

Course Information Document: Undergraduate For Academic Year 2023/24

1. Course Summary

Names of programme and award title(s)	BSc (Hons) Data Science (apprenticeship programme)
Award type	Single Honours
Mode of study	Part-time
Framework of Higher Education Qualification (FHEQ) level of final award	Level 6
Normal length of the programme	36-48 months
Maximum period of registration	The normal length as specified above plus 3 years
Location of study	Keele Campus
Accreditation (if applicable)	Not applicable
Regulator	Office for Students (OfS); Institute for Apprenticeships
Tuition Fees	<p>UK students:</p> <p>Fee for 2023/24: all course fees are paid by the employer and no fees are charged to apprentices.</p> <p>The fee is set at the maximum funding band for this apprenticeship standard set by the Institute for Apprenticeships (IfA), which is a government non-departmental body sponsored by the Department for Education (DFE).</p> <p>We reserve the right to increase the fee in future. Fees will be paid by the employer on behalf of the apprentice using Levy or co-funding arrangements. At no point must any costs for the course be passed to the apprentice.</p> <p>https://www.gov.uk/government/publications/apprenticeship-funding-from-may-2017</p> <p>A full breakdown of costs is set out in the training plan.</p>

Please note that this document applies to Level 6 (Year 3) students only in 2025/26. Level 4 (Year 1) and Level 5 (Year 2) students should refer instead to the document labelled '2025/26'.

How this information might change: Please read the important information at <http://www.keele.ac.uk/student-agreement/>. This explains how and why we may need to make changes to the information provided in this document and to help you understand how we will communicate with you if this happens.

2. What is a Single Honours Apprenticeship programme?

The programme described in this document allows you to focus on Data Science and relevant areas of Computer Science, while at the same time also allowing you to work for your employer. Thus the course enables you to gain, and be able to demonstrate, a distinctive range of graduate attributes.

The Single Honours Data Scientist Degree Apprenticeship enables apprentices to devote their studies to the tools, techniques, underpinning theories and practical work-based applications that make the science and technology so innovative and exciting. It provides the greatest breadth of learning in the subject, and has been developed in accordance with the requirements of the Standard for Level 6 Data Scientist Degree Apprenticeship.

3. Overview of the Programme

The Single Honours Data Scientist Degree Apprenticeship is a programme for apprentices with an interest in the application of data science and computing to a wide range of theoretical and real world problems. Data driven computer systems are now vital to business, government, science and society, and there is much demand for graduates with the professional understanding and practical skills to harness software and hardware technologies to solve real-world data analytics problems and develop the data analysis systems of the future. Many of the recent advances in these areas can be attributed to developments in computing and data science, and this trend is likely to increase in speed and impact.

The programme explores the theoretical underpinnings of the discipline and places an emphasis on practical data analytics, computer programming and software development. There are no specific subject requirements for entry to the programme, and no previous experience of computing or computer programming is assumed. Any mathematical knowledge needed beyond GCSE level is taught either by tailored mathematics modules developed for data science or as part of the data science and computing modules included in the programme.

4. Aims of the programme

The broad aims of the programme are to:

- Develop your intellectual, practical and additional transferable skills, to enable you to gain a sound academic grounding in the discipline of Data Science and relevant aspects of Computer Science.
- Develop an understanding of the professional issues relevant to your working life.
- Include areas of teaching at the leading edge of the discipline, as informed by subject research, discipline and industry trends and market requirements.

The range of opportunities for graduates with data science and computing skills continues to expand. Our graduates on this programme are expected to continue working for their employer in increasingly challenging roles.

5. What you will learn

The intended learning outcomes of the programme (what students should know, understand and be able to do at the end of the programme), can be described under the following headings:

- Subject knowledge and understanding
- Subject specific skills
- Behaviours and transferable skills (including employability skills)
- Work experience abilities and skills

A. Subject knowledge and understanding

In line with the [apprenticeship standard for the Data Scientist Degree Apprenticeship](#) successful apprentices will be able to demonstrate knowledge and understanding of:

LO1.1 The context of Data Science and the Data Science community in relation to computer science, statistics and software engineering. How differing schools of thought in these disciplines have driven new approaches to data systems.

LO1.2 How Data Science operates within the context of data governance, data security, and communications. How Data Science can be applied to improve an organisation's processes, operations and outputs. How data and analysis may exhibit biases and prejudice. How ethics and compliance affect Data Science work, and the impact of international regulations (including the General Data Protection Regulation). Recognise the professional, economic, social, environmental, moral and ethical issues involved in the sustainable exploitation of data science and computer technology and be guided by the adoption of appropriate professional, ethical and legal practices.

LO1.3 How data can be used systematically, through an awareness of key platforms for data and analysis in an organisation, including:

- A. Data processing and storage, including on-premise and cloud technologies.
- B. Database systems including relational, data warehousing & online analytical processing, "NoSQL" and real-time approaches; the pros and cons of each approach.
- C. Data-driven decision making and the good use of evidence and analytics in making choices and decisions.

LO1.4 How to design, implement and optimise analytical algorithms - as prototypes and at production scale - using:

- A. Statistical and mathematical models and methods.
- B. Advanced and predictive analytics, machine learning and artificial intelligence techniques, simulations, optimisation, and automation.
- C. Applications such as computer vision and Natural Language Processing.
- D. An awareness of the computing and organisational resource constraints and trade-offs involved in selecting models, algorithms and tools.
- E. Development standards, including programming practice, testing, source control.

LO1.5 The data landscape: how to critically analyse, interpret and evaluate complex information from diverse datasets:

- A. Sources of data including but not exclusive to files, operational systems, databases, web services, open data, government data, news and social media.
- B. Data formats, structures and data delivery methods including "unstructured" data.
- C. Common patterns in real-world data

B. Subject specific skills

Successful apprentices will be able to:

LO2.1 Identify and clarify problems an organisation faces, and reformulate them into Data Science problems. Devise solutions and make decisions in context by seeking feedback from stakeholders. Apply scientific methods through experiment design, measurement, hypothesis testing and delivery of results. Collaborate with colleagues to gather requirements.

LO2.2 Perform data engineering: create and handle datasets for analysis. Use tools and techniques to source, access, explore, profile, pipeline, combine, transform and store data, and apply governance (quality control, security, privacy) to data.

LO2.3 Identify and use an appropriate range of programming languages and tools for data manipulation, analysis, visualisation, and system integration. Select appropriate data structures and algorithms for the problem. Develop reproducible analysis and robust code, working in accordance with software development standards, including security, accessibility, code quality and version control.

LO2.4 Use analysis and models to inform and improve organisational outcomes, building models and validating results with statistical testing: perform statistical analysis, correlation vs causation, feature selection and engineering, machine learning, optimisation, and simulations, using the appropriate techniques for the problem.

LO2.5 Implement data solutions, using relevant software engineering architectures and design patterns. Evaluate Cloud vs. on-premise deployment. Determine the implicit and explicit value of data. Assess value for money and Return on Investment. Scale a system up/out. Evaluate emerging trends and new approaches. Compare the pros and cons of software applications and techniques.

LO2.6 Find, present, communicate and disseminate outputs effectively and with high impact through creative storytelling, tailoring the message for the audience. Use the best medium for each audience, such as technical writing, reporting and dashboards. Visualise data to tell compelling and actionable narratives. Make recommendations to decision makers to contribute towards the achievement of organisation goals.

LO2.7 Develop and maintain collaborative relationships at strategic and operational levels, using methods of organisational empathy (human, organisation and technical) and build relationships through active listening and trust development.

LO2.8 Use project delivery techniques and tools appropriate to their Data Science project and organisation. Plan, organise and manage resources to successfully run a small Data Science project, achieve organisational

goals and enable effective change.

C. Behaviours and transferable skills (including employability skills)

Successful apprentices will have the opportunity to develop:

LO3.1 An inquisitive approach: the curiosity to explore new questions, opportunities, data, and techniques; tenacity to improve methods and maximise insights; and relentless creativity in their approach to solutions.

LO3.2 Empathy and positive engagement to enable working and collaborating in multi-disciplinary teams, championing and highlighting ethics and diversity in data work.

LO3.3 Adaptability and dynamism when responding to varied tasks and organisational timescales, and pragmatism in the face of real-world scenarios.

LO3.4 Consideration of problems in the context of organisation goals.

LO3.5 An impartial, scientific, hypothesis-driven approach to work, rigorous data analysis methods, and integrity in presenting data and conclusions in a truthful and appropriate manner.

LO3.6 A commitment to keeping up to date with current thinking and maintaining personal development. Including collaborating with the data science community.

LO3.7 The ability to construct well-argued and grammatically correct documents. The ability to locate and retrieve relevant ideas, and ensure these are correctly and accurately referenced and attributed.

LO3.8 Recognising factors in environmental and societal contexts relating to the opportunities and challenges created by data analytics and computing systems across a range of human activities.

D. Work experience skills

Successful apprentices will be able to:

LO4.1 Apply academic theory learnt as part of the taught degree to real situations in the workplace.

LO4.2 Reflect on their work activities and experiences and evaluate their learning in the context of their work.

LO4.3 Explain how the professional data science and analytics sector operates and identify the skills required to pursue careers within the sector.

Keele Graduate attributes

Engagement with this programme will enable you to develop your intellectual, personal and professional capabilities. At Keele, we call these our ten Graduate Attributes and they include independent thinking, synthesizing information, creative problem solving, communicating clearly, and appreciating the social, environmental and global implications of your studies and activities. Our educational programme and learning environment is designed to help you to become a well-rounded graduate who is capable of making a positive and valued contribution in a complex and rapidly changing world, whichever spheres of life you engage in after your studies are completed.

Further information about the Keele Graduate Attributes can be found here: <http://www.keele.ac.uk/journey/>

6. How is the programme taught?

Learning and teaching methods used on the programme vary according to the subject matter and level of the module. They include the following:

- **Traditional and online lectures** often supported by copies of lecture slides in print or electronic form
- **Practical sessions** in computer laboratories at workplace or on campus during residential sessions, often supported by copies of laboratory instruction sheets
- **Web-based learning** using the University's virtual learning environment (KLE)
- **Tutorials** online and during residential sessions and directed reading on specific topics under the supervision of a member of academic staff
- **Work-based projects** in which apprentices plan and manage a small Data Science project to provide solutions to an identified problem in order to achieve organisational goals
- **Professional practice** through working for the employer.

Apart from these formal activities, apprentices are also provided with regular opportunities to talk through particular areas of difficulty, and any special learning needs they may have, with, for example, their Academic Mentors or Work-place Mentor.

These learning and teaching methods enable apprentices to achieve the learning outcomes of the programme in a variety of ways. For example:

- Online lectures allow apprentices to gain a systematic knowledge and understanding of data science concepts and ideas and how to apply them to development of software and information systems.
- Web-based learning and directed reading allow apprentices to develop their interest in data science, their ability to reflect on their own learning and to take responsibility for its development.
- Group sessions enable apprentices to develop their written and oral communication skills.
- Practical sessions and group work encourages apprentices to work both independently and in collaboration with others as well as enabling them to solve problems in new or unfamiliar environments.

7. Teaching Staff

The Data Science academic staff currently comprises Professors, Readers, Senior Lecturers, Lecturers and Teaching Fellows, of whom a number are Associate Fellows, Fellows and Senior Fellows of the Higher Education Academy. Teaching will also involve demonstrators and session teachers who have significant experience in working in data science and computer science research and delivering practicals to data science and/or computer science apprentices. More information about the Data Science staff is available at <http://www.keele.ac.uk/scm/staff/>

The University will attempt to minimise changes to our core teaching teams, however, delivery of the programme depends on having a sufficient number of staff with the relevant expertise to ensure that the programme is taught to the appropriate academic standard.

Staff turnover, for example where key members of staff leave, fall ill or go on research leave, may result in changes to the programme's content. The University will endeavour to ensure that any impact on students is limited if such changes occur.

8. What is the structure of the Programme?

The traditional academic year runs from September to June and is divided into two semesters. For the Apprenticeship integrated degree this is extended and complemented by an additional summer period of directed learning. The number of weeks of teaching will vary in each semester, but you can generally expect to attend scheduled teaching sessions between the end of September and mid-December, and from mid-January to the end of April.

Our degree courses are organised into modules. Each module is usually a self-contained unit of study and each is usually assessed separately with the award of credits on the basis of 1 credit = 10 hours of student effort. An outline of the structure of the programme is provided in the tables below.

All modules are compulsory on this programme and you are not able to replace any of the modules with electives.

Year	Compulsory	Optional		Electives	
		Min	Max	Min	Max
Level 4	120	0	0	0	0
Level 5	120	0	0	0	0
Level 6	120	0	0	0	0

Module Lists

Level 4

Compulsory modules	Module Code	Credits	Period
Numerical and Computational Skills	CSC-10044	15	Semester 1
Programming Fundamentals	CSC-10046	15	Semester 1
Introduction to Computing	CSC-10048	15	Semester 1
Making Sense of Statistics for Data Scientists	CSC-10052	15	Semester 1
Calculus for Data Scientists	CSC-10054	15	Semester 2
Requirements, Evaluation and Professionalism for Data Scientists	CSC-10066	30	Semester 2
Introduction to Data Science With Python	CSC-10068	15	Semester 2

Level 5

Compulsory modules	Module Code	Credits	Period
Software Development	CSC-20063	15	Semester 1
Data Analytics and Visualisation	CSC-20065	15	Semester 1
Machine Learning	CSC-20067	15	Semester 1
Professional Skills	CSC-20093	30	Semester 1-3
Statistical Techniques for Data Analytics	CSC-20053	15	Semester 2
Cloud Computing	CSC-20057	15	Semester 2
Databases	CSC-20061	15	Semester 2

Level 6

Compulsory modules	Module Code	Credits	Period
Artificial Intelligence for Data Science	CSC-30051	15	Semester 1
Data Ethics, Security and Governance	CSC-30053	15	Semester 1
Professionalism in Data Science	CSC-30035	30	Semester 1-2
Preparing for the Data Science End Point Assessment	CSC-30055	0	Semester 1-2
Data Scientist End Point Assessment	CSC-30049	60	Semester 3

9. Final and intermediate awards

Credits required for each level of academic award are as follows:

BSc (Hons) Data Science, including achievement of apprenticeship standard	360 credits	You will require at least 120 credits at levels 4, 5 and 6 You must accumulate at least 360 credits in Data Science, with at least 120 credits in Level 4, 120 credits in Level 5 and 120 credits in Level 6 (including 60 credits for the End-Point Assessment), to graduate with a named single honours degree in Data Science.
Diploma in Higher Education	240 credits	You will require at least 120 credits at level 4 or higher and at least 120 credits at level 5 or higher
Certificate in Higher Education	120 credits	You will require at least 120 credits at level 4 or higher

Achievement of the End-Point Assessment (EPA) ensures the apprenticeship standard has been met as outlined in the [standard EPA assessment criteria](#). Successful completion of the EPA will signify the completion of the apprenticeship as well as the full degree.

10. How is the Programme Assessed?

The wide variety of assessment methods used on this programme at Keele reflects the broad range of knowledge and skills that are developed as you progress through the degree programme. Teaching staff pay particular attention to specifying clear assessment criteria and providing timely, regular and constructive feedback that helps to clarify things you did not understand and helps you to improve your performance. The following list is representative of the variety of assessment methods used on your programme:

- **Class tests** are taken during the course of a module, usually during a residential period or as an online test via the KLE. They are intended to assess an apprentice's current understanding and subject knowledge in that module in a structured and focused manner. Some taught compulsory modules may have class tests as part of the assessment profile.
- **Coursework** normally consists of assignments designed to assess an apprentice's knowledge and understanding of the module material. Some of these assignments may be computer based; others take the form of individual reports, essays or group projects.
- **Short reports:** for which apprentices are required to write up their own account of small group studies and discussions on particular topics.
- **Tutorial Participation**, whereby apprentices may be asked to make contributions based on the subject material, either orally or as a written solution, sometimes in consultation with their peers.
- **Dissertations** are formal reports of work carried out by apprentices undertaking a project. Projects involve the integration and application of theoretical knowledge and problem-solving skills to an identified programming need and/or research problem within the discipline. Dissertations describe product and process in extended detail.
- **Oral presentations** and reports assess an apprentice's ability to communicate their knowledge and understanding, both visually and orally, to both general and academic audiences.
- **Work-based assessment** is carried out in the workplace, for example through discussion about, and observation of, work practices, and assessment of work products, or away from the workplace, for example through assessment of reports, records, logs, written accounts etc., as well as discussion.
- **Reflective diary** is an account of the apprentice's work in progress, which provides an opportunity for reflection on the learning experience. It provides a means of engaging critically and analytically with content of the programme.
- **End-Point Assessment** is the final stage of the apprenticeship. It consists of the following:
 - a) Knowledge Test
 - b) Report (based on a work-based project) and
 - c) Professional Discussion informed by a portfolio

Marks are awarded for summative assessments designed to assess your achievement of learning outcomes. You will also be assessed formatively to enable you to monitor your own progress and to assist staff in identifying and addressing any specific learning needs. Feedback, including guidance on how you can improve the quality of your work, is also provided on all summative assessments within three working weeks of submission, unless there are compelling circumstances that make this impossible, and more informally in the course of tutorial and seminar discussions.

11. Contact Time and Expected Workload

The minimum amount of time that should be spent on off-the-job training during an apprenticeship is set at 20%. This means that at least 20% of the apprentice's normal working hours are spent in training in order to achieve the knowledge, skills and behaviours required by the apprenticeship standard. This can include online learning

activities such as lectures, seminars, tutorials, project supervision and practical activities; also learning support and time writing assignments. Any training that takes place outside normal working hours or progress reviews are not included in the off-the-job training allocation.

The programme will be a mixture of online learning and block release where students will attend residential sessions on Keele campus. The block release timetable will be a mixture of tutorials, some face to face lectures and practical sessions. This will be supported by further independent study.

12. Accreditation

This programme is not currently accredited by a professional body.

13. University Regulations

The University Regulations form the framework for learning, teaching and assessment and other aspects of the student experience. Further information about the University Regulations can be found at: <http://www.keele.ac.uk/student-agreement/>

If this programme has any exemptions, variations or additions to the University Regulations these will be detailed in an Annex at the end of this document titled 'Programme-specific regulations'.

14. Additional Costs

Data Scientist Apprenticeship Programme Additional Costs

For apprentices the costs of tuition are covered by the employer and most resources will be available online. It is possible that, as an apprentice, you may incur costs that are not covered by the mandatory components of the apprenticeship. These typically might include library fines, print costs and costs associated with graduation.

We do not anticipate any further costs for this undergraduate programme.

Version History

This document

Date Approved: 02 April 2025

What's Changed

Returning for amendments following validation panel

Previous documents

Version No	Year	Owner	Date Approved	Summary of and rationale for changes
1	2023/24	NADIA KANWAL	19 January 2023	
1	2022/23	ALLISON GARDNER	31 January 2022	
1	2021/22	ALLISON GARDNER	17 August 2021	
1	2020/21	ALLISON GARDNER	24 July 2020	
1	2019/20	EDWARD MCCAULEY	03 October 2019	