Programme Specification

A Programme Specification provides a concise summary of the main features of a programme and its intended learning outcomes. It is intended to be used by prospective students, current students, academic staff and potential employers.

Programme Title:	
BSc (Hons) Artificial Intelligence / BSc (Hons) Artificial Intelligence with Foundation year	
Programme (AOS) Code(s):	**BB1ARI1 / BB1ARI4**
UCAS Code:	**ARIN / ARIF**
Name of Final Award:	**Bachelor of Science with Honours, BSc (Hons)**
Level of Qualification:	**Level 6**
Regime of Delivery:	**Attendance**
Mode(s) of Delivery:	**Full Time**
Typical Length of Study (Years):	**3 years / full-time** **4 years/ full-time with Foundation Year**
Professional Body Recognition / Accreditation (including specific requirements where applicable):	**N/A**

Brief Description of the Programme

The Government's recent Industrial Strategy indicated that the UK will need to focus on highly-specialised, tech-based, tertiary and secondary activity to maintain its current economic position in the world. The report estimates that Artificial Intelligence (AI) - related, economic activity alone could be worth £630B to the country by the year 2035.
AI which can be defined as the simulation of human intelligence processes by machines, has been identified as the first of the Government's four Grand Challenges, intended to keep the UK at the vanguard of technological innovation and the industries of the future. AI technologies are rapidly transforming traditional industry and acting as an enabler to develop new sectors of human endeavour. The ever-evolving area of Artificial Intelligence offers exciting opportunities to be at the forefront of future technological developments that will directly affect society in the very near future.

This BSc. (Hons) in Artificial Intelligence has been developed to equip students with the knowledge and understanding to be able to operate and thrive in this "brave new world". It offers students the opportunity to embark on an educational programme in an increasingly vital subject area. The course is for those wishing to pursue careers as Computing, AI or Data professionals, or to develop new skill sets that may enable them to consider alternative roles in IT services. The course will provide students with the opportunity to learn, practise and develop capabilities in the areas of machine learning and artificial neural networks, data analysis, fuzzy and expert systems *inter alia*, which underpin AI systems development.

AI is underpinned by many supporting disciplines including mathematics, logic, philosophy, cognitive psychology, linguistics and sociology. However, as it has its roots in computer science, students will also build artificially intelligent machines, whether these are in the form of Expert Systems, Intelligent Agents or robots. This unique combination means our students must have a

strong background in general computing and this programme provides precisely the experience for you to be successful in your future AI career. If you have an enquiring mind and enjoy using critical and computational thinking to solve challenging real-life problems, if you would like to learn to design and programme computer-based systems in a very 'hands-on' environment using AI technologies then this course is for you.

The programme is distinctive in that as well as providing students with a strong theoretical background in AI, it also has a very significant practical element so you will also learn to use a range of AI-related tools and techniques including Matlab, Jason with AgentSpeak etc. In addition, it provides a solid grounding in contemporary software engineering principles and computer science. Throughout the course, students are encouraged to recognise that the latter form the foundations for sound and sustainable AI system development. As well as improving their technical understanding of AI, prospective students will also be gaining the opportunity to understand how it this relates to the wider world and customer-facing needs for potential employers.

Programme Aims

1	Prepare students for a professionally proven career in Computing and Artificial Intelligence sector or in related fields
2	Develop students' knowledge, skills and understanding of Computing and Artificial Intelligence theory and practice
3	Foster analytical capabilities and their application across a range of settings
4	Develop in students skills that link directly to professional body and ethical standards to become a responsible and socially aware information technology professional
5	Nurture students' confidence and transferable skills in areas highly sought by employers, including communications, problem solving, critical thinking, working in a team and as an individual

Programme Learning Outcomes

The Bucks Graduate Attributes 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. The attributes are developed through the programme.

ID	Learning Outcome
On successful completion of the programme a graduate will be able to:	
Graduate Attribute: Knowledge and its application (K)	
K1	Understand some of the core disciplines of AI including: machine learning, deep learning, knowledge representation/inference, large scale computing systems and distributed systems, human-computer interactions, natural language processing, big data analytics
K2	Identify systems requirements for both rule-based and data driven systems including the recognition and analysis of criteria and models leading to specifications used in the solution of specific AI problems.
K3	Explain the mathematical principles that underpin AI systems.

K4	Identify the key stages of the software lifecycle as well as outputs and dependencies between stages.
K5	Recognise the business, industrial and commercial context in which AI is deployed, with particular regard to its usability.
Practical Skills (P)	
P1	Analyse, design, develop and maintain reliable AI software, with particular regard to Intelligent Systems encapsulated in a Quality Assurance Framework.
P2	Employ analytical techniques and design tools in the development of AI software and Intelligent system artefacts.
P3	Apply sound programming principles to the construction and maintenance of AI software deployed on multiple platforms, using appropriate programming paradigms and languages.
P4	Recognise the risks or safety aspects associated with various intelligent systems
Graduate Attribute: Social and ethical awareness and responsibility (S)	
S1	Understand the importance of ethical, professional and legal standards when deploying AI.
S2	Identify and critically evaluate the interplay of environmental, social and economic impacts arising from AI related activities.
S3	Consider the question of acceptance and adoption of AI-based technology in society by professionals, by individuals and by society in general.
Graduate Attribute: Leadership and self-development (L)	
L1	Analyse theories of learning, intelligence and self-development and apply them to “real world” problems.
L2	Recognise the different roles in teams and understand how to make an appropriate contribution to a collaborative project according to the nature of the problem and skill set within the team
L3	Develop problem-solving and decision-making skills as well as the ability to communicate both orally and in writing.
L4	Demonstrate the ability to operate in and lead teams and to collaborate at all levels of an organisation.

Programme Structure

Programmes are structured in stages. The number of stages will vary depending on the mode (e.g. full-time, part-time), duration and location of study which will be detailed in the Programme Handbook.

Modules are set at a specific academic level and listed as either core (compulsory) or optional. The level indicates the relative academic difficulty which will increase through the programme. Passing modules will reward you with academic credit. The amount of credits will depend on the complexity of the module and the level of effort required, which is measured in ‘notional learning hours’.

Our Academic Advice webpages provide more information on the structure of taught awards offered by the University.

Please note: Not all option modules will necessarily be offered in any one year. Other option modules may also be introduced at a later stage enabling the programme to respond to sector developments.

Foundation Level (Optional for students on degree programmes)

Code	Module Title	Credit	Core / Option	Compensable (Normally Yes)
FY026	Preparing for Success: Knowledge and Creativity	N/A	Core	Yes
FY027	Preparing for Success: Self Development and Responsibility	N/A	Core	Yes
FY028	Inquiry Based Learning	N/A	Core	Yes
FY006	Digital Media	N/A	Core	Yes
FY007	Computing Essentials	N/A	Core	Yes

Level Four

Code	Module Title	Credit	Core / Option	Compensable (Normally Yes)
CO450	Computer Architectures	15	Core	Yes
CO452	Programming Concepts	15	Core	Yes
CO454	Digital Technologies & Professional Practice	15	Core	Yes
CO451	Networking	15	Core	Yes
CO453	Application Programming	15	Core	Yes
CO456	Web Development	15	Core	Yes
CO407	Essentials of Intelligent Systems	15	Core	Yes
CO408	Computational fundamentals for Intelligent Systems	15	Core	Yes

Level Five

Code	Module Title	Credit	Core / Option	Compensable (Normally Yes)
CO536	Algorithms and Data Structures	15	Core	Yes
CO537	Introduction to Formal Reasoning	15	Core	Yes
CO567	Object Oriented Systems Development	15	Core	Yes
CO559	Intro to Intelligent Systems (Team Project)	15	Core	Yes
CO558	Database Design	15	Core	Yes
CO566	Mobile Systems	15	Core	Yes
CO538	Machines and their Languages	15	Core	Yes
CO539	Planning, Search and Artificial Intelligence Programming	15	Core	Yes

Level Six

Code	Module Title	Credit	Core / Option	Compensable (Normally Yes)
CO699	Project	30	Core	No
CO625	Autonomous Robotic Systems	15	Core	Yes
CO652	Knowledge-Based Systems in A.I	15	Core	Yes
CO618	Legal Aspects of IT	15	Core	Yes
CO653	Learning Machines and Intelligent Agents	15	Core	Yes
CO617	Data Science	15	Opt	Yes
CO657	Data Base Technologies	15	Opt	Yes
CO654	Cloud Computing	15	Opt	Yes
CO656	Database Development	15	Opt	Yes
CO651	Quality Assurance and Testing	15	Opt	Yes
CO666	Advanced Mobile Development	15	Opt	Yes
CO659	Enterprise Systems Development	15	Opt	Yes

Learning and Teaching Activities

Please see the Academic Advice pages for a description of learning and teaching activities that are recognised by the University. Detailed information on this specific programme is outlined below:

In your first year, you study fundamental areas of computing, including computer systems, programming, analysis and design and AI basics. In your second year, there is in-depth study of searching, reasoning and problem solving for AI, as well as professional software development, and work User Experience, much of which involves teamwork. In your third year you undertake an independent project, which will be based on an AI topic of AI of your choice. In addition, you take modules in rule-based and data-driven approaches and choose from a range of other optional modules, including e.g. Data Science and Database Technologies.

Learning, Teaching and Assessment Methods to achieve the Programme Learning Outcomes

How will Students Learn:

A variety of delivery approaches and the use of the latest technology will be blended together to encourage full student participation in classroom-based learning as well as similar levels of engagement outside the classroom. 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 at each stage and level of the course. The strategies have been designed to ensure that there is progression from formal teaching through to student centred independent learning as the student progresses through the levels of the course(s).

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 students and is most effective when followed up by a seminar or tutorial session to consolidate learning.
The lecture format may be supported by written hand-outs, web or library references which serve to reinforce and expand the audio-visual information presented. In addition, staff will make appropriate use of the VLE (Blackboard) facilities. This should enable lecturers to enhance the traditional communication and learning mediums, as well as making material available to students at home and university.

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

Seminars
These can vary from large group seminars, which provide an opportunity for the student-led formal debate of particular 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 student learning. The teaching and learning strategies for individual modules are detailed in the relevant module pro-forma.

How will students be assessed

A variety of assessment vehicles will be used as appropriate to the module, including assignments carried out in the student's own time, in-class assignment, workshops, presentations and formal examination. The form of assessment has been chosen so as to motivate students to achieve their best, and create learning activities for the students. The assessment vehicles for individual modules are detailed in the module descriptor.

Assessments will be appropriate to the task, achievable, motivating and vocationally focussed and will form a constructive part of the learning process.

Assessments will develop general transferable skills as well as academic skills.

Assessments will provide sufficient opportunity for the best students to exhibit a level of innovation and creativity associated with excellence.

During the foundation year, students will be exposed to a variety of summative and formative assessments whilst developing the academic skills to be a successful student at university; course content and learning outcomes strongly relate to students developing their knowledge and understanding of the subjects being studied and assessed.

Level 4 assessments will be primarily formative and will encourage the development of appropriate academic practice and concepts. The emphasis will be on frequent small-scale assessments wherever possible with a balance between formative and summative assessment.

Level 5 assessments will be more demanding, with the emphasis still on development of knowledge, skills, and concepts but now encouraging learning at greater depth, emphasising the fundamental principles. There will be a shift towards summative assessment.

Level 6 assessments are designed so as to allow students to demonstrate their knowledge and skills so that they have become effective, independent learners. The emphasis is on summative assessment.

Advice, Feedback and Collaborative Learning

Assessment is an integral part of the education process, promoting student 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 students about the strengths and weaknesses in their work, with tutors affirming what students have done well whilst giving constructive and encouraging advice about areas requiring reflection and further improvement.

Tutor feedback on formal assessment elements is just part of the ongoing dialogue with students about their learning and personal development. Tutors will offer students 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 students towards achieving their full potential.

Different strategies for timely advice and effective feedback will be adopted, according to what is fit-for-purpose for students and modules. For instance: good or bad examples of previous student work not only give students 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; practising presentations with other students 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.

Additional Course Costs

There are costs associated with all studies, additional to the tuition fee, which require consideration, when planning and budgeting for expenditure. Costs are indicative and for the total length of the course shown unless otherwise stated and will increase with inflation; depending on the programme they may include equipment, printing, project materials, study trips, placement activities, DBS and/or other security checks.

The university will provide access to the appropriate facilities and equipment to allow you to do your course. However, a student on this course may find it useful to have their own computer or laptop, so that they can work flexibly at home and elsewhere, if necessary. Whilst it is difficult to be exact, other common annual costs can be:

- Text books - £100 to £150 per year
- Software - £200 to £250 per year
- Printing - £30 to £50 per year

Contact Hours

1 unit of credit is the equivalent of 10 notional learning hours. Full time undergraduate students study 120 credits (1200 hours) and full-time postgraduate students study 180 credits (1800 hours) per year or 'stage' of the course.

Course Stage	Scheduled Activities (Hours)	Guided Independent Study (Hours)	Placement / Study Abroad / Work Based Learning (Hours)
Foundation Year	336	864	0
Year One	360	840	0
Year Two	360	840	0
Year Three	360	840	0

Assessment Methods

The Assessment and Examination webpages provide further information on how assignments are marked and moderated, including a description of assessment activities. These also include further information about how feedback on assessed work is provided to students, including our commitment to ensure this is provided to students within 15 working days (the 'three-week turnaround').

Assessment Strategies

A variety of assessment vehicles will be used as appropriate to the different modules, including assignments carried out in the student's own time, in-class assignment, workshops, presentations and formal examination. The form of assessment has been chosen so as to motivate students to achieve their best, and create learning activities for the students. The assessment vehicles for individual modules are detailed in the 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 sufficient opportunity for the best students to exhibit a level of innovation and creativity associated with excellence.

During the Foundation Year, students will be exposed to a variety of summative and formative assessments whilst developing the academic skills to be a successful student at university; course content and Learning Outcomes strongly relate to students developing their knowledge and understanding of the subjects being studied and assessed.

Level 4 assessments will be primarily formative and will encourage the development of appropriate academic practice and concepts. The emphasis will be on frequent small-scale assessments wherever possible with a balance between formative and summative assessment.

Level 5 assessments will be more demanding, with the emphasis still on development of knowledge, skills, and concepts but now encouraging learning at greater depth, emphasising the fundamental principles. There will be a shift towards summative assessment.

Level 6 assessments are designed so as to allow students to demonstrate their knowledge and skills so that they have become effective, independent learners. The emphasis is on summative assessment.

Advice, Feedback and Collaborative Learning

Assessment is an integral part of the education process, promoting student 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 students about the strengths and weaknesses in their work, with tutors affirming what students 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 students about their learning and personal development. Tutors will offer students 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 students towards achieving their full potential.

Different strategies for timely advice and effective feedback will be adopted, according to what is fit-for purpose for students and modules. For instance: good or bad examples of previous student work not only give students 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; practising presentations with other students 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.

Classification

Calculation of final award:	**Level 5 - 33%** **Level 6 – 67%**

For full details of assessment regulations for all taught programmes please refer to our Results webpages. These include the criteria for degree classification.

Admissions Requirements

Please see the Application webpages for more information on how to apply, including a statement on how we support students from a variety of backgrounds. Please also see our general entry requirements for taught programmes. Applicants who do not meet our published entry requirements are encouraged to contact our admissions team for further advice and guidance.

Typical applicant profile and any programme-specific entry requirements

Applicants will normally have some demonstrable interest, experience or employment ambitions in Artificial Intelligence or related to areas such as computing, IT and data analysis, along with an interest in mathematics. The programme is not just aimed at recent leavers of School/College but is also an option for mature candidates who may have aspirations to return to education, perhaps as a springboard towards a significant career change. Standard University entry requirements will apply.

Do applicants required a Disclosure and Barring Service (DBS) Check?	**No**

Opportunities for students on successful completion of the programme

Within the course, students will cover specific modules dedicated to the various facets of Artificial Intelligence as part of a broader computing education. This means that graduates could go into a diversity of roles in computing and IT, as well as very particular roles as indicated by the fundamental course theme of Artificial Intelligence.

AI specialists are currently in great demand with employers across a range of sectors around the globe. We anticipate that this pattern will continue for the foreseeable future as AI becomes more embedded in technological developments. Our students will have gained the fundamental skills and knowledge necessary to adopt quickly the emerging technologies and concepts in this dynamic field. Furthermore, they will also possess the professional and business skills needed to be able to use AI to meet the needs and requirements of the organisations for which they will work. Opportunities for future employment occur in a wide range of sectors including: engineering, finance, healthcare, games and films, pharmaceuticals and public services and many other areas of business and society. A range of employers including large national and multinational firms to regional and local organisations are seeing the benefits of employing graduates with strong Artificial Intelligence underpinning to the benefit of their business.

After studying at Bucks and with some experience, you'll be ready for a range of AI roles including:

- Machine learning engineer – build and manage platforms for machine learning projects.
- Business intelligence developer – design, model, and maintain complex data in cloud-based data platforms.
- Artificial Intelligence architect – provide AI solutions to help businesses.
- Robotics scientist – build and maintain software for robots that do tasks with varying human input.

Progression to further study on a Master's programme is a meaningful alternative to employment as a next step after completing this BSc (Hons) course.

Student Support

During the course of their studies, students will be supported in the following ways:

- At the start of their studies all students will receive a full **induction** to the programme which will include introduction to the staff responsible for delivering the course, and access to library and IT facilities
- The **Programme Handbook** will outline the exact nature of the course and how it is structured, including the availability of option modules
- Each student will be allocated a **Personal Tutor** who will support their academic development, be able to advise and guide them with their studies and, where necessary, give advice on study options
- Students will be able to access our full range of **support services**, including the Learning Development Unit for skills and study support, the Library, the Careers and Employability Team, Student Finance Team, Accommodation and Counselling Services

Appendices

Quality Assurance

Awarding Body:	**Buckinghamshire New University**
Language of Study:	**English**
QAA Subject Benchmark Statement(s):	**Computing (2016)**
Assessment Regulations:	***Academic Assessment Regulations*, accessible via the Academic Advice webpages (https://bucks.ac.uk/students/academicadvice)**
Does the Fitness to Practise procedure apply to this programme?	**No**
Ethics Sub-committee	**Computing Ethics Sub-Committee**
Date Published / Updated:	**September 2019, February 2022**
Date programme re-approval required:	**September 2025**

Other awards available on programme (Exit Qualifications)

Please refer to the *Academic Qualifications Framework* for Exit Qualifications recognised by the University and credit and module requirements.

Name of Exit Qualification:	**Certificate of Higher Education (CertHE)**
Full name of Qualification and Award Title:	**CertHE in Artificial Intelligence**
Credits requirements:	**120 Credits**
Module requirements:	**ALL 120 Credits at Level 4**
Learning Outcome	
Comprehend and apply a simple requirement in a structured manner and implement a computer based / software solution; with appropriate application of programming techniques and coding skills.	
Demonstrate competence in the design and development of a cross-platform Web 'front-end' solution, paying appropriate attention to user expectations and process needs.	
Understand the operation of the major hardware units of computers and appreciate the fundamental components and protocols of network systems.	
Adopt a systematic approach to the design and evaluation of human computer interaction, as part of different development projects.	
Exhibit an appreciation of the underpinning of computer Artificial Intelligence.	
Demonstrate a range of transferable skills, including team work and meeting deadlines	
Demonstrate an understanding of digital technologies within a professional context, and how different tools and environments can be used for handling information, communication and other purposes.	

Name of Exit Qualification:	**Diploma of Higher Education (DipHE)**
Full name of Qualification and Award Title:	**DipHE in Artificial Intelligence**
Credits requirements:	**240 Credits**
Module requirements:	**ALL 120 Credits at Level 4** **PLUS ALL 120 Credits at Level 5**
Learning Outcomes	
Make informed design decisions and produce innovative plans whilst developing computer systems for diverse platforms using industrial standard tools including areas of networking, mobile platforms, databases and Web technologies.	
Evaluate different techniques and tools used within the development and management of computer systems.	
Apply sound computing and software principles to the construction and maintenance of computer / software deployed on multiple platforms & processors, using current appropriate standards, protocols and tools (e.g. algorithms, programming paradigms, languages, hardware)	
Apply engineering principles and analysis and design techniques to the specification, design, development and evaluation of high-quality computing information systems and software systems.	
Work as a member of a development team, recognising the different roles within a team and different ways of organising teams.	
Demonstrate an understanding of formal reasoning, search approaches as used in the field of Artificial Intelligence.	
Manage one's own learning and development including time management and organisational skills.	

Name of Exit Qualification:	**Ordinary Degree**
Full name of Qualification and Award Title:	**BSc Artificial Intelligence**
Credits requirements:	**300 Credits**
Module requirements:	**ALL 120 Credits at Level 4** **ALL 120 Credits at Level 5** **PLUS 60 credits from Level 6 modules, excluding the Project – CO699 module.**
Learning Outcome	
Make informed design decisions and produce innovative plans whilst developing Artificial Intelligence and Computer systems for diverse platforms using industrial standard tools.	
Critically evaluate different techniques and tools used within the development of Artificial Intelligence computer-based systems.	
Apply sound computing and software principles to the construction, maintenance and testing of complex computer / software deployed on multiple platforms & processors, using current appropriate standards, protocols and tools (e.g. programming paradigms, languages, hardware)	
Select and systematically utilise engineering principles and analysis and design techniques to the specification, design, development, testing and evaluation of complex high-quality Artificial Intelligence and Computing Information systems.	

Work as a member of a development team, recognising the different roles within a team and different ways of organising teams.
Manage one's own learning and development including time management and organisational skills and appreciate the need for continuing professional development in recognition of the need for lifelong learning.
Interrogate the complex dimensions of a technical problem in order to design and model an appropriate solution for the context
Select and systematically utilise suitable skills, methods, techniques and strategies to develop, test and evaluate the solutions to different given problems
Develop and demonstrate knowledge of professional, legal and ethical responsibilities of computing personnel in the field of Intelligent & Autonomous Systems.