT Support Desk is open during term between 11.00 a.m. – 12.30 p.m. Monday to Friday and 2.30 p.m. – 4.00 p.m. Monday to Thursday. You can visit the Computer Science IT Support webpage for helpful technical guidance http://www.cs.ucc.ie/help

Print Quota

In order to manage printing facilities effectively, you will be allocated a Print Quota. Your logon entitles you to print 150 pages, with a charge of 5c per subsequent page. You can "top-up" by buying additional quota from the Print Quota machine, which is located near the Computer Science IT Helpdesk on the First Floor.

Statistics Lab Support

If you have any IT queries regarding the Statistics Labs, please see the "IT Help for Students" link at: www.ucc.ie/en/matsci or contact us at it.maths@ucc.ie .

Please note that you should use your entire UCC student email address and password to log onto pcs within our labs.

Your statistics lecturers will assist you with software queries.

Health & Safety Guidelines for Students (2019-20)

Students and staff are at all times expected to adopt a responsible attitude to all matters concerning health and safety at UCC. Under the current Safety, Health and Welfare at Work Act students/staff have a legal responsibility to consider their own safety, must cooperate at all times in implementing laboratory safety policy of UCC, must use the safety equipment provided, must report accidents or unsafe practices and must not interfere with the school safety policy.

It is expected that students will adhere strictly to the instructions of academic, technical and research staff when carrying out practical work.

Emergency evacuation drills/fire alarms

If the fire alarm sounds please leave the building as quickly as possible by the nearest exit and follow instruction of the fire marshals.

School First Aider

Contact School Office ext. 5891

Laboratories

- Food and beverages are not allowed in the laboratories – food contamination on the mouse and keyboards are serious health risk
- Remove all trip hazards (rucksacks, clothing etc.) from walking areas
- Please remove all items from the laboratory when you are leaving
- Do not provide access to the laboratory to other non-Computer Science students
- Report any hazards (obstacles, cables, etc.) to School Office, Rm 1.28
- Note the UCC acceptable usage policy regarding online usage. See link listed below.
- Pay attention to existing signage in the laboratories
- If you find items in labs that do not belong to you, please bring to the School Office, Rm 1.28
- Please remember that the laboratories are a working environment and noise should be kept at a minimum
- Dispose of all waste in the refuse bins provided

UCC Policies and Procedures

There are many important policies and procedures with which Students should be familiar. See the below for information on each one.

Policies and Procedures http://www.ucc.ie/en/students/policies/
Acceptable Usage Policy https://www.ucc.ie/en/it-policies/policies/au-pol/
Student Health Service https://www.ucc.ie/en/studenthealth/
UCC Emergency Tel. 021-490[3111]

This document is provided as a guideline only, if you have any concerns, please contact the School Office; Tel: 021 420 5892, email: csoffice@cs.ucc.ie

Contact Details

School of Computer Science and Information Technology

The School Office is situated in Room 1.28 on the First Floor of the Western Gateway Building.

Contact Details:

Margaret Hynes/Julie Walsh
Phone: +353 21 4205892
Email: csoffice@cs.ucc.ie

The School Office opening hours is from 9.00 a.m. – 1.00 p.m. and 2.00 p.m. – 5.00 p.m. Monday – Friday to help you with any queries.

School of Mathematical Sciences

The School Office is situated in Room 1.28 on the First Floor of the Western Gateway Building.

Contact Details:

Michelle Glynn
Phone: +353 21 4205817
Fax: +353 21 4205367
Email: sms@ucc.ie

The School Office opening hours is from 9.00 a.m. – 1.00 p.m. and 2.00 p.m. – 5.00 p.m. Monday – Friday to help you with any queries.

The School Office is situated in Room 1.57 on the First Floor of the Western Gateway Building.

List of Lecturing Staff

School of Computer Science and Information Technology

Lecturing Staff	Tel. No.	Room No.	Email
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School of Mathematical Sciences

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Book of Modules: http://www.ucc.ie/modules/

College Calendars: https://www.ucc.ie/admin/registrar/calendar/science/sci027.html#CK411

Examinations: http://www.ucc.ie/en/exams/

Fees: http://www.ucc.ie/en/financeoffice/fees/

Marks and Standards: http://www.ucc.ie/admin/registrar/marksandstandards/

Registration: http://www.ucc.ie/calendar/general/info014j.html

(includes information on the following)

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