



Course Specification Part A

MSc Data Science EECT109

**Faculty of Engineering, Environment and Computing
School of Computing, Electronics and Mathematics**

Academic Year: from 2021/2022

Please note: This specification provides a concise summary of the main features of the course and the learning outcomes that a typical student might reasonably be expected to achieve and demonstrate if s/he takes full advantage of the learning opportunities that are provided.

We regularly review our course content, to make it relevant and current for the benefit of our students. For these reasons, course modules may be updated.

More detailed information on the learning outcomes, content, and teaching, learning and assessment methods of each module can be found in the Module Information Directory (MID), student module guide(s) and the course handbook.

Coventry University's accreditation with CMI is currently ongoing for the relevant modules and is regularly reviewed and monitored by the CMI through their quality systems. Whilst Coventry University anticipates that these reviews will continue to be successful, if they were to be unsuccessful, the relevant module in this course would no longer be accredited and we would notify applicants and students of this change as soon as possible.

The accuracy of the information contained in this document is reviewed by the University and may be verified by the Quality Assurance Agency for Higher Education.

PART A Course Specification (Published Document)

MSc Data Science

1. Introduction

This MSc Data Science course is for graduates from a wide range of disciplines looking to upskill in Data Science. Gaining useful insights from data involves all of logical thinking, technical skills and deep knowledge of the domain the data comes from. Graduates from Law, Finance, Marketing, Business, Creative Arts, Social Sciences, Health Sciences, Sports Science, Psychology, Geography, Biological Sciences and Engineering (to name a few) are best placed to analyse data from their own discipline and would bring a unique perspective (and set of questions) to a Data Science team. Therefore, this course is designed to support students with perhaps little previous experience of data analysis or computer programming to gain new skills such as working with databases, statistical thinking, programming in high-level languages, modelling, applying Data Science tools and packages, machine learning, information retrieval, data visualisation, and addressing the challenges of Big Data. These complement existing knowledge and skills from each student's undergraduate study or work experience, such as formulating questions, building arguments, writing reports, delivering presentations, creative problem solving, and a curiosity about data.

Building on expertise in the Institute of Coding and the Centre for Data Science at Coventry University, experienced academics will support students as they gain foundational skills in computer programming before building more specialised knowledge and hands-on skills for the management and analysis of data of a variety of kinds and sizes. A feature of the course is working with other students with different backgrounds, experience and perspectives and therefore getting broad experience of working with a variety of types of data to address diverse and interesting questions. Coventry University is a leader in the field of mathematics and statistics support through its Sigma Centre where experienced tutors offers free one-to-one support and resources for all Coventry University students.

One of the seven pillars of the Government's UK Digital Strategy policy (March 2017) is "Data – Unlocking the power of data in the UK economy and improving public confidence in its use" (see <https://www.gov.uk/government/publications/uk-digital-strategy>). The policy (Section 7) recognises the need to develop skills in data analysis to support the data economy so that "businesses and government are able to use data in innovative and effective ways".

"As the global digital economy grows, all leading economies are seeing a major increase in demand not just for digital skills, but for a wide range of specialist data skills. Four out of five companies are struggling to find the talent they need and two thirds of data-driven companies have experienced difficulty in filling at least one vacancy when they have tried to recruit data analysts. This shortage of data talent has direct and serious economic implications, and addressing this shortfall should therefore be a strategic priority."

The policy briefing "Analytic Britain: Securing the right skills for the data-driven economy" (Nesta and Universities UK, July 2015, page 6, https://media.nesta.org.uk/documents/analytic_britain.pdf) comments on the data analysis education and skills provision in the UK. It calls for an increase in the supply of high-end analytical talent, both "practitioners capable of engaging with the current state of the art" and for "practitioners capable of developing new techniques and methods".

"By and large, the problem is finding people with the right *mix* of skills: the data scientists who combine technical skills, analytical and industry knowledge, and the business sense and soft skills to turn data into value for employers are very hard to find — so much so that some people refer to them as 'unicorns'."

The technology and tools surrounding Data Science are evolving at a very fast rate, fuelled by the needs, research and development of the technology giants such as Google, Apple, Facebook, Amazon, and Microsoft, and by the open-source developer community. Technology-dependent practical skills will be integrated with future-proof knowledge and understanding of specialist methods and algorithms in learning from data, statistical thinking, and mathematical language and foundations. The course also engages students with broader issues around data ethics and data protection, and communication with stakeholders of all kinds. Graduates of this course would be well prepared to join a team in an organisation related to their undergraduate discipline (contributing some data analytics skills) or a specialist Data Science team in a more general organisation or consultancy. After some further experience, they would be well placed to establish or lead a Data Science team.

As part of this course you will undertake a professional development module which is currently accredited by the Chartered Management Institute (CMI). Upon successful completion of the module, you will gain the CMI Level 7 Certificate in Strategic Management and Leadership Practice at no additional cost.

2 Available Award(s) and Modes of Study

Title of Award	Mode of attendance	UCAS Code	FHEQ Level
MSc Data Science	1 Year FT On-campus 2 Years PT On-campus		7
PG Diploma Data Science	Fall-back		
PG Certificate Data Science	Fall-back		

3 Awarding Institution/Body	Coventry University
4 Collaboration	None
5 Teaching Institution and Location of delivery	Coventry University, Coventry Campus.
6 Internal Approval/Review Dates	Date of approval: 05/2020 Date for next review: 2026/2027
7 Course Accredited by	Not applicable
8 Accreditation Date and Duration	Not applicable
9 QAA Subject Benchmark Statement(s) and/or other external factors	This MSc Data Science degree has been designed in accordance with the <u>QAA Subject Benchmark Statement for Computing (Master's)</u> (October 2019). The ACM Data Science Task Force (see http://dstf.acm.org/) has published a draft document on "Computing Competencies for Undergraduate Data Science Curricula" (December 2019).
10 Date of Course Specification	September 2021
11 Course Director	Dr Mark Johnston

12 Outline and Educational Aims of the Course

The aims of this MSc Data Science course are to:

- (1) Prepare students from diverse (non-computing) backgrounds for employment as part of a Data Science team or for further study in Data Science.
- (2) Establish depth in the design and development of computer software and in mathematical language, concepts and theory, sufficient for understanding the methods, algorithms and theoretical aspects of Data Science independently of the current state-of-the-art tools and technologies.

- (3) Build deep knowledge and understanding in core topics of Data Science including machine learning and Big Data.
- (4) Develop professional, practical and analytical skills across the data science project lifecycle in modelling and analysis of different types and scales of data and in applying modern Data Science tools and technologies.

This MSc Data Science course has been designed at Level 7 of the QAA Framework for Higher Education Qualifications of UK Degree-Awarding Bodies (October 2014) and guided by the QAA Subject Benchmark Statement for Computing (Master's) (October 2019). It provides a cohesive set of Data Science modules designed to challenge students from diverse backgrounds and provide opportunities for cross-disciplinary insights and projects.

13 Course Learning Outcomes

On successful completion of the course a student will be able to:

1. Demonstrate systematic knowledge and critical understanding of core and advanced topics in data science and its theoretical foundations.
2. Design and evaluate computer systems for the storage, organisation, management, retrieval and processing of different types of information and sizes of datasets, including distributed systems.
3. Use an analytical approach, statistical thinking and a comprehensive understanding of appropriate models, methods, algorithms and software tools to analyse data of a variety of types, and identify the limitations of any analysis.
4. Demonstrate practical skills and capabilities related to employment, including working effectively and constructively as part of a team, leading a team, motivating and communicating complex ideas accurately to experts and non-experts, and technical expertise with modern data science tools and technologies.
5. Identify and apply appropriate practices within a professional, legal, social, cultural and ethical framework, including complex, inter-related, multi-faceted issues that can be found in a variety of organisations and professional contexts.
6. Apply research skills such as planning research, and critical analysis of information from appropriate sources, demonstrate awareness of current issues and show originality in the application of knowledge where appropriate.
7. Critically evaluate the principles for leading and developing people and entrepreneurial practice in strategic contexts.

14 Course Structure and Requirements, Levels, Modules, Credits and Awards

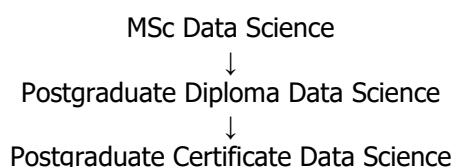
The course structure is designed to support students from diverse backgrounds to fulfil the course aims and learning outcomes. In particular, the first semester modules build knowledge and understanding of Data Science in computer programming, mathematical language and concepts, and statistical analysis. These principles are integrated with a broad overview of the applications, analytical skills and issues in the field of Data Science through problem-based learning and development of practical skills with high-level programming languages and specialised Data Science libraries and tools. The second semester modules develop more specialised knowledge and understanding across a broad range of specialist Data Science areas. These modules respond to different challenges in data management and data analysis, and integrate theoretical concepts and algorithms with practical applications and experience with specialised Data Science tools and technologies. The individual research project (Data Science Project) in the third semester will require students to conduct research into some current issue or challenging application in Data Science.

A module accredited by the Chartered Management Institute (CMI) will involve students working together across disciplines to facilitate an appreciation of how different sectors solve internal issues and how different sectors can learn and adopt or adapt solutions from other fields. Students who successfully complete the module and meet the CMI learning outcomes will gain a Level 7 Certificate in Strategic Management and Leadership Practice based on the following CMI units: Leading and Developing People to Optimise Performance (unit 702); Entrepreneurial Practice (unit 711).

Students who successfully complete this module will be awarded Foundation Chartered Manager status and be able to use the designation 'fCMgr' after their name.

In each module, teaching is mainly face-to-face through a combination of lectures, problem-solving workshops, supervised computer laboratory sessions, in-class discussions and presentations, directed reading and formative assessments. Additional support will be available from the University's Sigma Centre for Mathematics and Statistics Support (see <http://sigma.coventry.ac.uk/>).

Cascade of Awards:



To achieve the award of Master's degree from study on the course, as student must achieve the minimum credits specified in the University academic regulations.

The requirement for an MSc in Data Science is as follows:

Achievement of the full curriculum, 180 CATS credits comprising all of the taught modules described in the programme of study.

The requirement for a PG Diploma award in Data Science is as follows:

Achievement of 120 credits comprising all of the taught modules (excluding 7150CEM and 7050CRB).

The requirement for a PG Certificate award in Data Science is as follows:

Achievement of 60 credits comprising 7143CEM and 7144CEM.

Modules within the course, their status (whether mandatory or options), the levels at which they are studied, and their credit value are identified in the table below.

Please note that this course could be delivered in block format.

Credit Level	Module Code	Title	Credit Value**	Mandatory/ Optional	Course Learning Outcomes	Semester*
7	7143CEM	Programming for Data Science	30	Mandatory	1, 4, 5	1
7	7144CEM	Principles of Data Science	30	Mandatory	1, 3, 4	1
7	7071CEM	Information Retrieval	15	Mandatory	1, 2, 3, 4	2
7	7072CEM	Machine Learning	15	Mandatory	1, 3, 4, 5, 6	2
7	7082CEM	Big Data Management and Data Visualisation	15	Mandatory	1, 2, 3, 4, 5, 6	2
7	7086CEM	Data Management Systems	15	Mandatory	1, 2, 4, 5	2
7	7050CRB	Entrepreneurial Practice	10	Mandatory	7	3
7	7150CEM	Data Science Project	50	Mandatory	1, 2, 3, 4, 5, 6	3

* The delivery pattern is an indication and can be subject to change.

** The credit value applies to both assessment and learning credits.

15 Criteria for Admission and Selection Procedure

An applicant will normally be expected to possess at least one of the following:

- An honours degree or equivalent qualification.
- An unclassified degree in a relevant field plus professional experience.

Students whose first language is not English must demonstrate proficiency in the English language equivalent to IELTS 6.5. Alternatively students may be admitted with IELTS 6.0 if they attend and pass a compulsory five week pre-session English course, operated by Coventry University, before joining the master's course.

Applications involving other UK or overseas qualifications, mature candidates, or candidates with experience are welcome and will be considered on their merit as below:

- The programme is subject to the general University admission procedures and access policies. A wide range of academic backgrounds is deemed suitable for entry into the programme. However, careful monitoring of applications to ensure that applicants are suited to the programme takes place. Where necessary and possible, applications are interviewed, especially those who do not appear to meet standard admissions criteria;
- Accreditation for Prior Learning (APL) is in accordance with University regulations;
- The Accreditation for Prior Experiential Learning (APEL) will only be awarded for achievements equivalent to master's level.

16 Academic Regulations and Regulations of Assessment

This Course conforms to the standard [University Academic Regulations](#) Postgraduate Mode R.

17 Indicators of Quality Enhancement

The Course is managed by the School of Computing, Electronics and Mathematics (CEM) Board of Study of the Faculty of Engineering, Environment and Computing (EEC).

The Programme Assessment Board (PAB) for the EEC faculty is responsible for considering the progress of all students and making awards in accordance with both the University and course-specific regulations.

The assurance of the quality of modules is the responsibility of the Boards of Study which contribute modules to the course.

External Examiners have the opportunity to moderate all assessment tasks and a sample of assessed work for each module. They will report annually on the course and/or constituent modules and their views are considered as part of the Course Quality Enhancement Monitoring (CQEM). Details of the CQEM process can be found on the Registry's web site.

Students are represented on the Student Forum, Board of Study and Faculty/School Board, all of which normally meet two or three times per year.

Student views are also sought through module and course evaluation questionnaires.

The Quality Assurance Agency (QAA) Higher Education Review undertaken in February 2015 confirmed that Coventry University meets the UK expectations regarding the:

- setting and maintenance of academic standards of awards;
 - quality of student learning opportunities;
 - quality of the information about learning opportunities;
 - enhancement of student learning opportunities.
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The Faculty of Engineering, Environment and Computing (EEC) is host to the Centre for Data Science which carries out fundamental and applied research in Data Science, Artificial Intelligence, Computer Science and Statistics (see <https://www.coventry.ac.uk/research/areas-of-research/centre-for-data-science/>). Students will be taught by a teaching team (including researchers from the Centre) whose expertise and knowledge are closely matched to the content of the modules on the course.

Lecturers, guest speakers, case studies and web materials are used when appropriate to ensure that the content of this MSc course remains valid and contemporaneous, drawing on relevant expertise from within the course team. Research activity and interests, and relevant scholarly and consultancy activities will be used to inform the module content.

The course complements the portfolio of MSc courses in the School, including MSc Computer Science, MSc Cyber Security, MSc Software Development, and MSc Data Science and Computational Intelligence. There is also strong and regular industry input into the subject-base of the course. These include the links with employers through the CEM Industry Advisory Board (IAB), and industry-focused collaborative research initiatives.

18 Additional Information

Enrolled students have access to additional, key sources of information about the course and student support including:

- Faculty Student Handbook
- Data Science Course Handbook
- Module Guides
- Postgraduate Course page and Module pages on the University's Virtual Learning Environment (VLE)
- Module Information Directory

The University and Faculty support is also available via links as follows:

- University Library: <https://www.coventry.ac.uk/study-at-coventry/student-support/academic-support/lanchester-library/>
- Sigma Mathematics and Statistics Support Centre (in the University library): <https://www.coventry.ac.uk/study-at-coventry/student-support/academic-support/sigma-maths-and-stats-support/>
- Centre of Academic Writing (in the University library): <https://www.coventry.ac.uk/study-at-coventry/student-support/academic-support/centre-for-academic-writing/>
- EEC Student Web: <https://share.coventry.ac.uk/students/EC/Pages/Home.aspx>
- Coventry University Student Portal: <https://share.coventry.ac.uk/students/Pages/Index.aspx>