Buckinghamshire New University

PROGRAMME SPECIFICATION

1. Key Information

Programme Title:	MSc Data Science
Awarding Institution:	Buckinghamshire New University
Teaching Institution(s):	Buckinghamshire New University
Subject Cluster:	Computing
Award Title (including separate Pathway Award Titles where offered):	MSc Data Science
Pathways (if applicable)	N/A
FHEQ level of final award:	7
Other award titles available (exit qualifications):	PG Certificate PG Diploma
Accreditation details:	N/A
Length of programme:	1 year
Mode(s) of Study:	Full Time
Mode of Delivery:	In person (on-site) delivery
Language of study:	English
QAA Subject Benchmark(s):	Computing (including Master's) (2024)
Other external reference points (e.g. Apprenticeship Standard):	British Computer Society
Course Code(s):	MSDATSFT
UCAS Code(s):	N/A
Approval date:	December 2024
Date of last update:	

2. Programme Summary

Data science is the driving force behind today's digital world, influencing every aspect of our lives, from medicine and healthcare to industrial applications, global trade, transportation, communications, entertainment, and security. It encompasses the development of methods for recording, storing, and analysing data to extract valuable insights. With the rapid advancement of computing technology, data science has become one of the fastest-growing fields globally, and the demand for skilled data scientists continues to rise. Complex datasets can be subjected to statistical analysis and computational processing to uncover meaningful information that supports decision-making.

Data scientists are highly sought after due to their ability to analyse data and apply various analytics techniques to identify patterns, trends, and relationships within data sets. Their analysis of big data can yield insights applicable across numerous industries. For example,

businesses can predict and capitalise on consumer behaviours, banks can enhance fraud detection, investors can leverage big data and artificial intelligence to make informed investment decisions, and pharmaceutical companies can expedite drug development through advanced data analysis.

Our comprehensive and structured approach to data science provides students with a deep understanding of both theoretical concepts and practical skills, equipping them to solve real-world, critical challenges. Students will engage with systems at various levels of abstraction, including big data system architectures, data processing and programming, artificial intelligence, and database management.

The MSc Data Science programme is designed to prepare learners for careers as professional data scientists, particularly in environments where specialised knowledge, critical thinking, proficiency with computer hardware and applications, software engineering, and advanced data science are essential for the development of complex data-driven information systems.

In addition to the broad educational objectives of the programme, a key focus is to provide graduates with the foundational engineering skills needed for designing, programming, constructing, debugging, and testing intricate systems. To support this goal, we have integrated numerous opportunities throughout the curriculum for learners to develop and practice these essential skills.

3. Programme Aims and Learning Outcomes

Programme Aims

This programme aims to:

1. Equip learners with an advanced and comprehensive understanding of the methodologies, technologies, and techniques employed in the field of data science, providing a strong foundation to develop the skills necessary for a diverse range of data-related professional engineering careers. Graduates will be prepared to excel as high-quality practitioners and leaders in business, technology, research, and development within the field.
2. Enable learners to apply their knowledge of data science and related technologies in the development of systems and software for industrial, business, and commercial applications, ensuring practical and impactful solutions.

3. Foster an awareness in learners of the growing pervasiveness and challenges of data science in the contemporary world. Develop their ability to systematically and critically analyse and evaluate options to address complex data science issues.

4. Prepare learners to be adaptable and independent in evaluating various approaches to problem-solving and decision-making in the context of data-driven computing systems. Equip them to build solutions using diverse technologies, architectures, and methodological approaches while navigating the complexities of dynamic professional environments and varied organisational structures.

5. Cultivate an appreciation for the professional, moral, and ethical considerations involved in data science systems development, ensuring adherence to legal frameworks. Enhance learners' leadership and management skills, as well as their understanding of emerging research trends in the computing and big data sectors.

Programme Learning Outcomes

Knowledge and Understanding (K)

On successful completion of the programme, you will be able to:

ID	Learning Outcome
K1	Demonstrate a solid understanding of the fundamentals and theoretical principles that underpin data science, particularly within the global context of computer science and information engineering systems.
K2	Describe and critically assess computational principles foundational to computer science systems, including topics such as computability and algorithmic complexity, where relevant to related disciplines.
K3	Recognise the importance of both efficient and effective management in the development and construction of computer science and information engineering systems, within an ethical framework. Appreciate the inherent uncertainty, ambiguity, and knowledge limitations that exist in business, industrial, and commercial contexts where computer science is applied, as well as the importance of usability.
K4	Describe and evaluate current best practices, research, leadership, and management approaches as applied throughout the life cycle of computer science and information engineering systems, highlighting outputs and dependencies across various stages of system development.

Analysis and Criticality (C)

On successful completion of the programme, you will be able to:

ID	Learning Outcome
C1	Apply advanced level skills of an intellectual, analytical, creative and problem-solving nature in the context of data science and data-driven information systems.
C2	Deploy innovative plans, approaches and solutions to data science and data-driven engineering issues within a quality assurance and testing framework focused against the needs of data-based system.
C3	Evaluate concepts and data, to make judgements, and to frame appropriate questions to achieve an appropriate solution to a problem in a logical, analytical and ethical manner across the spectrum of data science and data-driven information systems developments.
C4	Assess competently, critically analyse and make use of current and future technologies in the data science and data-driven information systems field. Apply theory to practice in the strategic management and technical solutions of data science-based systems within organisations.

Application and Practice (P)

On successful completion of the programme, you will be able to:

ID	Learning Outcome
P1	Undertake project work that encompasses the key stages of analysis, design, implementation, and testing, supported by comprehensive product documentation. Demonstrate the ability to apply learned methods and techniques to review, consolidate, extend, and apply knowledge in addressing the unique challenges of developing and deploying data science and data-driven information systems.
P2	Formulate and sustain social, ethical, and computational arguments to solve complex problems, utilising ideas and techniques at the forefront of the data science and data-driven information systems field.
P3	Adhere to professional codes of conduct and demonstrate a deep appreciation for the ethical considerations that influence the acceptance and integration of data science and data-driven information systems within society by professionals, individuals, and the public at large.
P4	Apply methods and techniques related to requirements analysis, specification, prototyping, implementation, testing, integration, documentation, delivery, and maintenance. Utilise these practices to review, consolidate, extend, and apply knowledge for identifying and addressing the needs of practical data science problems and information systems.
P5	Critically evaluate arguments, assumptions, abstract concepts, and data to provide optimal technical or managerial consultation, make informed decisions, and devise effective solutions. Synthesise and assess information from diverse sources related to data science and business issues.

Transferable skills and other attributes (T)

On successful completion of the programme, you will be able to:

ID	Learning Outcome
T1	Effectively communicate data, ideas, problems, and solutions to both specialist and non-specialist audiences, utilising clear writing, speaking, and appropriate forms of presentation.
T2	Apply computational data through advanced data processing and analytics technologies to efficiently manage data and perform system simulations for design and testing purposes.
T3	Build upon and refine prior experiences to support personal development, whether leading or working collaboratively as part of a team.

Graduate Attributes

The BNU Graduate Attributes of: Knowledge and its application; Creativity; Social and ethical awareness and responsibility; and Leadership and self-development focus on the development of innovative leaders in professional and creative capacities, who are equipped to operate in the 21st Century labour market and make a positive impact as global citizens.

Whilst developing as an advanced data science specialist on this programme, personal attributes are developed through the practical application of data analytical skills, computational principles, algorithmic intricacy, computing technology systems in a variety of data-driven situations, including real-world scenarios, and life-critical Case Studies (K1, P3, P4, C1, C2, C3). Analysis and evaluation approaches are embedded throughout the

programme in individual and team tasks, through the appraisal of current and past data science and data-driven information systems supported by the feedback given to your own personal work (P1, T1, T3, C4, P5). An understanding and awareness of operational applications is fostered with a strong focus given to applying and assessing an appropriate life-cycle methodology (K3, C4). This nurtures the self-efficacy to develop your own work opportunities and to adapt to a constantly evolving technological work environment (C4, K1, K2, K4). Through analysing the historical, social and cultural contexts of operational data science and data-driven information systems, a growing social awareness is formed to ensure professional and ethical values are developed alongside the confidence to assess existing real-world, life critical systems, whilst appreciating the balance between the needs of data science and its practice, embedded by data-driven information fundamentals (P1, P2, P3, C1, T3, T2, P4, P5).

4. Entry Requirements

The University's general entry requirements will apply to admission to this programme with the following additions / exceptions:

- An academic qualification equivalent to a BSc (Hons) Degree in a relevant subject area, 2:2 classification or better
- English Language level according to current IELTS requirement

Where an applicant does not meet the standard entry requirement with regards to academic qualification, their suitability for the programme will be assessed based upon their previous studies, professional and/or vocational experiences. An interview will likely be necessary in such cases.

The accreditation of prior learning (APL) process may be utilised to determine if any exemptions from studying modules are appropriate.

5. Programme Structure

Level	Modules (Code, Title and Credits)	Exit Awards
Level 7	**Core modules:** COM7002 Project (60) COM7011 Data Science (20) COM7112 Information Systems & Database Design (20) COM7064 Programming for Data Science (20) COM7063 Big Data Processing and Data Visualisation (20) **Option modules:** Choose modules to the total of 40 credits: COM7003 Cloud Security (20) COM7014 Natural Language Processing (20) COM7017 Introduction to Applied Artificial Intelligence (20) COM7018 Machine Learning and Intelligent Agents (20) COM7010 Computer Science Overview (20)	**Postgraduate Certificate,** awarded on achievement of 60 credits (not including COM7002) **Postgraduate Diploma**, awarded on achievement of 120 credits (not including COM7002)

6. Learning, Teaching and Assessment

Learning and teaching

Our adopted teaching and learning styles in the subject of computing reflect the role and importance that the various disciplines of the sector undertake in the modern world of today. Increasing emphasis on capability, competency and performance is woven into our approach to all aspects of our teaching and learning methods. They can reflect traditional workplace environments – including the expected activities and professionalism associated with real projects and working with clients - as well as newer approaches like online evaluations, role-playing scenarios and gig-economy/commissioned work. Practical coursework, both individual and in teams, features heavily in our computing programmes.

The teaching and learning approaches in our programmes are designed to provide meaningful opportunities for applied learning in authentic or simulated work contexts. Working in teams on bigger projects simulates real-world environments and exposes learners to complexity. Projects may involve collaboration with industrial partners or research groups, enhancing learning and self-regulation and can give learners exposure to legal or ethical issues.

The focus is to provide for learners the opportunity to improve control of their own educational journey, giving them the tools and techniques to enable them to self-regulate and to optimise their personal performance: self-reflection, performance monitoring, evaluation and feedback within learning to support a more personalised journey. The teaching and learning approaches also aim to imbue the ability to work autonomously, both individually and in teams, reflecting the key desired professional attributes employers value in the various fields related to computing and data science.

Modules on this programme will be taught in line with best practice across the university and in the sector. A variety of approaches, and good use of the latest technology, will be blended to engage learners in learning in class, labs and beyond, and to encourage full learner

participation. Meanwhile, the Course Team will strive to ensure that all modules embrace current industrial practice wherever possible. The teaching and learning strategies employed throughout the course are those judged to be the most appropriate for each module. Whilst there will be some formal teaching, Masters students are expected to take significant responsibility for their own learning and development in and outside of the classroom environment.

A range of teaching methods will be used including:

Lectures

This is the most formal teaching strategy employed in teaching the modules. It is generally used to deliver a body of theoretical information to a large group of learners and is most effective when followed up by a seminar or tutorial session to consolidate learning.

The lecture format may be supported by written handouts, web or library references which serve to reinforce and expand the audio-visual information presented. In addition, staff will make appropriate use of the University's VLE (Virtual Learning Environment) and rich-media facilities. This will enable lecturers to enhance the traditional communication and learning mediums, as well as making material available to learners off-site and at the university.

Tutorials / Practical Sessions

Often in smaller groups, tutorials are guided learning sessions, which can either support a formal lecture by learners working through tutorial sheets with the help of a lecturer or by learners working through practical exercises in say a computing room.

Seminars

These can vary from large group seminars, which provide an opportunity for the learner-led formal debate of topic areas, to 'impromptu' discussion sessions with smaller groups, which may for example follow the showing of a video.

Other techniques such as industrial visits, guest lectures and computer aided learning tools will be used where appropriate. This variety of techniques is aimed at stimulating learner learning. The teaching and learning strategies for individual modules are detailed in the relevant module proforma.

Assessment

The assessment of our data science course includes a variety of projects that are accessible to all learners. Assessments are, where possible, authentic and tied to real-world contexts and constraints, allowing learners to practically demonstrate the skills they have developed. Appropriate adaptations to assessments will be implemented for individual learners where reasonable adjustments have been formally assessed and recommended.

Students will be required to develop and explain solutions to a range of technical problems, with project outputs needing to be supported by appropriate documentation and, in some cases, demonstrated and explained to tutors through oral presentations. The COM7002 Project is a significant and in-depth piece of research into a specialist topic, requiring learners to apply knowledge and skills learned through the course.

Assessments have been designed to motivate learners to achieve their best, against the necessary Learning Outcomes. The assessment requirements for individual modules are detailed in the pertinent module descriptors.

Assessments will be appropriate to the task, achievable, motivating and vocationally focused and will form a constructive part of the learning process. Assessments will develop general transferable skills as well as academic skills. Assessments will provide enough opportunity for the best learners to exhibit a level of innovation and creativity associated with excellence.

Personal review and evaluation is encouraged for all assessments so that students develop important reflective skills. These tasks prepare learners for their careers, requiring communication in various formats. Each module includes formative assessments for learning through feedback and feedforward, with support available both in person and remotely.

Advice, Feedback and Collaborative Learning

Assessment is an integral part of the education process, promoting learning by providing a focus for consolidating, applying and demonstrating understanding of the subject matter. The listed summative assessment regime essentially measures and grades learner development and achievement in relation to the intended Learning Outcomes. It also generates feedback information for learners about the strengths and weaknesses in their work, with tutors affirming what learners have done well whilst giving constructive and encouraging advice about areas requiring reflection and further improvement.

In fact, tutor feedback on formal assessment elements is just part of the ongoing dialogue with learners about their learning and personal development. Tutors will offer learners frequent opportunities to discuss their progress, where their work can be examined and reviewed, including the evaluation of plans and drafts for assignments prior to submission. This supportive engagement helps to clarify what "good performance" is, with reference to published criteria and expected standards; it also encourages, motivates and directs learners towards achieving their full potential.

Different strategies for timely advice and effective feedback will be adopted, according to what is fit-for-purpose for learners and modules. For instance: good or bad examples of previous learner work not only give learners clues about appropriate content, structure and presentation of assignments but also highlight common mistakes and omissions; mock exam papers and formative tests; work portfolios represent a collection of structured activities completed over a period of time with regular interactions with the tutor; individual and group tutorials; practicing presentations with other learners can invite peer review; model answers can supplement and extend the feedback given on assessments; group discussions can

promote reflection and collaborative learning; audio and video recordings can be used at various points to explain topics and to give guidance; other technology (such as the VLE) can facilitate information sharing, and support learning and collaboration.

Contact Hours

One unit of credit is broadly equivalent to ten notional learning hours. Postgraduate learners will complete modules equivalent to 180 credits in total during their programme. This translates as 1800 notional learning hours. The combination of scheduled teaching (contact) activities, guided independent study and any opportunities for placement or work-based learning, will be defined at Module level.

7. Programme Regulations

This programme will be subject to the following assessment regulations:

Academic Assessment Regulations

8. Support for learners

The following systems are in place to support you to be successful with your studies:

- The appointment of a personal tutor to support you through your programme
- A programme handbook and induction at the beginning of your studies
- Library resources, include access to books, journals and databases - many of which are available in electronic format – and support from trained library staff
- Access to Blackboard, our Virtual Learning Environment (VLE), which is accessible via PC, laptop, tablet or mobile device
- Access to the MyBNU portal where you can access all University systems, information and news, record your attendance at sessions, and access your personalised timetable
- Academic Registry staff providing general guidance on University regulations, exams, and other aspects of learners and course administration
- Central learner services, including teams supporting academic skills development, career success, learner finance, accommodation, chaplaincy, disability and counselling
- Support from the Bucks Learners' Union, including the Learners' Union Advice Centre which offers free and confidential advice on University processes.

9. Programme monitoring and review

BNU has a number of ways for monitoring and reviewing the quality of learning and teaching on your programme. You will be able to comment on the content of their programme via the following feedback mechanisms:

- Formal feedback questionnaires and anonymous module 'check-ins'
- Participation in external surveys
- Programme Committees, via appointed learner representatives
- Informal feedback to your programme leader

Quality and standards on each programme are assured via the following mechanisms:

- An initial event to approve the programme for delivery

- An annual report submitted by the External Examiner following a process of external moderation of work submitted for assessment
- The Annual Monitoring process, which is overseen by the University's Education Committee
- Review by the relevant PSRB(s)
- Periodic Subject Review events held every five years
- Other sector compliance and review mechanisms

10. Internal and external reference points

Design and development of this programme has been informed by the following internal and external reference points:

- The Framework for Higher Education Qualifications (FHEQ)
- The QAA Subject Benchmark Statement – see detailed mapping below (Computing)
- The BNU Qualifications and Credit Framework
- The BNU Grading Descriptors
- The University Strategy

Mapping of Subject Benchmark Statement and any relevant Apprenticeship Standard to Programme Learning Outcomes

Subject Benchmark Statement / Apprenticeship Standard:	Knowledge and understanding (K)				Analysis and Criticality (C)				Application and Practice (P)					Transferable skills and other attributes (T)		
Benchmark / Standard requirement	**K1**	**K2**	**K3**	**K4**	**C1**	**C2**	**C3**	**C4**	**P1**	**P2**	**P3**	**P4**	**P5**	**T1**	**T2**	**T3**
Subject knowledge understanding and skills/ Demonstrate an exceptional understanding of the main body of knowledge for their subject and be able to exercise insightful and critical judgement in the use of that knowledge. Be creative and innovative in the application of the principles covered in the curriculum, and be able to go beyond what has been taught in classes	X	X			X	X		X	X		X					X
Intellectual skills/ Critically analyse and apply a wide range of concepts, principles and practices of the subject in the context of open scenarios, showing. refined judgement and	X	X	X	X	X	X	X	X	X	X	X	X		X		

adaptability in the selection and use of tools and techniques																
Computational problem-solving/ Be able to demonstrate sophisticated judgement, critical thinking, research design, and well-developed problem-solving skills with a high degree of autonomy, and to create highly effective computational artefacts across complex and unpredictable circumstances		X		X	X	X	X	X	X		X		X		X	
Practical skills across the computing lifecycle/ Demonstrate the ability to undertake problem identification and analysis to appropriately design, develop, test, integrate or deploy a highly complex computing system and any associated artefacts; deeply understand the relationship between stages and be able to demonstrate related sophisticated problem-solving and evidence-informed evaluative skills	X	X		X	X	X	X	X	X	X	X	X	X	X	X	X

Criteria																
Interpersonal and team working Skills/ Demonstrate the ability to work in a highly proactive and accomplished manner, including as a leading member of a team, making excellent use of tools and techniques to proficiently communicate, manage tasks and plan projects with minimum guidance	X	X		X			X	X		X	X	X				X
Professional practice covering Equality, diversity and inclusion, Sustainability and Entrepreneurship and enterprise education/ Identify best-of-kind practices and effect highly principled solutions within a professional, legal and ethical framework. to consistently address a wide breadth of relevant considerations – including data management and use, security, equality, diversity and inclusion (EDI) and sustainability – in the work that they undertake	X				X	X	X	X	X		X			X	X	X

Mapping of Programme Learning Outcomes to Core Modules

Programme Learning Outcome	Knowledge and understanding (K)				Analysis and Criticality (C)				Application and Practice (P)					Transferable skills and other attributes (T)		
Module Code (Core)	K1	K2	K3	K4	C1	C2	C3	C4	P1	P2	P3	P4	P5	T1	T2	T3
Level 7																
COM7002 Project	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
COM7011 Data Science	X	X		X	X	X	X	X	X		X		X	X	X	X
COM7112 Information Systems & Database Design	X	X		X			X	X	X	X	X			X	X	
COM7064 Programming for Data Science	X	X	X		X	X		X	X		X	X		X	X	
COM7063 Big Data Processing and Data Visualisation	X	X	X		X	X	X		X	X		X	X	X	X	X