Programme Specification: Undergraduate

For apprentices starting in Academic Year 2019/2020

1. Course Summary

Names of programme(s) and award title(s)	BSc (Hons) Data Science
Award type	Single Honours
Mode of study	Full-time (Apprenticeship)
Framework of Higher Education Qualification (FHEQ) level of final award	Level 6
Duration	36-48 months
Location of study	Keele University – main campus Employer premises
Accreditation (if applicable)	Not Applicable
Regulator	Office for Students Institute for Apprenticeships
Tuition Fees	**UK/EU students:** Fee for 2019/20: All course fees are paid by the employer and no fees are charged to apprentices. 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). 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. https://www.gov.uk/government/publications/apprenticeship-funding-from-may-2017 A full breakdown of costs is set out in the commitment statement.
Additional Costs	Refer to the Additional Costs section

How this information might change: *Please read the important information at http://www.keele.ac.uk/apprentice-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 an 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.

** Fee liability for apprenticeship programmes resides with the employer.*

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 apprentices 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 may include any of 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 Personal Tutors 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 apprentices 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.

Module lists

Year 1 (Level 4)

Compulsory modules		**Semester**	**Credits**
CSC-10048	Introduction to Computing	1	15
CSC-10046	Programming Fundamentals	1	15
CSC-10050	Requirements, Evaluation and Professionalism for Data Scientists	2	15
CSC-10044	Numerical and Computational Skills	1	15
CSC-10052	Making Sense of Statistics for Data Scientists	1	15
CSC-10054	Calculus for Data Scientists	2	15
CSC-10042	Introduction to Data Science with Python	2	30

Year 2 (Level 5)

Compulsory modules	**Credits**
Data Analytics and Visualisation	15
Computational Mathematics with Python	15
Machine Learning	15
Data Structures and Algorithms	15
Statistical Techniques for Data Analytics	15
Databases	15
Cloud Computing	15
Software Development	15

Year 3 (Level 6)

Compulsory modules	**Credits**
Work-based Project	30
End-Point-Assessment (EPA)	60
Artificial Intelligence I	15
Artificial Intelligence II	15

For further information on the content of modules currently offered, please visit www.keele.ac.uk/recordsandexams/az

Learning Outcomes

The table below sets out what apprentices learn in each year of the Programme, the modules in which that learning takes place, and the main ways in which apprentices are assessed on their learning. In Year 1 (Level 4) and Year 2 (Level 5) these learning outcomes are achieved in the compulsory modules which all apprentices are required to take. In Year 3 (Level 6) apprentices will, in addition to taught module assessments, demonstrate achievement in the learning outcomes listed below via the maintenance of a reflective diary (completed throughout Years 1 to 3) which will help develop the End Point Assessment portfolio.

Subject Knowledge and Understanding		
Learning Outcome *Successful apprentices will be able to demonstrate knowledge and understanding of:*	**Module in which this is delivered**	**Principal forms of assessment (of the Level Outcome) used**
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.	Introduction to Data Science with Python Requirements, Evaluation and Professionalism for Data Scientists Statistical Techniques for Data Analytics	Coursework and class test End Point Assessment
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.)	Introduction to Data Science with Python Requirements, Evaluation and Professionalism for Data Scientists Machine Learning Statistical Techniques for Data Analytics	Coursework and class test End Point Assessment
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.	A. Databases; Cloud Computing B. Databases; Cloud Computing C. Making Sense of Statistics for Data Scientists; Calculus for Data Scientists, Statistical Techniques for Data Analytics; Computational Mathematics with Python	Coursework and class Test End Point Assessment
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	A. Data Structures and Algorithms; Statistical Techniques for Data Analytics; Computational Mathematics with Python; Calculus for Data Scientists, Numerical and Computational Skills B. Artificial Intelligence I; Statistical Techniques for Data Analytics; Machine Learning; Introduction to Data science with Python; Data Structures and Algorithms	Coursework and class Test End Point Assessment

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.	C. Artificial Intelligence II; Machine Learning; D. Machine Learning; Data Structures and Algorithms; Introduction to Data Science with Python; Data Analytics and Visualisation; Introduction to Computing E. Programming Fundamentals; Software Development; Introduction to Data Science with Python	
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	A. Statistical Techniques for Data Analytics B. Databases; Statistical Techniques for Data Analytics C. Statistical Techniques for Data Analytics; Artificial Intelligence I; Machine Learning; Data Analytics and Visualisation	Coursework and class Test End Point Assessment

Subject Specific Skills		
Learning Outcome *Successful apprentices will have the ability to:*	**Module in which this is delivered**	**Principal forms of assessment (of the Level Outcome) used**
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.	Requirements, Evaluation and Professionalism for Data Scientists Statistical Techniques for Data Analytics Introduction to Data Science with Python Making Sense of Statistics for Data Scientists Statistical Techniques for Data Analytics	Coursework and class Test End Point Assessment
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.	Databases Introduction to Data Science with Python Machine Learning Requirements, Evaluation and Professionalism	Coursework and class Test End Point Assessment

	for Data Scientists Software Development	
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.	Programming Fundamentals Data Structures and Algorithms Statistical Techniques for Data Analytics Machine Learning Data Analytics and Visualisation Software Development	Coursework and class Test End Point Assessment
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.	Statistical Techniques for Data Analytics Machine Learning Artificial Intelligence I; Artificial Intelligence II Data Analytics and Visualisation	Coursework and class Test End Point Assessment
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.	Programming Fundamentals Data Structures and Algorithms Cloud Computing Software Development	Coursework and class Test. End Point Assessment
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.	Requirements, Evaluation and Professionalism for Data Scientists Data Analytics and Visualisation Work-based Project	Coursework and class Test End Point Assessment

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.	Work-based Project	Coursework End Point Assessment
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.	Work-based Project	End Point Assessment

Behaviours and Transferable Skills		
Learning Outcome *Successful apprentices will have the opportunity to develop:*	**Module in which this is delivered**	**Principal forms of assessment (of the Level Outcome) used**
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.	Requirements, Evaluation and Professionalism for Data Scientists Statistical Techniques for Data Analytics Machine Learning Artificial Intelligence I Artificial Intelligence II Work-based Project	Coursework and class test End Point Assessment
Empathy and positive engagement to enable working and collaborating in multi-disciplinary teams, championing and highlighting ethics and diversity in data work.	Introduction to Data Science with Python Machine Learning Requirements, Evaluation and Professionalism for Data Scientists	Coursework and class test End Point Assessment
Adaptability and dynamism when responding to varied tasks and organisational timescales, and pragmatism in the face of real-world scenarios.	Software Development Statistical Techniques for Data Analytics Requirements, Evaluation and Professionalism for Data Scientists Work-based Project	Coursework and class Test End Point Assessment

Consideration of problems in the context of organisation goals.	Requirements, Evaluation and Professionalism for Data Scientists Introduction to Data Science with Python	Coursework and class Test End Point Assessment
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.	Statistical Techniques for Data Analytics Introduction to Data Science with Python Machine Learning Requirements, Evaluation and Professionalism for Data Scientists	Coursework and class Test End Point Assessment
A commitment to keeping up to date with current thinking and maintaining personal development. Including collaborating with the data science community.	Statistical Techniques for Data Analytics Introduction to Data Science with Python Requirements, Evaluation and Professionalism for Data Scientists Machine Learning	Coursework and class Test End Point Assessment
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.	Requirements, Evaluation and Professionalism for Data Scientists Databases Software Development Artificial Intelligence I Work-based Project Artificial Intelligence II	Coursework and class Test End Point Assessment
Recognising factors in environmental and societal contexts relating to the opportunities and challenges created by computing systems across a range of human activities.	Introduction to Computing; Introduction to Data Science with Python Requirements, Evaluation and Professionalism for Data Scientists	Coursework and class test End Point Assessment
Work experience skills		
Learning Outcome *Successful apprentices will be able to:*	**Module in which this is delivered**	**Principal forms of assessment (of the Level Outcome) used**
Apply academic theory learnt as part of the taught degree to real situations in the workplace.	Professional practice	End Point Assessment Work-based project
Reflect on their work activities and experiences and evaluate their	Professional practice	End Point Assessment Work-based project

learning in the context of their work		
Explain how the professional data science and analytics sector operates and identify the skills required to pursue careers within the sector.	Professional practice	End Point Assessment Work-based project

9. Final and intermediate awards

The 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 within Data Science 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 within Data Science:

- **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. Regulations

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

14. What are the typical admission requirements for the programme?

Subject	A-level	Subjects not included	International Baccalaureate	BTEC	Access to Higher Education Diploma	GCSE requirements
Data Science (Single Honours) Apprenticeship	ABC / BBB (individual employer requirements may vary)	None	32 points	DDM	Obtain Access to Higher Education Diploma with 30 Level 3 credits at Distinction	Maths @ C (or 4) English Language @ C (or 4)

Applicants for whom English is not a first language must provide evidence of a recognised qualification in English language. The minimum score for entry to the Programme is Academic IELTS 6.0 or equivalent.

Please note: All non-native English speaking apprentices are required to undertake a diagnostic English language assessment on arrival at Keele, to determine whether English language support may help them succeed with their studies. An English language module may be compulsory for some apprentices during their first year at Keele.

Recognition of Prior Learning (RPL) is considered on a case-by-case basis and those interested should contact the Programme Director. The University's guidelines on this can be found here:
http://www.keele.ac.uk/qa/accreditationofpriorlearning/

Apprentices must be employed by one of Keele's contracted employer partners.

Note that individual employers may set higher entry thresholds based on their recruitment requirements.

15. How are apprentices supported on the programme?

Support for apprentice learning on the Programme is provided in the following ways:

- Module lecturers, teaching fellows and computing laboratory demonstrators are responsible for providing support for learning on the modules. They also give individual feedback on coursework assignments and more general feedback on examinations and tests. Apprentices will be able to access support through electronic systems from the Data Science Apprenticeship teaching team. Every apprentice is allocated to a Personal Academic Tutor (Personal Tutor) who is responsible for reviewing and advising on apprentices' academic progress in Data Science. Apprentices will be able to communicate with their personal tutor via email and online office hours, or by appointment outside these hours, for support. Apprentices will also be able to seek support from the teaching team and their tutor during residential periods.

- Every apprentice is allocated to a Personal Workplace Tutor who is responsible for reviewing and advising on apprentices' academic-related workplace-based progress in Data Science. The Personal Workplace Tutor is an employee of the organisation where the apprentice works, and is appointed in agreement with the employer.

- Personal Academic Tutors and Personal Workplace Tutors also act as first points of contact for apprentices on non-academic issues which may affect their learning and can refer apprentices on to a range of specialist health, welfare and financial services co- ordinated by the University's Student Services or on to specialist services offered by their employer.

16. Learning Resources

Data Science is taught in lecture theatres, teaching rooms, computer laboratories and online. The learning resources available to apprentices on the Programme include:

- Dedicated networked PC laboratories within the School of Computing and Mathematics, which use the Microsoft Windows and GNU/Linux operating systems and provide a wide range of supported software. The School buildings are accessible 24 hours a day. Apprentices have individual email accounts and file stores on University and School servers.

- Dedicated networked PC laboratories at their employer's premises (provided by their employer), which use the Microsoft Windows and GNU/Linux operating systems and provide a wide range of supported software. These PCs are accessible according to the schedule set by the employer and should be accessible at least for such time that allows the apprentices to do their laboratory work and computer based private study required for the modules that they study. Apprentices have individual email accounts and file stores on the employer's servers. Additional facilities are provided for final year projects at the employer's premises (provided by their employer).

- The Keele Learning Environment (KLE) which provides easy online access to a range of learning resources including lecture notes and other resources supplied in modules.

- The extensive collection of books and journals relevant to undergraduate study held in the University Library. Much of this material is also accessible online to Keele apprentices from anywhere in the world with a University username and password.

17. 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.

18. Quality management and enhancement

The quality and standards of learning in Data Science are subject to a continuous process of monitoring, review and enhancement.

- The Education Committee of the School of Computing and Mathematics is responsible for reviewing and monitoring quality management and enhancement procedures and activities across the School.

- Individual modules and the Data Science Programme as a whole are reviewed and enhanced every year in the annual programme review which takes place at the end of the academic year and as part of the University's Annual Programme Review.

- The programmes are run in accordance with the University's Quality Assurance procedures and are subject to periodic reviews under the Internal Quality Audit (IQA) process.

Apprentice evaluation of, and feedback on, the quality of learning on every Data Science module takes place every year using a variety of different methods:

- The results of apprentice evaluations of all modules are reported to module leaders and reviewed by the Programme Committee as part of the Annual Programme Review process.

- Findings related to the Data Science Programme from the annual National Student Survey (NSS), and from regular surveys of the apprentice experience conducted by the University, are subjected to careful analysis and a planned response at programme and School level.

- Feedback received from representatives of apprentices in all three years of the Data Science Programme is considered and acted on at regular meetings of the Student Staff Voice Committee.

The University will also seek feedback from employers at regular intervals as part of the contract management process.

The University appoints senior members of academic staff from other universities to act as external examiners on all programmes. They are responsible for:

- Approving coursework
- Confirming all marks which contribute to an apprentice's degree
- Reviewing and giving advice on the structure and content of the programme and assessment procedures

Information about current external examiner(s) can be found here:
http://www.keele.ac.uk/qa/externalexaminers/currentexternalexaminers/

For all Apprenticeship programmes there is a requirement for participation in the annual FE Choices survey. When programmes fall into scope there is a six month window where we will encourage you to participate and feed into the national survey.

19. The principles of programme design

The Data Science Apprenticeship Programme described in this document has been drawn up with reference to, and in accordance with the guidance set out in the following documents:

a. Data Scientist Level 6 Apprenticeship Integrated Degree Standard ST0585, Institute of Apprenticeships, https://www.instituteforapprenticeships.org/apprenticeship-standards/data-scientist-degree/

b. UK Quality Code for Higher Education, Quality Assurance Agency for Higher Education: http://www.qaa.ac.uk/quality-code

c. QAA Subject Benchmark Statement: Computing (2016) http://www.qaa.ac.uk/docs/qaa/subject-benchmark-statements/sbs-computing-16.pdf?sfvrsn=26e1f781_10

d. QAA Apprenticeships Characteristics Statement: https://www.qaa.ac.uk/en/quality-code/supporting-resources

e. Accreditation criteria, British Computer Society, 2010. http://www.bcs.org/category/5844, http://www.bcs.org/upload/pdf/criteria.pdf

f. Keele University Regulations and Guidance for Students and Staff: http://www.keele.ac.uk/regulations

g. Institute for Apprenticeships and Technical Education Data Scientist (Integrated Degree) Assessment Plan: https://www.instituteforapprenticeships.org/media/1973/st0585_data-scientist-integrated-degree_l6_ap-for-publication_230718.pdf

20. Document Version History

Date of first approved version (v1.0): 23rd September 2019

Revision history

Version number[1]	Author	Date	Summary of and rationale for changes

[1] 1.1, 1.2 etc. are used for minor changes and 2.0, 3.0 etc. for major changes (as defined in the University's Guidance on processes supporting curriculum changes)