

Applied Computer Science and Artificial Intelligence Programme Specification

Academic Year:	2025-26
Degree Awarding Body:	University of Bradford
Final and interim award(s):	Degree of Master of Science Postgraduate Diploma Postgraduate Certificate
Programme accredited by	N/A
Programme duration:	12 months full time 24 months part time
QAA Subject benchmark statement(s):	Computing Master's (2022)

Minor Modifications Schedule

1. July 2025: Annual Changes for the 2025 academic year, including changes to academic regulation.

Introduction

Currently, the UK government and industry are prioritising the advancement of Computer Science, which encompasses AI, Big data, Cybersecurity, and more, as a means of promoting sustainable growth and establishing international leadership in the digital economy. As a result of this societal shift, the demand for professionals with expertise in computer science, AI techniques, software design and development, database technologies, and their practical applications is steadily increasing. This programme is specifically designed to address this demand by empowering students to integrate their existing knowledge with practical computing skills. Through the use of real-world case studies from diverse global contexts, the programme equips graduates with the practical expertise and industry-relevant competencies that are essential for success in today's rapidly evolving technological landscape.

Building on the strong academic foundation of the School of Computer Science, AI and Electronics—renowned for its excellence in research and teaching at both undergraduate and postgraduate levels—this programme reflects the increasing importance of digital skills within the School and the broader university community. Designed to accommodate

students from diverse academic and professional backgrounds, the programme adopts inclusive learning, teaching, and assessment strategies to ensure accessibility, engagement, and success for all participants. The curriculum is shaped by input from industry stakeholders and external collaborators, ensuring it remains responsive to the evolving needs of the digital economy. Students benefit from a coherent and inclusive learning journey that equips them with essential digital competencies while fostering their contribution to the UK's leadership in the global technology sector. The programme spans a wide range of practical and theoretical topics, including digitally-enabled machine learning, ethical and legal considerations in applied computing, AI and data platforms, and big data visualisation. Emphasis is placed on engaging with the ethical, legal, and social dimensions of AI, cultivating responsible and sustainable innovation. Through a combination of lectures, laboratory sessions, seminars, and collaborative projects, students gain hands-on experience with industry-relevant tools and techniques. The Dissertation module offers a unique opportunity to undertake original research projects, working alongside leading researchers within the School of Computer Science, AI and Electronics, as well as across other departments such as the School of Management. This collaborative approach ensures students develop not only technical expertise but also the critical thinking and research skills essential for impactful careers in the digital economy.

With a strong emphasis on enterprise and employability, this programme offers students the flexibility to tailor their learning experience through optional modules and customised career pathways. The School of Computer Science, AI and Electronics brings significant expertise to the programme, driven by cutting-edge research and collaboration with major industries including NASA, the European Space Agency (ESA), the NHS, Syngenta, and Jaguar Land Rover. Our School members lead research initiatives such as the AI Research Group and the Advanced Automotive Analytics Research Lab, and are involved in numerous funded projects with both large enterprises and SMEs, including Exa Networks, Rakusen's, Xalient, and National Breakdown. These industry partnerships ensure that the programme remains at the forefront of technological advancements and provides students with unique opportunities to engage with real-world challenges and innovations.

Graduates of this programme will be equipped not only with technical mastery but also with the confidence, creativity, and leadership skills to drive innovation in applied Computer Science and AI domains. By fostering research engagement, collaboration, and a commitment to lifelong learning, this MSc programme will make students well-prepared for a diverse range of roles within AI, computing, and data-driven industries. Leveraging the programme's cutting-edge curriculum and emphasis on the applied nature of AI-driven applications, graduates will be equipped with the skills and confidence to excel in a variety of roles within the rapidly evolving tech industry. From AI development to machine learning engineering, data science, and digital transformation, the programme provides the foundation for a successful career in AI and computing, positioning graduates to drive innovation across a wide range of sectors including healthcare, autonomous systems, and smart cities.

Programme Aims

The programme is intended to:

1. provide graduates with fundamental knowledge and advanced practical skills in applied computing, artificial intelligence (AI), applied machine learning, and data

science, offering a clear conversion pathway for students from diverse academic backgrounds.

2. enhance students' critical analysis skills and their ability to integrate interdisciplinary knowledge to discover, document, and disseminate research findings effectively. Foster the capability to present practical work professionally and understand the contextual significance of data mining, cybersecurity, and software development.
3. prepare graduates for the job market by equipping them with hands-on experience in conceiving, designing, developing, and evaluating innovative solutions to real-world challenges using AI tools and methodologies.

Programme Learning Outcomes

To be eligible for the award of Postgraduate Certificate at FHEQ level 7, students will be able to:

1. Demonstrate a comprehensive understanding and critical awareness of discipline knowledge in applied computing and artificial intelligence through a systematic approach.
2. Exhibit expertise in the latest computing techniques for applications and development projects in applied computing, AI and big data topics.
3. Demonstrate originality in collecting and utilising applied computing principles and knowledge for software design, development, and testing, along with a practical understanding of how novel domain techniques are created.
4. Assess state-of-the-art methodologies and algorithms in applied computer science and AI, and propose new methodologies for addressing known practical challenges.
5. Communicate practical work outcomes, evaluation of results, and conclusions within the field of applied computer science and AI to both specialist and non-specialist audiences.
6. Apply transferable skills for informed decision-making in complex and unpredictable computing projects.
7. Demonstrate independent learning capabilities essential for ongoing professional development.

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

8. Effectively coordinate and resolve complexity in applied computing projects, encompassing design, development, and documentation phases, utilising appropriate project management techniques.
9. Demonstrate the ability to work collaboratively within a team, utilising appropriate communication and planning strategies.
10. Exhibit a comprehensive understanding of computing principles and applied practical skills across a diverse range of computer science subjects, incorporating

legal, social, ethical, and professional considerations relevant to AI and database technologies.

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

11. Demonstrate the ability to choose, develop, organise, and oversee an independent and self-managed project that focuses on practical applications. This includes the critical analysis and evaluation of relevant material, as well as the application of the latest computing methodologies to create an advanced report.

Curriculum

The programme has two stages: the taught programmes stage which takes place during the first two semesters and the project/dissertation stage. The taught programmes stage is organised on a modular basis. 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 dissertations as a capstone to their degree.

The programme has two entry points: September and January. Students who enter via the September intake will carry out their studies via the usual semester sequence (1,2,3), whilst those students who enter onto the course in January will study semesters in the sequence 2,3,1.

Table 1: Applied Computer Science and Artificial Intelligence core and optional Modules

FHEQ Level	Module Title	Core/ Option	Credits	Study Period	Module Code
7	Software Development	C	20	Autumn (Sem 1)	COS7009-B
7	Cloud AI	O	20	Autumn (Sem 1)	COS7054-B
7	Statistical Applications of Industrial Big Data	O	20	Autumn (Sem 1)	COS7049-B
7	Big Data Visualisation	C	20	Autumn (Sem 1)	COS7046-B
7	Applied Machine learning and Big Data Strategy	O	20	Spring (Sem 2)	OIM7508-B
7	Advanced Topics in AI and Digital Healthcare	C	20	Spring (Sem 2)	COS7053-B
7	MSc Group Project	C	20	Spring (Sem 2)	COS7048-B
7	Industrial Big Data Analysis and Mining	O	20	Spring (Sem 2)	COS7050-B
7	Business System Security	O	20	Spring (Sem 2)	COS7035-B
7	Dissertation	C	60	Summer (Sem 3)	COS7004-E

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

Assessment, Continuation and Award Regulations

This programme follows the Assessment, Continuation and Award regulations published on the University's website (<https://www.bradford.ac.uk/media-v8/ageo/regulations/Regulation-9-Postgraduate-Taught-Assessment-Continuation-and-Award-1.0b.pdf>) for postgraduate courses (Regulation 9).

Learning and Teaching Strategy

The programme has been designed by incorporating the four key dimensions of the Bradford Curriculum: Programme Centric, Liberated, Research Engaged, and Future Focused. This structured approach creates an inclusive, supportive, and empowering environment designed to cultivate independent learners and innovative problem-solvers in applied computer science and artificial intelligence. Students will actively engage in collaborative work, which is fundamental in computing and AI, fostering an appreciation for teamwork in both disciplinary and interdisciplinary contexts. A diverse range of teaching methods is employed, including interactive lectures, hands-on laboratory sessions, small-group problem-solving activities, and industry-relevant project work, all enriched with formative feedback to reinforce learning and encourage critical thinking. To provide an accessible and flexible learning experience that caters to the diverse student body, the programme incorporates various assessment formats, such as technical coursework with oral presentations, real-world problem-solving exercises, and hands-on coding projects. At all stages, students are exposed to authentic real-life social and industrial challenges, ensuring they develop both technical expertise and the critical thinking skills required to tackle emerging problems in AI and computing. The programme also benefits from the University of Bradford Computing Society (PiSoc), a student-led initiative that enhances peer learning, fosters cross-cohort connections, and encourages interdisciplinary collaboration on innovative projects. This holistic and inclusive approach ensures that graduates are equipped with advanced technical skills, problem-solving abilities, and the adaptability required to excel in the rapidly evolving fields of artificial intelligence and computer science.

The programme design integrates the strategic aims of the University's Learning, Teaching and Student Experience Strategy (LTSES) and Universal Design for Learning (UDL), ensuring a balance between subject-specific knowledge and transferable skills. The carefully crafted student journey provides core modules that deliver foundational expertise in applied computer science and AI, while optional modules allow students to explore specialised interests, supporting personal career aspirations and intellectual curiosity. Core modules such as Software Development and Advanced Machine Learning equip students with essential technical knowledge and hands-on skills, forming a robust foundation in AI. Optional modules, including Cloud AI, Big Data Visualisation and Industrial Big Data Analysis and Mining, enable students to deepen their understanding of critical and future-facing topics, aligning their studies with evolving industry demands. To further enhance learning, academic workshops and seminars develop essential professional skills such as digital literacy, self-regulation, and collaboration, fostering independence and adaptability in students. The programme also incorporates advanced tools such as Amazon Web Services (AWS), used across modules including Cloud AI and Applied Machine Learning and Big Data Strategies. These modules build on the AWS Academy "Cloud Practitioner" learning path, equipping students with industry-relevant expertise and practical experience in scalable AI solutions. By addressing both technical and societal impacts of AI, the programme prepares graduates to excel in diverse professional environments, contributing meaningfully to ethical and innovative AI applications.

In this programme, students will be encouraged to engage in student-led communities such as the Applied AI Society and PiSoc, fostering interdisciplinary collaboration and innovation. These communities provide a platform for students to work on diverse projects, such as camera-based facial identification systems, smart city simulations, and other real-world

challenges. Students from non-computing backgrounds will collaborate with computer science peers and research students to apply the applied skills acquired during the programme. This inclusive and collaborative environment allows students to analyse user requirements, design functionalities, implement systems through coding, test developed solutions, and demonstrate their effectiveness in practical settings. The hands-on, project-based learning approach is further enhanced through laboratory sessions and modules like the MSc Group Project and Dissertation, immersing students in authentic learning experiences. These opportunities enable students to tackle complex, real-world issues, such as public health challenges. Beyond technical expertise, the curriculum emphasises the ethical, legal, and societal implications of AI, preparing students to lead responsibly in addressing global challenges. By embedding governance frameworks and discussions on the broader impact of AI systems, the programme ensures graduates are equipped with the skills and values to innovate inclusively and ethically, making meaningful contributions to both industry and society.

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, understanding, and discipline-specific skills.
2. Laboratory sessions, run in conjunction with the theoretical components, provide students with opportunities to enhance their discipline-specific knowledge, skills, and understanding of topics.
3. Tutorials, seminars, and workshops will develop knowledge, understanding, discipline-specific skills, and personal transferable skills through discussion, presentations, and small-scale project work. These exercises often involve problem-solving and design and are frequently tackled by working in small group.
4. Successful, research-active members of staff make a valuable contribution to the teaching programme, which is a particular strength of this programme.
5. Invited external speakers from various industry sectors, including large corporates such as the BBC, Microsoft, and Sky, as well as SMEs, provide students with additional learning opportunities.
6. Directed study, involving the reading of appropriate texts and the preparation of assessed work, is used to develop learning outcomes. Additionally, students can learn from each other in specifically organized study clubs with their fellow students.

In addition to acquiring advanced knowledge and technical expertise, students will also develop essential transferable skills and independent research capabilities, laying a solid foundation for future career progression and professional growth. A strong focus on research-engaged learning encourages students to explore cutting-edge topics in Applied Computer Science and AI. By engaging with advanced methodologies and technologies, students gain exposure to the latest developments in these fields, further enhancing their understanding and practical application of current AI trends. Opportunities to collaborate with the Artificial Intelligence Research (AIRe) group and other active research initiatives within the department allow students to contribute to funded projects and interact with

leading School and PhD researchers, learning directly from experts at the forefront of AI research. As part of the programme, students will undertake a dissertation involving the creation of an application, system prototype, or experimentally tested theoretical hypothesis, addressing real-world challenges. Guided by research-active staff, the dissertation fosters independent research, critical analysis, and implementation skills. Students will also refine their professional communication abilities through an assessed viva presentation of their work and findings. This holistic approach not only equips students with advanced technical expertise but also prepares them for lifelong learning, professional growth, and future career progression in a rapidly evolving field. By integrating research-active learning, practical problem-solving, and critical analysis, the dissertation experience positions graduates to excel as innovators and leaders in AI and related disciplines.

The University acknowledges the significance of providing holistic support to students throughout their academic journey. To this end, every student is assigned a personal academic tutor, with whom they can meet regularly for guidance on their learning and personal development. Additionally, the University offers a range of support services to address various student needs, such as disability, counselling, faith advisors and career services.

The University of Bradford is committed to fostering diversity and inclusion, attracting students from a wide range of backgrounds, experiences, and countries. Actively championing gender equality, the University has held Bronze Athena Swan accreditation since 2015 and celebrates initiatives like International Women in Engineering Day and International Women and Girls in Science Day. The School plays a key role in promoting representation, with significant involvement from female staff and students, supported by STEM ambassadors who inspire underrepresented groups to pursue careers in science and engineering. This programme aligns with the University's ethos, Making Knowledge Work, by embedding ethical, inclusive, and socially responsible practices into its curriculum. Through efforts to decolonise content and include diverse global perspectives, it prepares graduates to address the cultural, societal, and ethical challenges of AI and computing in a rapidly evolving world.

The programme's learning and teaching activities integrate equality, diversity, and inclusion (EDI) values. We respect differences and guarantee that all students have an equal opportunity to achieve their desired outcomes. Students are also taught about ethical and professional issues related to big data system development and applications, as well as the associated responsibilities. 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 the societal and economic impact of applications of AI. The programme will instil in students the importance of embracing the values of equality, diversity, and inclusion in their development of data-driven solutions. This approach will equip students with a broad perspective on the relevance of big data science and AI-driven technology for the betterment of businesses and society.

Assessment Strategy

The assessment strategy for this programme is designed to provide a comprehensive and inclusive evaluation of student learning, emphasising the development of both theoretical knowledge and practical skills. A variety of assessment methods are employed, including written reports, computer-based assignments, practical laboratory tasks, oral presentations, and formal examinations. This diverse approach reflects the programme's commitment to providing students with multiple opportunities to demonstrate their competencies in ways that align with their strengths and career aspirations.

Practical coursework forms the core of the assessment strategy, enabling students to engage with real-world problems and apply their knowledge to case studies with practical relevance. Assignments such as programming tasks, data analysis, and the development of machine learning models are crafted to foster creativity, critical thinking, and problem-solving skills. These assessments not only measure the attainment of learning outcomes but also serve as a platform for students to gain career-ready skills that are highly valued in the industry. Written or computer-based examinations are utilised to evaluate students' understanding of theoretical concepts and foundational knowledge. In parallel, coursework assignments often integrate reflective and critical analysis components, enabling students to demonstrate their ability to connect theoretical principles with practical applications. The Dissertation module serves as a capstone assessment, combining research, critical evaluation, design, and implementation skills. Students undertake a significant project, culminating in a comprehensive written report and a viva voce examination. This approach ensures that students synthesise their learning and communicate their findings effectively to both specialist and non-specialist audiences.

Inclusivity is embedded within the assessment strategy. Adjustments, such as deadline extensions and tailored feedback, are available for students requiring learning accommodations. Marking schemes are designed to reward depth and complexity, while formative assessments provide opportunities for feedback, skill development, and self-reflection without contributing to final grades. This inclusive and developmental framework empowers students to take ownership of their learning journey while building confidence and competence in their academic and professional pursuits.

Admission Requirements

The University welcomes applications from all potential students and most important in the decision to offer a place is our assessment of a candidate's potential to benefit from their studies and of their ability to succeed on this particular programme. Consideration of applications will be based on a combination of formal academic qualifications and other relevant experience.

To be considered for this course, applicants should have a bachelor's degree from an accredited degree-awarding institution in engineering or other non-computing related field (e.g. accounting, finance) with a result classification of 2:2 or above.

The University of Bradford has always welcomed applications from disabled students, and these will be considered on the same academic grounds as are applied to all applicants. If applicants have some form of disability, they may wish to contact the Disability Service before they apply at <http://www.bradford.ac.uk/disability>.

Recognition of Prior Learning

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.

Applications are welcome from students with non-standard qualifications or mature students (those over 21 years of age on entry) with significant relevant industrial experience, in addition to GCSE English at grade 4 (formerly grade C) or above. International written and spoken English tests passed at grade 6.0 for IELTS or 550 for TOEFL (or 250 for the computer-based test) are accepted for overseas applications.