



Xi'an Jiaotong-Liverpool University

西交利物浦大學

Department of Intelligence Science
School of Advanced Technology

MODULE HANDBOOK

<p><i>INT305</i> <i>Machine Learning</i></p>
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Siyue Yu

Semester 1

2025-2026

SECTION A: Basic Information

□ Brief Introduction to the Module

Machine learning is a set of techniques that allow machines to learn from data and experience, rather than requiring humans to specify the desired behaviour by hand. Over the past two decades, machine learning techniques have become increasingly central both in AI as an academic field, and in the technology industry. This course provides a broad introduction to some of the most commonly used ML algorithms. It also serves to introduce key algorithmic principles which will serve as a foundation for more advanced courses, such as INT408.

□ Key Module Information

Module name: *Machine Learning*

Module code: *INT305*

Credit value: *5 credit*

Semester in which the module is taught: *S1*

Pre-requisites needed for the module: *MTH013/019/023/025/027/029 AND MTH007 OR MTH015 OR MTH017*

Programmes on which the module is shared:

BSc Bioinformatics

BSc Information and Computing Science

BSc Information Management and Information Systems

BEng Mechatronics and Robotic Systems

□ Delivery Schedule

Lecture room: *MA104/MA216*

Lecture time: *9:00-11:00/18:00-20:00*

Tutorial times: *N/A*

❑ **Module Leader and Contact Details**

Name: *Siyue Yu*

Brief Biography:

Dr. Siyue Yu graduated from Xi'an Jiaotong-Liverpool University (Department of Electrical and Electronic Engineering) with a bachelor's degree in July 2016. In December 2022, she received a Ph.D degree from the University of Liverpool (School of Electrical and Electronic Engineering). Joined Xi'an Jiaotong-Liverpool University in January 2023 as a lecturer. During her doctoral period, she has been engaged in research in the direction of computer vision, including video object segmentation, weakly supervised salient object detection, and co-salient object detection. She has published papers in CVPR, AAAI, ICCV, TPAMI and other internationally renowned authoritative conferences or journals. She also serves as a reviewer for several journals and conferences including TPAMI, TIP, and CVPR.

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Room number and office hours: SD553; 14:00 – 16:00, Friday, by appointment.

Preferred means of contact: siyue.yu02@xjtlu.edu.cn

❑ **Additional Teaching Staff and Contact Details**

Name: *Dr. Sichen Liu*

Brief Biography:

Dr. Sichen Liu got her bachelor degree in Underwater Acoustic Engineering from Harbin Engineering University in 2016. She got her PhD degree in Signal and Information Processing from the Institute of Acoustic, University of Chinese Academy of Sciences in 2021. She was an audio algorithm research scientist in Tencent Video. Her current research interests focus on the AI research for audio/speech, cover from sound event detection, sound source separation and audio information retrieval.

Email address: Sichen.Liu@xjtlu.edu.cn

Office telephone number: +86-(0)512-8188 0432

Room number and office hours: SD557 Monday 13:00-15:00 / appointment

Preferred means of contact: *E-mail*

Teaching Assistants:

Xiaolei Wang, email: Xiaolei.Wang2202@student.xjtlu.edu.cn

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Yuexin Wang, email: Yuexin.Wang23@student.xjtlu.edu.cn

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

Have a solid understanding of the theoretical issues related to problems that machine learning algorithms try to address.

Be able to ascertain the properties of existing ML algorithms and new ones.

Be able to apply ML algorithms for specific problems.

Be proficient in identifying and customising aspects on ML algorithms to meet particular needs.

□ Assessment Details

Coursework 1 : 15%

The coursework requires no lab practice.

Coursework 2 : 15%

This coursework requires lab practice.

Final Exam : 70%

Final Exam is the most important part for assessment. It will be an open book exam.

□ Methods of Learning and Teaching

Mainly by module lecture delivery, and meanwhile there will be one lab session.

□ Syllabus & Teaching Plan

Week Number and/or Date	Lecture/Seminar/Field Trip/Other	Topic/Theme/Title	Pre-reading
<i>Week 1</i>	<i>Lecture 1</i>	<i>Introduction to module, nearest neighbour</i>	<i>Class slides</i>
<i>Week 2</i>	<i>Lecture 2</i>	<i>Linear Methods for Regression, Optimization</i>	<i>Class slides</i>
<i>Week 3</i>	<i>Lecture 3</i>	<i>Linear Classifiers, Logistic Regression, Multiclass Classification</i>	<i>Class slides</i>
<i>Week 4</i>	<i>Lecture 4</i>	<i>Support Vector Machine, SVM Loss and Softmax Loss</i>	<i>Class slides</i>
<i>Week 5</i>	<i>Lecture 5</i>	<i>Neural Network and Back Propagation</i>	<i>Class slides</i>
<i>Week 6</i>	<i>Lecture 6</i>	<i>Convolutional Neural Network</i>	<i>Class slides</i>
<i>Week 8</i>	<i>Lecture 7</i>	<i>Decision Trees & Bias-Variance Decomposition</i>	<i>Class slides</i>
<i>Week 9</i>	<i>Lecture 8</i>	<i>Bagging, Boosting</i>	<i>Class slides</i>
<i>Week 10</i>	<i>Lecture 9</i>	<i>Probabilistic Models</i>	<i>Class slides</i>
<i>Week 11</i>	<i>Lecture 10</i>	<i>k-Means and EM Algorithm</i>	<i>Class slides</i>
<i>Week 12</i>	<i>Lecture 11</i>	<i>Recurrent Neural Network, Attentions, Transformers</i>	<i>Class slides</i>
<i>Week 13</i>	<i>Lecture 12</i>	<i>Multi-modal Large Language Model</i>	<i>Class slides</i>

❑ **Lab Schedule**

We will have 1 lab session, in week 10.

❑ **Reading Materials**

The slides will be the main materials.

SECTION C: Additional Information

❑ Attendance

Students who are able to be on campus are reminded of the Academic Policy requiring attendance in classes. Failure to observe this requirement may ultimately lead to penalties such as failure or exclusion from retake examinations in the following year.

❑ 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 Student Module Feedback Questionnaire. 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 'Assessment and Examination' 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 'Assessment and Examination' 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 'Assessment and Examination' 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 'Assessment and Examination' 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, Development 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 'Assessment and Examination' section under the heading 'Policies and Regulations'.

□ **Learning Mall**

Copies of lecture notes and other materials are available electronically through XJTLU Learning Mall Core, the University's virtual learning environment at: <https://sso.xjtlu.edu.cn/login>.