



Xi'an Jiaotong-Liverpool University

西交利物浦大學

Department of Intelligent Science
School of Advanced Technology

MODULE HANDBOOK

INT104
Artificial Intelligence

Shengchen Li

Semester 2

2023-2024

SECTION A: Basic Information

□ Brief Introduction to the Module

This module intends to give students a clear overview of artificial intelligence techniques with a hands-on experience. A whole protocol of artificial intelligence system will be presented with students with a brief on underneath mathematical principles and theorems.

□ Key Module Information

Module name: *Artificial Intelligence*

Module code: *INT104*

Credit value: *5 Credits*

Semester in which the module is taught: *Semester 2*

Pre-requisites needed for the module:

Linear Algebra

C Programming / Java Programming

Programmes on which the module is shared:

- Information and Computing Science
- Digital Media Technology

□ Delivery Schedule

Lecture room: *BSG02*

Lecture time: *1400-1600 Mondays*

Tutorial times: *1400-1600 Thursdays (Week 1-3)*

□ Module Leader and Contact Details

Name: *Shengchen Li*

Brief Biography: *Graduated from world-famous Centre for Digital Music (C4DM), Queen Mary University of London (QMUL), Shengchen Li has focused on machine listening techniques on various types of signals including music, acoustic signal and biomedical signal. Being a pianist in young age, Shengchen has a special interest in computer music research including but not limited to automatic music generation, computational musicology and objective evaluation of piano performance.*

His fellow students have named among the winner / top-ranked teams of IEEE AASP Data Challenge on Detection and Classification of Acoustic Scenes and Events (DCASE), which is a competitive and top-ranked data challenge in acoustic signal processing society, in the year of 2018-2021.

You are also more than welcome to visit Shengchen's personal webpage at <https://shengchenli.github.io/>

Email address: *shengchen.li@xjtlu.edu.cn*

Office telephone number: *+86-(0)512-88973077*

Room number and office hours: *SD533 Mondays 16:00-17:00 / appointment*

Preferred means of contact: *Via Mail*

□ **Additional Teaching Staff and Contact Details**

Name: *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)512-81880432*

Room number and office hours: *SD557 Thursdays 10:00-12:00 / appointment*

Preferred means of contact: *Via Mail*

Name: *Dr. Fang Kang*

Brief Biography:

Dr. Fang Kang obtained her Bachelor's degree in Communication Engineering from the China University of Geosciences in 2016. She was awarded her Ph.D. in Signal

and Information Processing from the Institute of Acoustics at the University of Chinese Academy of Sciences in 2021. From 2021 to 2023, she served as an Audio Algorithm Researcher at WeChat. Her primary research focus is on audio signal processing, including blind source separation, speech enhancement, echo cancellation, audio classification, and involves sound signal processing and deep learning.

Email address: *Fang.Kang@xjtlu.edu.cn*

Office telephone number: +86-(0)512-8188 4917

Room number and office hours: *SC567 Monday 16:00-18:00 / appointment*

Preferred means of contact: *Via Mail*

SECTION B: What you can expect from the module

□ Educational Aims of the Module

This module gives an introduction to Artificial Intelligence (AI) by (1) providing a ground in AI algorithm implementation, which is used as a vehicle for practical illustrations; (2) understanding the framework of an AI system; (3) introducing students the advances of AI application and (4) ethics and responsibilities related to AI techniques.

The specific aims are: (1) to introduce students the concept of AI techniques and AI systems; (2) to introduce students the intelligent systems built on the use of AI techniques; (3) to provide a grounding in algorithm implementation and (4) to understand the security and risks related to AI.

□ Learning Outcomes

- A. Demonstrate an understanding of AI concepts.*
- B. Apply and optimise AI algorithms to solve appropriate problems.*
- C. Code and test AI applications using programming languages such as Python.*
- D. Demonstrate the ability to address and mitigate potential risks associated with AI technology to promote responsible AI development.*
- E. Assess ethical implications of AI solutions and evaluate their potential impact on inclusion and diversity.*

□ **Assessment Details**

Initial Assessment

Sequence	Assessment Type(EXAM or CW)	Method	Learning outcomes assessed(<i>use codes under Learning Outcomes</i>)	Duration ³	% of Final Mark	Resit(Y/N/S) ⁴
001	EXAM	Final Exam	ALL	2 hours	60	S
002	CW	Data Observation Exercise	A, C, D		15	S
003	CW	Data Classification Exercise	A, B, C, E		15	S
004	CW	Data Clustering Exercise	A, B, C, E		10	S

Resit Assessment

Sequence	Assessment Type (EXAM or CW)	Learning outcomes assessed (<i>use codes under Learning Outcomes</i>)	Duration	Week	% of Final Mark
R001	EXAM	ALL	3.5 hours		100

Marks for components where no resit opportunities are offered ***will be carried forward***, whether or not they are passed or failed, and will be calculated, with the same weighting, in the final module mark.

□ Syllabus & Teaching Plan

Week Number and/or Date	Lecture/Seminar/Field Trip/Other	Topic/Theme/Title	Pre-reading
Week 1	Lecture 1	Overview	Ch 1 of Textbook
Week 2	Lecture 2	The Machine Learning Landscape	Ch 2 of Textbook
Week 3	Lecture 3	Dimensionality Reduction	Ch 8 of Textbook
Week 4	Lecture 4	Data Observation Exercise	CW1 Tasksheet
Week 5	Lecture 5	Classifications and Training Models	Ch 3 & 4 of Textbook
Week 6	Lecture 6	Supervised Learning I	Ch 5 of Textbook
Week 8	Lecture 7	Supervised Learning II	Ch 6 & 7 of Textbook
Week 9	Lecture 8	Classification Exercise	CW2 Tasksheet
Week 10	Lecture 9	Unsupervised Learning I	Ch 9 of Textbook
Week 11	Lecture 10	Unsupervised Learning II	Lecture Notes
Week 12	Lecture 11	Clustering Exercise	CW3 Tasksheet
Week 13	Lecture 12	AI Applications	N/A
Week 14	Lecture 13	Revision	All Slides

All teaching arrangements are subject to amendment.

□ Tutorial Schedule

Student Group	Time	Day	Venue	Lecturer/Instructor
<i>ALL</i>	<i>1400-1600</i>	<i>Thursdays</i>	<i>BSG02</i>	<i>Sichen Liu</i>

□ Methods of Learning and Teaching

Students will be expected to attend two to three hours of formal lectures in a typical week. Lectures will introduce students to the academic content and practical skills which are the subject of the module.

Computer labs are arranged in three sessions where each session lasts four hours. The computer practical allows students to use those tools and practice the acquired techniques.

In addition, students will be expected to devote six to seven hours of unsupervised time to solving continuous assessment tasks and private study. Private study will provide time for reflection and consideration of lecture material and background reading. Continuous assessment will be used to test to what extent practical skills have been learned, in particular, assessment tasks will be solved individually and each solution comprises the resolution, using sound software engineering techniques, of the given problems expressed in terms of a requirements statement.

❑ **Reading Materials**

Optional Textbook

- Hands-On Machine Learning with Scikit-Learn, Keras, and TensorFlow, 2nd Edition, by Aurélien Géron, ISBN: 9781492032649, Oreilly

Reference Textbook

- Practical Statistics for Data Scientists, 2nd Edition, by Peter Bruce, Andrew Bruce, Peter Gedeck, ISBN: 9781492072942, Oreilly.
- Data Science from Scratch, 2nd Edition, by Joel Grus, ISBN: 9781492041139, Oreilly
- A Hands-On Introduction to Data Science, by Chirag Shah, ISBN: 9781108472449, Cambridge University Press
- Mathematics for Machine Learning, by Marc Peter, Deisenroth A. Aldo Faisal, Cheng Soon Ong, ISBN: 9781108455145, Cambridge University Press

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 resit examinations or 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>.