MSc Big Data Science and Technology Programme Specification

https://www.bradford.ac.uk/courses/pg/big-data-science-and-technology/

Academic Year:	2023/24
Degree Awarding Body:	The University of Bradford
Target Degree Award:	Master of Science in Big Data Science and Technology [Framework for Higher Education Qualifications (FHEQ) Level 7]
Interim/exit Awards:	Postgraduate Diploma; Postgraduate Certificate [FHEQ Level 7]
Programme Admissions:	September and January
Programme duration:	12 months full time; 24 months part time
Subject Benchmark Statement:	Computing (QAA 2016)
Programme Accrediting Body:	BCS – The Chartered Institute for IT

Please note: This programme specification has been published in advance of the academic year to which it applies. Every effort has been made to ensure that the information is accurate at the time of publication, but changes may occur given the interval between publishing and commencement of teaching. Any change which impacts the terms and conditions of an applicant's offer will be communicated to them. Upon commencement of the programme, students will receive further detail about their course and any minor changes will be discussed and/or communicated at this point.

Minor Modifications

1. December 2015 – academic portfolio review.
2. April 2016 – Final academic portfolio review outcomes implemented.
3. March 2019 – Revised curriculum structure.
4. March 2020 – Further revised structure based on feedback from BCS, students and graduates
5. January 2021 – Specification reformatted and made accessible. Added January intake.
6. June 2021 – Annual changes for 2021 academic year
7. July 2022 – Annual changes for 2022 academic year and updated title for optional module.
8. April 2023 – Updates for periodic review.

Introduction

In this era of the fourth industrial revolution, computerised applications are becoming a part and parcel of our life. A huge amount of data is generated by machines and humans every day and these data are collected and processed to make intelligent decisions to automate different processes, saving costs and improving efficiency and the quality of service provision for businesses in different domains. To benefit from data-driven decision-making processes, a wide range of industries are increasingly demanding employees with advanced knowledge and skills in big data management, data analytics, machine learning, and data mining.

The MSc Big Data Science and Technology from the University of Bradford Faculty of Engineering and Digital Technologies provides students with the knowledge of cutting-edge methodologies, approaches and skills in the emerging field of data science and big data applications, including advanced software development, systems for big data

analytics, statistical data analysis, machine learning, data privacy and security, data visualization and exploration, and legal, social, ethical, and professional (LSEP) issues associated with data-driven applications. The programme of study culminates in a dissertation, enabling students to bring what they have learnt together in a significant piece of project work.

To fulfil the University's mission to "*drive sustainable social and economic development*", this programme aims to enable students to develop important knowledge and understanding, practical discipline skills, and awareness of LSEP issues in the area of big data and data science that will be vital in enriching lives and benefitting society. This programme will offer an opportunity for students to gain a range of transferable skills that will enhance their personal and professional development. In summary, the MSc Big Data Science and Technology offers students the opportunity to build their own path of study— from the advanced computing modules, as well as the dissertation—so as to match their specific career aspirations in the area of big data and data science.

Programme Aims
The programme is intended to:

1. Equip graduates with the cutting-edge knowledge and skills to work in the industry as a Data Scientist, Big Data Architect, or Big Data Analyst.

2. Provide industry with graduates able to develop solutions to address challenges for big data analytics and developing big data systems by considering legal, social, ethical and professional issues with such systems.

Programme Learning Outcomes
To be eligible for the FHEQ Level 7 award of Postgraduate Certificate, students will be able to:

1. Demonstrate a systematic understanding and critical awareness of discipline knowledge in big data analytics and big data system development.

2. Demonstrate an understanding of advanced techniques applicable to their research and development projects on big data applications.

3. Demonstrate originality in the application of principle and knowledge on big data analytics and big data systems, together with a practical understanding of applying big data analytics to generate new knowledge in the discipline.

4. Demonstrate ability of evaluating existing methodologies in the literature and proposing new methodologies for addressing challenges of big data.

5. Communicate the results and conclusion on big data clearly to specialist and non-specialist audiences.

6. Demonstrate the transferable skills for decision-making in complex and unpredictable situations in big data project.

7. Demonstrate the independent learning ability required for continuing professional development.

8. Demonstrate a systematic understanding and critical awareness of legal, social, ethical and professional issues and undertaking risk management with big data systems development.

Additionally, to be eligible for the FHEQ Level 7 award of Postgraduate Diploma, students will be able to:

9. Deal with complexity in big data projects for design, development, and data analytics.

Additionally, to be eligible for the FHEQ Level 7 Degree award of Master, students will be able to:

10. Demonstrate skills to select, design, plan and manage a self-directed and managed research-informed original project, demonstrating a critical analysis and evaluation of relevant material and the ability to apply relevant skills and research methodologies in the production of an advanced report

Learning and Teaching Strategy

Our Learning and Teaching Strategy is to provide a nurturing and supportive environment that enables students to become an independent learners and problem solvers. Students will be supported via various approaches including e.g. learning in small groups and in practical laboratory sessions where discussions and formative feedbacks are embedded, having the support of lecturers, demonstrators and project supervisor, who all provide academic support and guidance. Students will also have their own personal academic tutor who provide academic and pastoral care throughout the programme of study. Students will also have the opportunity to be part of the University of Bradford Computing Society for students, PiSoc, where students are able to meet with other fellow Computer Science students at different stages of their study.

This programme will involve a range of teaching and assessment approaches. The teaching, learning and assessment strategy takes into consideration the learning outcomes for the programme, the nature of topic studied and the need for students to demonstrate greater autonomy in their learning as they progress through the programme.

Each 20-credit module on the programme requires 200 hours of study. Some of these hours will be formally timetabled lectures, laboratories, seminars, tutorials and workshops, while others will involve carrying out private study by students.

Students will experience a range of teaching and learning environments. Concepts, principles and theories are generally explored in formal lectures, demonstrated in laboratory classes, and practised in associated tutorials and seminars.

1. Formal lectures will facilitate the acquisition of knowledge and understanding, discipline specific skills

2. Practical skills are developed in laboratories. Laboratory sessions run in conjunction with the theoretical components will give students the opportunity to enhance their discipline-specific knowledge, skills and understanding of particular topics.

3. Tutorials, seminar/workshops will develop knowledge and understanding, discipline specific skills and personal transferable skills, through discussion, presentations and small-scale project work which involves problem solving and design exercises, often tackled by working in small groups.

4. A particular strength of this programme is the contribution made to the teaching programme by successful research active members of staff.

5. This programme will also involve invited external speakers from various industry sectors to provide students with opportunities to learn from large corporates such as the BBC, Microsoft and Sky and other SMEs.

6. Directed study, involving directed reading of appropriate texts and the preparation of assessed work, is used to develop the majority of learning outcomes. Students will also have opportunities to learn from each other in the specifically organized study clubs with fellow students.

We use Canvas to share course materials and reading lists, communicate with students, track student participation, facilitate discussions, support formative and summative assessments and provide feedback. Students can use Canvas independently to revise materials, ask questions and interact with lecturers and other students using discussions, practice and assess their understanding using quizzes, or for finding resources for further reading.

Equality, diversity and inclusion are embedded in the programme's learning and teaching activities. We celebrate differences and ensure that everyone has equal opportunities to achieve their desired outcomes. Students are also instilled with the understanding of ethical and professional issues in the context of development and applications of big data systems and the responsibilities around these issues. Students will be encouraged to explore a diverse range of digital technologies and theories and engage constructively with businesses and communities to enrich their understanding of societal and economic impact of big data science and embrace the values of equality, diversity and inclusion in their development of data-driven solutions. This approach will equip students with the wider perspective of the relevance of big data science and technology for the betterment of businesses and society.

Assessment Strategy

The assessment strategy is designed to allow students to demonstrate achievement of the learning outcomes of an individual module appropriate to their level of study and the learning outcomes of the programme. These learning outcomes are consistent with the Framework for Higher Education Qualifications. Students will have the opportunity to demonstrate skills of analysis, synthesis and criticism through a wide variety of assessment strategies, including written and oral examinations, coursework assignments, report writing, group work, oral presentations, and a dissertation. The final

project/dissertation provides a major opportunity for students to demonstrate their capability and skill in big data analytics and system development. Formative assessments are also used to allow feedback to be provided, strengths and areas of improvement to be identified.

Curriculum

The programme has two stages: the taught programmes stage which takes place during the first two semesters (or four semesters for the part-time route), and the project/dissertation stage. The taught programmes stage is organised on a modular basis. All modules are assessed at FHEQ Level 7.

The programme has modules in the Autumn and Spring periods providing grounding and advanced study of the field. The final two semesters allow students the opportunity to develop, through sustained major project work, advanced knowledge and understanding of data science and Big Data management.

Students study 60 core credits in the Autumn. Students study 40 core credits in the Spring and one 20 credit optional module from the 2 available. Work for the dissertation begins in the Spring and is submitted at either the beginning or the end of Semester 1 (Autumn) depending on which admissions period (SEM1 or SEM2) students start the programme in.

Table 1: MSc Big Data Science and Technology Modules

Study Period	Code	Title	Credit	Type
SEM1	COS7006-B	Big Data Systems and Analytics	20	Core
SEM1	COS7046-B	Big Data Visualisation	20	Core
SEM1	COS7009-B	Software Development	20	Core
SEM2	COS7045-B	Advanced Machine Learning	20	Core
SEM2	COS7048-B	MSc Group Project	20	Core
SEM2	COS7051-B	Cyber Physical Systems Security	20	Option
SEM2	ENB7007-B	Risk Assessment and Management	20	Option
S123 or S231	COS7004-E	Dissertation	60	Core

Please note: The curriculum may change, subject to the University's programme approval, monitoring and review procedures.

Assessment and Award Regulations

This Programme conforms to the standard University Postgraduate Assessment Regulations which are available at the following link: www.bradford.ac.uk/regulations

Students will be eligible to exit with the award of **Postgraduate Certificate** if they have successfully completed 60 core credits and achieved the award learning outcomes.

Students will be eligible to exit with the award of **Postgraduate Diploma Big Data Science and Technology** if they have successfully completed 120 credits, at least 80 of which should be from core modules, and achieved the award learning outcomes.

Students will be eligible for the award of **Degree of Master** if they have successfully completed 180 credits and achieved the award learning outcomes.

Admission Requirements

We take into consideration a number of factors when assessing your application. It's not just about your grades; we take the time to understand your personal circumstances and make decisions based on your potential to thrive at university and beyond.

In addition to satisfying the general admissions requirements of the University of Bradford, the typical applicant profile for this programme is to have at least an undergraduate degree classified at 2:2 or above in computer science, computer engineering, electrical engineering, informatics or other "computing-adjacent" subjects (including non-STEM disciplines such as finance, economics, business studies etc. dependant on the modules taken) from an accredited degree awarding body. In addition to satisfying the degree classification requirement, candidates with non-STEM backgrounds have to demonstrate that they have studied at least two Mathematics or Computing or Statistics related modules during their previous studies and have some prior computer programming experience. Candidates who do not fulfil the normal entry requirements but have extensive industrial experience in a related area are considered on an individual basis.

International students are welcome to apply and should check their country page website for details of equivalent qualifications: https://www.bradford.ac.uk/international/country/

For all students whose first language is not English, the standard postgraduate English language requirements for the University apply and these are listed at:
https://www.bradford.ac.uk/international/entry-requirements/

Intakes available

Students admitted to the programme in September study in the semester pattern of 1,2,3. Students admitted in January study in the semester pattern of 2,3,1. Part time routes are available for both admission periods. Students on part-time routes will study the taught component over 2 years and complete the dissertation in year 2.

Access and Recognition of Prior Learning

Applications are welcome from students with non-traditional qualifications, and/or significant personal/professional experience. Candidates who do not fulfil the normal entry requirements but have extensive industrial experience related to Civil Engineering are considered on an individual basis.

The University of Bradford has always welcomed applications from disabled students. To discuss adjustments or to find out more about support and access, you may wish to contact the Disability Service before you apply at www.bradford.ac.uk/disability/before .

Applications are particularly welcomed from women, returners to study (those aged 26+ at the start of the programme), armed forces families, carers and care leavers, estranged or orphaned learners, refugees and asylum seekers, and Romani or Traveller families.

If applicants have prior certificated learning or professional experience which may be equivalent to parts of this programme, the University has procedures to evaluate and recognise this learning in order to provide applicants with exemptions from specified modules or parts of the programme: www.bradford.ac.uk/teaching-quality/prior-learning/

Please note: The information above relates to the contemporary recruitment cycle at time of publication and therefore may now be out of date. The current entry requirements are published on the course website: https://www.bradford.ac.uk/courses/pg/big-data-science-and-technology/