UNIVERSITY of BRADFORD
Faculty of Engineering and Informatics

MSc Artificial Intelligence Programme Specification

https://www.bradford.ac.uk/courses/pg/artificial-intelligence/

Academic Year: 2022/23

Degree Awarding Body: The University of Bradford

Target Higher Education Qualifications Framework (FHEQ) Level 7 award:

Degree of Master of Science in Artificial Intelligence

Interim and exit awards at FHEQ Level 7: Postgraduate Diploma; Postgraduate Certificate

Programme Admissions: September and January

Programme duration: 1 year full time; 2 years part time

QAA Subject Benchmark: Computing (2019); Master's degrees

Date last approved by Faculty Board: April 2022

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 Schedule

1. April 2022: New programme

Introduction

The rise of Artificial Intelligence and its applications within society is gaining pace rapidly, with consumers, industry and governments driving its adoption into our everyday lives. Smarter systems, apps and insights gained from data-driven analytics and predictive modelling can enrich our lives and make the world around us a fairer, faster and more fun to live in. While this programme delivers advanced theoretical knowledge, it has a strong focus on applied practical skills using real world case studies from across the globe to equip graduates with the skills that industry need.

MSc Artificial Intelligence delivers cutting edge and industrially in-demand knowledge of a wide range of advanced concepts, approaches and methodologies and will equip students with market ready practical and applied skills using powerful software tools and online solutions. The programme covers subjects ranging across digitally enabled and enhanced healthcare, applied predictive modelling, ethical and legal implications of AI systems, programming, and software development, to data visualization as well as a wide variety of application focussed case studies. The programme includes a large-scale individual dissertation giving students the opportunity to work with leading research active staff within the Department of Computer Science and across the University in collaborative projects. Optional subject choices within the programme allows students to tailor their degree towards their chosen career path or future aspirations.

The Department of Computer Science has long-standing academic expertise in Artificial Intelligence in the AI Research group, the Advanced Automotive Analytics Research Lab in collaboration with the Automotive Research Centre, the contributions to the Digital Health Enterprise Zone, Digital Catapult Centre Yorkshire, the large number of relevant PhD theses and our funded research projects. The department has also established track record of developing AI systems with large industries and working with a variety of SMEs.

Programme Aims

The programme is intended to:

- Equip graduates with advanced knowledge and cutting-edge practical skills in Artificial Intelligence (AI), applied Machine Learning and Data Science
- Enhance students' critical analysis skills, their ability to discover, document and disseminate research findings, to present outputs of practical work, to understand the context within which data is used and to analyse, transform and process data in order to use it for data driven solutions.
- Provide market-ready graduates with experience in conceiving, designing, developing and evaluating solutions to real world problems using AI tools and techniques.

Programme Learning Outcomes

To be eligible for the FHEQ Level *7* award of Artificial Intelligence Postgraduate Certificate, students will be able to:

1. Demonstrate a systematic understanding and critical awareness of discipline knowledge in artificial intelligence.
2. Demonstrate an understanding of advanced techniques applicable to research and development projects for AI applications.
3. Demonstrate originality in the collection and use of theoretical principles and knowledge for AI, together with a practical understanding of how novel domain knowledge is created.
4. Demonstrate the ability to evaluate and compare existing methodologies from literature and propose new methodologies for addressing known challenges in AI.
5. Communicate outcomes of practical work, evaluation of results and conclusions within the field of AI clearly to specialist and non-specialist audiences.
6. Demonstrate transferable skills for decision-making in complex and unpredictable situations in AI projects.
7. Demonstrate the independent learning ability required for continuing professional development.

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

8. Coordinate and resolve complexity in AI projects including design, development, and documentation.
9. Demonstrate ability to work effectively within a team, including use of appropriate communication and planning approaches.
10. Demonstrate a depth and breadth of theoretical knowledge and applied practical skills across a range of AI subjects, including legal, social, ethical and professional issues relevant to AI.

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

11. 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.

Curriculum

The course is comprised of three distinct stages; Autumn (Sem1) and Spring (Sem2) semesters where three taught modules will be completed, and the dissertation stage commencing in the Summer (Sem3).

September starting students study periods are ordered 1,2,3 and January starting students, 2,3,1. Part time students will take modules over two years, splitting the module load for each semester across each year.

The taught module stages build knowledge, skills and research techniques within the subject, supporting students with their dissertation as a capstone to their degree.

Modules

Study Period	Code	Title	Type	Credits	FHEQ Level
Autumn (S1)	COS7054-B	Cloud AI	Core	20	7
Autumn (S1)	COS7009-B	Software Development	Core	20	7
Autumn (S1)	COS7046-B	Big Data Visualisation	Option	20	7
Autumn (S1)	OIM7510-B	Responsible AI: Ethics, Law and Governance	Option	20	7
Spring (S2)	COS7045-B	Advanced Machine Learning	Core	20	7
Spring (S2)	COS7053-B	Advanced Topics in AI and Digital Healthcare	Core	20	7
Spring (S2)	COS7048-B	MSc Group Project	Core	20	7
Summer (S3)	COS7004-E	Dissertation	Core	60	7

Please note: The curriculum may change, subject to availability, accreditation requirements and the University's programme approval, modification and review processes.

Awards

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

Students will be eligible to exit with the award of Postgraduate Diploma if they have successfully completed at least 120 credits and achieved the award learning outcomes.

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

Learning and Teaching Strategy

The programme uses a variety of teaching approaches to support student learning through face-to-face sessions as well as a virtual learning environment for directed independent study and developing practical skills. In addition to the advanced knowledge and technical skills students will develop during their studies, there is also a strong focus on developing transferrable skills and independent research/study skills that will provide a foundation for future career progression and professional growth through strong lifelong learning approaches and techniques.

Embedding the strategic aims of the Universities Learning, Teaching and Student Experience Strategy (LTSES), the programme is designed to achieve a balanced between subject knowledge and transferable skills. The student journey has been considered at programme-level and the core modules will provide students with skills and knowledge that are deemed to be fundamental to the AI discipline, whereas optional modules are also included to promote and increase interest and offer students more choices and to meet their own personal career goals. In addition to the modules, academic skills workshops will be organised during the year to provide further support in self-regulation, persistence, and the development of essential skills such as digital literacy.

Critical future-facing subjects such as the ethical and societal impact of increasing use of AI systems are embedded within many core modules in the course such as Advanced Topics in AI and Digital Healthcare, MSc Group Project and the Dissertation, with the option to study at increased depth in optional modules Responsible AI: Ethics, Law and Governance or Big Data Visualisation. These subjects aim to address the increasing importance of societal impact and related governance frameworks, designed to ensure the impact of AI systems and tools benefits humanity and considers diverse populations around the world.

Learning and teaching activities include lectures that introduce and explore theory, concepts and case studies illustrating how practical outcomes are derived from theoretical principles. Laboratory sessions demonstrate hands on and applied use of industry standard tools to support development of subject relevant practical skills and facilitate individual and small group feedback to students. Seminars and tutorials help to build communication, teamwork and strengthen the connections between theory and practice.

The programme will demonstrate an advanced industry standard tool, Amazon Web Services, across modules including dissertation and project work in the course, as well as the module “Cloud AI” that complements the Amazon AWS Academy “Cloud Practitioner” learning path principles and concept.

There will be a substantial focus on Digital Health topics and applications layered on fundamental theoretical learning across several AI topics, bringing subjects that are both of increasing international focus and a major University research theme into the heart of the student learning experience. Collaboration with local NHS bodies such as the Bradford Institute for Health Research (BIHR) and Bradford Teaching Hospitals NHS Foundation Trust allows for the integration of real-world data and project topics within the course, instilling demonstrable transferable skills within students exemplifies through a growing area of international focus; public health.

Students on the course will undertake a dissertation as part of their studies, involving the selection or creation of a research project requiring development of an application, system prototype or experimentally tested theoretical hypothesis. Under the supervision of a departmental staff member with relevant research expertise, the process will further strengthen independent research and implementation skills as well as professional communication through an assessed viva presenting the work, key outputs and conclusions.

Programme links to the Artificial Intelligence Research (AIRe) group offers an opportunity to promote the research active aspect of our department and the links to cutting edge research that inform the teaching on our courses. Examples of funded projects and demonstrable research outcomes can be marketed, and the expertise of both staff and PhD students within the group promoted as an opportunity to learn from genuine subject experts.

The University recognises the importance of providing pastoral support, taking into consideration all aspects of our students’ journeys and development. All students are allocated a personal academic tutor, with whom they meet regularly to discuss and receive guidance on their learning and development. The University also operates a wide range of support services covering areas such as disability, counselling, faith advisors and careers.

The University of Bradford is well known for attracting students from a wide variety of backgrounds, experiences and countries. The University of Bradford encourages and supports women in information technology and engineering, celebrating events such as International Women in Engineering Day and International Women and Girls in Science Day. Some of the staff in the Faculty of Engineering and Informatics are also STEM ambassadors, who actively promote science and engineering subjects to wider audiences. Female staff and students are an integral part to the University of Bradford’s Faculty of Engineering and Informatics. The University has held Bronze Athena Swan accreditation on an institutional level since 2015, demonstrating our commitment to striving for gender equality and actively engages with the Women in STEM initiative and activities within the University. The University of Bradford’s modus operandi, Making Knowledge Work, is embedded in the philosophy of this programme.

The programme will promote and encourage enrolments from individuals from non-traditional backgrounds across a range of educational and cultural metrics through

engagement with local and national admissions recognition schemes for those with non-standard or without any academic qualifications, recognising prior learning in all its forms through rigorous mapping processes.

Dissemination of ideas and concepts related to AI to non-standard audiences will also contribute to widening participation, through opportunities such as events organised by the Bradford Metropolitan Council Computing, Science and Environmental Technology (CSET) Industrial Centre of Excellence, such as the Bradford Skills Month. In addition to this the programme has been designed to include, wherever possible, opportunities for students to incorporate topics, applications and assessment or project content that reflects their individuality and personal cultural background. Modules such as Advanced Machine Learning, Advanced Topics in AI and Digital Healthcare, and the Dissertation include assessment components with strong elements of personalised choice in topics, datasets and research aims. This commitment to inclusive learning and assessment is also reflected in the commitment to “decolonise” the curriculum and reading materials, wherever possible utilising and promoting research papers, textbooks and other content from non-western backgrounds and authors.

Please note that the programme will not directly lead to AWS Academy certification.

Assessment Strategy

Assessment of learning outcomes is achieved through module specific assignments and examinations. Most modules in this course assess student attainment through practical coursework exercises, reflecting the emphasis on demonstrable applied skills that support future career paths and progression.

Assessments using real world problems and limited scope case studies increase engagement, creating stronger links between the academic subject, the assessment of learning outcomes and the career-ready and transferrable skills modules aim to embed within students.

Written or computer-based examinations are also used to measure specific theoretical and knowledge aims, which are also assessed in written reports for many coursework assignments. The dissertation module assesses skills for research, critical analysis, design and implementation through a major written report and an oral examination.

Assessment Regulations

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

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 a Second-class Bachelor's Degree with Honours (2:2) in Computer Science; Artificial Intelligence; Software Engineering; or closely related subjects from an accredited degree awarding body.

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/

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 Artificial Intelligence 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 adult learners (those aged 21+ 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/