

CS921-30 Artificial Intelligence and Machine Learning

26/27

Department

Computer Science

Level

Taught Postgraduate Level

Module leader

Paolo Turrini

Credit value

30

Module duration

10 weeks

Assessment

Multiple

Study location

University of Warwick main campus, Coventry

Description

Introductory description

The module will equip students with:

- A deep understanding of the main tools used in modern AI research and practice.
- The capacity to create and evaluate learning algorithms at scale, understanding abstraction levels and accuracy of the solutions provided.
- The capacity to adapt AI/ML solutions for specific problems
- An understanding of explainability, bias and transparency in learning models

Module aims

The purpose of the module is to provide students who specialise in the subject area with in-depth knowledge about artificial intelligence and machine learning . Both are rapidly developing disciplines within computer science, with increasing importance in the age of digital transformation and emerging technologies, with significant economic impact.

Outline syllabus

This is an indicative module outline only to give an indication of the sort of topics that may be covered. Actual sessions held may differ.

Mathematical introduction to learning: basics of computational learning theory, convergence guarantees.

From theory to algorithms: Clustering, Classification, Boosting, Stochastic Gradient Descent, Kernel Methods, Deep Neural Networks

Generative Models, Multimodal Foundation Models

Transformers, Attention and LLMs

In-context learning, prompt engineering

Other advanced topics in AI and ML

Throughout the module we will cover the basic elements of bias, transparency and explainability.

Learning outcomes

By the end of the module, students should be able to:

- A deep understanding of the main tools used in modern AI research and practice.
- The capacity to create and evaluate learning algorithms at scale, understanding abstraction levels and accuracy of the solutions provided.
- The capacity to adapt AI/ML solutions for specific problems.
- An understanding of explainability, bias and transparency in learning models.

Research element

Coursework will contain research element

Subject specific skills

- A deep understanding of the main tools used in modern AI research and practice.
- The capacity to create and evaluate learning algorithms at scale, understanding abstraction levels and accuracy of the solutions provided.
- The capacity to adapt AI/ML solutions for specific problems
- An understanding of explainability, bias and transparency in learning models

Transferable skills

Being able to apply deep knowledge and understanding of specialist theoretical and methodological approaches in Artificial Intelligence and Machine Learning, suggesting and incorporating interrelationships with other relevant disciplines in abstract and unpredictably complex contexts.

Students will obtain the cognitive skills to critically contribute to existing discourses and

methodologies in Artificial Intelligence and Machine Learning, suggesting new ideas, and designing systematic studies in this area, based on critical analysis and evaluation.

Students will obtain practical skills in organising and communicating information, improving interpersonal, team and networking skills through engaging in classes and computer laboratories. Formative assessment will allow students to strategically enhance their own learning.

Artificial Intelligence and Machine Learning are areas with immediate relevance for increasing ethical awareness and its practical application regarding privacy concerns and AI alignment. The associated values will help understanding the importance of personal responsibility and ethical leadership.

Study

Study time

Type	Required
Lectures	30 sessions of 1 hour (10%)
Seminars	5 sessions of 2 hours (3%)
Supervised practical classes	9 sessions of 2 hours (6%)
Private study	116 hours (39%)
Assessment	126 hours (42%)
Total	300 hours

Private study description

Private study, background reading and revision.

Costs

No further costs have been identified for this module.

Assessment

You do not need to pass all assessment components to pass the module.

Assessment group D

	Weighting	Study time	Eligible for self-certification
Artificial Intelligence and Machine	30%	36 hours	No

	Weighting	Study time	Eligible for self-certification
Learning Coursework 1			
The coursework will consist of programming based tasks to test competency in applying advanced AI and ML tools and techniques and demonstrate in-depth understanding of advanced concepts applied to real-world problems.			
Artificial Intelligence and Machine Learning Exam	70%	90 hours	No
<ul style="list-style-type: none"> • Answerbook Gold (24 page) • Students may use a calculator 			

Assessment group R

	Weighting	Study time	Eligible for self-certification
Artificial Intelligence and Machine Learning Resit Exam	100%		No
<ul style="list-style-type: none"> • Answerbook Gold (24 page) • Students may use a calculator 			

Feedback on assessment

For coursework individual feedback will be provided. For the exam collective feedback will be provided.

[Past exam papers for CS921](#)

Availability

Courses

This module is Core optional for:

- Year 1 of TCSA-G5PA Postgraduate Taught Data Analytics