SUMMER PROGRAMMES

UNDERGRADUATE MODULE SYLLABUS

GENERAL INFORMATION	
Module title	Artificial Intelligence: Foundations & Applications
Module code	0ZSS0180
Module level	Level 4 (First year Undergraduate UK Higher Education)
Credit value	Equivalent to 15 King's credits, 7.5 ECTS, 3-4 US Credits
Duration	2 weeks
Workload	45 contact teaching hours + 105 Independent study hours. (See detail below)
Entry Requirements	Standard entry requirements here
Mode of Delivery	Face to face, on campus
Contributing Faculty	Faculty of Natural, Mathematical & Engineering Sciences (Department of Informatics)
Date last updated	13.10.2026 (following minor modifications approval)

MODULE INFORMATION

Module description

This course explores the principles and techniques of Artificial Intelligence (AI), combining computational foundations with their application to complex real-world problems. Students will develop an understanding of how AI methods are designed, implemented and evaluated, while gaining the knowledge and skills to analyse their potential, limitations and suitability for different applications. The course balances theoretical foundations with practical applications, enabling students to engage critically with AI methods and their use in areas such as healthcare, finance and economics.

The technical topics covered include machine learning, neural networks, probability and uncertainty, search and optimisation, logic and reasoning. Students will explore how these methods can be used to automate tasks, make predictions, support decision-making and address complex problems, while considering the practical challenges involved in applying AI in different contexts.

The course also considers the limitations and challenges of AI technologies. Particular attention is given to data requirements and the computational limitations of AI methods. Through these perspectives, students will develop a critical understanding of both the potential and challenges of applying AI to real-world problems.

The course is primarily aimed at Computer Science and Mathematics students, who will benefit particularly from its combination of computational principles, programming and mathematical foundations. It is also suitable for students from engineering disciplines, including mechanical, electrical and telecommunications engineering, as well as students from economics and finance who wish to develop their understanding of AI and computational methods. Students should have some prior programming experience and a basic mathematical background, including elementary logic, probability, sets and functions.

Educational aims

The module allows students to develop the ability to analyse and compare different AI approaches, understand and work with computational models and data, and select appropriate techniques for different types of problems. They will develop problem-solving skills and explore approaches for addressing computationally hard problems, while applying AI methods through programming, interpreting and evaluating results, and critically assessing their strengths, limitations and computational requirements. The module also aims to develop students' ability to reason about the principles underlying AI methods and communicate their findings clearly.

Learning outcomes

By the end of this module students will have obtained:

- A well-rounded understanding of the fundamental principles, methods and applications of Artificial Intelligence.

- The ability to analyse and compare different AI approaches and select appropriate methods for different types of problems.
- The ability to apply computational problem-solving techniques to AI problems, including approaches for addressing computationally hard problems.
- Practical skills in implementing and working with AI models and data, and in interpreting and evaluating their results.
- The ability to critically evaluate the strengths, limitations, computational requirements and suitability of AI methods for different applications.

Teaching methods

The module will typically consist of activities distributed as stated below. Please note that individual tutors may vary this in accordance with discipline-specific requirements.

Lectures	Seminar/ tutorials	Field/lab/studio/ supervised learning	Project work	Other/private study
12 hours	8	25		105

Assessment

Method	Number	Duration/length	Pass mark	% of final grade of module
Tests assessing two workshops	2	70 minutes each	40%	40%
Individual Project (Report, Working Code and Peer Feedback)	1		40%	60%

Attendance requirements

Students must attend a minimum of 80% of timetabled contact hours to receive a Record of Agreed Results.

Reading list

A detailed reading list will be provided via KEATS before the start of the module. Indicative texts include:

- Russell, S., & Norvig, P. (2020). *Artificial Intelligence: A Modern Approach* (4th ed.). Pearson.

- Goodfellow, I., Bengio, Y., & Courville, A. (2016). *Deep Learning*. MIT Press.
- Mitchell, T. M. (1997). *Machine Learning*. McGraw-Hill.

Sutton, R. S., & Barto, A. G. (2018). *Reinforcement Learning: An Introduction* (2nd ed.). MIT Press