



## **Module Specification**

### **Machine Learning for Language and Vision**

Version: 2024-25, v2.0, 20 May 2024

#### **Contents**

<b>Module Specification .....</b>	<b>1</b>
<b>Part 1: Information .....</b>	<b>2</b>
<b>Part 2: Description .....</b>	<b>2</b>
<b>Part 3: Teaching and learning methods .....</b>	<b>4</b>
<b>Part 4: Assessment.....</b>	<b>5</b>
<b>Part 5: Contributes towards .....</b>	<b>7</b>

## Part 1: Information

**Module title:** Machine Learning for Language and Vision

**Module code:** UFCEQ1-15-M

**Level:** Level 7

**For implementation from:** 2024-25

**UWE credit rating:** 15

**ECTS credit rating:** 7.5

**College:** College of Arts, Technology and Environment

**School:** CATE School of Computing and Creative Technologies

**Partner institutions:** None

**Field:** Computer Science and Creative Technologies

**Module type:** Module

**Pre-requisites:** None

**Excluded combinations:** None

**Co-requisites:** None

**Continuing professional development:** No

**Professional, statutory or regulatory body requirements:** None

## Part 2: Description

**Overview:** This module will introduce you to a range of contemporary AI-based algorithms for processing and responding appropriately to natural language (e.g. speech and text) and visual artefacts such as images and videos.

Weekly lectures and workbooks will cover the key concepts and provide hands-on experience with using range of state-of-the-art tools for handling language and vision-based problems. You will also be introduced to the key legal and ethical

issues, such as (but not limited to) avoiding unintentional bias against groups of people with protected characteristics.

The workbooks will focus on developing your skills through a complete machine learning workflow; data acquisition and pre-processing; model or algorithm selection, development, and evaluation; and presentation skills including visual analytics suitable for different audiences.

The skills demonstrated in the workbooks will contribute towards a portfolio of assessment, which will incorporate two primary deliverables. Typically, the deliverables will be:

A solution to a visual based problem, such as detecting and identifying objects in images.

A solution to a language-based problem, such as recognising key entities and intents in utterances.

**Features:** Not applicable

**Educational aims:** This module aims to provide students with the opportunity to acquire the technical skills and understanding to:

Identify and formulate appropriate representations for problems relating to language and vision.

Critically appraise a range of AI-based approaches for solving those problems.

Design, implement and evaluate solutions to problems, justifying their methodology in terms of the context in which solutions are being deployed, and associated legal and ethical issues.

**Outline syllabus:** Professional skills:

Tools and techniques for working with a group of colleagues to conduct data acquisition, and model development.

Creative effective presentations and data visualisations for communicating with a range of stakeholders.

Language and Vision:

Text preprocessing (lemmatisation, stop-words),

'Traditional' image processing for feature creation (pixel, neighbourhood and geometric transforms),

Semantic and statistical methods e.g., Naive Bayes,

Recurrent models e.g., LSTM,

Convolutional Neural Networks,

Encoder-decoder architectures,

Attention mechanisms,

Transfer Learning with pretrained models e.g., BERT, GPT-2/3, YOLO,

Addressing legal and ethical concerns, such as avoiding unintentional bias against groups of people when learning from historical data, targeted disinformation, and generating fake news, images etc.

### **Part 3: Teaching and learning methods**

**Teaching and learning methods:** Lectures will cover the key concepts, first at the abstract level then by reference to examples how these have manifested in our research projects and in collaborations with commercial partners. This will typically include guest lectures from our collaborators.

Lab sessions with practical workbooks will provide the opportunity for students to gain hands-on experience using range of state-of-the-art tools for handling language and vision-based problems.

Independent learning study hours include engaged with essential and exploratory reading, practical study, assignment preparation and completion etc.

**Module Learning outcomes:** On successful completion of this module students will achieve the following learning outcomes.

**MO1** Design, implement and evaluate AI-based systems for processing natural language and images.

**MO2** Demonstrate ability to justify the methodology chosen when developing AI-based solutions in terms of the problem characteristics and a range of contemporary tools.

**MO3** Consider ethical, legal and societal concerns when designing and implementing contemporary AI-based systems.

**Hours to be allocated:** 150

**Contact hours:**

Independent study/self-guided study = 126 hours

Face-to-face learning = 24 hours

Total = 0

**Reading list:** The reading list for this module can be accessed at [readinglists.uwe.ac.uk](https://rl.talis.com/3/uwe/lists/EA5140AC-FE13-E777-6C53-B39626C17A3E.html?lang=en-US&login=1) via the following link <https://rl.talis.com/3/uwe/lists/EA5140AC-FE13-E777-6C53-B39626C17A3E.html?lang=en-US&login=1>

## Part 4: Assessment

**Assessment strategy:** Weekly workbooks in the timetabled lectorials will provide frequent opportunity for peer-discussion and informal formative feedback from the tutors.

Summative assessment will comprise of a portfolio of coding exercises, tasks and essay style questions that are incorporated into the weekly workbooks:

Typically, the workbook portfolio will develop two primary deliverables, these will concern the design, implementation and evaluation of an AI-based solution for language and vision problems.

An online system will be used to provide automated marking and feedback via submission of the code developed, plus answers to a set of questions designed to test students' understanding of the work they have submitted, their ability to justify their chosen approach, and awareness the surrounding legal and ethical issues.

The resit attempt will be assessed in the same way as the first attempt. Wherever possible students will be assigned new language and vision tasks.

### **Assessment tasks:**

#### **Portfolio (First Sit)**

Description: Description: Submission of a portfolio of work to online marking systems typically comprising:

- code and answers to questions concerning the development of an AI-based solution to a language-based problem.
- code and answers to questions concerning the development of an AI-based solution to a vision-based problem.
- how well the delivered AI-based solution responds to and meets relevant ethical and legal concerns.

Weighting: 100 %

Final assessment: Yes

Group work: No

Learning outcomes tested: MO1, MO2, MO3

#### **Portfolio (Resit)**

Description: Description: Submission of a portfolio of work to online marking systems typically comprising:

-code and answers to questions concerning the development of an AI-based solution to a language-based problem.

-code and answers to questions concerning the development of an AI-based solution to a vision-based problem.

-how well the delivered AI-based solution responds to and meets relevant ethical and legal concerns.

Weighting: 100 %

Final assessment: Yes

Group work: No

Learning outcomes tested: MO1, MO2, MO3

## **Part 5: Contributes towards**

This module contributes towards the following programmes of study:

Artificial Intelligence [Frenchay] MSc 2024-25