PROGRAMME SPECIFICATION

1. General information

Awarding body / institution	**Leeds Trinity University**
Teaching institution	**Leeds Trinity University**
'Parent' Faculty *(ICE / BCDI / SHS)*	**Faculty of Business, Computing and Digital Industries**
'Parent' School	**School of Computer Science**
Professional accreditation body *(if applicable)*	*Application to the British Computer Society (BCS) will be made after the first year of operation of the programme*
Final award *(eg. BA Hons)*	**MSc**
Title of programme(s)	**Data Science and Artificial Intelligence**
Subsidiary award(s) *(if any)*	**PgDip Data Science and Artificial Intelligence** **PgCert Data Science and Artificial Intelligence**
Honours type *(Single / Joint / Combined)*	**NA**
Duration and mode(s) of study	**1 Year Full-time (FT)** **2 Years Part-time (PT)**
Month/year of approval of programme	**July 2023**
Start date (this version) *(month and year)*	**September 2023**
Periodic review next due *(academic year)*	**TBC**
HECoS subject code(s)	**100755 Data Management - Balanced** **100359 Artificial Intelligence - Balanced** **100992 Machine Learning - Balanced**
UCAS course code & route code **(available from Admissions)**	**NA**
SITS codes *(Course / Pathway / Route)* **(available from Student Administration)**	**MSLTUDSAIN/ DASCAIN**
Delivery venue(s) (please also indicate partner institutions where relevant)	**Leeds Trinity University**

2. Aims of the programme

Rationale and general aims, including what is special about this programme *(from the student's and a marketing perspective)*
The MSc Data Science and Artificial Intelligence programme enables students to continue with postgraduate studies in emerging technologies of Data Science and Artificial Intelligence and contributes to addressing the shortage of AI and data specialists in the tech sector. The programme is for graduates with STEM degrees and non-STEM degrees with an interest in the tech sector.

Our programme creates AI and data specialists to meet the growing need for effective data processing and analysis skills. It is designed to welcome applicants from diverse academic backgrounds and builds skills in mathematics, technical specialism and subject expertise. Graduates will have in-demand skills and be highly employable.

The programme contains modern, outward-looking modules, grounded in Data Science and AI theory and practice, yet suitable for a range of in-demand career paths. Programme aims are:

- to provide an opportunity for the understanding of scientific-technological development, implementation and communication
- to develop strongly analytical students equipped with logical, explorative and analytical skills
- to utilise data science, machine learning, big data tools for decision-support to benefit further businesses, society and environments
- to assist students to demonstrate leadership skills, apply ethics and be responsible and accountable for their own actions
- to equip students with reflective skills for lifelong learning in pursuit of personal development and excellence in practice
- to enable students to be critical thinkers equipped with excellent communication skills to influence areas of a technological transformation such as smart systems, neural analysis, computer vision and language processing.

3. Student learning outcomes of the programme

Learning outcomes in terms of:
- **knowledge and understanding (K)**
- **intellectual / cognitive / 'thinking' skills (I)**
- **practical skills specific to the subject (P)** *(for example, lab skills and similar)*
- **employability skills (postgraduate) (E) or attributes and skills (undergraduate) (AS)**

The 'K1', etc codes are used in section 7b) and module descriptors to refer to each of these learning outcomes.

On successful completion of the programme, students will have demonstrated:

K1 a systematic understanding of knowledge, and a critical awareness of current problems and/or new insights, much of which is at, or informed by, the forefront of the data science and artificial intelligence field of study or the associated area of professional practice;

K2 a comprehensive understanding of techniques applicable to research or advanced scholarship in data science and artificial intelligence;

K3 conceptual understanding and original application of knowledge gained, used in parallel with a critical evaluation of research methodologies to develop critiques of them and, where appropriate, to propose new hypotheses;

K4 the ability to recognise the inherent variability and diversity of technological and computational functioning, including the contribution of international and cultural differences to this;

K5 understanding of advanced technology and data science literacy and the contribution that an understanding of data science can make to the wider community and society and its role in promoting values of equality and social justice;

I1 secure use of analytical techniques, statistics and inference appropriate to solving problems related to data science and artificial intelligence;

I2 critical evaluation of approaches to solving complex problem issues both systematically and creatively;

I3 self-direction and originality in tackling and solving problems, recognising ethics and values relevant to professional practice of data science and artificial intelligence;

I4 effective and sustained communication of results and arguments to specialist and non-specialist audiences;

I5 understanding of the limits of their knowledge and the consequent influence on their analysis;

I6 autonomous action in planning and implementing tasks at a professional or equivalent level.

Employability skills (postgraduate)

E1 **Self-management** – the ability to plan and manage time; readiness to accept responsibility and improve their own performance based on feedback/reflective learning; the ability to take initiative and be proactive, flexible and resilient;

E2 **Teamworking** – the ability to co-operate with others on a shared task and to recognise and take on appropriate team roles; leading, contributing to discussions and negotiating; contributing to discussions; awareness of interdependence with others;

E3 **Business and sector awareness** – an understanding of the key drivers for business success, including the importance of customer/client satisfaction and innovation; understanding of the market/sector in which an organisation operates; the ability to recognise the external context and pressures on an organisation, including concepts such as value for money, profitability and sustainability;

E4 **Problem-solving** – a capacity for critical reasoning, analysis and synthesis; a capacity for applying knowledge in practice; an ability to retrieve, analyse and evaluate information from different sources;

E5 **Communication** – the ability to present information clearly and appropriately, both orally and in writing, and to tailor messages to specific audiences and purposes;

E6 **Application of numeracy** – a general awareness of mathematics and its application in practical contexts; the ability to carry out arithmetic operations and understand data, to read and interpret graphs and tables and to manage a budget;

E7 **Application of information technology** – the ability to identify the appropriate IT package for a given task; familiarity with word-processing, spreadsheets and file management; the ability to use the internet and email effectively;

E8 **Entrepreneurship/enterprise** – the ability to demonstrate an innovative approach and creativity, to generate ideas and to identify and take opportunities;

E9 **Social, cultural & civic awareness** – embracement of an ethos of community and civic responsibility; an appreciation of diversity and ethical issues; an understanding of cultures and customs in the wider community.

See also the learning outcomes for subsidiary awards set out in section 4 below.

3a   External benchmarks

Statement of congruence with the relevant published subject benchmark statements *(including appropriate references to any PSRB, employer or legislative requirements)*
Learning outcomes of the programme are consistent with the Frameworks for HE Qualifications (FHEQ), QAA Computing Subject Benchmark Statement published on 30 March 2022 and British Computer Society (BCS) guidelines for universities.   Subject Benchmark Statement - Computing (including Master's) (qaa.ac.uk)   Qualifications Frameworks (qaa.ac.uk)   Academic accreditation - BCS accredited degree programmes | BCS *(application to BCS after first year of operation of the programme)*

4.   Learning outcomes for subsidiary awards

If the programme is not completed, there are two fallback awards:

1) Award of Postgraduate Certificate in Data Science and Artificial Intelligence

On successful completion of 60 credits at Level 7, students will have demonstrated an ability to:

(i) develop new skills to a high level and advance knowledge and understanding in the data science and artificial intelligence discipline and/or area of professional practice;

(ii) approach data problems in an analytical manner, make decisions and communicate insights driven from data to different audiences;

(iii) develop the qualities and transferable skills necessary for employment including the ability to exercise initiative and personal responsibility.

2) Award of Postgraduate Diploma in Data Science and Artificial Intelligence

On successful completion of 120 credits at Level 7, students will have demonstrated, in addition to the outcomes for a Postgraduate Certificate:

(i) the ability to utilise knowledge that is at, or informed by, the forefront of the data science and artificial intelligence discipline and/or area of professional practice to evaluate critically new insights and/or current issues;

(ii) comprehensive knowledge of research techniques and how these can be critically applied to existing knowledge;

(iii) further development of the qualities and transferable skills necessary for employment including autonomous decision-making in complex situations.

5.   Content

Our MSc Data Science and Artificial Intelligence programme comprises modules covering topics from fundamentals for data science, programming for data science and artificial intelligence, to machine learning, big data analytics and visualisation and ethics, transparency and accountability.

Fundamental Subject Knowledge

You will start with the key fundamentals for data science to ensure students from a wide range of academic backgrounds have the necessary knowledge in relation to key data concepts and methods. You will also take a module in programming for data science and artificial intelligence to prepare learners entering the programme with non-STEM degrees. This will equip learners with the necessary programming skills to implement real-life data solutions. From there, you will move on to explore aspects and tasks relating to the life cycle of data in organisations and the wider issues relating to data handling, along with algorithms and data structures used to solve several computational challenges.

You will develop fundamental AI and machine learning skills and discover related concepts, mainly from a practical, problem-solving perspective – including foundations of predictive tasks, visualisation of data and contemporary techniques for predictive modelling.

Ethics and Values

You will learn the ethics and legal aspects of data science and the approaches to develop responsible solutions in the light of existing frameworks including DPA and GDPR.

Research Skills

Finally, you will complete an in-depth, independent research project. With the support of our academic and technical team and industry mentor, you will undertake a piece of research on a topic of your choice in the area of data science and AI. This will involve designing, implementing and evaluating a substantial piece of software and documenting the research through writing a dissertation.

Personal Development and Future Directions

The programme places a strong emphasis on critical skills, with students taking control of their learning, aided and supported by academic staff/personal tutors. Students will develop a holistic confidence in the discipline, having achieved success across a range of practical and academic assessments. Graduates will have taken their first step towards BCS membership and be well-positioned to achieve a successful and rewarding career in data science and artificial intelligence.

6.   Structure

MSc Data Science and Artificial Intelligence
Duration: 1 year full-time/2 years part-time

Total credit rating: 180

Full time:

Core: Students are required to take:

COM7015	Fundamentals for Data Science	Term 1	15 credits
COM7025	Programming for Data Science and Artificial Intelligence	Term 1	15 credits
COM7003	Machine Learning	Term 1	30 credits
COM7013	Big Data Analytics and Visualisation	Term 2	30 credits
COM7023	Ethics, Transparency and Accountability	Term 2	30 credits
COM7016	Project	Term 3/Summer	60 credits

Part Time:

Year 1: Students are required to take the following modules:

COM7015	Fundamentals for Data Science	Term 1	15 credits
COM7025	Programming for Data Science and Artificial Intelligence	Term 1	15 credits
COM7023	Ethics, Transparency and Accountability	Term 2	30 credits

Year 2: Students are required to take the following modules:

COM7003	Machine Learning	Term 1	30 credits
COM7013	Big Data Analytics and Visualisation	Term 2	30 credits
COM7016	Project	Term 3/Summer	60 credits

7.   Learning, teaching and assessment

7a) Statement of the strategy for learning, teaching and academic experience for the programme

The programme meets the requirements of relevant policy documents, particularly the QAA Frameworks for HE Qualifications, relevant QAA Subject Benchmark Statement and the University's Strategic Plan and Learning, Teaching and Academic Experience Strategy.

The learning, teaching and assessment strategy for the programme is centred on principles of active learning, critical reflection and teamwork. We believe that students at this higher level of study should handle their own learning and have a role in supporting the learning of their peers. Learning is a shared experience and students can gain significant benefits from developing skills and knowledge in partnership with others. This prominent level of student responsibility is embedded into the programme, with students taking the lead in their own learning with the support and facilitation of expert tutors. The programme employs a variety of teaching methods but with an emphasis on student-led activities, supervised small-group work and an approach to teaching and learning which values active learning. All taught modules in this programme will be delivered through a combination of lectures, small group tutorials/seminars and lab exercises.

Module assessments employ a full range of written forms, presentations, portfolios and software artefacts, in order to reflect the academic and employability skills being developed within the programme. Assessments across the programme ensure a good variety and balance of assessment forms and there are opportunities for students to exercise an element of choice in negotiated assessments. All assessments are centred around a real-world scenario where students will need to apply their knowledge of the topics covered to data science and artificial intelligence from a specific application area to solve given problems.

Students will further develop transferable and employability skills (e.g. critical thinking, teamwork) while engaging with a variety of online resources, including basic statistical packages using Python and popular packages, video tutorials and the Moodle Virtual Learning Environment. Moodle is used to support class sessions, with module information and learning materials posted in advance. We also use Pre-Live-Post to engage students in the learning and

teaching material. As emphasised in the University's Learning, Teaching and Academic Experience Strategy, we are committed to increasing the amount of contact time devoted to student-led enquiry. Students will engage with programme content and learn in an active fashion and in alignment with the Pre-Live-Post model of delivery. Assessment methods will be used to satisfy the learning outcomes for the programme – all of which include internationalisation and a historical perspective of the discipline, while promoting awareness of how data science and analytics can be applied in the workplace and in the community, to the benefit of all.

7b) Programme learning outcomes covered

Adjust LO codes as necessary. ↓

Lighter or hatched shading indicates modules that are not core, ie. not all students on this programme will undertake these.	K1 Detailed Knowledge	K2 Comprehensive Understanding	K3 Original Application	K4 Contribution to Differences	K5 Data science and AI Literacy	I1 Secure Analytics and Inference	I2 Critical Evaluation	I3 Problem Solving and Ethics	I4 Scientific Communication	I5 Limitations of Knowledge	I6 Planning and implementation	E1 Self-management	E2 Teamworking	E3 Business & sector awareness	E4 Problem-solving	E5 Communication	E6 Application of numeracy	E7 Application of IT	E8 Entrepreneurship / enterprise	E9 Social, cultural & civic awareness
COM7015 Fundamentals for Data Science	■	■			■	■	■	■	■	■	■	■		■	■	■	■	■	■	■
COM7025 Programming for Data Science and Artificial Intelligence	■	■			■	■		■	■		■	■			■	■	■	■		■
COM7003 Machine Learning	■	■	■	■	■	■	■	■	■	■	■	■		■		■	■	■		
COM7013 Big Data Analytics and Visualisation	■	■	■	■	■	■	■	■	■	■	■	■		■	■	■	■	■	■	■
COM7023 Ethics, Transparency, and Accountability	■	■	■	■	■	■	■	■	■	■		■	■	■	■	■	■	■	■	■
COM7016 Project	■	■	■	■	■	■	■	■	■	■	■	■		■	■	■	■	■	■	■

8.   Entry requirements

Do the University's standard entry requirements apply (as outlined within the University's Admissions Policy)?	Yes
Detail of any deviation from and/or addition to the University's standard entry requirements (if applicable)	Applications from all candidates will be considered on their merits. Entry route 1: A 2:2 or above bachelor's degree (or an acceptable equivalent) in a computing related subject, which is considered at least comparable to a UK 2:2 degree, from an institution acceptable to the University. This could include computer science, information systems, software engineering, artificial intelligence, cyber security, health informatics or any other Computer Science related degrees available at ucas.com. Entry route 2: Professionals without a first degree but have substantial work experience supported by an online work portfolio which evidence equivalence to a suitable 2:2 undergraduate degree. Applicants may be invited for a short interview with the programme lead. Entry route 3: A 2:2 or above bachelor's degree (or an acceptable equivalent) in a non-computing related subject. Applicants may be invited for a short interview with the programme lead. For all routes, the programme will require prior knowledge of mathematics foundation equivalent to GCSE maths 4 or higher. This is evidenced in having a bachelor's degree for routes 1 & 3, while for route 2, prior mathematical knowledge will need to be evidenced in the work portfolio. The programme will help students refresh their foundation in mathematics and provide students with pre-masters material to help them refresh their knowledge in areas.

9.   Progression, classification and award requirements

Details of requirements for student progression between levels and receipt of the award(s) (A certain level of attainment which <u>must</u> be achieved in a specific module; any modules exempted from condonement, any deviation from the standard institutional stipulations for award classification, e.g. exclusion of Level 4 module marks from Foundation Degree classification)
The following University Taught Programme Academic Regulations apply: • General Academic Regulations   Programme Regulations for Taught Postgraduate Degrees.

10.   Prerequisites

Details of modules students <u>must</u> study and achieve credit for before enrolling on a module at a higher level, or attaining their final programme award
N/A

11.   Additional support needs

Arrangements made to accommodate students with additional support needs and any unavoidable restrictions on their participation in the programme/scheme
Students with disabilities or with neurodiversity are welcome and are expected to be able to participate fully in this programme. Arrangements will be made, via the normal University support systems, to accommodate students with additional support needs wherever possible, with reasonable adjustments made to accommodate individual needs.