

PROGRAMME SPECIFICATION

for the award of

MSc Artificial Intelligence

Managed by the Faculty of Technology Design and Environment

delivered by School of Engineering Computing and Mathematics

Date approved:	May 2019
Applies to students commencing study in:	May 2021

RECORD OF UPDATES

Date amended*	Nature of amendment**	Reason for amendment**
December 2020	Removal of sandwich mode	Consolidation of delivery
March 2019	Initial Submission	

SECTION 1: GENERAL INFORMATION

Awarding body:	Oxford Brookes University
Teaching institution and location:	Oxford Brookes University, Headington Campus
Language of study:	English
Final award/s:	MSc
Programme title:	Artificial Intelligence
Interim exit awards and award titles available:	Postgraduate Diploma Artificial Intelligence Postgraduate Certificate Artificial Intelligence Postgraduate Certificate Artificial Intelligence, Research Project
Brookes course code:	
UCAS code:	
JACS code:	I400
HECoS code:	100359
Mode of delivery: (Mode of Study given in brackets)	Face to face/on-campus (full-time) Face to face/on-campus (part-time)
Duration of study:	PG Cert Full time – minimum 1 semester, maximum 5 years PG Cert Part time – minimum 2 semesters, maximum 5 years PG Dip Full Time - minimum 2 semesters, maximum 5 years PG Dip Part Time - minimum 4 semesters, maximum 5 years MSc Full Time - minimum 1 year, maximum 5 years MSc Part Time - minimum 2 years, maximum 5 years
Subject benchmark statement/s which apply to the programme:	Master's degrees in computing (2011) QAA Subject benchmark statement: Computing (Master's)
Professional accreditation attached to the programme:	BCS accreditation for Chartered IT Professional Further Learning will be sought
Apprenticeship Standard:	N/A
University Regulations:	The programme conforms to the University Regulations for the year of entry as published/archived at: http://www.brookes.ac.uk/regulations/

SECTION 2: WHY STUDY THIS PROGRAMME?

Intelligence is one of the primary capacities of human beings that distinguishes them from all other forms of life on earth. The range of complex cognitive capabilities that humans possess enables them to learn, conceptualise, understand and reason about the world in which they live. Humans solve problems, make decisions, form plans, retain memories and use sophisticated languages to communicate ideas and emotions. They live in communities that are formed from complex webs of social and organisational structures, each with its own culture and sense of identity. These communities are governed by commonly agreed ethical standards and moral codes of conduct that regulate the behaviour of individuals and groups in that society.

The field of Artificial Intelligence (AI) involves the study of living intelligent agents (primarily but not exclusively humans) with a view to creating systems of hardware and/or software that are capable of simulating some of the cognitive and behavioural abilities of these agents. AI is a very broad field, drawing on a wide range of other academic disciplines including biology, psychology, mathematics, engineering and philosophy, and operating at different levels of abstraction, ranging from detailed neurobiological processes through to high level cognitive functions such as reasoning and spoken dialog.

In recent years machine learning, which is a core sub-discipline of AI, has demonstrated remarkable success in practical applications ranging from medical diagnosis to business functions such as customer engagement and the recruitment of talent. AI has now become central to the strategic development of many economies across the world, including that of the UK, with the government including AI and Data as the first of its four Grand Challenges of its industrial strategy. The rapid resurgence of AI has generated significant global demand for graduates with the skills and depth of understanding to develop and apply new applications of this technology.

Studying MSc AI will provide students with a structured, flexible and coherent programme, which will enable them to develop the skills, knowledge and understanding necessary to pursue careers in at the cutting edge of AI and implement novel technological solutions in real world problems. Students will study machine learning, deep learning, data science, data visualisation, big data and the cloud, intelligent autonomous systems as well as fundamental relevant aspects of cybersecurity.

In addition to the normal award of MSc, the course is offered with the awards of Postgraduate Certificate and Postgraduate Diploma for those who wish to learn a particular aspect of the discipline. Students, who have previous experience of research and study methods, and wish to undertake study which is linked to a particular aspect of their employment, also have the opportunity to study for a Postgraduate Certificate AI Research Project.

The design of our programmes is informed by state-of-the-art research being undertaken in the School of Engineering, Computing and Mathematics (ECM). This research is currently being led by a team of experienced academics whose combined expertise includes the primary areas of the discipline, including machine learning, computer vision, robotics, natural language processing and knowledge-based systems. The research and teaching in AI in ECM are supported by a 'Fab' lab and robotics lab which offer a range of platforms on which to implement AI algorithms.

Students completing the MSc programme will have developed deep understanding of the principles of AI, to be able to deal with complex, open ended and demanding problems. Students will be given the opportunity to design, implement and evaluate a variety of intelligent computer systems to solve real world problems. These problems will give the students the opportunity to develop skills in managing complex projects. The final dissertation will have provided an opportunity to put into practice the range of theory and practical skills, which have been acquired, by the undertaking of a complex research or technical project.

Students completing the Postgraduate Diploma or Postgraduate Certificate programmes will have extended their understanding of the principles of AI, from the undergraduate level to the extent of the modules completed. They will be able to deal with some more complex, open ended and demanding

problems. Students will be given the opportunity to design, implement and evaluate a variety of intelligent computer systems to solve real world problems. These problems will give the students the opportunity to develop skills in managing complex projects.

Career options are abundant in the areas of AI driven app development, machine learning, data science and intelligent systems.

SECTION 3: PROGRAMME LEARNING OUTCOMES

On successful completion of the programme, graduates will demonstrate the following Brookes Attributes:

3.1 ACADEMIC LITERACY

A1	Critically appraise emerging specialist AI technologies, and techniques, and identify and assess their potential for the design, analysis and implementation of AI systems.
A2	Create abstractions, from observed patterns encountered across the whole spectrum of real-world problem domains, to facilitate the analysis and synthesis of appropriate solutions using relevant AI tools and techniques.
A3	Critically evaluate the properties of AI systems to create efficient, ethical and secure solutions for given real world problems.
A4	Analyse, and apply, the processes and techniques necessary for the management and production of AI projects, taking into consideration customer requirements, quality assurance, risk assessment, development schedules and costs.

3.2 RESEARCH LITERACY

R1	Demonstrate self-direction, and originality, in planning and managing a research project and synthesise relevant research-based materials in the organisation of the project.
R2	Demonstrate a systematic understanding of knowledge of current AI problems and/or new insights, much of which is at, or is informed by, the forefront of AI research or relevant areas of professional practice.
R3	Understand and participate in the process of peer review and publishing academic work.

3.3 CRITICAL SELF-AWARENESS AND PERSONAL LITERACY

C1	Evaluate and reflect on the evolution of their strengths and weaknesses across the range of subject based competences involved in the AI domain.
C2	Participate in, and direct group activities, and recognise and evaluate the importance of teamwork, time management, initiative, personal responsibility and accountability in delivering successful solutions.
C3	Create solutions to problems, acting autonomously, and make decisions in challenging situations in planning and implementing tasks and delivering on a given time scale.

3.4 DIGITAL AND INFORMATION LITERACY

D1	Identify digital information sources and, from which, acquire information for further analysis.
	Demonstrate the effective skills and practices necessary to become a confident, agile

D2	adopter of a range of technologies for personal, academic and professional use.
D3	Create a solution to a complex problem using existing appropriate AI software tools and techniques.

3.5 ACTIVE CITIZENSHIP

G1	Identify and analyse risk, reliability, legal, social, environmental, professional and ethical issues relevant to research and problem solving in the AI domain.
G2	Evaluate the impact of the development, use and maintenance of AI systems in economic, political, cultural and social contexts in both national and international settings.

SECTION 4: CURRICULUM CONTENT & STRUCTURE

4.1 PROGRAMME STRUCTURE AND REQUIREMENTS:

Requirements for MSc Artificial Intelligence:

Code	Module Title	Credits	Level	Status	Coursework/ Exam:
DALT7011	Introduction to Machine Learning	10	7	Compulsory	100% Coursework
COMP7018	Foundations of Artificial Intelligence	10	7	Compulsory	100% Coursework
ROBO7001	Autonomous Intelligent Systems	20		Compulsory	100% Coursework
COMP7015	AI Systems Engineering	20	7	Compulsory	100% Coursework
DALT7012	Advanced Machine Learning	10	7	Compulsory	100% Coursework
DALT7016	Data Visualisation	10	7	Compulsory	100% Coursework
SOFT7011	Big Data and the Cloud	20	7	Compulsory	100% Coursework
TECH7005	Research, Scholarship Methods and Professional Skills	20	7	Compulsory	100% Coursework
TECH7009	Dissertation in Computing Subjects	60	7	Compulsory	100% Coursework

Requirements for Postgraduate Diploma Artificial Intelligence:

Code	Module Title	Credits	Level	Status	Coursework/ Exam:
DALT7011	Introduction to Machine Learning	10	7	Compulsory	100% Coursework
COMP7018	Foundations of Artificial Intelligence	10	7	Compulsory	100% Coursework
ROBO7001	Autonomous Intelligent Systems	20	7	Optional	100% Coursework
COMP7015	AI Systems Engineering	20	7	Compulsory	100% Coursework
DALT7012	Advanced Machine Learning	10	7	Optional	100% Coursework

DALT7016	Data Visualisation	10	7	Optional	100% Coursework
SOFT7011	Big Data and the Cloud	20	7	Optional	100% Coursework
TECH7005	Research, Scholarship Methods and Professional Skills	20	7	Compulsory	100% Coursework
TECH7009	Dissertation in Computing Subjects	60	7	Optional	100% Coursework

Requirements for Postgraduate Certificate Artificial Intelligence:

Code	Module Title	Credits	Level	Status	Coursework/ Exam:
DALT7011	Introduction to Machine Learning	10	7	Compulsory	100% Coursework
COMP7018	Foundations of Artificial Intelligence	10	7	Compulsory	100% Coursework
ROBO7001	Autonomous Intelligent Systems	20	7	Optional	100% Coursework
COMP7015	AI Systems Engineering	20	7	Compulsory	100% Coursework
DALT7012	Advanced Machine Learning	10	7	Optional	100% Coursework
DALT7016	Data Visualisation	10	7	Optional	100% Coursework
SOFT7011	Big Data and the Cloud	20	7	Optional	100% Coursework
TECH7005	Research, Scholarship Methods and Professional Skills	20	7	Compulsory	100% Coursework

Requirements for Postgraduate Certificate AI Research Project:

Code	Module Title	Credits	Level	Status	Coursework:
TECH7009	Dissertation in Computing Subjects	60	7	Compulsory	100% Coursework

4.2 PROGRESSION AND AWARD REQUIREMENTS

Students must pass all modules marked 'Compulsory', as well as meeting the university rules for postgraduate programmes.

Students studying for an MSc must complete at least 180 credits worth of modules.

Students studying for a Postgraduate Diploma must complete at least 120 credits worth of modules.

Students studying for a Postgraduate Certificate must complete at least 60 credits worth of modules.

Students who choose to progress from a Postgraduate Certificate, to a Postgraduate Diploma, may be required to take additional credits, over the 120 normally required for a Postgraduate Diploma, in order to ensure that they have completed all the compulsory modules for the Postgraduate Diploma.

4.3 PROFESSIONAL REQUIREMENTS

Not applicable.

SECTION 5: TEACHING AND ASSESSMENT

Students will attend lectures to acquire the knowledge and understanding of the key concepts.

Practical elements of the course will enable students to practice essential skills, in a variety of contexts, and build a wide set of experiences on which to reflect and develop professional expertise. For more technical skills, including programming, the practical elements will be based around laboratory classes, allowing students to experiment with the technology in a controlled environment. A larger proportion of the assessment, for these types of modules, will be coursework.

Several modules will include an element of team working, enabling students to collaborate with their peers, thus developing an awareness of their own abilities, as reflected by feedback from others. Team work will also be used to assess the students' acquisition of personal and inter-personal skills, so important for this degree, and equally important for most career paths in the industry.

Modules have 10 learning hours per module credit. For the 20 credit taught modules, this is 200 learning hours, for the dissertation, this is 600 learning hours. Learning hours are broken down in contact and non-contact hours. For taught modules this normally consist of 4 hours contact per week, divided into 2 hours of lecture and 2 hours of practical/tutorial work.

Students on the dissertation will arrange supervision sessions with their supervisor(s) as needed. It is expected that each student will contact their supervisor(s) at least once every 2 weeks during the dissertation period.

Academic Literacy will be assessed through coursework, testing the students' ability to explain key concepts and to apply them to practical problem solving.

Research Literacy is primarily assessed in the dissertation module, but students will have learned and practised these skills in a number of modules.

Self-awareness, and personal literacy, will be supported through the on-going use of reflection, which is assessed in courseworks, and culminates in the assessed reflective component of the dissertation.

Digital and Information Literacy is fundamental to the academic content of this degree and will be a distinguishing feature of graduates from the programme. In particular, the use of software tools for system development will be taught and assessed throughout many of the modules. Part of the assessment for these modules will be based on the student's ability to locate, read and evaluate appropriate documentation for software tools, as well as their ability to document their own software and system artefacts.

Effective and innovative use of ICT is also a key part of the School's strategy. The School uses a variety of VLE's (tailored to what is being taught) and makes extensive use of ebooks, online videos, podcasts and other electronic resources.

Graduates from this programme will develop a career in a world that is increasingly dependent on information technology and in which major social, political and economic endeavours are enabled by the technology. Students will develop an awareness of their active citizenship, through the core modules of the programme, especially those emphasizing the evolution of modern computing technology and current research directions.

Compulsory modules provide assessments appropriate to the learning outcomes of the programme. Assessment tasks will be specified, in the context of the importance of quality assurance in the IT and telecommunications industry, and criteria for success in assessments will mirror those needed in the work place.

By paying due regard to the Oxford Brookes University's Assessment Compact, the assessments on this programme have been designed to develop the learning of technical skills, shaped by the underlying theory and requirements of the industry. Assessment does not present students with a set of hurdles, but rather guides them through the staged acquisition, of a complex set of professional skills, so that, by the time they graduate, they are ready to play an effective role in their chosen career.

Feedback on the assessment tasks will be provided in a timely manner, emphasizing the achievement of the learning outcomes of the modules and the programme. Students will be encouraged to relate the assessment tasks, with professional activities, and to relate their achievements with professional standards. Where appropriate, self and peer assessment will be used to encourage students to involve themselves in their own professional development.

The School is committed to inclusivity and diversity in its teaching. By the very nature of the discipline, virtually all of our teaching material is available in an accessible format and, where possible, we follow best practice guidelines and make our electronic material available before the lectures. We also use electronic references and e-books to further enhance accessibility. Inclusivity and diversity are also embedded in what we teach. As such, all new students have a lecture on inclusivity and diversity, as part of their induction, and important inclusivity and diversity topics, such as the need for accessibility and internationalization, and how to achieve them, are taught on a variety of modules throughout the programme.

SECTION 6: ADMISSION TO THE PROGRAMME

6.1 ENTRY REQUIREMENTS

The University's standard requirements are

<http://www.brookes.ac.uk/studying-at-brookes/how-to-apply/entry-requirements/postgraduate-courses/>

Typical offers: -

Undergraduate degree: 2:2 in computing, mathematics, engineering or a science-related subject, in which good programming skills have been developed. Applicants, whose first degree is not in these areas, but who have worked in a related industry, and have obtained good relevant experience and programming skills, can also be considered.

Specific entry requirements for the MSc in AI, Postgraduate Diploma AI and Postgraduate Certificate AI

If the first language is not English, evidence is required of a minimum of IELTS score of 6.0 or an equivalent English language qualification acceptable to the University.

Specific entry requirements for Postgraduate Certificate, AI Research Project:

Previous relevant experience in research and study methods at the appropriate level

If the first language is not English, evidence is required of a minimum of IELTS score of 6.0 or an equivalent English language qualification acceptable to the University.

6.2 DBS AND OTHER PRE-COURSE CHECKS REQUIRED

Not applicable.

6.3 JOB ROLE/EMPLOYER PROFILE (DEGREE AND HIGHER APPRENTICESHIPS)

Not applicable.

SECTION 7: PREPARATION FOR EMPLOYMENT

Throughout the programme, module and dissertation handbooks alongside online resources, available through the virtual learning environment, provide a great deal of guidance for students on how their studies relate to their future careers. In addition, students can get help and guidance from their Programme Lead, Subject Co-ordinator, the Postgraduate Programme Administrator and the department's Student Support Co-ordinators. They can also get module specific advice from the Module Leader and any of the staff teaching on the relevant module.

At the University level, there are dedicated support services both for specific groups of students, such as Oxford Brookes International and the Disability Advisory Service, and for all students such as Upgrade, the university's study skills development/support service.

Graduates, from the programme, will be ideally equipped for a career in wide variety of industries.

Graduates are employed across a whole range of jobs including

- Data Scientist
- Software Data Engineer
- Machine Learning Engineer
- Machine Learning Scientist
- AI Architect
- AI Consultant
- AI Specialist
- ML Architect
- Knowledge Engineer.