MASTER OF ARTIFICIAL INTELLIGENCE PROGRAMME REQUIREMENTS

1.   Programme Type

The type of programme offered for the Master of Artificial Intelligence is a programme consisting 10 modules, which prepares students for the final capstone project. This programme allows students to apply the knowledge they learned in the taught courses into real world applications.

2.   Admission

(a)   Qualifications for Admission

  (i)   A Bachelor's degree in Science Computer and Information Technology (Science stream) or a related field with a minimum CGPA of 3.0: **or**

     OR

  (ii)   A bachelor's degree in Science Computer and Information Technology (Science stream) or a related field with a minimum CGPA of 2.7-2.99 with Computer Science/ Artificial Intelligent experiences minimum 3 years

     OR

(iii)   Other qualifications approved by the University Senate.

(b)   English Language Proficiency

International candidates are required to:

(i)   At least IELTS Band 6 (Academic) or TOEFL score of 550 (paper based) / 213 (computer based) / 80 (Internet based) /PTE minimum 57 score if their first degree is from a university where English is not the medium of instruction.

3.   Duration of Study

The programme of study: two (2) semesters + one (1) special semester, to eight (8) semesters.

4.   Programme Structure

(1)   The Master of Artificial Intelligence Programme through coursework shall have a total of forty-two (42) credits.

(2)   Through Coursework

(i) The programme shall consist of two parts:

(a)   Part I comprises:

(i)   **Seven (7)** core discipline courses, comprised of three or four credits courses; and

(ii)   **two (2)** elective courses, each four credits

(b)   Candidates may be imposed to enrol in other courses and obtain satisfactory results deemed necessary by the Faculty.

(c)   Part II consist of a **ten (10) credits project** and shall involve investigation and analysis of a real-world case study, leading to the submission of a report.

(3)   Details of courses offered shall be of those approved by the Senate from time to time on the recommendation of the Faculty and shall be made known to the candidates at the start of each session.

(4)   The list of Senate approved courses for the Master of Artificial Intelligence Programme shall be as indicated in List 1.

PROGRAMME GOALS AND OUTCOMES MASTER OF ARTIFICIAL INTELLIGENCE

AIM OF THE PROGRAM

To produce high quality and skilled graduates who are critical thinkers in the field of Artificial Intelligence through research, education and dissemination of knowledge.

Objective

The Program objectives are:

1. Graduates who are skilled in the development of technology based on Artificial Intelligence.
2. Graduates who are involved in research and continuing education activities based on Artificial Intelligence.
3. Graduates who practice a professional and ethical attitude in applying Artificial Intelligence technology.

PROGRAMME LEARNING OUTCOMES

No.	Programme Learning Outcomes	POs	Taxonomic Category
1.	Demonstrate the mastery of knowledge and thorough understanding of technological and scientific principles in the field of Artificial Intelligence.	PO1	K
2.	Recommend innovative solutions that is at the forefront of developments in Artificial Intelligence.	PO2	K
3.	Utilize tools or software to develop useful, efficient, effective AI solutions.	PO3	P
4.	Communicate and interact effectively within a group and with diverse stakeholders by publishing and presenting technical materials in the fields of Artificial Intelligence.	PO4	P,A
5.	Apply a wide range of digital technologies with suitable Artificial Intelligence techniques in designing and planning solutions.	PO5	P
6.	Demonstrate leadership, teamwork, autonomy and responsibility in delivering services in Artificial Intelligence.	PO6	P,A
7	Exhibit capabilities to extend knowledge through life-long learning in Artificial Intelligence.	PLO7	A
8	Uphold professional and ethical practices in conducting research and delivering services in Artificial Intelligence.	PLO8	A

Total hours of student learning time for the entire program is 42 credits.

(List of 7 domains of learning outcomes in accordance with the MQF program. Please refer to the attachment. Additional learning outcomes can be given if necessary)

Reference notes:

The Domain of the MQF in Programme Learning Outcomes program (PO)

PO Domain

PO1   Knowledge

PO2   Practical Skills

PO3   Social Skills and Responsibility

PO4   Values, Attitudes and Professionalism

PO5   Communication, Leadership and Team Skills

PO6   Problem Solving and Scientific Skills

PO7   Information Management and Life Long Learning Skills

PO8   Managerial and Entrepreneurial Skills

Reference notes:
Taxonomic Category

K   Cognitive
A   Affective
P   Psychomotor

COURSE PLAN FOR MASTER OF ARTIFICIAL INTELLIGENCE ACADEMIC SESSION 2023/2024

INTAKE SEMESTER 1 2023/2024

MASTER OF ARTIFICIAL INTELLIGENCE		Credits	Semester I 2023/2024	Semester II 2023/2024	Semester III 2023/2024
Core Courses					
WOX7001	*Research Methodology	**3**	√		
WOA7015	Advanced Machine Learning	**3**	√		
WQF7002	AI Techniques	**3**	√		
WQF7006	Computer Vision and Image Processing	**3**	√		
WQF7007	Natural Language Processing	**4**	√		
WQF7001	AI Research Project - P1	**10**		√	
WQF7003	Intelligent Computation	**3**		√	
WQF7004	Data Analytics	**3**		√	
WQF7005	Data Privacy and AI Ethics	**3**		√	
WQF7001	AI Research Project – P2	**N/A**			√
Elective Courses [Students are required to choose any two (2) courses from the list below]					
WQF7008	Practical Deep Learning	**3**	√		
WQF7009	Explainable AI(XAI)	**3**	√		
WOA7019	Augmented Reality	**3**		√	
WQF7010	Robotics and Automation	**3**		√	
WQF7011	Cognitive Computing	**3**		√	

Note:
*Students are only allowed to register for the *WQF7001 AI Research Project* after completing at least three (3) core discipline courses (including WOX7001)

The courses that will be offered every semester are subject to change, depending on the availability of staff and the number of students registering.

COURSE PLAN FOR MASTER OF ARTIFICIAL INTELLIGENCE
ACADEMIC SESSION 2023/2024

INTAKE SEMESTER 2 2023/2024

MASTER OF ARTIFICIAL INTELLIGENCE		Credits	Semester II 2023/2024	Semester III 2023/2024	Semester I 2024/2025
Core Courses					
WOX7001	*Research Methodology	**3**	√		
WOA7015	Advanced Machine Learning	**3**	√		
WQF7002	AI Techniques	**3**	√		
WQF7006	Computer Vision and Image Processing	**3**	√		
WQF7007	Natural Language Processing	**4**	√		
WQF7001	AI Research Project - P1	**10**			√
WQF7003	Intelligent Computation	**3**			√
WQF7004	Data Analytics	**3**			√
WQF7005	Data Privacy and AI Ethics	**3**			√
WQF7001	AI Research Project – P2	**N/A**		√	
Elective Courses [Students are required to choose any two (2) courses from the list below]					
WQF7008	Practical Deep Learning	**3**			√
WQF7009	Explainable AI(XAI)	**3**			√
WOA7019	Augmented Reality	**3**	√		
WQF7010	Robotics and Automation	**3**	√		
WQF7011	Cognitive Computing	**3**	√		

WOX7001   Research Methodology

Course Learning Outcomes

At the end of the course, students are able to:
1. Describe appropriate methodologies used in computer science and information technology research.
2. Devise a plan to be carried out within a feasible duration for answering research problems and questions identified.
3. Demonstrate attitude and character in line with professional and ethical codes in computer science and information technology research.

Synopsis of Course Content

This course gives on overview of the dimensions of research in computer science and information technology. Major considerations and tasks in conducting research in the areas such as review of literature, identify problem statement, formulate research questions and objectives, select an appropriate approach or method to the research, plan and manage the research, tools for research, data analysis, and writing and presentation strategies, will be discussed too.

Evaluation and Weightage

Continuous Assessment   **:** 100%
Final Examination   **:** 0%

WOA7015   Advanced Machine Learning

Course Learning Outcomes

At the end of this course, students are able to:

1. Practice concepts and techniques for machine learning related to digital and numerical methods.
2. Report the solution to machine learning problems by devising and listing the steps in machine learning applied to solve different types of problems
3. Demonstrate skills and knowledge on machine learning by managing a machine learning project.

Synopsis of Course Content

This course introduces advanced concepts and techniques for machine learning. It covers topics such as linear and logistic regression, decision tree, neural network, and support vector machines as well as reinforcement learning

Evaluation and Weightage

Continuous Assessment   : 50%
Final Examination   : 50%

WQF7002   Artificial Intelligence Techniques

Course Learning Outcomes

At the end of the course, students are able to:
1. Explain what constitutes Artificial Intelligence and identifying systems with Artificial Intelligence elements.
2. Analyse the applications of Artificial Intelligence techniques in intelligent agents, expert systems, artificial neural networks, and other machine learning models.
3. Apply basic principles of Artificial Intelligence in problem solving, inference, perception, knowledge representation, and machine learning

Synopsis of Course Content

This course introduces the core artificial intelligence concepts and skills that allow machines to mimic human intelligence. It contains a theory component about the concepts and principles that underlie modern AI algorithms, and a practice component to relate theoretical principles with practical implementation. Coverage includes knowledge representation, logic, inference, problem solving, search algorithms, game theory, perception, learning, planning, and agent design

Evaluation and Weightage

Continuous Assessment   : 60%
Final Examination   : 40%

WQF7006   Computer Vision and Image Processing

Learning Outcomes
At the end of this course, the students are able to:

1. Evaluate suitable image processing techniques to solve artificial intelligence problems.
2. Evaluate performances of image processing methods for a given artificial intelligence scenario.
3. Design and develop image processing systems in the artificial intelligence domain

Synopsis of Course Content

This course explores image processing techniques in solving artificial intelligence problems. Image formation and image models are initial steps involved, It covers pixel and object level operations including histogram, edge, and segment. Image enhancement and restoration are compared. Image registration and image transform operations are included. Finally, image features and recognition processes are given. Deep learning approach for computer vision is included

Evaluation and Weightage

Continuous Assessment   : 60%
Final Examination   : 40%

WQF7007   Natural Language Processing

Learning Outcomes
At the end of the course, students are able to:
1. Apply the Natural Language Processing (NLP) techniques in various domains.
2. Design a Natural Language Processing (NLP) solution to resolve issues related to unstructured text.
3. Develop an NLP application by integrating all processes in the NLP pipeline which are pre-processing, low level task and high-level task.

Synopsis of Course Content
Natural language processing (NLP) is one of the most important areas in Artificial Intelligence (AI). This course covers the theory and practice of NLP through techniques for different levels which are pre-processing, low-level and high level. It also covers recent techniques and applications in NLP including Sentiment Analysis, Machine Translation, Topic Modeling and Named Entity Recognition.

Evaluation and Weightage

Continuous Assessment   : 70%
Final Examination   : 30%

WQF7003   Intelligent Computation

Learning Outcomes
At the end of the course, students are able to:
1. Explain how mathematical theories help in solving AI problems.
2. Solve AI problems with formal reasoning.
3. Combine mathematical techniques in solving artificial intelligence problems.

Synopsis of Course Content
This course covers fundamental mathematical theories that support the development of artificial intelligence. Topics covered include logic and reasoning, linear algebra, graph theory and search algorithms, and probability theory.

This course finds relation with other courses in the program, such as: Advanced Machine Learning where linear algebra, graph theory and search algorithms are used heavily; Computer Vision and Image Processing where linear algebra and probability theory finds their applications; and Natural Language Processing which has relation with graph theory and search algorithms, as well as logic and reasoning. The content of this course is also the fundamental of courses like Practical Deep Learning and Artificial Intelligence Techniques.

Evaluation and Weightage

Continuous Assessment   : 50%
Final Examination   : 50%

WQF7004   Data Analytics in Artificial Intelligence

Learning Outcomes
At the end of this course, students are able to
1.   Explain the basic concepts of data analytics in Artificial Intelligence in various domains.
2.   Design domain-based data analytic pipeline to solve real world Artificial Intelligence problems.
3.   Apply suitable data analytics techniques to solve real world problems for Artificial Intelligence.

Synopsis of Course Content
This course aims to develop students' ability to describe, explore and analyse various types of data (tabular,text and images) using suitable data analytics techniques and do predictive modelling by using different Machine Learning techniques.

Evaluation and Weightage

Continuous Assessment   : 60%
Final Examination   : 40%

WQF7005   Data Privacy and Artificial Intelligence Ethics

Learning Outcomes
At the end of this course, the students are able to:
1. Assess the importance of data privacy and ethical concepts in the development of Artificial Intelligence system.
2. Check current smart systems and technologies that are less concerned with ethical issues and data privacy.
3. Design Artificial Intelligence technology to be more responsible and in line with the needs of industry and society

Synopsis of Course Content
The course describes the concepts and philosophy of data privacy and ethics in Artificial Intelligence technologies. All strategies for developing a more responsible Artificial Intelligence system will be explained in more detail. The course also analyse and critique issues of data privacy violations or unethical values in current smart systems and technologies

Evaluation and Weightage

Continuous Assessment   : 70%
Final Examination   : 30%

WQF7001   Artificial Intelligence Research Project

Learning Outcomes
At the end of this course, students are able to:
1. Design solution using artificial intelligence techniques for real world problems.
2. Develop Artificial Intelligence-based solution formulated on project objectives.
3. Explain solution in oral and written presentation related to artificial intelligence research.

Synopsis of Course Content
A research project is a medium-scale project to enable students to do research related to artificial intelligence. Research projects allow students to use actual data from industry partners or public data to create applications by applying knowledge in the basic, theories and scientific methods to solve problems related to artificial intelligence. During the project, students will engage in the overall process of general research, starting with identifying problems, collecting and processing data, recommending solution methods, applying appropriate scientific methods and ending with implementing affordable solutions and evaluations. At the end of the course, students are required to submit a project report and perform a project presentation.

Evaluation and Weightage

Continuous Assessment   : 100%
Final Examination   : 0%

WQF7008   Practical Deep Learning

Learning Outcomes
At the end of the course, students are able to:

1. Unifies the knowledge on the fundamentals and architectures of deep learning, and the need for parallel and distributed computing for deep learning.
2. Integrate and develop the requirements for cloud computing infrastructure, GPU and relevant software as well as tools for setting up, modelling, debugging and serving of deep learning projects.
3. Practise the knowledge and skills to design deep learning based solutions.

Synopsis of Course Content
This course is closely linked with the Advance Machine Learning course which is a pre-requisite for this course. It reinforces the knowledge on the fundamental concepts related to deep learning (such as different deep learning architectures) and introduces practical techniques to get started on Artificial Intelligence projects and develop an industry portfolio. Specifically, it will provide the necessary knowledge and skills on how to design a deep learning production system end-to-end: project scoping, data needs, modelling strategies, and system deployment requirements.

Evaluation and Weightage
Continuous Assessment   : 60%
Final Examination   : 40%

WQF7009   Explainable Artificial Intelligence (XAI)

Learning Outcomes
At the end of the course, students are able to:

1. Categorize the concepts of Explainable Artificial Intelligence (AI) and the current techniques for generating explanations from black-box machine learning methods.
2. Design the Explainable AI methods.
3. Develop the ability to critically assess the state-of-the-art of Explainable AI methods.

Synopsis of Course Content
This course gives an introduction to Explainable AI (XAI), providing an overview of relevant concepts such as interpretability, transparency and black-box machine learning methods. The course provides an overview of state-of-the-art methods for generating explanations, and touches upon issues related to decision-support, human interaction with AI/intelligent systems and their evaluation. In summary, the Explainable AI course covers the following topics: definitions and concepts such as black-box models, transparency, interpretable machine learning and explanations, explainable AI models, methods for Explainable AI, applications and examples.

Evaluation and Weightage
Continuous Assessment   : 60%
Final Examination   : 40%

WQF7010　　　Robotics and Automation

Learning Outcomes
At the end of the course, students are able to:

1. Design robotic and automation systems using parts like sensors, controllers and actuators.
2. Infer patterns from data collected.
3. Evaluate robotic and automation systems for optimum performance in various applications.

Synopsis of Course Content
This course focuses on developing robotic and automation systems by integrating components such as sensors, controllers, motors and actuators. Students apply data acquisition methods, control methods and also program robot sensing, connectivity, mobility and manipulation to achieve automation. Additionally, students can apply artificial intelligence techniques to analyse collected data for informed decision making.

Evaluation and Weightage

Continuous Assessment　　　: 70%
Final Examination　　　　　: 30%

WQF7011　　　Cognitive Computing Learning Outcomes

At the end of the course, students are able to:

1. Assess the relationship between cognitive computing systems, artificial intelligence and and human interaction.
2. Specify requirements and techniques for designing cognitive computing systems.
3. Develop cognitive computing systems as a solution for artificial intelligence applications.

Synopsis of Course Content
The student will learn and understand the concept of cognitive computing systems and its relations with artificial intelligence and big data. Students will also learn the requirements and techniques such as the characteristics, components and architecture needed to design cognitive computing system applications powered by multiple AI technologies encompassing machine learning, reasoning, natural language processing, speech recognition and vision (object recognition), human–computer interaction, dialog and narrative generation. In addition, students will also evaluate how such systems can be used to achieve human-like behaviors that improve the performance of human-machine interactions in various domains

Evaluation and Weightage

Continuous Assessment　　　: 70%
Final Examination　　　　　: 30%

WOA7019　　　Augmented Reality

At the end of the course, students are able to:

1. Describe the technologies related to Augmented Reality.
2. Apply the related new technologies in the design of augmented reality applications.
3. Develop interactive augmented reality applications for both PC based and mobile devices using a variety of input devices.

Synopsis of Course Content
This course is designed to introduce students with knowledge related to augmented reality concepts and technology. This is followed with a discussion on how knowledge about human sensory systems can facilitate in designing ergonomic augmented reality devices that match human perceptual capabilities. Students are then trained to develop an augmented application using a suitable

programming language and 3D software. Towards the end of the course, there will be discussions on several examples of augmented reality applications with emphasis on the contributions of the augmented reality technology and future direction of this technology.

Evaluation and Weightage

Continuous Assessment   : 70%
Final Examination   : 30%