

## Module Name | Module Code

Year	1
ECTS Credits	5
Contact Hours	14 Hours of lectures, 4 hours of tutorials, 3 hours of laboratory Q&A, 3 hours of group project discussion
Pre-requisite	None
Semester	2
Module Leader & Lecturer	Dr Giovanni Di Liberto
Contact Email	gdiliber@tcd.ie

## Module Outline

### Module Learning Outcomes:

On successful completion of this module, students should be able to:

1. Configure a programming environment suitable for exploring ML techniques
2. Prepare datasets for ML processing, visualise the data, and understand the consequences of decisions made in cleaning data
3. Assess the performance of a ML pipeline
4. Critically evaluate the outputs of a ML pipeline
5. Communicate with ML experts and non-experts: Explain goals and requirements of a project, interpret the outcomes of typical ML analyses, present results to non-experts
6. Assess the cost/benefit of distinct ML methodologies and explain what makes one approach more suitable than another one for a given task
7. Understand challenges involving data sharing, storage and privacy

### Graduate Attributes: levels of attainment:

To act responsibly – introduced

To think independently – enhanced

To develop continuously enhanced

To communicate effectively – attained

### Module Content:

Introduction to Machine Learning is designed to offer an introduction to the basics of ML, specifically with a hands-on curriculum aimed at developing knowledge and skills in establishing ML pipelines with state of the art languages and toolkits. This module is designed for students with limited prior experience of programming. It will introduce the fundamentals of programming, with a focus on setting up an effective pipeline for processing datasets to execute common ML techniques such as Support Vector Machines and Linear Regression. Students will be assessed both on the acquired technical skills and on their ability to understand the ML pipeline and results and communicate effectively with experts and non-experts.

Teaching and Learning Methods:

Lectures, tutorials, group projects, guest lecture/seminar, classroom discussions.

## Assessment

Assessment Component	Assessment Description	LO Addressed	% of Total	Week due
Engagement and Communication	Group Project presentation	LO2-6	10	Second Last Week
Technical Skills (coding and ML)	Individual laboratory assignments	LO1-4	25	Weeks 3,6,9
Communication, presentation and group work	Group assignment (written report)	LO2-7	25	Final Week
Written Test	2H written test	LO2-7	40	Final Week
Reassessment	Written Examination		100	

## Recommended Reading List

Recommended:

Python Crash Course: A Hands-On, Project-Based Introduction to Programming, Eric Matthes (eBook available in the TCD library)

Hands-On Machine Learning with Scikit-Learn, Keras, and Tensorflow, Aurélien Géron, 2<sup>nd</sup> edition, O'Reilly Media (first half of the book)

Optional:

“Fundamentals of machine learning for predictive data analytics”, By John D. Kelleher, Brian MacNamee, and Aoife D’Arcy