



Xi'an Jiaotong-Liverpool University

西交利物浦大學

School of Advanced Technology

MODULE HANDBOOK

INT305 Machine Learning

Erick Purwanto

Semester 1

2021-2022

SECTION A: Basic Information

□ Brief Introduction to the Module

The main aim of this module is to introduce the fundamental knowledge of Machine Learning, including basic principles, techniques, algorithms, implementation and applications.

□ Key Module Information

Module name: Machine Learning

Module code: INT305

Credit value: 5

Semester in which the module is taught: 1

Pre-requisites needed for the module: Linear Algebra, Probability, Programming, Algorithms and Data Structures

Programmes on which the module is shared: BSc Information and Computing Science

□ Delivery Schedule

(Description of time & venue required if format below does not suit.)

Lecture room: SC176

Lecture time: Monday 16:00-18:00

Labs room: SD546, SD554

Labs times: Thursday 9:00-10:00, 10:00-11:00, Friday 10:00-11:00

❑ **Module Leader and Contact Details**

Name: Dr Erick Purwanto

Email address: erick.purwanto@xjtlu.edu.cn

Room number and office hours: SD545, Thursday 14:00-16:00

Preferred means of contact: email and LMO Forum; email first for consultation

❑ **Additional Teaching Staff and Contact Details**

-

SECTION B: What you can expect from the module

❑ **Educational Aims of the Module**

To equip students with a broad expertise in the basic principles, techniques, algorithms, implementation and applications of Machine Learning.

❑ **Learning Outcomes**

- A. Have a solid understanding of the theoretical issues related to problems that machine learning algorithms try to address.
- B. Be able to ascertain the properties of existing ML algorithms and new ones.
- C. Be able to apply ML algorithms for specific problems.
- D. Be proficient in identifying and customising aspects on ML algorithms to meet particular needs.

❑ **Assessment Details**

Read Lecture 0 Course Admin notes and CW3 Task Sheet.

❑ **Methods of Learning and Teaching**

Students will be expected to attend two hours of a formal lecture and two hours of a lab section in a typical week. Lectures will introduce students to the academic content. Labs will be used to apply the lecture materials in Python programming.

In addition, students will be expected to devote unsupervised time to private study. Private study will provide time for reflection and consideration of lecture material and background reading.

The first assessment (CW1) will assess how well students keep up with the material presented in the lectures. The second assessment (CW2) will assess how well students keep up with the material presented in the labs. A final project involving both theoretical and practical materials (CW3) at the end of the module will assess the academic achievement of students..

□ Syllabus & Teaching Plan

Tentative teaching plan :

Week	Lecture/Labs	Topic	Pre-reading
Week 3	Lecture 0 Lecture/Lab 1	Course Admin Introduction to Machine Learning	in LMO each week
Week 4	Lecture/Lab 2	Linear and Maximum Margin Classifiers	
Week 5	Lecture/Lab 3	SVMs, Regularization, Feature Engineering	
Week 6	Lecture/Lab 4	Least-Squares Linear, Logistic Regression	
Week 7	Lecture/Lab 5	Ridge Regression, LASSO, Subset Selection	
Week 8	No Lecture 6 No Lab 6	Midterm Break	
Week 9	Lecture/Lab 7	Kernel Trick	
Week 10	Lecture/Lab 8	Feedforward Neural Networks, Gradient Descent, and Backpropagation Algorithm	
Week 11	Lecture/Lab 9	Recurrent Neural Networks, Backpropagation with Softmax Outputs and Logistic Loss	
Week 12	Lecture/Lab 10	Heuristics for Neural Networks, Convolutional Neural Networks	
Week 13	Lecture/Lab 11	Unsupervised Learning, PCA, SVD	
Week 14	Lecture/Lab 12	Clustering, Generative Models, Mixture Models, EM Algorithm	
Reading Week 1	No Lecture No Labs	University Closed Days	
Reading Week 2	Lecture 13	Decision Trees	
Reading Week 3	Lecture 14	Ensemble Learning and Boosting Conclusion	

❑ **Reading Materials**

Read Lecture 0 Course Admin notes.

SECTION C: Additional Information

❑ **Student Feedback**

The University is keen to elicit student feedback to make improvements for each module in every session. It is the University policy that the preferred way of achieving this is by means of an Online Module Evaluation Questionnaire Survey. Students will be invited to complete the questionnaire survey for this module at the end of the semester.

You are strongly advised to read the policies mentioned below very carefully, which will help you better perform in your academic studies. All the policies and regulations related to your academic study can be found in ‘Student Academic Services’ section under the heading “Policies and Regulations” on E-bridge.

❑ **Plagiarism, Cheating, and Fabrication of Data.**

Offences of this type can result in attendance at a University-level committee and penalties being imposed. You need to be familiar with the rules. Please see the “Academic Integrity Policy” available on e-Bridge in the ‘Student Academic Services’ section under the heading ‘Policies and Regulations’.

❑ **Rules of submission for assessed coursework**

The University has detailed rules and procedures governing the submission of assessed coursework. You need to be familiar with them. Details can be found in the “Code of Practice for Assessment” available on e-Bridge in the ‘Student Academic Services’ section under the heading ‘Policies and Regulations’.

❑ **Late Submission of Assessed Coursework**

The University attaches penalties to the late submission of assessed coursework. You need to be familiar with the University’s rules. Details can be found in the “Code of Practice for Assessment” available on e-Bridge in the ‘Student Academic Services’ section under the heading ‘Policies and Regulations’.

❑ **Mitigating Circumstances**

The University is able to take into account mitigating circumstances, such as illness or personal circumstances which may have adversely affected student performance on a module. It is the student’s responsibility to keep their Academic

Advisor, Programme Director, or Head of Department informed of illness and other factors affecting their progress during the year and especially during the examination period. Students who believe that their performance on an examination or assessed coursework may have been impaired by illness, or other exceptional circumstances should follow the procedures set out in the “Mitigating Circumstances Policy”, which can be found on e-Bridge in the ‘Student Academic Services’ section under the heading ‘Policies and Regulations’.

❑ **Learning Mall Online**

Copies of lecture notes and other materials are available electronically through LMO, the University’s virtual learning environment.