

MODULE DESCRIPTION FORM

DEPARTMENT OF MECHANICAL AND AEROSPACE ENGINEERING

ME977 MACHINE LEARNING FOR SATELLITE DATA

Module Registrar: Dr A. Riccardi annalisa.riccardi@strath.ac.uk	Taught To (Course): MSc. Satellite Data for Sustainable Development for whom the class is compulsory	
Other Lecturers Involved:	Credit Weighting: 10	Semester: 2
Elective class	Academic Level: 5	Suitable for Exchange: N

Required prerequisites

Note: It is the responsibility of ALL students to ensure that they satisfy the prerequisite knowledge for this module BEFORE adding as part of curriculum selection. If unsure, please contact the Module Registrar or discuss with your Programme/Year Adviser of Studies.

Fundamentals of Satellite Image Processing
Knowledge of Google Earth Engine environment
(prerequisites covered by ME975 – students can enrol in the two classes in the same semester)

Module Format and Delivery (HOURS i.e. 1 credit = 10hrs of study):

Lecture	Tutorial	Laboratory	Groupwork	External	Online	Project	Assignments	Private Study	Total
10		10					50	30	100

Educational Aim

This class is designed to provide the students with the theoretical and practical foundations on the applications of machine learning methods to satellite data for prediction, classification, clustering and time series analysis.

Learning Outcomes

On completion of the module the student is expected to be able to:

LO1 Assess and determine the difference between machine learning methods and their applicability to practical problems

LO2 Understand and analyse the computational cost and parallelisation options for processing satellite data with machine learning methods

LO3 Objectively select, train and test a machine learning method for a given problem

Syllabus

The module will teach the following:

- Machine Learning fundamentals (supervise, unsupervised learning)
- Machine learning methods for prediction (regression), clustering, classification and time series analysis
- Satellite data preprocessing for machine learning applications
- Cloud GPU computing for training machine learning algorithms on satellite data
- Use of heterogeneous datasets
- Data preprocessing
- Image classification and segmentation
- Ethical use of satellite and ground data

Assessment of Learning Outcomes

Criteria

LO1

C1 Communicate clearly the difference between machine learning methods used in assignments

C2 Be able to select and communicate clearly which machine learning method can be used and for which task

LO2

C1 Successfully train machine learning algorithms on GPU cloud computing resources

C2 Communicate clearly the computational cost involved in training large machine learning models and the choice of computational resources

LO3

C1 Produce code to retrieve, process satellite data and train a machine learning method for a given problem

C2 Communicate clearly the reasoning behind the choice of data and algorithms

The standards set for each criterion per Module Learning Outcome to achieve a pass grade are indicated on the assessment sheet for all assessment.

Principles of Assessment and Feedback

(within Assessment and Feedback Policy at: <https://www.strath.ac.uk/professionalservices/staff/policies/academic/>)

The students are assessed with 5 practical exercises sketch out during laboratories sessions and completed at home, plus an individual project. For individual projects, students are provided with source of data and problem description. They will need to select the most suitable machine learning model for the problem, train the model, generate the results and write a report.

Feedback for the practical assessment is provided in terms of oral feedback during laboratory sessions. Written feedback on submitted project is provided together with the mark.

Assessment Method(s) Including Percentage Breakdown and Duration of Exams (*individual weightings*)

Examination				Coursework		Practical		Project	
Number	Month(s)	Duration	Weighting	Number	Weighting	Number	Weighting	Number	Weighting
				6	100%				
*				LO1-3*					

* **L/Os:** Indicate which Learning Outcomes (LO1, LO2, etc) are to be assessed by exam/coursework/practical/project as required.

Coursework / Submissions deadlines (*academic weeks*):

Submission of the 5 practical laboratories at the end of tutorial activities weeks (week 6 - 10).

Submission of project during April/May exam diet weeks

Resit Assessment Procedures:

Submission of alternate ^project prior to commencement of the July/August exam diet.

^^Students must contact the module Registrar for details as soon as results confirm that a resit is required.

PLEASE NOTE:

Students must gain a summative mark of 50% to pass the module. Students who fail the module at the first attempt will be re-assessed before the July/August exam diet. This re-assessment will consist entirely of a project. No marks from any previous attempts will be transferred to a new resit attempt

Recommended Reading

No set texts or recommended for the class. Relevant material provided during tutorials or on the Myplace module page

Additional Student Feedback

(Please specify details of when additional feedback will be provided)

Date	Time	Room No
		Check timetable webpages for details

Session: 2024/25

Approved:

Programme Lead/Director Signature: Dr A McLaren
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Date of Last Modifications: 06/09/24

(MAE template updated July 2024)

MODULE TIMETABLE

Module Code:

ME977

Module Title:

Machine Learning for Satellite Data

Brief Description of Assessment:

5 practical laboratory exercises to be submitted at the end of the tutorial activities weeks (week 6-10) - 40%
1 project to be submitted during April/May exam diet - 60%

Assessment Timing

Indicated on the table below are the start/submission dates for each assignment/project and the timing of each exam/assessment.

Please note: Timings could change during unforeseen periods of disruption; this should only be used as a guide.

Semester One	W&D Wk	WK1	WK2	WK3	WK4	WK5	WK6	WK7	WK8	WK9	WK10	WK11	Exam Period
	Choose an item. Choose an item.	Choose an item. Choose an item.	Choose an item. Choose an item.	Choose an item. Choose an item.	Choose an item. Choose an item.	Choose an item. Choose an item.	Choose an item. Choose an item.	Choose an item. Choose an item.	Choose an item. Choose an item.	Choose an item. Choose an item.	Choose an item. Choose an item.	Choose an item. Choose an item.	Choose an item.

Semester Two	C&D Wk	WK1	WK2	WK3	WK4	WK5	WK6	WK7	WK8	WK9	WK10	WK11	Exam Period
	Choose an item. Choose an item.	Choose an item. Choose an item.	Choose an item. Choose an item.	Choose an item. Choose an item.	Choose an item. Choose an item.	Choose an item. Choose an item.	Lab Report Submission	Lab Report Submission	Lab Report Submission	Lab Report Submission	Lab Report Submission	Course work Set	Project Submission