

# WM9B7-15 Artificial Intelligence & Deep Learning

21/22

**Department**

WMG

**Level**

Taught Postgraduate Level

**Module leader**

Michael Mortenson

**Credit value**

15

**Module duration**

2 weeks

**Assessment**

Multiple

**Study locations**

University of Warwick main campus, Coventry Primary

Distance or Online Delivery

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## Description

### Introductory description

In today's world, artificial intelligence and data science are powering innovation in virtually all industries and domains. The ability to build machines, and algorithms, that are able to reason and make decisions autonomously offers not only huge benefits to modern business, but to society as a whole. This module provides a hands-on exposure to the practice of developing AI/machine learning algorithms and implementing them in a variety of problem sets and datasets

### Module aims

This module aims to enable participants to select, implement and evaluate deep learning algorithms in data science and artificial intelligence. In particular, the module highlights several of the most common, and in-demand, modern algorithms including recurrent, convolutional and other neural networks. Alongside technical knowledge, participants should develop an understanding of the applicability of different types of artificial intelligence & machine learning to common problems, and best practice for data science and artificial intelligence projects.

### 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.

Core concepts of Artificial Intelligence & Deep Learning; Data pre-processing & engineering; Optimisation algorithms (SGD, Adam, etc.); Artificial Neural Networks (ANN): autoencoders; Convolutional Neural Networks (CNN); Recurrent Neural Networks (RNN) & Long-Short Term Memory (LSTM); attention models; transformer models; Q-learning; Bayesian Neural Networks (BNN); Variational Autoencoders (VAE); Generative Adversarial Networks (GAN); transfer learning; Siamese networks; Model training and evaluation.

## **Learning outcomes**

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

- Interpret and evaluate various use-cases and the applicability of artificial intelligence and deep learning.
- Adopt best practices for data processing and engineering for artificial intelligence and deep learning models.
- Implement, interpret and critique current, professional standard learning models.
- Automate deployment-ready deep learning pipelines and algorithms.
- Evaluate and interpret the results of deep learning models and tune them to optimise performance.

## **Indicative reading list**

[View reading list on Talis Aspire](#)

## **Interdisciplinary**

In particular, combining computer science and mathematics/statistics

## **International**

International demand remains high for graduates with the skills incorporated in this module

## **Subject specific skills**

Artificial intelligence, deep learning, statistics, machine learning, software development, data analysis

## **Transferable skills**

Programming, statistics and modelling, team work, critical analysis

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## **Study**

## Study time

| Type                         | Required                               |
|------------------------------|--|
| Lectures                     | 12 sessions of 1 hour 30 minutes (12%) |
| Seminars                     | 6 sessions of 1 hour 30 minutes (6%)   |
| Supervised practical classes | 12 sessions of 1 hour 30 minutes (12%) |
| Assessment                   | 105 hours (70%)                        |
| Total                        | 150 hours                              |

## Private study description

No private study requirements defined for this module.

## Costs

No further costs have been identified for this module.

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## Assessment

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

### Assessment group A

|  | Weighting | Study time |
|--|-----------|------------|
| Algorithm Development  | 20%       | 20 hours   |
| Students work on a real dataset to apply learning and present their results                |           |            |
| Post Module Assessment   | 80%       | 85 hours   |
| PMA on artificial intelligence and deep learning topics (including original code creation) |           |            |

### Assessment group R

|  | Weighting | Study time |
|--|-----------|------------|
| Post Module Assignment   | 100%      |            |
| PMA on artificial intelligence and deep learning topics (including original code creation) |           |            |

## Feedback on assessment

Verbal feedback for in-module components; written feedback and annotated scripts for post-module work

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## **Availability**

## **Pre-requisites**

Pre-requisite to be added once that module has been approved (Data Engineering with Python)

## **Courses**

This module is Optional for:

- Year 1 of TWMS-H1S4 Postgraduate Taught e-Business Management (Full-time)