DATA SCIENCE INSTITUTE

Internationally Accredited Data Science Programme

MSc in Computer Science (AI and Machine Learning)

Data Science Education and Certification

MSc in Computer Science (AI and Machine Learning)

Course Overview

The MSc in Computer Science (Artificial Intelligence and Machine Learning) is an advanced program building upon the Postgraduate Diploma's core modules in Python programming, foundation models, computer vision, NLP, mathematics for AI, high-dimensional data, deep learning, and MLOps. It features an Advanced Applied Computer Science Project, enabling students to design, implement, and maintain AI solutions from conceptualization to deployment. Balancing rigorous theory with practical engagement, the program develops the specialized competencies demanded across industries including finance, healthcare, technology, telecoms and more. Graduates emerge with the expertise to excel in AI-driven roles and advance both academically and professionally.

The MSc in Computer Science (Artificial Intelligence and Machine Learning) will enable you to:

- Attain advanced programming proficiency, designing and implementing robust, scalable AI/ML solutions in Python and related frameworks
- Deepen mathematical and statistical foundations, applying sophisticated optimization, probability, and interpretability techniques for rigorous model development
- Master cutting-edge machine learning and deep learning methods, including ensemble approaches, autoML, and transformer-based architectures for complex challenges
- Manage large-scale, high-dimensional data, employing advanced dimensionality reduction, clustering, and feature engineering to extract meaningful insights
- Deploy AI applications in professional environments, leveraging MLOps best practices, containerization, and continuous integration for production-ready systems
- Undertake a substantial research or industry project, demonstrating end-to-end proficiency—from data curation and algorithmic selection to ethical considerations and stakeholder communication

Who Should Take This Course?

Software Engineers & Technical Leads	Professionals with development experience or strong academic foundations aiming to architect and lead sophisticated AI/ML initiatives at scale.
Data Analysts & AI Specialists	Practitioners seeking advanced methodologies in ensemble models, deep learning, and automated workflows to enhance their current analytics toolkit.
Statisticians & Quantitative Experts	Individuals expanding their quantitative expertise, integrating cutting-edge AI techniques to improve model accuracy and interpretability.
Graduates	Recent degree holders and postgraduates with solid grounding in quantitative or computing fields who wish to advance their AI/ML knowledge and skills for professional or research-oriented careers.
Entrepreneurs & Innovation Managers	Leaders in tech-driven ventures or established organizations who aim to leverage AI strategies for product innovation, process optimization, and maintaining a competitive edge.

Entry Requirements

Academic Entry Route

We invite candidates with a strong foundation in numerate or analytical disciplines to join our advanced data science programs. Typically, this includes:

- **A 2.1 honours degree** (or international equivalent) in a numerate/analytical discipline
- Preferred fields such as Mathematics, Statistics, Computer Science, Engineering, Physics, Sciences, Economics, or quantitative Business Studies
- Consideration of alternative qualifications for those demonstrating sufficient quantitative or analytical skills

Alternate Entry Route

Designed for professionals with relevant experience and/or non-degree qualifications, this route offers an opportunity to advance in data science. Candidates must demonstrate:

- **Recognised Prior Learning (RPL):** Minimum of Six years' relevant professional experience
- **Performance-Based Assessment (PBA):** Provisional admission, requiring a GPA of 90% or higher in the first two course modules for full acceptance

How to Apply and further information

Course applications can be submitted on our website at:
www.datascienceinstitute.net/masters-in-ai-and-machine-learning
Along with your application, please submit:

Curriculum Vitae (CV)
Educational Certificates

Non-native English speakers must provide evidence of language proficiency equivalent to **IELTS 6.5 or higher.**

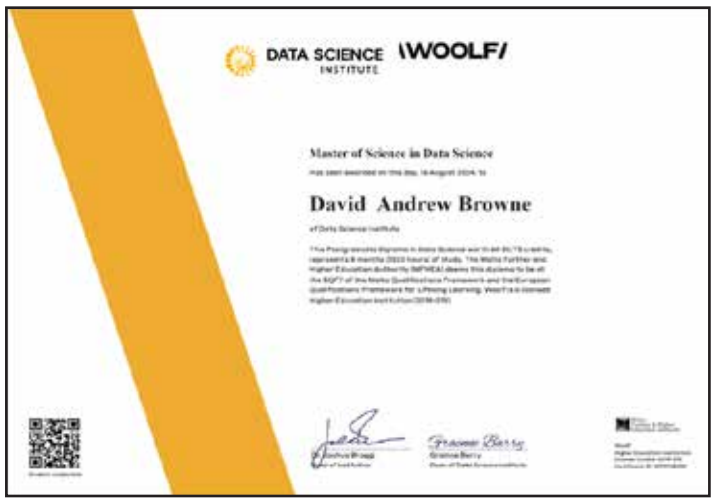
For further information:

Phone: +353 21 204 0519
Whatsapp: +353 89 973 5641
Email info@datascienceinstitute.net

Accreditation

The Data Science Institute's postgraduate programmes in Data Science, Machine Learning, and AI are fully accredited by Woolf University in Malta and award internationally recognized ECTS credits. Designed to meet rigorous academic standards, they not only equip you with advanced skills for a competitive job market.

Accreditation and ECTS Credits



Underpinning these programmes is the European Credit Transfer and Accumulation System (ECTS), a standardized framework that assigns one credit for approximately 25–30 hours of student workload. Recognized by universities and employers worldwide, ECTS enhances the portability of your qualification and facilitates further education or professional advancement.

Academic Pathways

Through structured academic pathways, students can progress seamlessly from postgraduate certificates to diplomas and ultimately to a master's degree, securing a credential widely respected by employers and institutions. Woolf accreditation ensures the credibility of your qualification, while ECTS credits offer global transferability and transparency of learning outcomes.

Postgraduate Pathway to MSc in Computer Science

Postgraduate Diploma in Computer Science	MSc in Computer Science
60 ECTS credits	**90 ECTS credits**

Industry-Aligned and Academically Accredited

Industry Focus

At the Data Science Institute, our programmes and certifications blend real-world relevance with rigorous academic standards, ensuring that graduates earn qualifications recognized across sectors. Guided by an active Industry Advisory Board of senior professionals, our curriculum remains on the cutting edge of evolving technologies and workforce needs.






Academically Accredited

At the Data Science Institute, all our programmes and certifications are not only industry-driven but also academically accredited, ensuring that learners gain recognised qualifications that carry value across sectors. Our offerings are co-developed with input from industry experts and aligned with academic standards, so learners benefit from both real-world relevance and rigorous quality assurance.

Our Faculty

Our faculty members bring extensive, hands-on experience from diverse fields such as finance, healthcare, manufacturing, and technology. Having worked with leading global organizations, they combine practical insights with academic expertise to deliver an education that is both industry-informed and forward-thinking.

Our Students and Graduates

Our students come from varied professional and academic backgrounds, progressing into roles ranging from Data Scientists and Cybersecurity Specialists to Management Consultants and Researchers. They represent multiple nationalities and work for a wide array of employers, including large corporations, research institutes, and innovative startups. Whether just starting out or making a career pivot, all share a commitment to applying data-driven approaches that create meaningful impact across industries.

Some of the organisations our students and graduates work at

Programme Modules

Module 1: Introduction to Computer Programming

Covers Python essentials (syntax, data types, control structures) to build a coding foundation for AI and ML. Students practice writing, testing, and debugging programs in realistic scenarios, preparing them for data-driven tasks. Emphasis is on skills used in software development, automation, and data-focused roles.

Introduction to Computer Programming

Python Fundamentals
Control Structures
Realistic Debugging
AI/ML Foundation

Module 2: Applied Statistics

Students learn statistical techniques essential for AI and machine learning, including descriptive and inferential methods for analyzing data, designing experiments, and validating hypotheses. This module develops competencies in statistical modeling, probability distributions, and hypothesis testing—fundamental skills for training machine learning models, optimizing algorithms, and ensuring data-driven decision-making in AI applications.

Applied Statistics

Descriptive & Inferential
Probability Distributions
Hypothesis Testing
Experimental Design

Module 3: Mathematics for Computer Science

Introduces linear algebra, calculus, and probability as core mathematical foundations for AI and machine learning. Students apply vectors, matrices, eigenvalues, and Bayes' theorem to optimize models and handle uncertainty. These concepts are essential for developing, optimizing, and interpreting machine learning algorithms, enabling students to build AI models.

Mathematics for Computer Science

Linear Algebra
Probability Theory
Differential Calculus
Matrix Operations

Module 4: Introduction to Machine Learning

Covers core ML methods (linear, logistic regression; decision trees; Random Forest), addressing missing data and class imbalance. Students learn model evaluation to build reliable industry solutions for tasks such as customer segmentation, fraud detection, or operational forecasting.

Introduction to Machine Learning

Regression Techniques
Tree-Based Methods
Missing & Imbalanced
Model Evaluation

Module 5: High Dimensional Data Analysis

Addresses complex datasets via dimensionality reduction (PCA, t-SNE), clustering (K-Means, DBSCAN), and feature selection (Lasso). Students learn to manage large feature spaces—essential in fields like finance, genomics, and text analytics—uncovering insights and streamlining computations.

High Dimensional Data Analysis

Dimensionality Reduction
Feature Selection
Data Visualization
Scalable Processing

Module 6: Advanced Machine Learning

Explores boosting (AdaBoost, XGBoost, LightGBM) and AutoML for efficient model experimentation. Students apply SHAP and LIME for interpretability, aligning AI solutions with ethical considerations and compliance requirements in regulated industries.

Advanced Machine Learning

Boosting Techniques
AutoML Efficiency
Model Interpretability
Ethical Compliance

Module 7: Introduction to Deep Learning

Examines neural network fundamentals (gradient descent, backpropagation) along with feedforward, convolutional, and recurrent architectures. Students learn regularization, hyperparameter tuning, transfer learning, and diffusion models for applications in image analysis, language processing, and beyond.

Introduction to Deep Learning

Neural Networks
Backpropagation Techniques
Activation Functions
Hyperparameter Tuning

Module 8: Deep Learning for Computer Vision

Focuses on convolutional networks for classification, detection, segmentation, and examines vision transformers and diffusion models for generative tasks. Students learn to handle visual data at scale, relevant to sectors like healthcare imaging, security, and autonomous systems.

Deep Learning for Computer Vision

Image Processing
Object Detection
Convolutional Nets
Feature Extraction

Module 9: Deep Learning for Natural Language Processing

Covers deep learning for text: embeddings (Word2Vec, GloVe), recurrent architectures (LSTM, GRU), and transformer-based models (BERT, GPT). Also explores diffusion-based language models and retrieval-augmented generation (RAG) for tasks like sentiment analysis, NER, translation, and conversational AI.

Deep Learning for Natural Language Processing

Neural Networks
Backpropagation Techniques
Activation Functions
Hyperparameter Tuning

Module 10: Productionization of Machine Learning Systems

Focuses on deploying and maintaining ML applications in professional environments. Students use containerization (Docker), API development (FastAPI, Flask), and MLOps practices for continuous integration, monitoring, and iterative improvement of AI solutions.

Productionization of Machine Learning Systems

Continuous Integration
Deployment Pipelines
Version Control
Monitoring Models

Module 11: Devops

This module covers deploying high-velocity applications on distributed infrastructure using DevOps principles. Students learn Linux scripting, networking, microservices, containerization (Docker, Kubernetes), and CI/CD with Jenkins. Topics include automated testing, serverless computing, Cloud-DevOps, monitoring, and infrastructure-as-code, all with real-world examples.

Devops

Linux & Networking
Microservices & Containers
Research Methodology
Infrastructure-as-Code

Module 12: Foundations of Cloud Computing

Covers core concepts of cloud infrastructure, including service models (IaaS, PaaS, SaaS), deployment types, and platforms like AWS, Azure, and GCP. Students gain hands-on experience with virtual machines, storage, and networking, while learning key principles of scalability, containerization, and cloud security—foundational skills for building and deploying AI and software solutions in the cloud.

Foundations of Cloud Computing

Cloud Infrastructure
Service Models
Hands-On Platforms
Scalability & Security

Module 13: Advanced Applied Computer Science

This 30 credit dissertation module in the Artificial Intelligence and Machine Learning specialisation guides students through the full project life cycle—from problem definition and literature review to data exploration, modelling, and solution delivery. Projects are grounded in real-world challenges, often drawn from students' own domains. Using appropriate AI/ML methods, students develop practical solutions and communicate their findings clearly to both technical and non-technical audiences.

Advanced Applied Computer Science

Full Project Lifecycle
Real-World Challenges
AI/ML Integration
Clear Communication

Course Delivery

We employ a structured approach that balances theoretical foundations with practical application, ensuring participants gain both the critical knowledge and experiential skills necessary for professional advancement.

Cohort-Based and Supportive Learning Environment

Our cohort-based model enables participants to progress together, fostering mutual support, shared experiences, and peer-to-peer learning. Through collaborative discussions and group problem-solving, this structure enriches both academic growth and real-world preparedness.

Flexibility and Engagment

Our programmes accommodate diverse time commitments, allowing participants to balance scheduled, instructor-led sessions with hands-on, interactive activities. This blend of structured teaching and practical work facilitates a deeper engagement with course materials and methods.

Course Features

Flexible Schedules	Balance live, instructor-led sessions with self-paced content for an adaptable learning experience
Learning Platform	Access recorded live sessions, structured course materials, and supplementary resources at any time.
Discord Channel	Stay connected with peers and instructors through real-time updates, feedback, and collaborative tools.
One-to-One Tutorials	Receive individualized guidance to address specific learning objectives or areas of interest.
Group Projects:	Collaborate on authentic case studies, enhancing teamwork, problem-solving skills, and applied knowledge.
Live Concept Classes and Hands-On Workshops	Participate in synchronous classes led by expert instructors to build foundational and advanced competencies. Reinforce learning through practical coding and modelling exercises that simulate real-world scenarios.

Data Science Institute

The Data Science Institute is dedicated to providing academically accredited education and professional certifications in data analytics, data science, artificial intelligence, and machine learning.

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