



澳門理工大學
Universidade Politécnica de Macau
Macao Polytechnic University

Macao Polytechnic University
Faculty of Applied Sciences

Four-year Full-time

Bachelor of Science in Artificial Intelligence
Programme Handbook
2023-2024



WELCOME

Welcome to the Bachelor of Science in Artificial Intelligence Programme of Macao Polytechnic University (MPU) and welcome back if you are a returning student.

Please kindly be reminded that the university has the following expectations from our students.

- To pursue their academic studies in an honest, ethical and responsible manner.
- To actively participate in various learning opportunities provided by MPU.
- To provide fair and constructive feedback on relevant aspects of their Faculty/Programme.
- To enhance tolerance in the pursuit of knowledge.
- To attain ethical standards in support of the values and mission of MPU.
- To be aware of and follow the policies, procedures and regulations of MPU.
- To seek and pursue their own learning experiences.
- To engage in opportunities for self-development after their studies in MPU.

This handbook aids in your understanding of the Programme. It depicts the Programme and explains the University's procedures and aspects of the regulations that affect you. Read it carefully and keep it as a source of reference throughout the years. If you lose or mislay it, then you can obtain a copy from your year tutor or the soft copy from the programme website cp.mpu.edu.mo.

If you have questions about anything that you read in the guide, please ask your year tutor. You will be expected to be familiar with and observe the various guidelines, regulations and procedures that are covered in this handbook.

Please kindly be reminded that Student ID card is an important means to identify a student. Students are required to present this card when making use of library check-out service and computing facilities, and for examinations.

Students have the responsibility to provide updated personal details to the Student Affairs Office.

The University and Programme keep you informed about events and changes to teaching and activities in a number of ways: email and a virtual learning environment such as Canvas. We expect you to check these every day.

With best wishes for your time at the BSc in AI Programme

Lam Chan Tong, PhD.

Acting Dean, Faculty of Applied Sciences

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SECTION 1 PRELIMINARY INFORMATION

The Bachelor of Science in Artificial Intelligence (AI) is one of the BSc programmes under the *Faculty of Applied Sciences (FCA)* in the *Macao Polytechnic University (MPU)*. The degree is taught and examined entirely in English. Students in the Bachelor of Science in AI will normally complete the programme in four years on a full-time basis. Students need to take 34 credits in Year 1, 35 credits in Year 2, 30 credits in Year 3 and 27 credits in their Year 4 and a total of 126 credits must be taken in order to obtain their Bachelor Degree. Scheduled teaching contact is timetabled between 9 am and 6 pm Monday to Friday.

Historical Development of the Programme

The history of the Computing Programme can be dated back to 1982 when the former University of East Asia, (now, University of Macao) started to offer a two-year Diploma Programme in Computer Studies through the College for Continuing Education, which was the first of its kind in the history of Macao. The Computer Studies Programme was later restructured to group under the former Polytechnic College of the University of East Asia. In 1991, the former Polytechnic College of the University of East Asia began to run as an independent higher education institute under the current name Macao Polytechnic University.

Since the inauguration of Macao Polytechnic Institute in 1991, the Computer Studies Programme (CSP) has implemented new curricula in 1993/1994, 1996/1997, 2000/2001, 2009/2010 and 2016/2017. Initially, CSP only offered day programmes for a 2-year Diploma programme and a 3-year Higher Diploma programme. In 1996/1997, an evening programme was offered to enable the working population to make use of their non-working hours to further their studies. Since 1998/1999, the Diploma programme ceased to accept any applicants. After the launch of the Bachelor of Science in Computer Studies Programme in 2000/2001, with the most recent update for 2023/2024.

Due to the recent strides in Artificial Intelligence, particularly the extensive use of machine learning across different industries, there is a significant rise in the need for skilled graduates with AI expertise. Leveraging our expertise from the Bachelor of Science in Computing, FCA has formulated a new program: Bachelor of Science in Artificial Intelligence (BSc in AI). This program, an extension of our Computing program, has gained official approval from the Macau Government. It will commence from the academic year 2023/2024, aimed at fulfilling the heightened demand from both academia and the industry.

Job Market

The development of digital economy and smart manufacturing, smart finance, smart agriculture, health care, smart home, smart city, smart logistics, robotics has a huge demand for talents and experts in AI and currently the graduates supply is far less compared to demands. We believe our graduates will have a wide range of opportunities in Internet companies, industries as well as research institutes and government departments and agencies.

For students aspiring to pursue further academic pursuits, the avenue of postgraduate studies at MPU and esteemed global universities remains open, thereby facilitating their intellectual growth and specialization.

University/Faculty Information

Macao Polytechnic University is a fully government-funded public university. For over two decades since its inception, the University has grown and prospered into a modern and fully equipped teaching and research tertiary institute with a team of experienced and dedicated academic staff.

The MPU offers both full-time academic programmes of Bachelor Degrees as well as professional training. Its mission is to provide student-centred education and training that combines rigorous learning with the excitement of discovery, promoting academic freedom, integrity and creativity, supporting a diverse research culture in a dynamic environment, and instilling a spirit of service for the betterment of society.

Being one of the six academic faculties offering degree programmes, the Faculty of Applied Sciences, split from the formerly School of Public Administration, is one of the newly established faculties in MPU. The mission of the Faculty of Applied Sciences is to provide up-to-date and market-oriented (practical) education, to advance learning and knowledge, as well as to enable students to obtain the maximum benefits of higher education, in seven programmes, namely Bachelor of Science in Computing, Bachelor of Science in Artificial Intelligence, Master of Science in Big Data and Internet of Things, Doctor of Philosophy in Computer Applied Technology, Doctor of Philosophy in Artificial Intelligence Driven Drug Discovery, Doctor of Philosophy in Educational Technology and Innovation, and Bachelor of Social Science in Sino-Lusophone Trade Relations.

SECTION 2 PROGRAMME INFORMATION

Programme Aims and Objectives

The evolving field of AI has driven breakthrough changes across a wide variety of industries such as manufacturing, finance, agriculture, health care, retail, and entertainment. AI has been identified as the key technology for future digital economy in China and around the world and the job market for AI graduates will be enormous. Macao Polytechnic University has a solid foundation in AI teaching and research staff and research centres (Engineering Research Centre of Applied Technology on Machine Translation and Artificial Intelligence, Ministry of Education, Centre in Artificial Intelligence Driven Drug Discovery etc.) and will adopt the existing academic-accredited student support system and the time-tested quality assurance processes of the University. Students are able to explore areas they wish to focus (including Image and video processing; Natural Language and Speech Recognition; Big Data Analysis; AI driven drug discovery). This helps students to enhance their knowledge of modern technologies and recent advancements in artificial intelligence, determine the topic for their research project and area of interest for subsequent professional development including AI system design and development in Internet enterprises, AI-powered industries and government agencies as well as further studies in relevant Master and PhD programmes. .

Upon completion of the Bachelor of Science in Artificial Intelligence Programme, students should be able to pursue further study and achieve the following (1-10):

1. Select and apply proven methods, tools and techniques to the effective and efficient implementation of information systems on common platforms, including the Internet platform;
2. Acquire essential knowledge in specific fields of artificial intelligence, including machine learning, computer vision and natural language processing;
3. Apply necessary mathematical techniques to model, analyse and devise solutions to complex problems;
4. Work independently to develop an understanding of, and the knowledge and skills associated with the general support and mitigation of security risks of computer systems and networks;
5. Design and implement both relational and non-relational data stores, with an emphasis on how to organise, maintain, retrieve and analyse information;
6. Distinguish the fundamental and operational issues of computer systems and artificial intelligence applications, with considerations of user, business, ethical, societal and environmental needs;
7. Evaluate, prepare and communicate effectively on technical information to both technical and non-technical audience;
8. Work as an effective member of a team in the analysis, design and development of software systems, with recognition of requirement to support equality, diversity and inclusion;
9. Use project planning, risk management and quality management techniques in solutions to complex problems;
10. Build the capacity and desire for lifelong learning and to learn advanced and emerging technologies on one's own.

Entry Requirement

There are two different entry routes, one for recruitment done locally in Macao, and one for recruitment from the Mainland of China.

For applicants from Macao: applicants have to be secondary school graduates (Form 6), and attend the University's admission examinations to show that they possess adequate English language and mathematics proficiency. The weighting of assessments is set as:

- A. English written examination – 50%

B. Mathematics written examination – 50%;

Candidates are selected based on the ranking of the total score of the two examinations. The programme normally takes 20% of all the applicants.

For students from the Mainland of China, applicants must participate in the National College Entrance Examination (NCEE) in China and attain a certain level (admission level 1). This examination is a prerequisite for entrance into almost all higher education institutions at the undergraduate level in China. In addition, the applicants must be a resident of one of the following provinces / municipalities / autonomous regions: Beijing, Tianjin, Shanghai, Chongqing, Guangdong, Fujian, Hainan, Hunan, Jiangsu, Zhejiang, Liaoning, Sichuan, Hubei, Guangxi, Henan, Shandong, Shaanxi, Yunnan, Guizhou, Jiangxi, Jilin, Heilongjiang, Anhui, Hebei, and Shanxi.

Programme Structure and Information

Structure of the Programme

The Bachelor of Science in AI Programme aims at providing a sound knowledge of computer science and mathematics and a thorough understanding of the analytical, design, and planning skills that are essential in developing artificial intelligence solutions to solve complex real-world problems. The Programme provides students with the means to compete successfully in the job market as well as developing their academic competences to pursue postgraduate studies in Macao or abroad. Students in the Bachelor of Science in AI will normally complete the Programme in four years on a full-time basis. 111 credits are for the required modules that include 6 credits for general elective modules and 9 credits for major elective modules. A total of 126 credits are required in order to obtain the Bachelor Degree.

Basically, the modules can be divided into 5 main groups:

Core Modules

Core modules are compulsory and constitute 31 modules (99 credits), each of which is a 3-credit 1-semester module, except for the Constitution and Basic Law, Chinese History and Culture, and Sustainable Development which are 2-credit 1-semester modules, and the Final Year Project which is an annual module of 12 credits.

Major Elective Modules

Major elective modules are vehicles for the delivery of the fundamental knowledge and skills necessary for career development in AI related areas. 21 modules fall into this category and students have to pass any 3 of them at a total of 9 credits.

General Elective Modules

General elective modules are general education modules not directly related to Information Technology. They provide the students with wider horizons for a well-rounded education, and promote fulfilment of students' technical IT knowledge in the more general context of business and society. 14 modules fall into this category and students have to pass any 2 of them at a total of 6 credits.

English Language Modules

During their first 2 years of study, students have to take 4 English modules, each of which is 3 credits at a total of 12 credits. The English modules aim at improving students' English language skills within an academic framework at the Intermediate and Upper Intermediate levels, with reference to the IELTS Band 5 and Band 6.

Period of Study

The length of study for the Programme is normally 4 academic years. There will be two semesters in each academic year for academic activities. To complete the curriculum, students are required to complete satisfactorily all module requirements.

Students are expected to graduate within the normal study period of 4 academic years. Any approved long leave of absence, including deferment and suspension of study, shall be counted towards the period of study. Students who are not able to complete the Programme within the maximum period of study (7 academic years) shall be deregistered from the University.

Students who wish to extend their period of study beyond the maximum programme duration shall apply in writing to obtain prior approval from the Faculty.

Design of Curriculum

Graduation Requirement

The students are awarded the Bachelor of Science in AI when they have gained 126 credits, and passed all the required modules, including all the core modules, three major elective modules, two general elective modules, four English language modules.

Progression Arrangements

The Programme equips the students with the skills needed to work in the industry or pursue postgraduate studies in Macao or abroad.

The first year is the basic or fundamental year for the computing discipline, in which students will learn the fundamental knowledge in the area of problem solving and programming skills, as well as in the relevant supporting disciplines, such as mathematics and English.

The second year is the broadening year, in which students will accumulate more knowledge in computing and AI, at an intermediate level. The Programme is designed to build up students' knowledge base in AI and data science, operating system, database design, probability and statistics, Ethics in computing and AI, web design, software engineering and their language skills.

The third year is designed to strengthen students' skills in modern AI system development on a larger scale and on more advanced technology.

The final year is designed to enhance students' theoretical thinking and to cover more advanced AI topics. During their third and fourth year, students will be able to choose modules that he/she likes most that will give in-depth knowledge in different sub areas in AI.

Contents of the Academic Programme

As shown in Figure 1, the modules of the Programme are divided into several module groups, including: Compulsory Foundation Modules, Compulsory Foundation Modules, Artificial Intelligence Core Modules, Major Electives Modules and General Electives Modules.

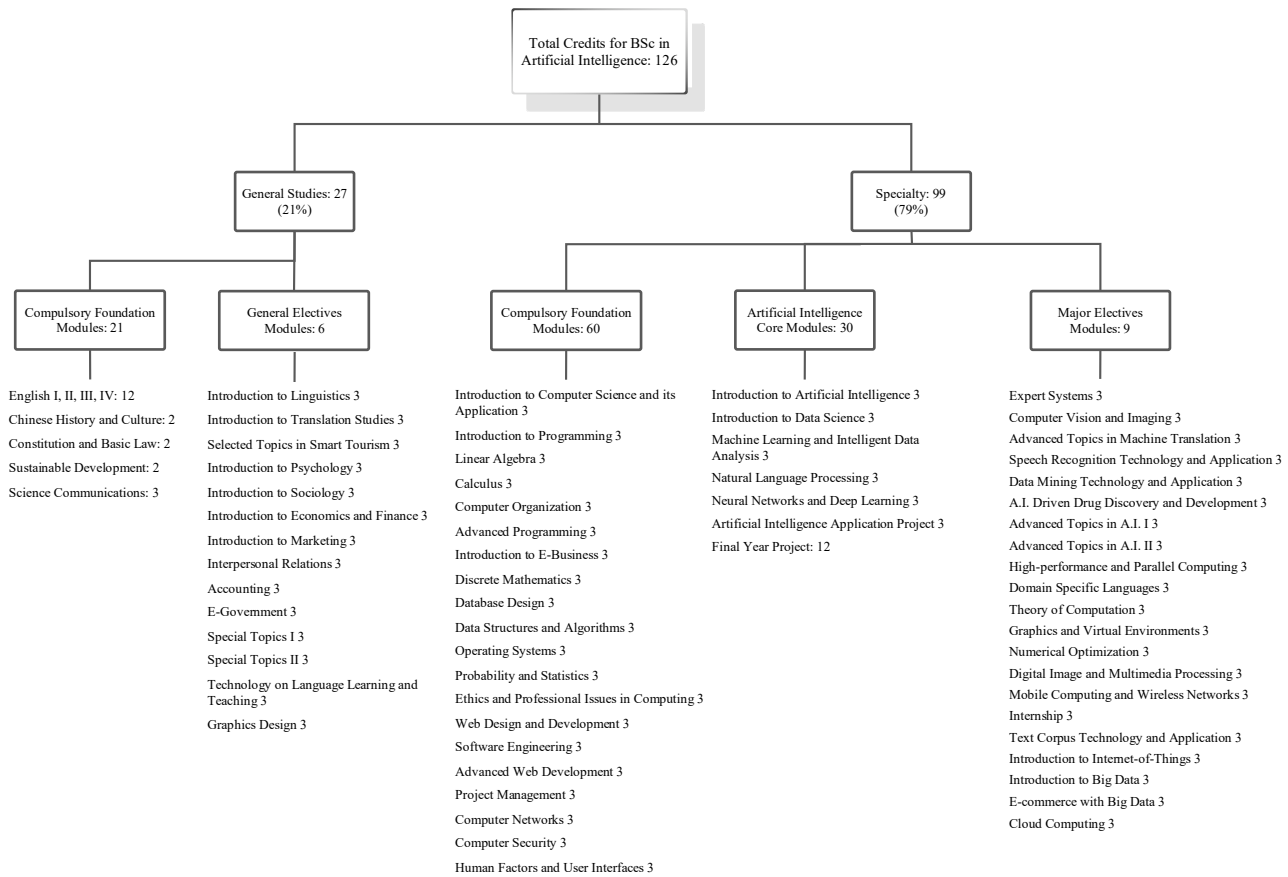


Figure 1 Module Structure of the BSc in AI Programme

International Academic Recognition

The BSc in AI Programme will along with other programmes in FCA to achieve academic accreditation by the Institution of Engineering and Technology (IET) in 2025 (scheduled). Qualified graduates of the Programme partially will fulfil the Chartered Engineer (CEng) educational requirement internationally.

Renowned universities abroad such as University of London, UK, Westminster University, UK, and Victoria University, Australia have articulation agreements with the Macao Polytechnic University. Graduates / Students of the BSc in AI Programme in MPU can directly transfer to those universities for further studies.

In 2009, the Memorandum of Understanding between the University and the UCLA (University of California, Los Angeles) Henry Samueli School of Engineering and Applied Science, was renewed, with a new item for better student exchange programme. The abovementioned agreement should provide our students with more opportunities for further studies abroad.

SECTION 3 MODULE INFORMATION

Table 1 – The Study Plan

Code	Module	Period of Study	Type	Hour	Credit
Year 1					
COMP1121	Introduction to Computer Science and its Application	1 st semester	Compulsory	45	3
COMP1122	Introduction to Programming	1 st semester	Compulsory	45	3
MATH1111	Linear Algebra	1 st semester	Compulsory	45	3
MATH1112	Calculus	1 st semester	Compulsory	45	3
MENG1111	English I	1 st semester	Compulsory	45	3
LLAW1120	Constitution and Basic Law	1 st semester	Compulsory	30	2
COMP1123	Computer Organization	2 nd semester	Compulsory	45	3
COMP1124	Advanced Programming	2 nd semester	Compulsory	45	3
COMP1125	Introduction to E-Business	2 nd semester	Compulsory	45	3
MATH1113	Discrete Mathematics	2 nd semester	Compulsory	45	3
MENG1112	English II	2 nd semester	Compulsory	45	3
HIST1110	Chinese History and Culture	2 nd semester	Compulsory	30	2
Year 2					
COMP2111	Database Design	1 st semester	Compulsory	45	3
COMP2112	Data Structures and Algorithms	1 st semester	Compulsory	45	3
COMP2113	Operating Systems	1 st semester	Compulsory	45	3
CSAI2121	Probability and Statistics	1 st semester	Compulsory	45	3
MENG2111	English III	1 st semester	Compulsory	45	3
CSAI2122	Introduction to Artificial Intelligence	1 st semester	Compulsory	45	3
SOCI1112	Social Sustainable Development	2 nd semester	Compulsory	30	2
COMP2114	Ethics and Professional Issues in Computing	2 nd semester	Compulsory	45	3
COMP2115	Web Design and Development	2 nd semester	Compulsory	45	3
COMP2116	Software Engineering	2 nd semester	Compulsory	45	3
CSAI2123	Introduction to Data Science	2 nd semester	Compulsory	45	3
MENG2112	English IV	2 nd semester	Compulsory	45	3
Year 3					
COMP3111	Advanced Web Development	1 st semester	Compulsory	45	3
COMP3112	Project Management	1 st semester	Compulsory	45	3
MENG3111	Science Communications	1 st semester	Compulsory	45	3
CSAI3121	Machine Learning and Intelligent Data	1 st semester	Compulsory	45	3
CSAI3122	Natural Language Processing	1 st semester	Compulsory	45	3
CSAI3123	Neural Networks and Deep Learning	2 nd semester	Compulsory	45	3
CSAI3124	Artificial Intelligence Application Project	2 nd semester	Compulsory	45	3
CSAI3125	Computer Networks	2 nd semester	Compulsory	45	3
	General Elective (I) (Table 2)	2 nd semester	Optional	45	3
	Major Elective (I) (Table 3)	2 nd semester	Optional	45	3

Code	Module	Period of Study	Type	Hour	Credit
Year 4					
COMP4111	Computer Security	1 st semester	Compulsory	45	3
CSAI4121	Human Factors and User Interfaces	1 st semester	Compulsory	45	3
CSAI4299	Final Year Project	1 st & 2 nd semester	Compulsory	90	12
	General Elective (II) (Table 2)	1 st or 2 nd semester	Optional	45	3
	Major Elective (II) (Table 3)	1 st semester	Optional	45	3
COMP4299	Major Elective (III) (Table 3)	1 st semester	Optional	45	3

Table 2 – General Elective Module List

Code	Module	Type	Hour	Credit
CSAI0124	Introduction to Linguistics	Optional	45	3
CSAI0125	Introduction to Translation Studies	Optional	45	3
COMP4115	Selected Topics in Smart Tourism	Optional	45	3
MSEL3101	Introduction to Psychology	Optional	45	3
MSEL3102	Introduction to Sociology	Optional	45	3
MSEL3103	Introduction to Economics and Finance	Optional	45	3
MSEL3105	Introduction to Marketing	Optional	45	3
MSEL3107	Interpersonal Relations	Optional	45	3
MSEL3108	Accounting	Optional	45	3
MSEL3110	E-Government	Optional	45	3
MSEL3111	Special Topics I	Optional	45	3
MSEL3112	Special Topics II	Optional	45	3
MSEL3113	Technology on Language Learning and Teaching	Optional	45	3
MSEL3114	Graphics Design	Optional	45	3

Table 3 – Major Elective Module List

Code	Module	Type	Hour	Credit
CSAI0111	Expert Systems	Optional	45	3
CSAI0112	Computer Vision and Imaging	Optional	45	3
CSAI0113	Advanced Topics in Machine Translation	Optional	45	3
CSAI0114	Speech Recognition Technology and Application	Optional	45	3
CSAI0115	Data Mining Technology and Application	Optional	45	3
CSAI0116	A.I. Driven Drug Discovery and Development	Optional	45	3
CSAI0117	Advanced Topics in A.I. I	Optional	45	3
CSAI0118	Advanced Topics in A.I. II	Optional	45	3
CSAI0119	High-performance and Parallel Computing	Optional	45	3
CSAI0120	Domain Specific Languages	Optional	45	3
CSAI0121	Theory of Computation	Optional	45	3
CSAI0122	Graphics and Virtual Environments	Optional	45	3
CSAI0123	Numerical Optimization	Optional	45	3
COMP4116	Digital Image and Multimedia Processing	Optional	45	3
COMP4119	Mobile Computing and Wireless Networks	Optional	45	3
COMP4127	Internship	Optional	45	3
COMP4128	Text Corpus Technology and Application	Optional	45	3
COMP4129	Introduction to Internet-of-Things	Optional	45	3
COMP4130	Introduction to Big Data	Optional	45	3
COMP4131	E-commerce with Big Data	Optional	45	3

Code	Module	Type	Hour	Credit
COMP4132	Cloud Computing	Optional	45	3

Table 4 – Pre-requisite Module List

Module Code and Title		Pre-requisite(s)	
Year 1			
COMP1124	Advanced Programming	COMP1122	Introduction to Programming
MENG1112	English II	MENG1111	English I
Year 2			
COMP2112	Data Structures and Algorithms	MATH1113	Discrete Mathematics
MENG2111	English III	MENG1112	English II
MENG2112	English IV	MENG2111	English III
Year 3			
CSAI3121	Machine Learning and Intelligent Data Analysis	MATH111 CSAI2121	Linear Algebra Probability and Statistics
CSAI3122	Natural Language Processing	CSAI2121	Probability and Statistics
CSAI3123	Neural Networks and Deep Learning	MATH1111 MATH1112	Linear Algebra Calculus
CSAI3124	Artificial Intelligence Application Project	COMP1122 CSAI2122	Introduction to Programming Introduction to Artificial Intelligence
COMP3111	Advanced Web Development	COMP1122 COMP2115	Introduction to Programming Web Design and Development
MENG3111	Science Communications	MENG2112	English IV
Year 4			
COMP4111	Computer Security	MATH1113	Discrete Mathematics
CSAI4299	Final Year Project	COMP2116 CSAI3124	Software Engineering Artificial Intelligence Application Project
Electives			
CSAI0112	Computer Vision and Imaging	COMP4116	Digital Image and Multimedia Processing
CSAI0113	Advanced Topics in Machine Translation	CSAI3122	Natural Language Processing
CSAI0114	Speech Recognition Technology and Application	CSAI3122	Natural Language Processing
CSAI0115	Data Mining Technology and Application	CSAI2123	Introduction to Data Science
COMP4127	Internship	COMP2114	Ethics and Professional Issues in Computing
COMP4119	Mobile Computing & Wireless Networks	CSAI3125	Computer Networks
CSAI0121	Theory of Computation	MATH1113 COMP2112	Discrete Mathematics Data Structures and Algorithms

For modules with pre-requisites, students must pass the pre-requisites first before taking them.

Module Descriptions

Year 1

COMP1121 Introduction to Computer Science and its Application (3 credits; 45 hours; Pre-requisite: nil)

This module will introduce: 1) fundamental electronic data processing concepts and associated terminologies; 2) the development of computers and computer applications; 3) network security, malware, security software and the use of encryption and decryption for secure data communication; 4) programming languages; and 5) concepts of algorithms, data structures, resource management. Furthermore, computer science related fields such as AI and its applications will be introduced and discussed.

COMP1122 Introduction to Programming (3 credits; 45 hours; Pre-requisite: nil)

This module introduces fundamental programming techniques and principles using the popular Python Programming language. It aims to build fundamental software development skills including the use of the Python programming language and tools, debugging, testing and fundamentals of good programming practice, style and design.

MATH1111 Linear Algebra (3 credits; 45 hours; Pre-requisite: nil)

This learning module introduces basic concepts and techniques from linear algebra that will be required in later computer science areas such as machine learning and computer graphics. Topics include systems of linear equations, matrices, determinants, vectors and vector spaces, linear in(dependence), multi-dimensional linear transformations, eigenvalues and eigenvectors.

MATH1112 Calculus (3 credits; 45 hours; Pre-requisite: nil)

This module introduces the basic concepts of differential and integral calculus. Topics include functions, limits and continuity, techniques of differentiation, applications of differentiation to practical problems, curve sketching, definite and indefinite integration, and applications of integral calculus.

MENG1111 English I (3 credits; 45 hours; Pre-requisite: nil)

This module aims to develop students' general English language proficiency at the intermediate level. Emphasis is placed on the development of vocabulary and fundamental grammatical conventions, general and academic reading, and writing skills. Students' speaking and listening skills are developed through communicative practice activities.

LLAW1120 Constitution and Basic Law (2 credits; 30 hours; Pre-requisite: nil)

This module introduces the general principles, the state system, the state organs, and the fundamental rights and duties of citizens stated in the Constitution of the People's Republic of China (the Chinese Constitution). It also covers the formulation of the "One Country, Two Systems" policy and the Basic Law of the Macao Special Administrative Region of the People's Republic of China (the Macao Basic Law) and such sections in the Macao Basic Law as the relationship between the Central Government and the Macao Special Administrative Region (SAR), the political structure of the Macao SAR, and the fundamental rights of Macao residents. The module is aimed at assisting the students to establish a correct understanding about the Chinese Constitution and the Macao Basic Law, and to identify the basic concept of the legal protection of people's rights and freedoms.

COMP1123 Computer Organization (3 credits; 45 hours; Pre-requisite: nil)

This module is concerned with the study of the structures and behaviour of computers. It traces the evolution of computers and considers the functional organization of a computer. Major components of a computer are discussed in this module and an overview of microcomputer technologies is provided.

COMP1124 Advanced Programming (3 credits; 45 hours; Pre-requisite: COMP1122)

This module covers the principles of object-oriented programming using the Java language. Fundamental programming skills and methods related to object-oriented approaches are discussed. Topics include: objects and classes, encapsulation, inheritance and polymorphism, abstract classes and interfaces, generics and container classes, exception handling, and functional programming.

COMP1125 Introduction to E-Business (3 credits; 45 hours; Pre-requisite: nil)

The goals of this module are to provide students with an overview of key concepts in business, and to develop an understanding of E-Business. This module will expose the students to the basic principles of running businesses, and to provide students with the knowledge of various modern e-commerce related concepts and terminologies, including topics on web technologies, payment and security, marketing, legal issues, and environmental and social behaviors.

MATH1113 Discrete Mathematics (3 credits; 45 hours; Pre-requisite: nil)

This module is designed for computing and AI programme students to enhance their training in logical thinking through a variety of mathematical topics. Topics include set theory, logic and proof, combinatorial mathematics, relations and functions, groups, graphs, Boolean algebra and logic gates.

MENG1112 English II (3 credits; 45 hours; Pre-requisite: MENG1111)

This module aims to refine students' general English language proficiency at the intermediate level. Emphasis is placed on the development of vocabulary and grammatical conventions, general and academic reading, and writing skills. Students' speaking and listening skills are developed through communicative practice activities.

HIST1110 Chinese History and Culture (2 credits; 30 hours; Pre-requisite: nil)

This course aims to give an overview of the History and Culture of China and to give students knowledge about the political, economic and cultural development of ancient and modern China. On the other hand, it is intended to show, generically, political and economic relations between China and the rest of the world. The history of Macau, as an important part of the exchange between China and the western world since the 16th century, will also be presented.

Year 2

- COMP2111 Database Design** (3 credits; 45 hours; Pre-requisite: nil)
This module is designed to provide students with an understanding of the principles of relational database design and the ability to apply these principles in the design and development of database projects. Principles of good design and modelling, how to structure queries using SQL will be the focus.
- COMP2112 Data Structures and Algorithms** (3 credits; 45 hours; Pre-requisite: MATH1113)
This learning module provides an introduction to data structures. The module begins with an introduction to concrete and abstract linear structures: linked lists, stacks and queues. Next, the fundamentals of algorithm analysis are covered. Recursive algorithms are introduced with mathematical induction to show the elementary reasoning about algorithms. Trees are discussed with the applications in heaps and search trees. Hashing and various sorting algorithms are explained and analyzed. Finally, the module concludes with some advanced algorithms on graphs.
- COMP2113 Operating Systems** (3 credits; 45 hours; Pre-requisite: nil)
This learning module aims to help students to understand important concepts and algorithms in operating systems. Major components discussed are process management, virtual memory, I/O and file systems. Topics include process description and control, process scheduling, threads, SMP, mutual exclusion and synchronization, partitioning, paging, segmentation, memory management algorithms, disk scheduling and file systems.
- CSAI2121 Probability and Statistics** (3 credits; 45 hours; Pre-requisite: nil)
This learning module aims to provide the probabilistic and statistical skills which are essential for AI. This module will cover descriptive statistics and probability theory basics. To develop a broad understanding of random variables, popular probability distributions, correlation and regression analyses. A gentle introduction to Maximum Likelihood Estimation (MLE) and Maximum A Posteriori (MAP) for Machine Learning will also be covered.
- MENG2111 English III** (3 credits; 45 hours; Pre-requisite: MENG1112)
This module aims to develop students' general English language proficiency at the upper intermediate level. Emphasis is placed on the understanding of vocabulary and the parts of speech, as well as advanced grammatical conventions. Emphasis is placed on business and academic communications with focus on presentation and writing skills. Students' speaking and listening skills are developed through communicative practice activities.
- SOCI1112 Social Sustainable Development** (2 credits; 30 hours; Pre-requisite: nil)
This module will be offered by the University from 2023/2024. The module description is still pending.
- COMP2114 Ethnics and Professional Issues in Computing** (3 credits; 45 hours; Pre-requisite: nil)
This module provides an overview of ethical theories and problems encountered by IT professionals in today's computing environments. Stimulating ethical issues in machine learning, deep learning, social networking, government surveillance, and intellectual property from different views are discussed. This module challenges students to think critically and draw their own conclusions, which ultimately prepare them to become responsible, ethical users of computing technologies.
- COMP2115 Web Design and Development** (3 credits; 45 hours; Pre-requisite: nil)
This module is an introduction to server-side web programming. It provides the principles of web application development, and arms students with the skills for developing web-oriented applications. Topics include HTML, CSS, web request handling, state management, and database manipulation.
- COMP2116 Software Engineering** (3 credits; 45 hours; Pre-requisite: nil)
This module introduces the concepts of software development. Emphasis will be put on understanding the processes, techniques and methods used to develop application software. Besides, students are exposed to various software development approaches. Upon completion, students will be able to understand the major software development methodologies and techniques, appreciate their relative merits and their limitations.
- CSAI2122 Introduction to Artificial Intelligence** (3 credits; 45 hours; Pre-requisite: nil)
The learning module introduces both the theoretical and the practical aspects of artificial intelligence (AI), including the fundamental mathematical models and the state-of-the-art tools for AI problem solving. The topics include mathematical logic, searching heuristics, Bayesian inference, machine learning and Prolog programming language. These topics cover a wide range of key topics in modern AI, from deterministic reasoning to reasoning with uncertainty, from rule-based systems to learning-based systems, etc.
- CSAI2123 Introduction to Data Science** (3 credits; 45 hours; Pre-requisite: nil)
This module introduces the fundamentals of data science programming and the use of Python programming language in data science to students. Python has become one of the most popular programming languages for data analysis due to its powerful libraries and tools such as Pandas, NumPy, and Matplotlib. This module is designed to help students become proficient in data analysis and wrangling using the Pandas library in Python. The module will cover essential topics, such as data manipulation, cleaning, visualization, and analysis, which will enable students to build data-driven solutions for real-world problems.
- MENG2112 English IV** (3 credits; 45 hours; Pre-requisite: MENG2111)
This module aims to refine students' general English language proficiency at the upper intermediate level. Emphasis is placed on the understanding of vocabulary and the parts of speech, as well as advanced grammatical conventions. Emphasis is placed on business and academic communications with focus on presentation and writing skills. Students' speaking and listening skills are developed through communicative practice activities.

Year 3

COMP3111 Advanced Web Development (3 credits; 45 hours; Pre-requisite: COMP1122, COMP2115)
Recent advances in Web standards and their wide support by mainstream browsers have enabled development of sophisticated Web applications that are accessible on desktop and mobile devices. This course examines important concepts and technologies required to develop state-of-the-art Web applications. Topics include the architecture and protocol of the Web, the JavaScript language, development of interactive user interfaces and scalable backend of Web applications, and the design and implementation of Web APIs.

COMP3112 Project Management (3 credits; 45 hours; Pre-requisite: nil)
The objective of this module is to study the concepts and issues related with management of information technology projects. Topics include introduction to projects and their management, project planning and development processes, project selection methods, work breakdown structures, network diagrams & critical path analysis, resource estimation, and project control, project organization structures, and various project management models.

CSAI3121 Machine Learning and Intelligent Data Analysis (3 credits; 45 hours; Pre-requisite: MATH1111, CSAI2121)
This module will first provide an introduction to the most important concepts for machine learning including different machine learning types, linear regression and logistic regression, loss functions, gradient descents etc. The introduction of machine learning and its applications will be taught with the Python Scikit-learn library. Students will learn about the different types of machine learning algorithms, their applications, and how to implement them using Scikit-learn. The module will cover data pre-processing, model selection, evaluation, and tuning techniques.
Some other important machine learning algorithms are also covered, including: SVM, K Nearest Neighbours, Game Theory, Genetic Algorithm etc. Students will learn these concepts with practices. There will be a group project for students to work on, students will work together for a complete machine learning task involving problem analysis, data processing, model selection and evaluation, solution design, system integration and final presentation.

CSAI3122 Natural Language Processing (3 credits; 45 hours; Pre-requisites: CSAI2121)
A lot of data is stored in the form of text in today's environment. Some examples include web pages, social media posts, instant messaging, legal documents, etc. Such unstructured text creates many challenges in understanding and harnessing knowledge within. In this module, students will learn basic knowledge of natural languages and computational approaches for working with text. Students will also develop an understanding of the main algorithms of natural language processing (NLP) and their various applications, such as sentiment analysis, text mining, machine translation and topic modelling.

CSAI3123 Neural Networks and Deep Learning (3 credits; 45 hours; Pre-requisite: MATH1111, MATH1112)
This module is an advanced Machine Learning module concentrates on modern deep neural network (DNN) based machine learning topics. It starts with the key concepts in Deep Learning including deep neural networks, activation and loss function, back propagation. Popular Deep Learning methods will be discussed in detail, including training tips for DNN, CNN, anomaly detection, attacking and defence of DNN, RNN.
Some DNNs for machine translation and speech recognition will also be introduced, including Sequence-to-sequence Model, Attention-based Model, Transformers etc. Students will learn these concepts with practices using Python language and Machine Learning frameworks such as Keras or PyTorch.

CSAI3124 Artificial Intelligence Application Project (3 credits; 45 hours; Pre-requisites: COMP1122, CSAI2122)
This module aims at developing students' abilities to apply their Artificial Intelligence knowledge, information systems development skills and project management methods to develop an Artificial Intelligence application project and produce written reports in a groupwork manner. The students should focus on demonstrating sound skills in integrating systems analysis, systems design, problem solving, implementation and testing to complete the process of project implementation. The module also prepares the students for taking the Final Year Project..

CSAI3125 Computer Networks (3 credits; 45 hours; Pre-requisites: nil)
This is an introductory course in Data Communications and computer networks. It familiarizes the students with the basics of data communications, technologies used in modern computer networking from the top layer to the bottom layer of the Internet protocol stack. Topics include data transmission, network services and applications, layered Internet architecture and protocols, routing and switching, etc.

MENG3111 Science Communications (3 credits; 45 hours; Pre-requisite: MENG2112)
The module develops the students' abilities to communicate science information effectively to both technical and non-technical audience. It covers strategies for preparing and communicating technical content in both written and spoken settings, and addressing challenges in dealing with complex research topics. It cultivates practical communication skills in science-related topics.

Year 4

COMP4111 Computer Security (3 credits; 45 hours; Pre-requisite: MATH1113)
This module explains the theoretical foundations, and current state, of modern cryptographic algorithms and trusted computers used to provide various computer security services. Cryptographic encryption algorithms, including DES, RSA, and Diffie-Hellman, are discussed. Additional topics are classical ciphers, modern private key block ciphers, public key ciphers, authentication and integrity, key management and modern application systems.

CSAI4121 Human Factors and User Interfaces (3 credits; 45 hours; Pre-requisite: nil)
This module applies the basic principles of human-computer interaction to the design of computer interfaces. It also looks at the analysis of interface design and system integration problems. Comparison of standard graphical user interfaces (GUI) and the application of guidelines for windows, menus, and other dialogue techniques is dealt with. Students will evaluate the usability of the program interfaces and compare interface design methodologies.

CSAI4299 Final Year Project (12 credits; 90 hours; Pre-requisites: COMP2116, CSAI3124)
The final year project (FYP) aims to allow students to tackle a real problem and to complete the specification / design / implementation / documentation / testing / evaluation processes. Students are required to develop software projects and / or carry out research project in the area Artificial Intelligence. The FYP is an individual project. The students are required to explore an area of Artificial Intelligence in considerable depth, demonstrating sound problem solving and analytical skills.

General Elective Modules

CSAI0124 Introduction to Linguistics (3 credits; 45 hours; Pre-requisite: nil)
This module provides the first exposure to the field of linguistics, particularly at the level of the integration of linguistics and artificial intelligence (AI), including domains like Lexical and Semantic Analysis and Semantics, Syntactic Analysis (Syntax), Speech Acts and Implicature Meanings (Pragmatics), Corpus Linguistics, Phonetics and Phonology, among others. Elementary and relevant knowledge that needs to be mastered is also acquired through language-related exercises and practice.

CSAI0125 Introduction to Translation Studies (3 credits; 45 hours; Pre-requisite: nil)
This module aims to provide an overview of the concept of translation, the main issues of translation studies, and the main paradigms of contemporary translation studies, which cover most of the traditional and emerging theories of this area and demonstrate the developing trends of translation studies in the context of the “cultural and ideological turns”. Translation in the digital age and related studies will also be presented, such as corpus-based translation studies, audio visual translation studies, post-colonial translation studies and interdisciplinary research related to machine translation (MT) and computer-assisted translation (CAT).

COMP4115 Selected Topics in Smart Tourism (3 credits; 45 hours; Pre-requisite: nil)
This module covers state-of-the-art topics about smart tourism, which is highly relevant to the sustainable development of Macao’s economy. Students will be introduced to technical topics such as artificial intelligence-based applications, robotics, the Internet of Things (IoT), etc., and their applications in the hospitality and tourism industries. These key concepts will be interrelated to areas of management and information systems for explaining how information technologies can be utilized to improve the services in these industries and the experience of tourists.

MSEL3101 Introduction to Psychology (3 credits; 45 hours; Pre-requisite: nil)
The module is designed to introduce students to the study of psychology. It is intended to provide broad coverage of the field by presenting basic theories, research, and applied use of psychology. It will give students a background from which to either pursue more advanced psychology courses, or to retain the information as a basic knowledge of psychology in general. Areas that will be covered include: research methods, human development, consciousness, learning, intelligence, motivation, personality, health psychology, psychological disorders, social psychology, and psychology of gaming. These areas will be approached from both theoretical and applied perspectives.

MSEL3102 Introduction to Sociology (3 credits; 45 hours; Pre-requisite: nil)
This module attempts to introduce to students the basic concepts in the discipline of sociology. This will include the study of the major sociological theories; procedures and objectives of sociological research; the sociological perspective used to analyse self and society in general. This course intends to prepare students the interpersonal skills necessary in their personal and work life.

MSEL3103 Introduction to Economics and Finance (3 credits; 45 hours; Pre-requisite: nil)
This module aims at providing a fundamental knowledge of Economics to students who never study it in a tertiary level. Students should demonstrate a sound understanding in both microeconomics and macroeconomics. Students become familiar with some important microeconomics topics, such as the economic problem, how markets work in terms of demand and supply, households’ choice and market failure and government. Other macroeconomics topic, such as the macroeconomic policy and the economy in the short and long run will be investigated. Besides, this course will also look into the advantages given by the present resource of Macau economic environment. This course will also let the students understand the fundamental theories and applications of economics in both micro and macro perspectives.

MSEL3105 Introduction to Marketing (3 credits; 45 hours; Pre-requisite: nil)
This module aims at providing a fundamental knowledge of Marketing to students who never study it in a tertiary level. Students should demonstrate a sound understanding in Marketing and become familiar with some important topics, such as Marketing Mix, Marketing Strategies, Segmentation and Positioning, Product Banding, Customer Relationship Management, Global Markets and International Marketing, Consumer Buying Behaviour, and Business Markets and Buying Behaviour, etc. Besides, this module will also look into the advantages given by the present resource of social system. This module will also let the students understand the fundamental theories and applications of marketing in micro and macro perspectives.

MSEL3107 Interpersonal Relations (3 credits; 45 hours; Pre-requisite: nil)
In today’s service-oriented, information-based global economy, strong interpersonal skills are essential. This module focuses on various topics of interpersonal communications. Its goal is to introduce theories and practices to help understand and develop

one's intrapersonal and interpersonal effectiveness. Group dynamics theory and leadership skills are introduced to develop clear and effective team communications.

MSEL3108 Accounting (3 credits; 45 hours; Pre-requisite: nil)
This introductory module in accounting provides students with an understanding of: the principles of accrual accounting; financial statement analysis; double-entry systems; the accounting cycle; and basic managerial accounting concepts.

MSEL3110 E-Government (3 credits; 45 hours; Pre-requisite: nil)
Governments are increasingly moving their functions to the online world, and public services are being delivered through websites, apps and digital channels gradually. This module will give an overview of key concepts in e-government, such as smart governance, citizen engagement, law and regulations, as well as the choices of implementation. In addition, students will be introduced to different types of e-government applications and their implications. They will be encouraged to explore the technological, ethical and policy tensions that emerged when government services are being digitalized.

MSEL3111 Special Topics I (3 credits; 45 hours; Pre-requisite: nil)
This module is designed to provide students an understanding of introductory topics in non-IT technical fields, broadening their view and knowledgebase for the design of information systems.

MSEL3112 Special Topics II (3 credits; 45 hours; Pre-requisite: nil)
This module is designed to provide students an understanding of introductory topics in non-IT technical fields, broadening their view and knowledgebase for the design of information systems.

MSEL3113 Technology on Language Learning and Teaching (3 credits; 45 hours; Pre-requisite: nil)
In this module, students will learn about several types of technologies that are commonly used within the context of language learning and teaching, including computer or mobile assisted language learning technologies, multimedia language learning technologies, etc., as well as their purposes and characteristics; about the development regarding technology integration in education; and about the impact that such technologies have not only on each individual's learning, but also on the restructure of teaching approaches.

MSEL3114 Graphics Design (3 credits; 45 hours; Pre-requisite: nil)
This module introduces basic 2D design knowledge, terminologies, design methods and aesthetic principles. This module will also focus on how to develop students' ability in seeing things and to use the visual language and design principles to help visual communication.

Major Elective Modules

CSAI0111 Expert Systems (3 credits; 45 hours; Pre-requisite: nil)
This module covers brief history of expert systems and gives an introduction to expert system development tools and techniques. In this module, we learn the techniques for the construction of expert systems including computer inference and knowledge acquisition, knowledge representation schemes, plausible reasoning techniques, production-rule programming, validation and measurement methods.

CSAI0112 Computer Vision and Imaging (3 credits; 45 hours; Pre-requisite: COMP4116)
This module focuses on the fundamental computational principles that enable an array of picture elements, acquired by one of a multitude of imaging technologies, to be converted into structural and semantic entities necessary to understand the content of images and to accomplish various perceptual tasks. This module covers the problems of image formation, low level image processing, object recognition, categorization, motion analysis, tracking and active vision.

CSAI0113 Advanced Topics in Machine Translation (3 credits; 45 hours; Pre-requisite: CSAI3122)
This module provides an overview of machine translation, including genres of translation, challenges and evaluation of machine translation, limitations and future of machine translation, pre-translation and post-translation editing, parallel corpus processing, machine translation development using Python, and modern machine translation applications.

CSAI0114 Speech Recognition Technology and Application (3 credits; 45 hours; Pre-requisite: CSAI3122)
This module is designed to provide an in-depth understanding of speech recognition technology and its applications. Students will learn the fundamentals of speech signal processing, speech recognition algorithms, and evaluation metrics. The module will also cover the challenges and future trends of speech recognition technology.
Students will explore various speech recognition toolkits and libraries, including Sphinx, Kaldi, Google Speech API, Microsoft Azure Speech Services, and Amazon Transcribe. The module will include hands-on practice using Python to implement speech recognition models and integrate them with other applications.
Through a combination of lectures, hands-on practice, and project work, students will gain the skills and knowledge to build speech recognition applications for various industries, including healthcare, automotive, and virtual assistants..

CSAI0115 Data Mining Technology and Application (3 credits; 45 hours; Pre-requisite: CSAI2123)
The field of data mining aims at extracting useful and interesting patterns and knowledge from large data repositories such as databases and the Web. It integrates techniques from database, statistics and artificial intelligence. This module provides a broad view of this field, and examines the methods that have proven valuable in recognizing patterns and making predictions. It also develops students' ability to use data mining techniques for business decision making.

CSAI0116 A.I. driven Drug Discovery and Development (3 credits; 45 hours; Pre-requisite: nil)
Artificial intelligence (AI) plays an important role in new drug discovery and development. This module explains how to apply AI techniques in drug discovery and development, including the prediction of target structure, lead discovery, lead optimization

and drug-likeness evaluation based on the usual AI algorithms. Additionally, it also covers the latest research progress and successful industrial cases of AI driven drug discovery and development.

- CSAI0117 Advanced Topics in A.I. 1: AI assisted medical diagnoses** (3 credits; 45 hours; Pre-requisite: nil)
Computer aided diagnosis (CAD) can be defined as the diagnosis made by the radiologist supported by a computer based medical image analysis that acts as a second opinion system. The module aims at giving the students the knowledge and ability to develop image enhancement, image analysis and classification systems useful in CAD environments.
- CSAI0118 Advanced Topics in A.I. 2- Reinforcement Learning** (3 credits; 45 hours; Pre-requisite: nil)
Strong AI requires autonomous systems that learn to make the right decisions. Reinforcement learning (RL) is a powerful paradigm for doing this, and it can be used to a large number of tasks, including robotics, gaming, consumer modelling, and healthcare. This module will provide a solid introduction to the field of reinforcement learning, and students will gain an understanding of core challenges and approaches, including generalization and exploration. Through a combination of lectures, written and coded assignments, students will become proficient in the key ideas and techniques of reinforcement learning and deep reinforcement learning.
- CSAI0119 High-performance and Parallel Computing** (3 credits; 45 hours; Pre-requisite: nil)
This module covers the principles of High-Performance Computing (HPC) and parallel computing. The fundamental of parallel programming such as multiprocessing and multithreading are discussed. Topics include technologies and approaches of computation using multicore processor, multi-processor; distributed computing and heterogeneous computing.
- CSAI0120 Domain Specific Languages** (3 credits; 45 hours; Pre-requisite: nil)
Domain-specific language (DSL) is a programming language specifically designed to working within a particular area of interest. DSLs have become a core part of model-driven software development. Using a DSL increases productivity for developers and improves their communication with business experts. This module introduces DSL techniques and discusses approaches on how to implement such languages in practice. It starts with an overview of domain-specific languages, both text-based and graphical. A trivial example language is then discussed and implemented using two special software tools: Eclipse Xtext and JetBrains MPS.
- CSAI0121 Theory of Computation** (3 credits; 45 hours; Pre-requisite: MATH1113, COMP2112)
This module provides a foundation of computation which is required for further computer science modules. Topics which will be studied include: 1) Deterministic Finite Automata, 2) Nondeterministic Finite Automata, 3) Regular Expressions, 4) Context-free Grammars, 5) Pushdown Automata, 6) Pumping Lemma, 7) Turing Machine, 8) Decidable Languages, 9) Undecidable Languages, and 10) Computational Complexity. Furthermore, computer science related fields such as AI and its applications will be introduced and discussed.
- CSAI0122 Graphics and Virtual Environments** (3 credits; 45 hours; Pre-requisite: nil)
Computer graphics are an intrinsic component of many modern software applications and are often essential to the success of these applications. The objective of this learning model is to familiarize students with fundamental algorithms and data structures that are used in today's interactive graphics systems as well as the programming and architecture of high-resolution graphics computers. The principles and practice of computer graphics are described from their mathematical foundations to the modern applications domains of scientific visualization, virtual reality, computer games, and film animation. The model covers fundamental topics such as graphical representations and transformations, the viewing pipeline, visibility, lighting, and textures, as well as more advanced areas such as ray tracing and global illumination.
- CSAI0123 Numerical Optimization** (3 credits; 45 hours; Pre-requisite: nil)
This learning module provides an overview of the important topic of numerical optimization. In this introductory-level module, we will cover the basic concepts of optimization, numerical method techniques, key algorithms, and their applications in AI. Topics covered include:
i) Basic concepts in optimization.
ii) Numerical Differentiation and Integration.
iii) Common optimization methods, e.g., First-Order methods and Second-Order methods.
iv) applications, e.g., root-finding and regressions.
- COMP4116 Digital Image and Multimedia Processing** (3 credits; 45 hours; Pre-requisite: nil)
The module introduces the different elements and the key perspectives in digital multimedia processing to students. It aims to equip the students with the background of developing image and multimedia processing tools and applications. The topics include: 1) the fundamental theories and mathematical models in digital image and multimedia processing; 2) the practical algorithms in digital image and multimedia processing; 3) the relevant mainstream standards in engineering and applications; 4) the development of image and multimedia processing applications in practice.
- COMP4119 Mobile Computing and Wireless Networks** (3 credits; 45 hours; Pre-requisite: CSAI3125)
This learning module covers the fundamental principles of mobile computing and wireless networks. Topics include wireless communication systems, radio propagation, wireless media access, mobile IP, mobile applications and services, wireless LANs, wireless network security and next generation of wireless networks.
- COMP4127 Internship** (3 credits; 45 hours; Pre-requisite: COMP2114)
This module is to provide practical experience in a professional setting for students. Students will have an opportunity to exercise their IT knowledge and the skills they have acquired in a supervised environment, demonstrating competence in obtaining employment relevant to the academic learning through activities such as creating a CV, researching the market/industry, networking, making job applications and attending interviews. The projected outcomes are: an authentic work experience, the credential of having completed a professional internship, and the establishment of a personal network of professional associates valuable for career advancement.

COMP4128 Text Corpus Technology and Application (3 credits; 45 hours; Pre-requisite: nil)

A text corpus is a machine-readable collection of a relatively large amount of text, and they are frequently used in various tasks in text mining and natural language processing. Students will learn the fundamentals of text corpora (e.g., what is a corpus, its characteristics and how to create one), their use in natural language processing, and common computational tools for text corpora. In addition, applications of text corpus technologies, such as n-grams, pattern finding, collocation, will be introduced and discussed.

COMP4129 Introduction to Internet-of-Things (3 credits; 45 hours; Pre-requisite: nil)

This module provides a comprehensive overview of the Internet of Things (IoT) from the global context. A number of underlying technologies enabling IoT will be discussed, such as different sensing technologies, wireless sensor networks, machine-to-machine communications, Cloud and Fog computing technologies, etc. The IoT environment should permit interaction among machines, smart devices, ubiquitous computers, physical objects and human users. This module is an introduction to the fundamentals of IoT, designed for either Information Communication Technology (ICT) or non-ICT students. In particular, the course will define the core system architectures, including but not limited to, the middleware to design single device and multi-device systems. In order to obtain more hands-on experience in building IoT applications through different smart sensing devices, constructions of smart sensor devices through experiencing the Arduino and Raspberry Pi device programming will be covered.

COMP4130 Introduction to Big Data (3 credits; 45 hours; Pre-requisite: nil)

This learning module covers the characteristics of Big Data, the sources of massive data in enterprises and sensor networks, and the challenges in data ingestion, data storage and analytic processing. The students will acquire skills and working knowledge of the Big Data tools and technologies. This course focuses on the planning, designing and implementing Big Data solutions. Examples and exercises of Big Data systems are used to provide hands-on experiences in the workings of major components in Big Data solutions. The students will also be able to integrate the Big Data tools to form coherent solutions for business problems. Finally, additional related topics in the area of Big Data, such as alternative large-scale processing platforms, non-relational data stores, and Cloud Computing execution infrastructure are presented.

COMP4131 E-commerce with Big Data (3 credits; 45 hours; Pre-requisite: nil)

Recent advances in information and communication technologies (ICTs) have led to the rapid explosion of consumer and user data. Business intelligence derived from Big Data can help firms to better understand market needs, develop new products and services, improve operational efficiency, and acquire competitive advantages. This learning module provides an overview of common big data applications and analysis techniques (e.g., market basket analysis, sentiment analysis, decision tree, clustering, etc.) in business and discusses some implementation issues related to big data projects. As part of a group project, students will need to demonstrate the ability to come up with a business plan based on a given case study and a relevant data set.

COMP4132 Cloud Computing (3 credits; 45 hours; Pre-requisite: nil)

Cloud Computing is one important technological innovation, and being adopted across industries at a rapid pace. With improved data redundancy and availability across different geographical locations, Cloud Computing transforms the ways how services, applications, and solutions are delivered. With the rises of novel virtualization technologies and new programming paradigms, applications can be delivered quickly to customers, without the need to own any physical infrastructure. Furthermore, with its rapid elasticity and scalability, Cloud Computing offers low-cost solutions to the needs of companies of any sizes. It is the perfect operating platform for housing Big Data systems and analysing collected IoT sensing data. In this module, the main characteristics and enabling technologies of Cloud Computing, including orchestration of compute nodes, and different service paradigms, will be discussed. Other underpinning issues such as security, privacy, and ethical concerns are also covered.

SECTION 4 TEACHING & LEARNING

The BSc in AI Programme has a close relationship between students and lecturers. Students may contact lecturers in person at anytime during office hours (six hours per week), or through email. Lecture notes and supplementary material are available in the University e-learning system called Canvas. Recommended book lists are provided at the beginning of each semester (see Appendix A1 for an example).

Basically, all modules (except for *Artificial Intelligent Application Project*, *Final Year Project*, *Internship*) are lecture-based and must fulfil the number of contact hours per week assigned to those modules. Many of the modules offer tutorial and laboratory practice as specified in the module syllabi. As for the final year projects, students are expected to complete an implementation-based and/or research-based project with the guidance, assistance and monitoring of the student project supervisors.

The teaching methods applied in most of the modules are face-to-face lectures and laboratory work. Generally, the credit hours of each module equal the number of contact hours per week, which comprises both lectures and laboratory work.

Students with an overall score of less than 35 in the coursework must take the re-sit examination even if the overall score for the module is 50 or above. Students with a score of less than 35 in the final examination must take the re-sit examination even if the overall score for the module is 50 or above. Students with an overall final grade of less than 35 are NOT allowed to take the re-sit examination.

The medium of instruction is English. Students are expected to attend lectures and tutorials and must attain 70% attendance in order to sit for their final examinations.

The main teaching methods include the following:

Face-to-face Lectures

In most modules, lecturers deliver pedagogical material to students in a logical and organized manner in the classroom. Students obtain concepts and knowledge of a specific module by attending the lectures, and learning is reinforced by assignments, laboratory practice and projects.

The University facilitates an interactive learning experience in the classroom. Students are often challenged to solve problems, and encouraged to criticize information they are exposed to, both inside and outside the classroom. These approaches increase students' involvement and attentiveness.

Many lecturers use *Microsoft PowerPoint* to deliver lectures, while some lecturers may use audio/video material. The required equipment (projector and computers) is available in every classroom and computer laboratory.

Laboratory Work

Modules related to programming, systems operation, multimedia authoring, and network administration generally involve a larger portion of hands-on practice than other modules. This is achieved by offering laboratory work in some general-purpose teaching computer laboratories and a special-purpose "hardware laboratory".

The University provides sufficient general-purpose teaching computer laboratories that offer PCs with Windows platforms and Apple Computer. System development tools (including compilers, database management system and project management software) and office software are accessible in the computer laboratories where teaching takes place. For network and system administration, the special-purpose "hardware laboratory" provides routers and switches for hands-on practice.

Group Projects

Several advanced level modules require students to work on module projects. In addition to extended problem-solving in specific modules, students are also involved in group work early in their studies.

The *Final Year Project* module takes a student-centred learning approach. Students participate in problem solving activities involving a different combination of application development, technical challenge and research problems. Project supervisors facilitate the learning experience by providing means for accessing information, monitoring, and giving advice to the students.

SECTION 5 STUDENT SUPPORT

Academic Support

At the University level, the Registry, the Student Affairs Office, the Library, and Information Technology Department provide services that support students in their attainment of success.

In particular, the Registry and the Student Affairs Office cater to the many needs of students, from coping with their studies, to their need for personal, social and career development. Admissions, registration and enrolment, deferred study, withdrawal, transcripts and testimonials, student insurance, student counselling, financial aid and scholarships, student hostels, and recruitment seminars are all handled by the Registry and the Student Affairs Office. The Registry also serves as the central hub for disseminating information, and regulations and guidelines to students, including the academic calendar, class timetables, examination and supplementary examination timetables, booklists, job opportunities, academic regulations, subject equivalence, class attendance, tuition fee and payment methods etc. Most of this information is available online, with some services offered online as well. For instance, students may enrol for modules online, and also view their grades and unofficial transcripts.

Student Counsellors

https://www.mpu.edu.mo/student_corner/en/counseling_overview.php

The counselling service is intended to assist students in adapting to their studies in the University, assist them to effectively manage their studies or prevent personal difficulties and enrich their campus life. The Student Counsellors provide counselling services to students on an individual basis and organise various types of activities. The Student Counsellors visit hostel students and non-resident students residing in the city on a regular basis.

Lecture Information for Students

https://www.mpu.edu.mo/student_corner/en/lecture_info.php

- Canvas LMS – e-Learning Platform
- Class Timetable Enquiry
- Class Cancellations & Make-up Classes Timetable Enquiry
- Examination Timetable Enquiry
- Re-sit Examination Timetable Enquiry
- e-Portfolio
- Booklists

IT Facilities

The University is keen to equip the campus with an efficient and effective IT infrastructure and computing environment and provides students especially those in Computing and AI Programme the conditions, they may expect to find in their future work place, using the Project Lab, Hardware Lab & self-study laboratory and other facilities.

On the one hand, the Project Lab (A216) providing high performance computers is dedicated to students in Computing and AI Programme especially for their final year projects. Besides Intel based PCs and Apple computers, numerous mobile devices, are available for use in selected projects.

On the other hand, the Hardware lab allows students to have hand-on experience with CISCO networking equipment, and other hardware devices. The detailed configurations of the laboratories can be found in <http://csc.mpu.edu.mo/index.php/computer-labs-intro>.

A dedicated computer laboratory, at A204, with teaching assistant is setup to provide learning support to 1st and 2nd year students in their programming skills. Moreover, self-learning facilities can be found in the main campus. The self-study Computer Lab A213, equipped with Intel computers, Apple Computers, scanners, color copiers and printers, is for students and registered public access only. In the lab, some lab assistants from the Information Technology Department provides assistance in using the computing facilities and enforce the computer laboratory usage regulations. Their contact phone number is 85996252. In addition, the self-learning area and Information Literacy Lab are setup in the Library in Wu Chi Building.

Basically, at least one of the computer labs opens 24 hours in normal days and until midnight in the evening of public holidays. The opening hours in the public holidays during Summer and Winter vacation are from 10 am till 10 pm. To access the computers in the labs, please login with your NetID and NetPassword as instructed in <http://csc.mpu.edu.mo/index.php/accounts-a-passwords/netid-computer-account>.

On the main campus, our IT facilities include a significant number of networked computers providing access to online services, Email and the Internet through computer laboratories and self-learning facilities and the campus wireless network as well.

In addition, Cyber cafés and information kiosks are available at a number of campus locations offering latest campus news and Internet access for students and visitors. Broadband Internet connections are provided in our student hostels to allow students to connect their computers to access the Internet within their rooms. *Canvas* is in use in the University offering our teachers and students an online teaching and learning management platform.

A helpdesk counter of the Information Technology Department is located at A201 on the main campus to provide IT support services to all staff and students.

SECTION 6 MAJOR QUALITY ASSURANCE MECHANISM AND STUDENT FEEDBACK SYSTEM

In guaranteeing that the assessment and examination procedure is up to standard, the Subject Leaders of the Assessment Standards Task Group of the Quality Assurance Committee (see Figure 2) are responsible for vetting the final examination question papers and marking schemes before the final examination, and also moderating the grading of student scripts after the final examination. The Internal Examiner for each module is responsible for grading students' continuous and final examinations. The External Examiner vets examination papers, moderates examination scripts, and attends Programme Examination Board meetings at the end of each year. Grades are previewed and double-marked by the Assessment Standards Task Group, forwarded to the Programme Examination Board, which are then submitted to the Pedagogic Committee (PC), the Examination Board at the Faculty Level. Students are given the right to review their grades. In case of any dispute between a student and the teacher, the Assessment Standards Task Group will try to resolve the issue. If it is not resolved, the issue will be brought to the Faculty level.

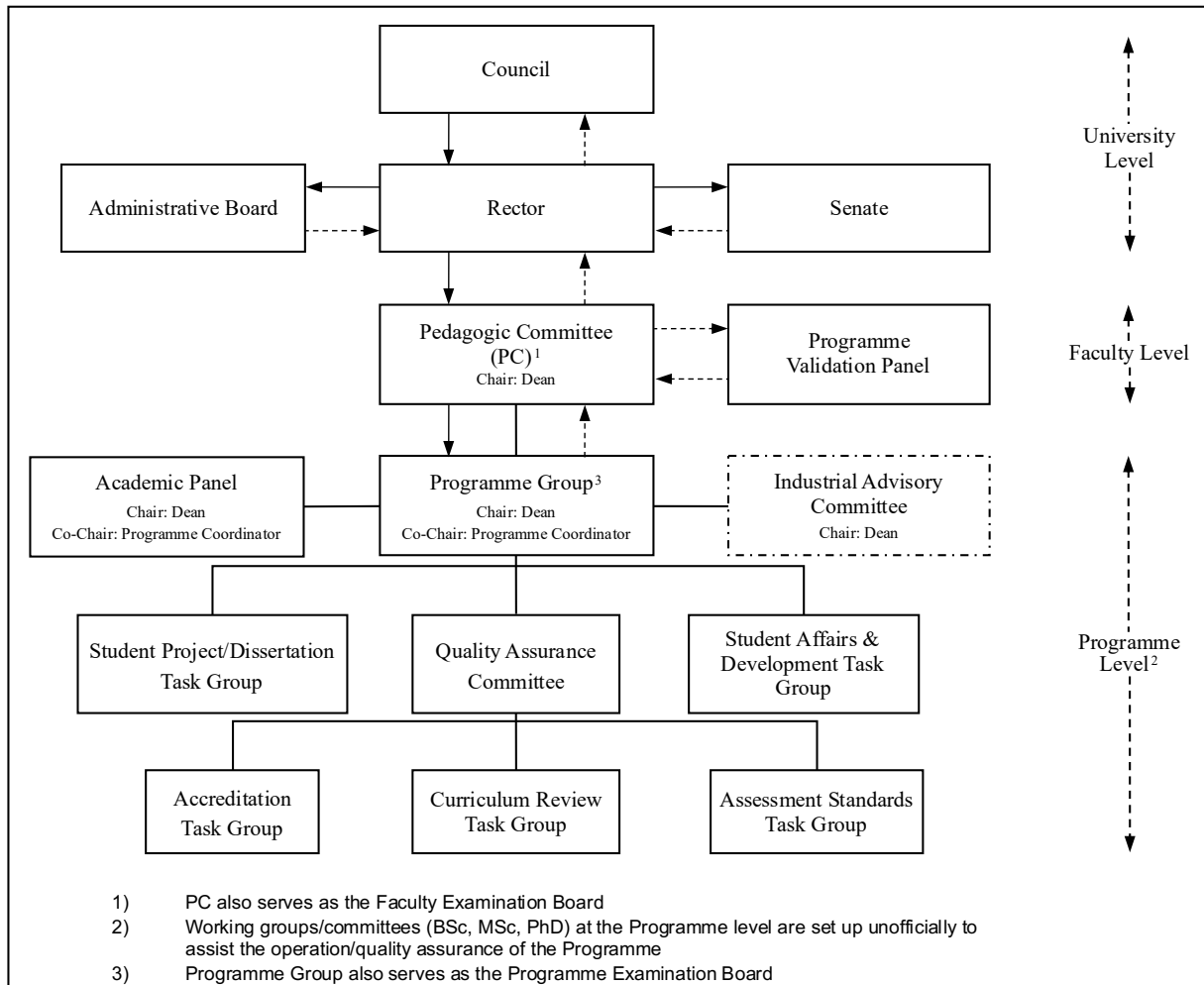


Figure 2 Academic Structure of MPU

Student Feedback

The University gathers feedback from students by a variety of means. These include informal staff/student discussions, Faculty Dialogue, Dialog with the University, student feedback questionnaires at module level, and engagement survey at the programme level.

Channels for student feedback are maintained and developed at the programme-level, being led by the Programme Coordinator, with the support of the Faculty Dean. At the Faculty level, the Faculty Dialog is a forum where student representatives can raise their problems and concerns. At the Programme level, students are encouraged to talk to their Year Tutors to discuss their personal as well as academic problems, which will be directed to the Student Advisor of the Programme's Student Affairs and Development Task Group. The Programme Coordinator may try to solve internal problems with the assistance of the Programme Team. If beyond the jurisdiction of the Programme level, problems will be directed to the Faculty Dialog Meeting. If beyond the jurisdiction of the Faculty level, the problems will be directed to the University level. The Faculty provides counsellors for students who want to resolve their problems further.

SECTION 7 GENERAL INFORMATION AND STUDENT ENQUIRIES

Programme Matters

Title and Name	Tel. No.	Email	Office
<i>Programme Coordinator</i> Dr. Yapeng Wang 王雅鵬博士	85996432	yapengwang@mpu.edu.mo	A313

List of Teachers

Teacher's Name	Tel. No.	Email	Office
Tse Tan Sim, Rita 謝丹嬋	85993280	ritatse@mpu.edu.mo	M537
Lam Chan Tong 林燦堂	85993342	ctlam@mpu.edu.mo	M502
Chan Mei Pou, Calana 陳美寶	85993277	calanachan@mpu.edu.mo	M511
Cheong Ngai, Phillip 張毅	85993333	ncheong@mpu.edu.mo	M520
Choi Ka Cheng, Rebecca 蔡嘉靜	85993335	rebeccachoi@mpu.edu.mo	M509
Chui Sai Chak, Zachary 崔世澤	85996411	zchui@mpu.edu.mo	A323
Ho Ka Chong, Wilson 何家忠	85996586	kcho@mpu.edu.mo	A216
Kim Song-Kyoo, Amang 金松圭	85996455	amang@mpu.edu.mo	A320
Lam Chi Kin, Charles 林子健	85996823	cklamsta@mpu.edu.mo	N46b
Lei Iat Seng, Philip 李日昇	85993356	phililei@mpu.edu.mo	M540
Lei Kin, Liam 李堅	85996808	liamli@mpu.edu.mo	N46b
Liu Yue, June 劉玥	85996433	yue.liu@mpu.edu.mo	A313
Lyu Erli 呂而立	85993267	erlilyu@mpu.edu.mo	M505
Pang Cheong Iao, Patrick 彭祥佑	85996886	patrickpang@mpu.edu.mo	N46b
Shen Hong 沈鴻	85993262	hshen@mpu.edu.mo	M501
Siu Ka Meng, Andrew 蕭嘉明	85996451	kmsiu@mpu.edu.mo	A320
Sun Yue, Joy 孫悅	85996889	yuesun@mpu.edu.mo	N46b
Tang Su Kit, Jacky 鄧樹傑	85996491	sktang@mpu.edu.mo	A202a
Tao Tan, 檀韜	85996643	taotan@mpu.edu.mo	A313
Wei Wei, 韋衛	85993392	weiwei@mpu.edu.mo	M505
Wong Chi Him, Dennis 黃智謙	85996875	cwong@mpu.edu.mo	N46b
Wong Un Hong, Chester 黃遠雄	85996453	chesterwong@mpu.edu.mo	A320
Yang Xu 楊旭	85996353	xuyang@mpu.edu.mo	A323
Yung Yau Kong, Edmund 容祐江	85993354	edmundyung@mpu.edu.mo	M511

Year Tutors

Class	Teacher	Tel. No.	Email	Office
Year 1-111	Siu Ka Meng, Andrew 蕭嘉明	85996451	kmsiu@mpu.edu.mo	A320
Year 1-112	Dr. Yung Yau Kong, Edmund 容祐江博士	85993354	edmundyung@mpu.edu.mo	M511

Student Enquiries

The Programme is operated with the *Faculty of Applied Sciences (FCA)*.

Location of the FCA office:

Room M539, Meng Tak Building, Main Campus.

Opening hours of the FCA office:

Monday - Thursday 9 am - 1 pm; 2:30 pm - 5:45 pm

Friday 9 am - 1 pm; 2:30 pm - 5:30 pm

Saturday, Sunday and Public holiday closed

Phone: (853) 85993281 or 85993273

Fax: (853) 28719227

Other Useful Contacts, Telephone Numbers, and Websites

WebMail

<https://mail.mpu.edu.mo/>

SIWeb

<http://siweb.mpu.edu.mo/> – to check timetable and other useful information

Programme Website

<http://cp.mpu.edu.mo/>

University Official Website

<http://www.mpu.edu.mo/>

Library & Photocopying

Website: <http://library.mpu.edu.mo/>

Phone: (853) 85996241, 85996708

Information Technology Department Website

<http://it.mpu.edu.mo/>

Computer Help Desk at A201

Phone: (853) 85996152

Fax: (853) 28530505

Email: it@mpu.edu.mo

Submit requests via email or the web-based service request system (SRMS) at:

<http://it.mpu.edu.mo/srms>.

Computer Lab Assistant at A213

Phone: (853) 85996147

Bell Centre

Phone: (853) 28719592

Fax: (853) 28719705

Email: mpubell@mpu.edu.mo

Registry

Phone: (853) 85996111/(853) 85996149/(853) 85996103

Fax: (853) 28523746

E-mail: registry@mpu.edu.mo

Student Affairs Office

Phone: (853) 85996203/(853) 85996121/(853) 85996486

Fax: (853) 28706747

E-mail: sao@mpu.edu.mo

Student Counselling and Advisory Services at A119

Phone: (853) 85996139/(853) 85996141

E-mail: priscillalai@mpu.edu.mo or thomasho@mpu.edu.mo

Welfare and Recreation Department

http://www.mpu.edu.mo/en/wrd_general_information.php

Student Union

<https://www.facebook.com/aeipm>

Scholarships and Grants

https://www.mpu.edu.mo/student_corner/en/scholarships_fellowships.php

Alumni

<http://mpu.edu.mo/aaampu/Chinese/cindex.htm>

APPENDICES

A1. Important Information and Regulations

Important guidelines and regulations are available in MPU website (Student > Undergraduate). Some of these resources are selected and listed here for your convenience.

Student Handbook

http://www.mpu.edu.mo/cntfiles/upload/docs/student_corner/common/student_handbook_e.pdf

The MPU Student Handbook provides students with such important information about the University as its regulations, services, facilities, and communication mechanisms. Printed copies of the Handbook are distributed to new students at the start of each academic year.

Prospectus

http://www.mpu.edu.mo/student_corner/en/prospectus_2223.php

The MPU prospectus provides students with such information as the academic calendar, MPU's profile, logo, motto, mission and vision, MPU's organisation and different study programmes.

Rules and Regulations

https://www.mpu.edu.mo/student_corner/en/rules_regulations.php



Academic Regulations

Admission Policy

Assessment Strategy

Regulations for Handling Examination Violations

Regulations for Handling Violations of Academic Integrity

Examination Regulations for Students

Regulations on the Management and Use of Teaching Facilities (Intranet)

Guidelines on Avoiding Plagiarism for Degree Programmes

Guidelines on Prevention of Sexual Harassment and Procedures of Handling Sexual Harassment Complaints (Intranet)

Students' Motorcycle Car Park

General Guidelines for Students with a Disability

Student Disciplinary Regulations

Guidelines for Student Internship

Assessment Strategy

http://www.mpu.edu.mo/student_corner/en/assessment_strategy.php

Macao Polytechnic University Guidelines for Plagiarism Avoidance

https://www.mpu.edu.mo/student_corner/en/reg_for_handling_violations_acad_integrity.php

Examination Regulations for Students

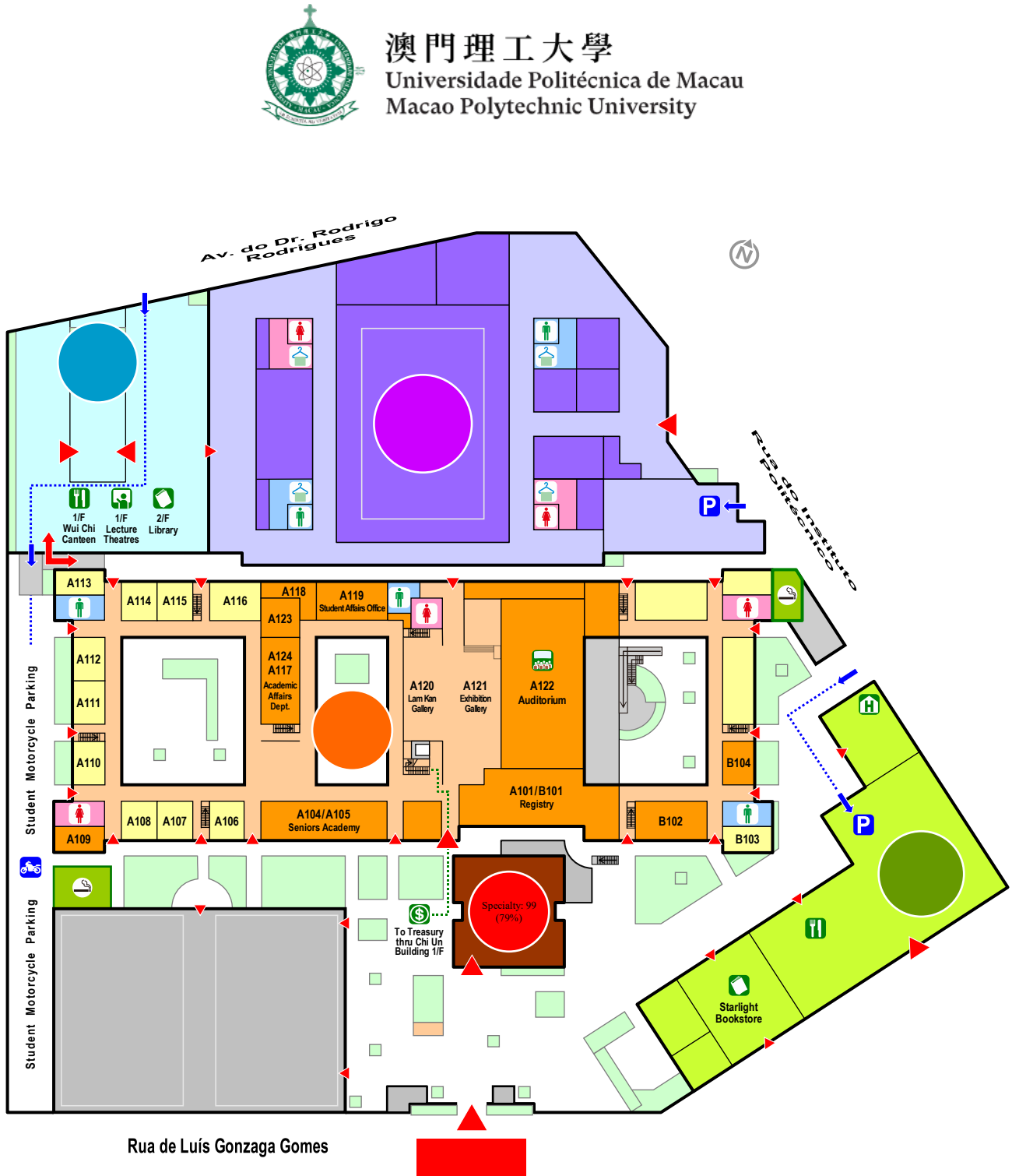
http://www.mpu.edu.mo/student_corner/en/examination_regulations_for_students.php

Adverse Weather Arrangements

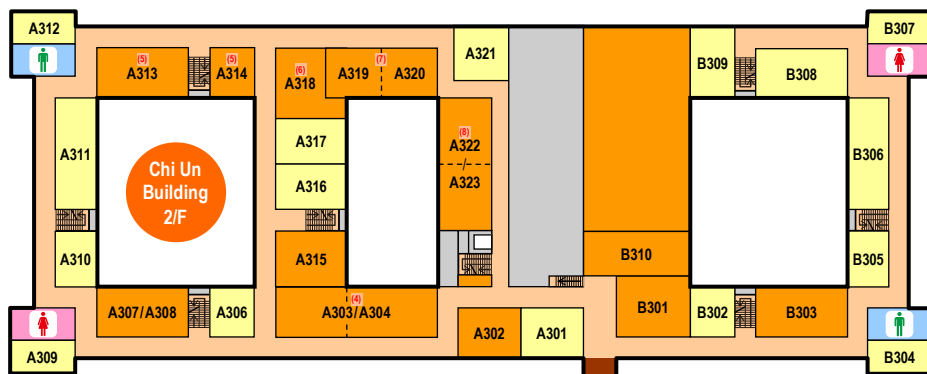
https://www.mpu.edu.mo/student_corner/en/adverse_weather_arrangements.php

A2. MPU Campus Map

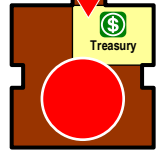
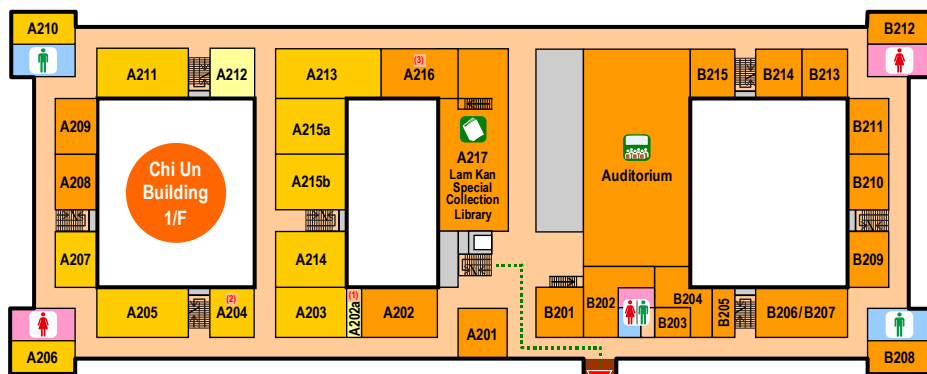
Map of Macao Polytechnic University Main Campus (1)



Map of Macao Polytechnic University Main Campus (2)

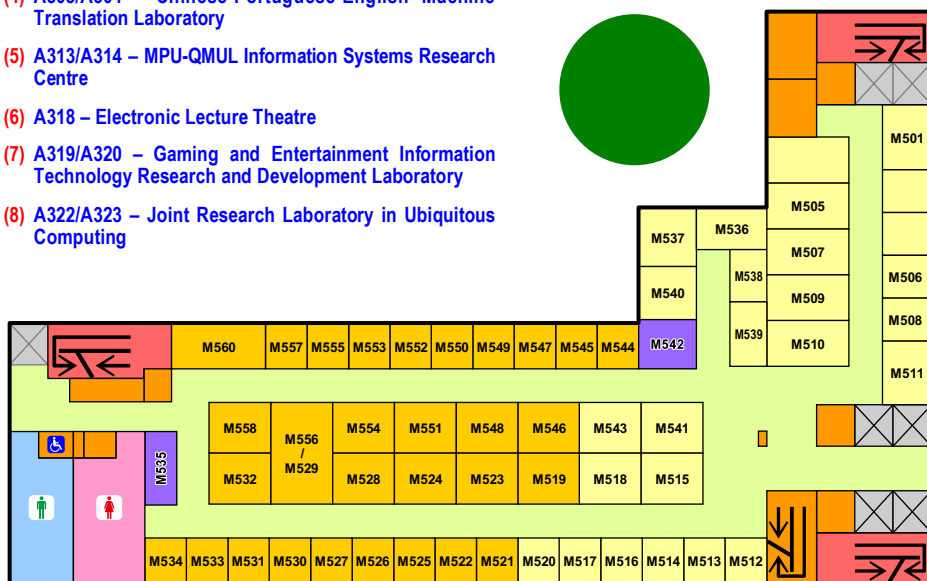


To Admin. Bldg. 2/F



Remarks

- (1) A202a – Office of the Programme Coordinator of the BSc. Programme / IPv6 Network Laboratory
- (2) A204 – Computer Lab for CP Students
- (3) A216 – Digital Terrestrial Television Research and Testing Centre / CP Project Lab
- (4) A303/A304 – Chinese-Portuguese-English Machine Translation Laboratory
- (5) A313/A314 – MPU-QMUL Information Systems Research Centre
- (6) A318 – Electronic Lecture Theatre
- (7) A319/A320 – Gaming and Entertainment Information Technology Research and Development Laboratory
- (8) A322/A323 – Joint Research Laboratory in Ubiquitous Computing



A3. Academic Calendar



Macao Polytechnic University
1st Semester, 2023/24

Week	Month	Events	Public Holidays / Students' Recess
1	August 2023	24 (開課) First Day of Classes (1st Semester)	
	Su M T W T F Sa		
	1 2 3 4 5		
	6 7 8 9 10 11 12		
	13 14 15 16 17 18 19		
2	September 2023		30 (中秋節翌日) The day following Mid-Autumn Festival
	Su M T W T F Sa		
	1 2		
	3 4 5 6 7 8 9		
	10 11 12 13 14 15 16		
3	October 2023		1 (國慶節) National Day 2 (國慶節翌日) The day following National Day 3 (中秋節翌日之後首個工作日) First Working Day After The day following Mid-Autumn Festival 4 (國慶節翌日之後首個工作日) First Working Day After The day following National Day 23 (重陽節) Chung Yeung Festival
	Su M T W T F Sa		
	1 2 3 4 5 6 7		
	8 9 10 11 12 13 14		
	15 16 17 18 19 20 21		
4	November 2023	29 (課堂結束) Last day of classes (1st sem.) 30/11-6/12 (補課/複習) Make-up Classes / Revision	2 (追思節) All Soul's Day
	Su M T W T F Sa		
	1 2 3 4		
	5 6 7 8 9 10 11		
	12 13 14 15 16 17 18		
5	December 2023	1-6 (補課/複習) Make-up Classes / Revision 7-19 (期末考試) Final Examinations (1st Sem.)	8 (聖母無原罪瞻禮) Immaculate Conception 20/12-1/1 (聖誕及新年假期) Christmas / New Year Recess
	Su M T W T F Sa		
	1 2		
	3 4 5 6 7 8 9		
	10 11 12 13 14 15 16		

Macao Polytechnic University 2nd Semester, 2023/24

Week	Month	Events	Public Holidays / Students' Recess
	January 2024		
	Su M T W T F Sa		
	1 2 3 4 5 6		
1	7 8 9 10 11 12 13	4 (期末考試成績公佈)Final Grades Announced 4 (開課)First Day of Classes (2nd Semester)	1 (元旦) New Year Day
2	14 15 16 17 18 19 20	4-5 (補考申請)Application for Re-sit Exam	
3	21 22 23 24 25 26 27	10-16 (補考期)Re-sit Examinations	
4	28 29 30 31	25 (補考成績公佈)Re-sit Exam Grades Announced	
	February 2024		
	Su M T W T F Sa		
	1 2 3		
5	4 5 6 7 8 9 10		7/2-18/2 (春節假期) Lunar New Year Recess
6	11 12 13 14 15 16 17		
7	18 19 20 21 22 23 24		
	25 26 27 28 29		
	March 2024		
	Su M T W T F Sa		
	1 2		
8	3 4 5 6 7 8 9		
9	10 11 12 13 14 15 16		
10	17 18 19 20 21 22 23		
11	24 25 26 27 28 29 30		29 (耶穌受難日) Good Friday 30 (復活節前日) Holy Saturday/Easter Eve
	31		
	April 2024		
	Su M T W T F Sa		
	1 2 3 4 5 6		
12	7 8 9 10 11 12 13		1 (復活節前日之後首個工作日) First Working Day After Easter Eve
13	14 15 16 17 18 19 20	20 (課堂結束) Last day of classes (2nd sem.)	4 (清明節) Ching Ming Festival
14	21 22 23 24 25 26 27	22-26/4 (補課/複習) Make-up Classes / Revision	
	28 29 30	27/4-9/5 (期末考試) Final Examinations (2nd Sem.)	
	May 2024		
	Su M T W T F Sa		
	1 2 3 4		
15	5 6 7 8 9 10 11	2-9 (期末考試) Final Examinations (2nd Sem.)	1 (勞動節) Labour's Day
	12 13 14 15 16 17 18	22 (期末考試成績公佈) Final Grades Announced	15 (佛誕節) Buddha's Birthday
	19 20 21 22 23 24 25	22-23 (補考申請) Application for Re-sit Exam	
	26 27 28 29 30 31	28/5-3/6 (補考期) Re-sit Examinations	
	June 2024		
	Su M Tu W Th F Sa		
	1		
	2 3 4 5 6 7 8	1-3 (補考期) Re-sit Examinations	
	9 10 11 12 13 14 15	8 (補考成績公佈) Re-sit Exam Grades Announced	
	16 17 18 19 20 21 22		
	23 24 25 26 27 28 29		
	30		10 (端午節) Tuen Ng Festival

A4. Textbook List

Year	Module Name	Module Code	Teacher	Text Book (* = Reference Book)	Edition / Year	Publisher	Author	Remark / ISBN
1	Introduction to Computer Science and its Application	COMP1121	Phillip Cheong	Discovering Computers: Digital Technology, Data, and Devices	16 th Edition	Cengage Learning	Misty E. Vermaat, Susan L. Sebok, Steven M. Freund, Jennifer T. Campbell and Mark Frydenberg	9781337285100 (Paperback) 9781337515092 (eBook)
	Introduction to Programming	COMP1122	Chester Wong	Introduction to Computation and Programming Using Python	3 rd Edition	MIT Press	John V. Guttag	9780262542364 (Paperback) 9780262363433 (eBook)
	Linear Algebra	MATH1111	Charles Lam	Introduction to Linear Algebra	6 th Edition	MIT Press	Gilbert Strang	9781733146678
	Calculus	MATH1112	Liam Lei	Thomas' Calculus	14 th / 2017	Pearson	George B. Thomas	9780134438986
	Constitution and Basic Law	LLAW1120	Yolanda Leong	-	-	-	-	-
	English I	MENG1111	Daisy Jiang / Oscar Ho / Jovy Wong	Cutting Edge (Intermediate)	3 rd / 2013	Pearson Longman	Cunningham S., P. Moor, and J. Bygrave	9781447936879
				* Ready to Write	3 rd / 2010	Pearson Longman	Blanchard, K. and C. Root	9780131363304
* Success with Reading 1				2019	Cosmos Culture	Gionis, T.	9786263000384	