

WM9B7-15 Artificial Intelligence & Deep Learning

26/27

Department

WMG

Level

Taught Postgraduate Level

Module leader

Boda Li

Credit value

15

Module duration

4 weeks

Assessment

Multiple

Study location

University of Warwick main campus, Coventry

Description

Introductory description

This module provides a comprehensive exploration and hands-on experience of advanced Artificial Intelligence (AI) and Deep Learning (DL), focusing on applications in computer vision, natural language processing, generative AI, or large language models. Students will investigate foundational principles and architectures, comparing traditional machine learning with deep learning approaches while engaging critically with real-world use cases. Students will have the opportunity to develop algorithms for solving real-world problems, developing the skills needed to design, implement, and evaluate AI systems. The module combines theoretical knowledge with hands-on experience to prepare students for both research and applied roles in the field of AI.

Module aims

This module aims to equip students with advanced knowledge and practical skills in Artificial Intelligence and Deep Learning, enabling them to design and evaluate AI solutions for various complex, real-world problems. Students will gain a critical understanding of modern AI architectures and frameworks, explore state-of-the-art developments in the field, and apply their learning collaboratively through model development, analysis, and technical communication. This module supports the development of research-informed and industry-relevant expertise in areas

such as computer vision, natural language understanding, or generative AI.

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.

- Foundations of Artificial Intelligence and Deep Learning: Deep Learning Overview; Deep Learning vs Traditional Learning; Introduction of Ethical and Societal Implications; Emerging Trends; and Overview of Model Interpretability and Explainability (XAI).
- Foundations of Neural Networks: Perceptron; Backpropagation; Activation and Loss Functions; Hyperparameters; Model Evaluation and Comparison.
- Deep Learning Architectures and Applications: Model Deployment and Comparison (e.g., CNN, RNN, or LSTM) for different applications, such as image or text analysis; Transformer architectures; and an Overview of Large Language Models (e.g., BERT, GPT, LLaMA, or similar).
- Generative and Retrieval-Augmented Artificial Intelligence: Introduction to Generative Adversarial Networks (e.g., GANs); and Introduction to Retrieval-Augmented Generation (e.g., RAG pipelines).

Learning outcomes

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

- Critically evaluate and explain the key differences between traditional machine learning and deep learning approaches.
- Critically evaluate deep learning and artificial intelligence solutions and their implications.
- Demonstrate an understanding of emerging trends and research development in AI.
- Design and evaluate deep learning models for practical applications.
- Collaborate effectively as part of a group to develop and communicate a practical AI solution by presenting findings through reproducible code, visualisations, or technical reporting.

Indicative reading list

[Reading lists can be found in Talis](#)

[Specific reading list for the module](#)

Interdisciplinary

In particular, combining computer science and mathematics/statistics

Subject specific skills

- Ability to evaluate Artificial Intelligence and Deep Learning techniques.

- Design and implementation of deep learning models.
- Model evaluation and performance analysis, including the use of appropriate metrics, validation techniques, and comparative analysis.
- Understanding and critical appraisal of current research trends.
- Working with AI model pipelines, including data preprocessing, fine-tuning, testing, and reporting.
- Ability to use Python Libraries and Frameworks to implement Deep Learning applications.

Transferable skills

- Critical thinking and analytical reasoning.
 - Problem-solving in complex and uncertain environments, with an emphasis on practical experimentation and iteration.
 - Collaboration and teamwork.
 - Effective technical communication.
 - Independent learning and self-direction.
 - Time and project management.
 - Adaptability and digital literacy.
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Study

Study time

Type	Required
Lectures	10 sessions of 1 hour (7%)
Seminars	20 sessions of 1 hour (13%)
Online learning (independent)	30 sessions of 1 hour (20%)
Private study	30 hours (20%)
Assessment	60 hours (40%)
Total	150 hours

Private study description

Private study will include preparing for lectures and seminars, reviewing lecture notes, and engaging with required readings and multimedia resources.

Costs

No further costs have been identified for this module.

Assessment

You must pass all assessment components to pass the module.

Assessment group A3

	Weighting	Study time	Eligible for self-certification
Group Assessment	30%	18 hours	No
Students will collaboratively explore an applied AI use case, propose a solution using AI or Deep Learning techniques, and present it. This assessment includes a Peer Review Activity.			
Individual Assignment	70%	42 hours	Yes (extension)
Students are required to apply and analyse AI or deep learning techniques to a real-world problem. For this purpose, they will submit an AI or Deep Learning application and a reflection piece of writing.			

Assessment group R3

	Weighting	Study time	Eligible for self-certification
Individual Presentation	30%		No
Students will explore an applied AI use case, propose a different solution using AI or Deep Learning techniques, and present it. This presentation will be recorded and submitted.			
Individual Assignment	70%	42 hours	No

Feedback on assessment

Verbal feedback for group assessment with a written summary; written feedback for the individual assignment.

Availability

There is currently no information about the courses for which this module is core or optional.