

POSTGRADUATE ACADEMIC HANDBOOK 2026/2027

Master Degree Programmes

Faculty of Artificial Intelligence
and Cyber Security (FAIX)

POSTGRADUATE ACADEMIC HANDBOOK

Master Degree Programmes

Session 2026/2027

FACULTY OF ARTIFICIAL INTELLIGENCE AND CYBER SECURITY
UNIVERSITI TEKNIKAL MALAYSIA MELAKA

All the information in this Academic Handbook is precise and current at the time of print.
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Universiti Teknikal Malaysia Melaka.

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VISION & MISSION

Establishment

UTeM was established under Section 20 University and University College Act 1971 (Act 30) through “Perintah Universiti Teknikal Malaysian Melaka (Pemerbadanan 2007)” gazetted as P.U. (A) on 1st February 2007. UTeM was initially known as Kolej Universiti Teknikal Kebangsaan Malaysia (KUTKM), established on 1st December 2001.

Vision

To be one of the world’s leading innovative and creative technical universities

Mission

UTeM determined to lead and contribute to the wellbeing of the country and the world by:

- Promoting knowledge through innovative teaching and learning, research and technical scholarship;
- Developing professional leaders with impeccable moral values;
- Generating sustainable development through smart partnership with the community and industry.

Motto

Excellence through competency.



Educational Goals

1. To conduct academic and professional programmes based on relevant needs of the industries.
2. To produce graduates with relevant knowledge, technical competency, soft skills, social responsibility and accountability.
3. To cultivate scientific method, critical thinking, creative and innovative problem solving and autonomy in decision making amongst graduates.
4. To foster research development and innovation activities in collaboration with industries for the development of national wealth.
5. To equip graduates with leadership and teamwork skills as well as develop communication and life-long learning skills.
6. To develop technopreneurship and managerial skills amongst graduates.
7. To instill an appreciation of the arts and cultural values and awareness of healthy life styles amongst graduates.

UTeM Top Management



**PROFESSOR DATUK
TS. DR. MASSILA BINTI KAMALRUDIN**
(VICE CHANCELLOR)



**PROFESSOR
DR. MOHD RIZAL BIN SALLEH**
DEPUTY VICE CHANCELLOR
(ACADEMIC AND INTERNATIONAL)



**PROFESSOR DR. ZAHRILADHA
BIN ZAKARIA**
DEPUTY VICE CHANCELLOR
(RESEARCH AND INNOVATION)



**ASSOCIATE PROFESSOR DATUK
DR. SABRI BIN MOHAMAD SHARIF**
DEPUTY VICE CHANCELLOR
(STUDENT AFFAIRS AND ALUMNI)



**ASSOCIATE PROFESSOR
DR. MUSTHAFAH BIN MOHD TAHIR**
ASSISTANT VICE CHANCELLOR
(STRATEGIC AND GLOBAL SUSTAINABILITY)



**MR. MASDZARIF
BIN MAHAT**
(CHIEF OPERATING OFFICER)



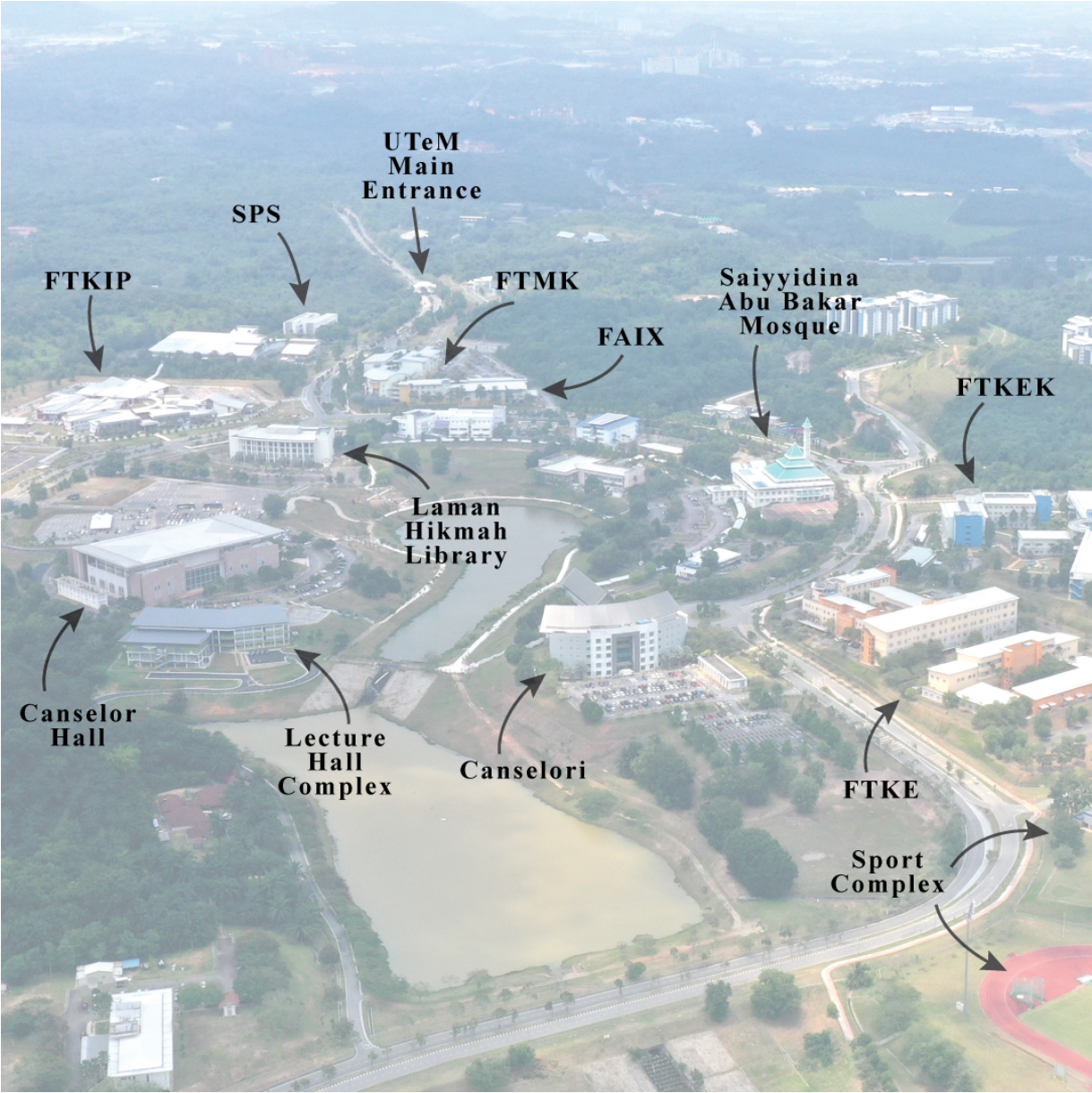
**MRS. SABARINA
BINTI ABDULLAH**
(BURSAR)



**MRS. SITI SALUWA
BINTI JAMAL**
(CHIEF LIBRARIAN)



**MR. MOHD NIZAM
BIN PAVEL**
(LEGAL ADVISOR)



FORWARD

by The Dean

Assalamualaikum warahmatullahi wabarakatuh and warm greetings.

All praise is due to Allah, the Most Gracious, the Most Merciful. It is my great pleasure to welcome all new and returning students to the Faculty of Artificial Intelligence and Cyber Security (FAIX), Universiti Teknikal Malaysia Melaka (UTeM), for the Academic Session 2026/2027.

A year has passed since FAIX embarked on its inaugural academic journey, and what an exciting year it has been. Established as part of UTeM's strategic vision to lead in emerging technologies, FAIX has continued to strengthen its position as a centre of excellence in artificial intelligence, cyber security, and digital innovation. Building upon the momentum of our official launch by the Prime Minister of Malaysia in June 2025, we have continued expanding our academic capabilities, strengthening industry collaborations, enhancing research initiatives, and creating meaningful learning experiences for our students.

Today, FAIX is no longer merely a newly established faculty. We are a growing academic community driven by innovation, integrity, and impact. Our dedicated team of academic, administrative, and technical staff remains committed to providing an education that combines strong theoretical foundations with practical, industry-relevant experiences. As technologies evolve rapidly, we continuously adapt our programmes to ensure our graduates remain future-ready, globally competitive, and ethically responsible.

To our new students, you are joining FAIX at a remarkable time. Artificial intelligence is reshaping industries, economies, and societies at an unprecedented pace. With these opportunities come great responsibilities. Beyond acquiring technical knowledge and professional skills, I encourage you to cultivate critical thinking, creativity, resilience, and a strong sense of ethics. These qualities will distinguish future leaders in the age of AI.



ASSOC. PROF. TS. DR. MUHAMMAD HAFIDZ FAZLI BIN MD FAUADI
DEAN
**FACULTY OF ARTIFICIAL INTELLIGENCE AND
CYBER SECURITY (FAIX)**

To our returning students, thank you for being part of FAIX's first chapter. Your achievements, contributions, and pioneering spirit have laid a strong foundation for those who follow. Continue to challenge yourselves, pursue excellence, and serve as role models within our growing faculty community.

At FAIX, learning extends far beyond the classroom. I encourage every student to actively participate in research, innovation projects, industry engagements, competitions, professional certifications, entrepreneurship initiatives, and community programmes. These experiences will not only enrich your university life but also prepare you to thrive in an increasingly interconnected and technology-driven world.

As we begin this new academic session together, let us continue building a faculty that embraces excellence, nurtures innovation, and creates meaningful impact for society. Together, we will contribute towards advancing Malaysia's digital transformation and developing technologies that are intelligent, secure, inclusive, and beneficial to humanity. I wish each of you a rewarding, successful, and inspiring academic journey at FAIX.

Thank you.



FAKULTI KECERDASAN BUATAN DAN KESELAMATAN SIBER
FACULTY OF ARTIFICIAL INTELLIGENCE AND CYBER SECURITY

VISION & MISSION

Vision

To be a global leader in advancing Artificial Intelligence and Cyber Security, empowering an intelligence, secure, and future-ready digital world.

Mission

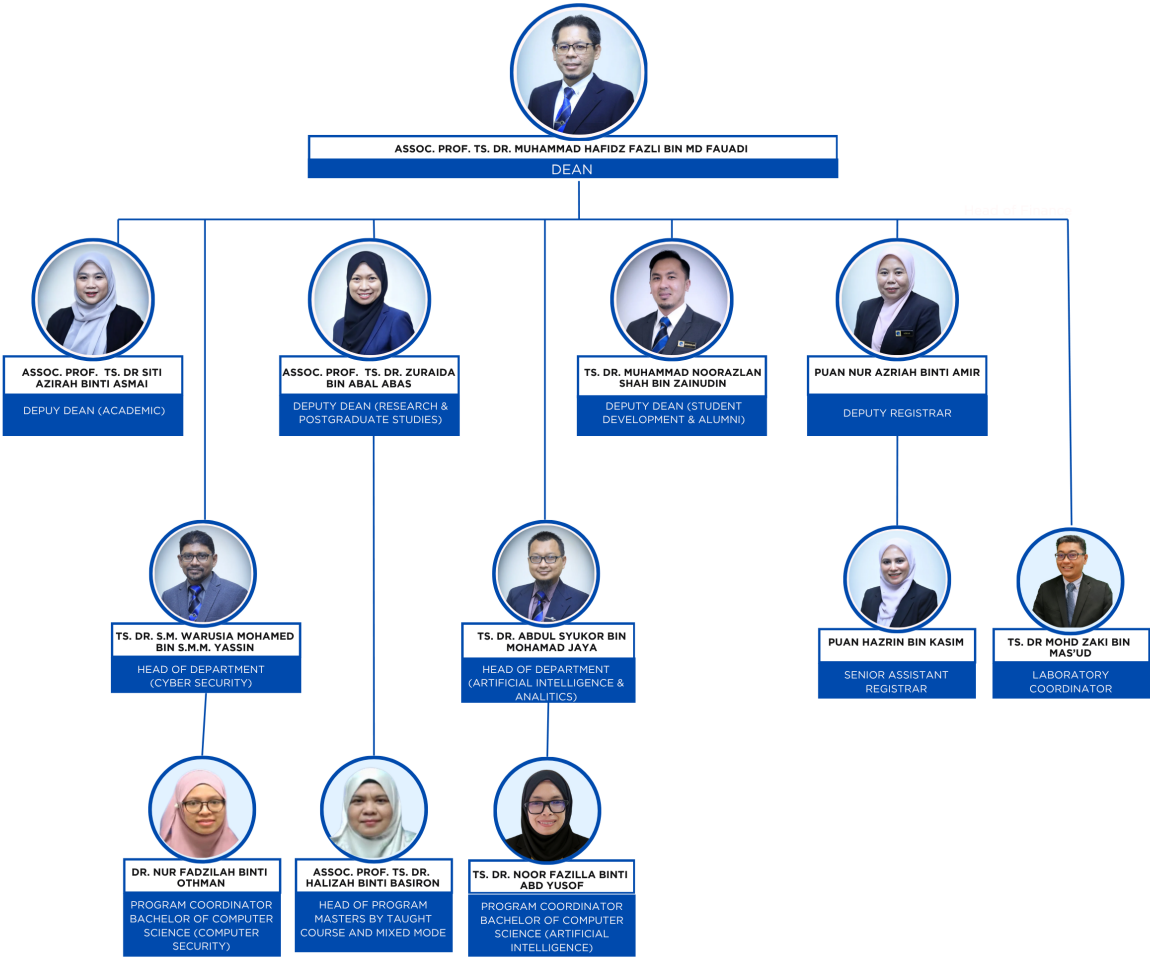
1. Leading the development of competent talent in the fields of Artificial Intelligence and Cyber Security to shape human capital and a secure, intelligent digital future.
2. Pioneering innovation in Artificial Intelligence and Cyber Security through strategic collaboration.
3. Advancing Artificial Intelligence and Cyber Security solutions that are ethical, inclusive, industry-oriented and societal well-being.

Objectives

1. To produce graduates who are competent, globally competitive, creative, and innovative in Artificial Intelligence and Cyber Security, capable of addressing future technological and industrial challenges.
2. To enhance research, innovation, and commercialisation in Artificial Intelligence and Cyber Security with strategic and integrated approach, to social well-being and technological sustainability.
3. To foster strong moral, leadership and ethics values among students holistically.
4. To strengthen smart infrastructure, digital systems, financial governance, and a high-performance work culture that supports sustainability of the faculty.
5. To uphold the faculty as a globally recognised institution through internationalisation, strategic collaborations, and excellence in academic and research.



ORGANIZATIONAL CHART



List of Programme Offered

MASTER'S DEGREE

By coursework:

1. Master in Cyber Security, MAXX (MQA/FA 5653)
Coordinator: Dr Zaheera Zainal Abidin
2. Master of Technology in Data Science and Analytics, MAXS (MQA/FA 9613)
Coordinator: Ts. Dr Ngo Hea Choon
3. Master of Technology in Data Science and Analytics, MAXL (MQA/PA 17473)_(ODL mode)
Coordinator: Ts. Dr Norfadzlia Mohd Yusof

BACHELOR'S DEGREE ¹

1. Bachelor of Computer Science (Artificial Intelligence) with Honours, BAXI (MQA/FA1888)
Programme Coordinator:Ts. Dr Noor Fazilla Abd Yusof.
2. Bachelor of Computer Science (Computer Security) with Honours, BAXZ (MBOT/FA/IT/0/02/0015)
Programme Coordinator: Dr Nur Fadzilah Othman.

¹Please browse through our **Undergraduate Academic Handbook** for details of Undergraduate Programmes

Facilities

Lab Facilities

Faculty of Artificial Intelligence and Cyber Security (FAIX) has been equipped with the state-of-art computers and software and integrated into UTeM Network. These facilities ease the process of teaching and learning in FAIX.

Averages of 36 computers with latest software are located at each lab and studio to ensure practical teaching and learning is applicable for the students. Server, router, switches, wireless, digital camera, video, biometric machines are also provided for teaching and learning purposes.

Lab Staffs

The labs in FAIX are administered by the Lab Coordinator assisted by Assistant Engineers to ensure smooth teaching and learning processes. The infrastructure committee members are responsible for maintaining and managing respective clients in FAIX environment.

Loan Facilities on Lab Equipment

Students are allowed to use the lab equipment to complete their assignments or projects on time. The equipment that are allowed to be used are wireless equipment, video camera, digital camera, biometric tool, GSM and others.

Lab Operational Hours

During Semester:

Monday to Thursday	8:00 am to 6:00 pm
Friday	8:00 am to 12:15 pm 2:45 pm to 6:00 pm

During Semester Break:

Monday to Thursday	8:00 am to 5:00 pm
Friday	8:00 am to 12:15 pm 2:45 pm to 5:00 pm

Saturday-Sunday / Public Holidays Close

NAME OF FACILITY	DESCRIPTION
Seminar Hall	The hall is equipped with audio-visual facility for 250 pax at a time
Lecture Rooms	Rooms No. 1 to 8 with each room for 60 pax Rooms No. 13 to 14 with each room for 120 pax
Recording Capture System (ReCap)	Mini Theatre for interactive learning environment for 114 pax
Collaborative Learning Laboratory (CLeAR)	A collaborative learning laboratory with 60 pax capacity
Mini Theatre	The theatre room for student animation presentation for 32 pax
Virtual Reality Studio	Laboratory for motion capture and games development
Photography/Recording Studio	Multimedia recording and editing studio
Teaching Laboratories	1. Software Engineering Lab 1, 2 and 3 2. Programming Laboratory 1, 2, 3 and 4 3. Database Laboratory 1, 2 and 3 4. Network Laboratory 1 and 2 5. CCNA & CCNP Laboratory 6. Fiber Optic Laboratory 7. Security Laboratory 8. System / Hardware Laboratory 9. Wireless Laboratory 10. Virtual Reality Laboratory 11. Multimedia Laboratory 1, 2, 3 and 4 12. Artificial Intelligence Laboratory 1, 2, 3 and 4 13. Student Workshop Laboratory 14. Nexus Core Laboratory

University-Industry Centre	UTeM Cybersecurity Competency Centre - collaboration with CyberSecurity Malaysia, ASK-Pentest, Ministry of Higher Education
University-Industry Laboratory	Coordinated Malware Eradication and Remediation Project (CMERP) Satellite Laboratory – collaboration with Cyber Security Malaysia
Research Group	1. Information Security Forensics & Computer Networking (INSFORNET) 2. Optimization, Modelling, Analytics and Simulation (OptiMAS) 3. Applied Intelligent Computing (APIC) 4. Social Analytics and Intelligence Lab (SAIL) 5. Embodied Intelligence (EMERGE-X)
Other Facilities	1. Visiting Professor Rooms 2. Executive Laboratory 3. Administration Office 4. Student Common Room 5. Surau or Prayer Room 6. Lobby Area 7. Parking Area for staffs and students

Lab Usage Regulation

1. Students must display their matric card at all times in the lab.
2. Students are not allowed to bring in their bags into the lab.
3. Students are not allowed to eat/drink or bring in any foods or drinks into the lab.
4. Students are not allowed to wear sandals in the lab except sandals with back straps for female students and covered sandals for male students.
5. Students are not allowed to wear t-shirt without collar in the lab. UTeM's students' dress code is referred.
6. All lab equipment used must be returned in its original condition.
7. Chairs must be arranged neatly after use.
8. Do not leave used papers or litters in the lab. Please throw it into rubbish bin if it is not needed anymore.
9. All equipment must be switched off after used.
10. Students should not enter the lab without lecturers' or tutors' presence.
11. For after-hours lab usage, students must record their details in the lab record book and submit their matric card to Assistant Engineers in duty.
12. Students are prohibited from playing games, chatting or surfing the net for unrelated content in the lab.
13. Students are not allowed to bring out any lab equipment except with permission from the lecturers or Assistant Engineers in duty.
14. Students are not allowed to bring in laptop, CPU, monitor, mouse, CD, VCD or any computer equipment except with permission from the lecturers or Assistant Engineers in duty.
15. Users are not allowed to do any installation on computers in the lab.
16. All requests for software installation into students' laptop will not be entertained.
17. Students must report immediately to lecturer or Assistant Engineers on duty if any lab equipment got lost or broken during their students' usage.

18. Research labs are for post graduates' students ONLY. Post-graduate students can get the access by referring to their supervisor.

Additional Lab Rules Outside Teaching and Learning Allocated Times

1. Total users for a lab must comply with the maximum capacity allowed for a particular lab.
2. Students are allowed to use labs outside teaching and learning allocated times with permission from a lecturer. The lecturer will be responsible for lab for the duration of the usage. Students must record their start and end times of usage in the record book provided in the lab.
3. Studios and Recording room usage are strictly by booking only. Students can use the studios or recording room through their lecturer or Assistant Engineer on duty.

DISCIPLINARY ACTIONS WILL BE TAKEN AGAINST ANY STUDENT WHO IS FOUND BREAKING ANY RULE LISTED ABOVE.

Academic System

The university adopts a semester-based academic system. Each academic year consists of two regular semesters and in some instances, the faculty may also offers a special semester, called Short Semester or Semester 3, which is arranged during the semester break.

Each regular semester spans 18 weeks, structured as follows:

- 7 weeks for the first part of lecture.
- 1 week of mid semester break.
- 7 weeks for the second part of lecture.
- 1 week of revision.
- 2 weeks for final examination.

For the Short Semester or Semester 3, the duration is limited to 8 weeks, consisting of 7 weeks of lectures followed by 1 week of final examinations.

Duration of Studies

MAXX and MAXS	Durations of studies	
	Minimum	Maximum
Full-time mode	1 year (2 normal semesters and 1 short semester)	3 years (6 normal semesters and 2 short semesters)
Part-time mode	2 years (4 normal semesters and 1 short semester)	4 years (8 normal semesters and 4 short semesters)

MAXL	Durations of studies	
	Minimum	Maximum
Full-time mode	1 year	6 years
Part-time mode	2 years	6 years

Grading System

The following shows the grading system adopted by the university.

Marks	Letter Grades	Grade Points	Remarks	Credit Hours Earned
80-100	A	4.0	Excellent	Yes
75-79	A-	3.7	Very Good	Yes
70-74	B+	3.3	Good	Yes
65-69	B	3.0	Pass	Yes
60-64	B-	2.7	Conditional Pass	Yes
55-59	C+	2.3	Fail	No
50-54	C	2.0	Fail	No
47-49	C-	1.7	Fail	No
44-46	D+	1.3	Fail	No
40-43	D	1.0	Fail	No
0-39	E	0.0	Fail	No

Academic Achievement

GRADE POINT AVERAGE (GPA):

GPA is average points obtained by students at the end of each semester.

$$\text{Total Grade Point (TGP)} = k_1m_1 + k_2m_2 + \dots + k_nm_n$$

$$\text{Total Calculated Point (TCP)} = k_1 + k_2 + \dots + k_n$$

$$\text{GPA} = \frac{TGP}{TCP}$$

where

k_n = credit hour for course n ,
 m = grade point obtained for course n ,
 n = number of courses registered.

CUMULATIVE GRADE POINT AVERAGE (CGPA):

CGPA refers to cumulative grade point average calculated for all semester studied.

$$\text{CGPA} = \frac{TGP_1 + TGP_2 + \dots + TGP_i}{TCP_1 + TCP_2 + \dots + TCP_i}$$

where

i = number of semester studied.

Academic Standing

A student's academic standing is determined at the end of every regular semester based on his/her CGPA as shown in the following table:

Good Standing / <i>Kedudukan Baik</i> (KB)	$\text{CGPA} \geq 3.00$
Conditional Status / <i>Kedudukan Bersyarat</i> (KS)	$2.7 \leq \text{CGPA} < 3.00$
Fail / <i>Kedudukan Gagal</i> (KG)	$\text{CGPA} < 2.70$

1. A student must attain a **minimum CGPA of 3.00** in order to be eligible **for graduation**.
2. The **minimum CGPA** that would allow a student to remain in the programme is **2.70**.
3. If a student obtains a **Conditional Pass (KS)** status in **TWO (2) consecutive semesters**, he/she will be **dismissed** from the programme.

MAXX

**Master in
Cyber Security**



Master in Cyber Security

(MQA/FA 5653)

Programme Overview

The Master in Cyber Security is a specialized graduate program to equip students to face the real-world challenges by offering students extensive knowledge and practical skills with security elements in information and communication technology related to management, data and infrastructure.

Programme Educational Objectives (PEO)

Program Educational Objectives (PEO) are specific goals describing graduates' expected achievements in their career and professional life after graduation. Following are the PEO for the Master in Cyber Security:

1. Computing specialists that have in-depth knowledge and are able to apply enhanced technical, digital, and numeracy skills with specializations to provide innovative solutions in cyber security.
2. Computing specialists who have leadership, interpersonal, and communication skills to interact with a wide variety of audiences effectively.
3. Computing specialists that engage and advocate lifelong learning activities and entrepreneurial mindset.
4. Computing specialists who uphold professional practices ethically and with integrity.

Programme Learning Outcomes (PLO)

Programme Learning Outcomes (PLO) are statements describing what students are expected to know and be able to perform or attain by the time of graduation. These relate to the skills, knowledge, and behaviours that students acquire through their program of studies.

1. Ability to integrate advanced knowledge through critical analysis, synthesis, and evaluation to promote computing solutions.
2. Ability to recommend innovative solutions that are at the forefront of developments to manage and resolve complex problems or issues in the field of cyber security.
3. Construct computing solutions and tools using standardized and specialized research approaches emphasizing functionality, efficiency, and effectiveness.
4. Demonstrate effective interaction within a group and with a wide variety of audiences using appropriate methods in verbal forms in discourses related to the field of cyber security.
5. Display effective communication within a group and with a wide variety of audiences using appropriate methods in written forms in the field of cyber security.
6. Practice a wide range of suitable digital technologies to design and plan evaluation activities in computing solutions.
7. Apply numerical skills to acquire, interpret and extend knowledge in computing.
8. Demonstrate significant autonomy, independence, responsibility, and leadership skills in providing services related to the field of cyber security.
9. Display capabilities of self-advancement through continuous academic and professional development to expand relevant knowledge.
10. Display elements of an entrepreneurial mindset effectively to the relevant field.
11. Practice professional and ethical codes in conducting research and delivering services related to the relevant fields.

Career Prospects

There is a wide range of career opportunities in the field of computer science and information technology available for graduates who are specialised in cyber security. Among the career opportunities are:

1. Chief Information Security Officer.
2. Cyber Risk Manager.
3. Cyber Risk Analyst.
4. Security Penetration Tester.
5. Security Operation Analyst.
6. Incident Manager.
7. Digital Forensic Specialist.
8. Security Architect / Engineer.

Programme Structure - Full Time

September Intake:

Semester 1 (Long September - September/October)			
Course Code	Course	Classification	Credit
MPSW 5013	Research Methodology	Core	3
MAXX 5493	Security Audit and Assessment	Core	3
MAXX 5223	Secure Software Development	Core	3
MAXX 5463	Security Management Practices	Core	3
MAXX 5433	System and Network Ethical Hacking	Core	3
MAXX ****	Elective I	Elective	3
Total credit			18
Semester 2 (Long Semester - February/March)			
Course Code	Course	Classification	Credit
MAXX 5443	Cryptography and Data Security	Core	3
MAXX 5483	Cyber Threat Intelligence	Core	3
MAXX ****	Elective II	Elective	3
MAXX ****	Elective III	Elective	3
MAXX 5214	Project I	Master Project	4
Total credit			16
Semester 3 (Short Semester - July)			
Course Code	Course	Classification	Credit
MAXX 5226	Project II	Master Project	6
Total credit			6
Total graduated credit			40

February Intake:

Semester 1 (February/March)			
Course Code	Course	Classification	Credit
MPSW 5013	Research Methodology	Core	3
MAXX 5443	Cryptography and Data Security	Core	3
MAXX 5483	Cyber Threat Intelligence	Core	3
MAXX ****	Elective I	Elective	3
MAXX ****	Elective II	Elective	3
Total credit			15
Semester 2 (Short Semester - July)			
Course Code	Course	Classification	Credit
MAXX ****	Elective III	Elective	3
MAXX 5214	Project I	Master Project	4
Total credit			7
Semester 3 (September/October)			
Course Code	Course	Classification	Credit
MAXX 5493	Security Audit and Assessment	Core	3
MAXX 5223	Secure Software Development	Core	3
MAXX 5463	Security Management Practices	Core	3
MAXX 5433	System and Network Ethical Hacking	Core	3
MAXX 5226	Project II	Master Project	6
Total credit			18
Total graduated credit			40

Elective - choose THREE (3) only:

Course Code	Course	Credit
MAXX 5713	Cloud Security	3
MAXX 5233	Defensive Programming	3
MAXX 5413	Public Key Infrastructure	3
MAXX 5423	Computer Forensics	3
MAXX 5453	Intrusion Detection & Prevention	3
MAXS 5473	Watermarking	3

Programme Structure - Part Time

September Intake:

Semester 1 (September/October)			
Course Code	Course	Classification	Credit
MPSW 5013	Research Methodology	Core	3
MAXX 5223	Secure Software Development	Core	3
MAXX 5463	Security Management Practices	Core	3
Total credit			9
Semester 2 (Long Semester- February/March)			
Course Code	Course	Classification	Credit
MAXX 5443	Cryptography and Data Security	Core	3
MAXX 5483	Cyber Threat Intelligence	Core	3
MAXX ****	Elective I	Elective	3
Total credit			9
Semester 3 (Short Semester - July)			
Course Code	Course	Classification	Credit
MAXZ ****	Elective II	Elective	3
Total credit			3
Semester 4 (Long Semester - September/October)			
Course Code	Course	Classification	Credit
MAXX 5493	Security Audit and Assessment	Core	3
MAXX 5433	System and Network Ethical Hacking	Core	3
MAXX 5214	Project I	Master Project	4
Total credit			10
Semester 5 (Long Semester - February/March)			
Course Code	Course	Classification	Credit
MAXX ****	Elective III	Elective	3
MAXX 5226	Project II	Master Project	6
Total credit			9
Total graduated credit			40

Elective - choose THREE (3) only:

Course Code	Course	Credit
MAXX 5713	Cloud Security	3
MAXX 5413	Public Key Infrastructure	3
MAXX 5423	Computer Forensics	3
MAXX 5453	Intrusion Detection & Prevention	3
MAXX 5473	Watermarking	3
MAXX 5233	Defensive Programming	3

Course Synopsis

MPSW 5013

Research Methodology

Course Learning Outcomes:

1. Apply ethical research skills in constructing research questions, objectives and hypothesis (if any) relevant to the research problem.
2. Synthesize relevant literature to address the knowledge gaps.
3. Propose a research work for an improvement of existing knowledge.

Course Synopsis:

The primary goal of this course is to provide students with the necessary knowledge and skills in preparing for their Master dissertation. In this course, students will be exposed to the important concepts of conducting scientific research and managing ethical research. The course is designed to introduce students to the principles and good practices of conducting research. Activities at each step of the research process will be elaborated in order to develop the skills and competencies required to facilitate a successful research project at postgraduate level. At the end of the course, students are expected to submit a research proposal relevant to their field of study.

MAXX 5443

Cryptography and Data Security

Course Learning Outcomes:

1. Explain the concept and components of cryptography.
2. Relate the basic theory and practice of secure systems, and the types of security services needed for computer and network security.
3. Demonstrate some aspect of cryptography in depth.

Course Synopsis:

This course explore the methods, algorithms, techniques, and tools of cryptography and data security. After studying the theoretical aspects of cryptographic algorithms and protocols, we show how these techniques can be integrated to solve particular data and communication security problems. This course material is of use to computer and communication engineers who are interested in embedding security into an information system, and thus, providing confidentiality, integrity and authenticity of the documents and the communicating parties.

MAXX 5483**Cyber Threat Intelligence****Course Learning Outcomes:**

1. Explain the concept of intelligence detection againsts cyberthreat.
2. Relate relevant approach in cyberthreat detection challenges.
3. Identify suitable approach in detecting cyberthreat collaboratively.

Course Synopsis:

This course covers the concept and applications of intelligence techniques to various problem domains in security and abuse. The course will explore methods for detecting, evaluating the suitability of different machine learning techniques in different scenarios, and focus on guiding principles that will help achieve better security. This course also discusses threats to modern computer and network systems on how intelligence detection applies to the aforementioned threats.

MAXX 5433**System and Network Ethical Hacking****Course Learning Outcomes:**

1. Explain the fundamentals steps that a hacker performs, and common tools hackers use in conducting attacks.
2. Demonstrate exploitation on system and network vulnerability as proof of concept by using appropriate hacking tools.
3. Formulate the tools and methods of protecting systems and networks against hacker attacks.

Course Synopsis:

In this course, students will study and gain experience with the role of defending hosts and networks from attack as well as learning how the hacker uses tools to attack and penetrate networks. Students will be able to use several open software tools that will analyze host and networks for vulnerabilities and be exposed to the hacking methodology. It will immerse the student into an interactive environment where they will be shown how to scan, test, hack and secure their own systems. The lab intensive environment gives each student in-depth knowledge and practical experience with the current essential security systems. Students will begin by understanding how perimeter defenses work and then be lead into scanning and attacking their own networks in a simulation environment. Students then learn how intruders escalate privileges and what steps can be taken to secure a system from hacking threat.

MAXX 5223**Secure Software Development****Course Learning Outcomes:**

1. Explain concepts related to the core software security requirements and foundational design principles.
2. Propose a secured software requirement in developing secure application.
3. Formulate a software using secure coding principles that effectively protect it from vulnerabilities

Course Synopsis:

Development of high-assurance software systems is a growing challenge in emerging complex systems. Secure by design is emerging as a basic principle for trustworthy computing and as a preferred way to ensure the security of networked information systems and infrastructures. This course covers the principles of security software lifecycle for increasing software trustworthiness. In addition, emphasizes on security during planning, designing, developing, acquiring, testing, deploying, maintaining, and/or managing software.

MAXX 5463**Security Management Practices****Course Learning Outcomes:**

1. Assess risks in information security and implement protection and control efforts.
2. Organize an information security program.
3. Design the requirement of regulatory, standards and best practices and apply them in the working environment.

Course Synopsis:

This course covers the principles of information security management and techniques to formulate, plan, manage, implement and maintain information security strategies, policies and procedures. The course focuses on two main disciplines of information security management; first is strategic which covers theoretical view of information security management issues that range from national to international levels, and second is on organizational security management. In the latter, students are taught on issues and challenges surrounding the implementation of best security practices, process and the application of well-known information security standards as practiced by the industry.

MAXX 5493**Security Audit and Assessment****Course Learning Outcomes:**

1. Analyze the concepts of computer audit and risk management.
2. Perform an audit process in the computerized environment.
3. Propose the appropriate response in conformity with security issues in computer security audit.

Course Synopsis:

This course focuses on the concept of computer security and risk management. In addition, emphasizes has given to the importance of computer audit and risk management. The enclosed topics are mainly related to security audit analysis, security monitoring, environmental security and follow up auditing in security concern. The student will be exposed to the field of risk and incident response, recovery and disaster recovery.

MAXX 5713**Cloud Security****Course Learning Outcomes:**

1. Describe the concept, principles and cloud computing architecture based on practices, standards and protocols for delivering cloud security services.
2. Manipulate the proposed solutions to resolve problems in cloud security service.
3. Relate the known threat, risks, vulnerabilities and privacy issues in cloud security services.

Course Synopsis:

The course covers the mechanism for data protection, types of service models for cloud services, the right procedure for every deployment model, and dimensions of cloud security through theories and hands-on experience. Additionally, students manage, configure, and implement cloud security services for a majority of available platforms. By the end of this course, students are equipped with Information Technology security techniques including auditing, encryption, role administration, application control, access control, and password management.

MAXX 5413**Public Key Infrastructure****Course Learning Outcomes:**

1. Explain the issues related to the successful deployment of digital certificates to meet business and security requirements.
2. Elaborate an insight and strategy into an effective use of PKI in the context of working policies that govern the use, administration, and management of certificates, and design the digital certificate according to the standard format.
3. Demonstrate how PKI establishes digital trust and maintains that level of assurance built through a complex web of social, legal, national, international, and business interactions, and the future trend of PKI.

Course Synopsis:

This subject highlighted the principles of Public Key Infrastructure, Digital Signature Law and the related Cyber Laws. The course will not only cover public key algorithms in electronic communications but also the certificate authority and related arrangements as well as. This course aims to give a broader view to the Electronic Commerce transaction to the students.

MAXX 5423**Computer Forensics****Course Learning Outcomes:**

1. Explain the emerging field of computer forensics in obtaining and analyzing the evidence from computers.
2. Prepare the investigation procedures for investigating the computer crime.
3. Demonstrate the use of forensic tools to complete the investigating process.

Course Synopsis:

This subject introduces the fundamentals of computer forensic technology. Emphasis will be placed on identifying the threats to, and vulnerabilities of, computer systems and how to minimize them. The subject also focuses on identifying the victims, executing the attack, and determining various methods that used to gain access to computer systems. The theory and technique on identifying the legal and ethical issues that are involved in computer forensics and methods on investigating the crime are also explored. The hands-on covers the process of investigating the computer crime using computer forensics tools.

MAXX 5453**Intrusion Detection and Prevention****Course Learning Outcomes:**

1. Explain the various types of intrusions and attacks on a network.
2. Organize the mechanism or tools which can be used to detect and prevent the intrusions by integration of technique and technology of security management.
3. Demonstrate intrusion detection system for preventing the illegal intrusion.

Course Synopsis:

This subject highlights the concepts of computer security in term of intrusion detection and prevention. The scope of detection mainly involves the network-based and host-based approaches. Several techniques as well as technology emphasized to form a secure network environment. In addition, the current trends with the application of machine learning and deep learning also will be focused. The hands-on covers the configuration of intrusion detection system using detection tools.

MAXX 5473
Watermarking**Course Learning Outcomes:**

1. Manipulate the concept, theory, method and practice in Digital Watermarking for analysis and evaluation.
2. Use the knowledge needed to resolve problems in digital watermarking based on techniques.
3. Demonstrate practical skills of development using current and latest tools for intellectual property management and protection of multimedia.

Course Synopsis:

The subject explores the mechanism for protecting audio, video, image and data. It covers about knowledge and application on protecting the multimedia content and distributing multimedia products over the Internet. The theory and technique on identifying the legal and technical issues that are involved in digital watermarking is studied. Methods on the mechanism of current and latest application tools for protecting the intellectual property management and protection of multimedia are also explored.

MAXX 5233
Defensive Programming**Course Learning Outcomes:**

1. Explain concepts related to the defensive programming and its related applications.
2. Formulate the defensive rate in applications.
3. Demonstrate the defensive programming techniques that can effectively protect it from threats.

Course Synopsis:

Development of high-assurance software systems is a growing challenge in emerging complex systems. Secure by design is emerging as a basic principle for trustworthy computing and as a preferred way to ensure the security of networked information systems and infrastructures. This course covers the principles of security software lifecycle for increasing software trustworthiness. In addition, emphasizes on security during planning, designing, developing, acquiring, testing, deploying, maintaining, and/or managing software.

MAXX 5214**Project I****Course Learning Outcomes:**

1. Identify the problems, objectives and scope based on current trends of technologies.
2. Prepare a comprehensive literature review and appropriate procedures to complete the project.
3. Justify the suitable key answers to clarify the contribution in application domain.

Course Synopsis:

This course is the first part of project that contains the results based on the theories and techniques of current technologies learnt previously. Besides writing the proposal, student is required to write four chapters of dissertation, i.e.;

- Chapter 1: Introduction,
- Chapter 2: Literature Review, and
- Chapter 3: Research Methodology.

In addition, student must accomplish the project design and justify the proposed solution during presentation.

MAXX 5226**Project II****Course Learning Outcomes:**

1. Demonstrate the solutions with significance contribution to the application domain.
2. Verify the proposed solutions to understand the strengths, weaknesses and limitations of the study.
3. Modify the proposed solution by articulating the series of processes to achieve the end results of the domain business requirements.

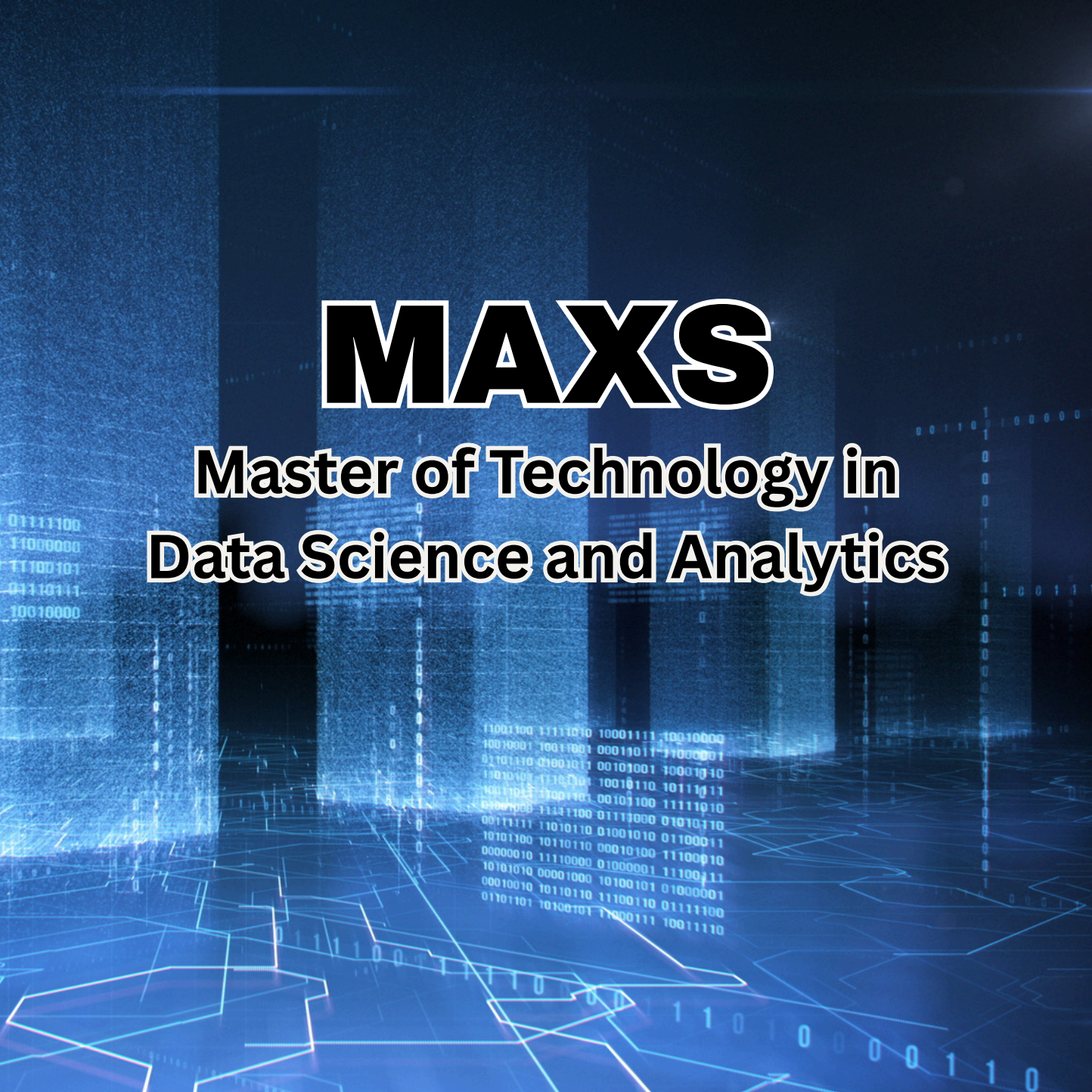
Course Synopsis:

This course is the second part of project that show the ability of student in applying the theories and techniques of knowledge and technologies learnt previously. Student must write the second fold of dissertation which consists of three chapters of dissertation, i.e.;

- Chapter 4: Analysis & Design,
- Chapter 5: Implementation,
- Chapter 6: Evaluation, and
- Chapter 7: Conclusion & Future Works.

These chapters must align with the proposed solutions developed as the end product of this project. Student is required to justify the contribution of the proposed solutions throughout the presentation and demonstration sessions.

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The background is a dark blue, almost black, digital space. It is filled with various elements: vertical columns of binary code (0s and 1s) in a lighter blue font, some of which are slightly blurred to create a sense of depth. There are also horizontal and diagonal lines of varying thickness and color (light blue, white, and a hint of red/pink) that intersect and overlap, resembling a complex network or data flow. The overall effect is a high-tech, futuristic aesthetic.

MAXS

**Master of Technology in
Data Science and Analytics**

Master of Technology in Data Science and Analytics

(MQA/FA 9613)

Programme Overview

The Master of Technology (Data Science and Analytics), for short MAXD, is aimed at recent graduates and industry practitioners from various academic disciplines with strong analytical and computing skills or experiences. The programme is designed to equip students with fundamental and applied knowledge, technical skills, and current technologies in Data Science and Analytic area. These include the fundamental principles of data science, the capability to analyse a diversity of big data, the skills of using data science tools and the capability to apply the data analytics techniques to various domains, as well as the capability to present the analytics results to intended audience. The programme's delivery modes are through lectures, lab sessions, and industrial projects, that emphasize on state-of-the-practice techniques, tools and technology, and recognised methodology through university-industry collaborations.

Programme Educational Objectives (PEO)

Program Educational Objectives (PEO) are specific goals describing graduates' expected achievements in their career and professional life after graduation. Following are the PEO for the Master of Technology (Data Science and Analytics):

1. Have in-depth knowledge and apply enhanced technical, digital, and numeracy skills of data science and analytics, and related disciplines to provide innovative solutions in computing.
2. Demonstrate effective leadership, interpersonal, and communication skills to interact effectively with a wide variety of audiences or multi-disciplinary teams, tolerate and value different global perspectives and cultures.
3. Engage and advocates lifelong learning activities and have an entrepreneurial mindset.
4. Practice professional, ethical and societal responsibilities with integrity, and show adaptability in different roles and surroundings in contributing to the community.

Programme Learning Outcomes (PLO)

Programme Learning Outcomes (PLO) are statements describing what students are expected to know and be able to perform or attain by the time of graduation. These relate to the skills, knowledge, and behaviours that students acquire through their program of studies.

1. Utilize data science and analytics knowledge for effective and excellent practice as a data scientist or data analyst.
2. Conduct systematic investigations and apply critical and creative thinking to generate innovative solutions in data science and analytics.
3. Apply knowledge, technology and skills of data science and analytics to discover potential yet hidden information, knowledge and insights for data-driven and well-informed decision making.
4. Effectively interact with diverse peers, superiors, clients and experts.
5. Display effective communication, both orally and in writing, for data science and analytics solutions, to a diverse audience, including peers, superiors, clients, and experts.
6. Practice digital skills to acquire, interpret and extend knowledge in data science and analytics.
7. Determine suitable numerical tools to manage and resolve data science and analytics problems.
8. Operate effectively in community and multidisciplinary teams either as a leader or a group member, demonstrate respect for cultural diversity and contribute to their organization and society.
9. Apply independent and lifelong learning skills to keep up with latest relevant knowledge and cutting edge technologies in data science and analytics.
10. Demonstrate entrepreneurial and managerial skills.
11. Manage research and services by applying ethics, values, attitude, professionalism and sustainable practices in data science and analytics.

Career Prospects

There is a wide range of career opportunities in the field of computer science and information technology available for graduates who are specialised in data science and analytics. Among the career opportunities are:

1. Principle Data Scientist.
2. Senior Data Scientist.
3. Principle Data Analyst.
4. Senior Data Analyst.
5. Principle Data Engineer.
6. Senior Data Engineer.
7. Data Architect.

Programme Structure - Full Time

September Intake:

Semester 1 (September/October)			
Course Code	Course	Classification	Credit
MPSW 5013	Research Methodology	Core	3
MAXS 5113	Fundamental of Data Science	Core	3
MAXS 5123	Big Data Management	Core	3
MAXS 5133	Applied Statistical Methods	Core	3
MAXS 5143	Applied Machine Learning	Core	3
MPSW 5063	Elective I (Entrepreneurship)	Elective	3
Total credit			18
Semester 2 (February/March)			
Course Code	Course	Classification	Credit
MAXS 5153	Big Data Analytics and Visualization	Core	3
MAXS 5163	Modelling and Decision Making	Core	3
MAXS ****	Elective II	Elective	3
MAXS ****	Elective III	Elective	3
MAXS 5214	Project I	Master Project	4
Total credit			16
Semester 3 (Short Semester - July)			
Course Code	Course	Classification	Credit
MAXS 5226	Project II	Master Project	6
Total credit			6
Total graduated credit			40

February Intake:

Semester 1 (February/March)			
Course Code	Course	Classification	Credit
MPSW 5013	Research Methodology	Core	3
MAXS 5113	Fundamental of Data Science	Core	3
MAXS 5123	Big Data Management	Core	3
MAXS 5133	Applied Statistical Methods	Core	3
MAXS 5143	Applied Machine Learning	Core	3
MAXS 5153	Big Data Analytics and Visualization	Core	3
Total credit			18
Semester 2 (Short Semester - July)			
Course Code	Course	Classification	Credit
MAXS ****	Elective I	Elective	3
MAXS 5214	Project I	Master Project	4
Total credit			7
Semester 3 (September/October)			
Course Code	Course	Classification	Credit
MAXS 5163	Modelling and Decision Making	Core	3
MPSW 5063	Elective II (Entrepreneurship)	Elective	3
MAXS ****	Elective III	Elective	3
MAXS 5226	Project II	Master Project	6
Total credit			15
Total graduated credit			40

Elective - choose THREE (3) only:

Course Code	Course	Credit
MPSW 5063	Entrepreneurship	3
MAXS 5213	Special Topics in Applied Data Science	3
MAXS 5223	Manufacturing Analytics	3
MAXS 5233	Social Media Analytics	3
MAXS 5243	Geospatial Analytics	3
MAXS 5253	Healthcare Analytics	3
MAXS 5263	Tourism Analytics	3
MAXS 5273	Customer and Financial Analytics	3

Programme Structure - Part Time

September Intake:

Semester 1 (September/October)			
Course Code	Course	Classification	Credit
MPSW 5013	Research Methodology	Core	3
MAXS 5113	Fundamental of Data Science	Core	3
MAXS 5133	Applied Statistical Methods	Core	3
Total credit			9
Semester 2 (February/March)			
Course Code	Course	Classification	Credit
MAXS 5123	Big Data Management	Core	3
MAXS 5143	Applied Machine Learning	Core	3
MAXS 5153	Big Data Analytics and Visualization	Core	3
Total credit			9
Semester 3 (Short Semester - July)			
Course Code	Course	Classification	Credit
MAXS 5214	Project I	Master Project	4
Total credit			4
Semester 4 (September/October)			
Course Code	Course	Classification	Credit
MAXS 5163	Modelling and Decision Making	Core	3
MAXS ****	Elective I	Elective	3
MAXS ****	Elective II	Elective	3
Total credit			9
Semester 5 (February/March)			
Course Code	Course	Classification	Credit
MPSW 5063	Elective III (Entrepreneurship)	Elective	3
MAXS 5226	Project II	Master Project	6
Total credit			9
Total graduated credit			40

Elective - choose TWO (2) only:

Course Code	Course	Credit
MPSW 5063	Entrepreneurship	3
MAXS 5213	Special Topics in Applied Data Science	3
MAXS 5223	Manufacturing Analytics	3
MAXS 5233	Social Media Analytics	3
MAXS 5243	Geospatial Analytics	3
MAXS 5253	Healthcare Analytics	3
MAXS 5263	Tourism Analytics	3
MAXS 5273	Customer and Financial Analytics	3

Course Synopsis

MPSW 5013

Research Methodology

Course Learning Outcomes:

1. Apply ethical research skills in constructing research questions, objectives and hypothesis (if any) relevant to the research problem.
2. Synthesize relevant literature to address the knowledge gaps.
3. Propose a research work for an improvement of existing knowledge.

Course Synopsis:

The primary goal of this course is to provide students with the necessary knowledge and skills in preparing for their Master dissertation. In this course, students will be exposed to the important concepts of conducting scientific research and managing ethical research. The course is designed to introduce students to the principles and good practices of conducting research. Activities at each step of the research process will be elaborated in order to develop the skills and competencies required to facilitate a successful research project at postgraduate level. At the end of the course, students are expected to submit a research proposal relevant to their field of study.

MAXS 5113

Fundamental of Data Science

Course Learning Outcomes:

1. Explain the concept of Data Science and the skill sets needed to be a data scientist.
2. Identify the Data Analytic Lifecycle and how its components interact.
3. Construct computer program to carry out basic statistical modeling and analysis.

Course Synopsis:

The course provides an introduction to data science, which is the study of the generalizable extraction of knowledge from data. Being a data scientist requires an integrated skill set spanning mathematics, statistics, machine learning, databases and other branches of computer science along with a good understanding of the craft of problem formulation to engineer effective solutions. This course provides an overview of today's data environment, the rationale and opportunity for a new approach to analytics, the roles required, including the Data Scientist, and representative examples of big data analytics in industry. This course introduces students to the fundamental principles of data science that underlie the algorithms, processes, methods, and data-analytic thinking. It also introduces students to algorithms and tools based on these principles, and frameworks to support problem-focused data-analytic thinking. The course ends by examining students understanding on integration and synthesis of concepts and their application to solving problems.

MAXS 5123**Big Data Management****Course Learning Outcomes:**

1. Explain the challenges, ecosystem, trends, and technologies for big data management.
2. Manipulate the learnt technologies to solve challenges in managing big data.
3. Integrate the different technologies in planning and designing comprehensive solution for big data management.

Course Synopsis:

Big data is the new norm for many organizations. Meaningful insights obtained from this huge amount of collected data help organizations remain competitive. Hence it is important that organizations manage their big data properly. In this course, the many challenges in managing big data such as data quality, data security, data privacy, data storage, data processing and data analytics are exposed. Ecosystem and future trends are elaborated to get better insight in managing big data. This course introduces NoSQL data storage like MongoDB, Cassandra, and Neo4J which stores non-relational data model easily. To deal with the huge amount data that need to be stored and processed, Hadoop which is the de-facto technology for big data management is explored by this course. HDFS which is Hadoop data storage component and MapReduce which is Hadoop data processing component are delved into. This course also discusses Hadoop ecosystem which provides added functionalities for managing big data such as Flume and Sqoop for data ingestion. For analyzing big data, this course introduces Spark and its ecosystem to provide different types of analytics. At the end of the course, students will have exposure and understanding in managing big data, what tools are appropriate and relevant to manipulate and to integrate in planning and designing comprehensive solution for big data management.

MAXS 5133**Applied Statistical Methods****Course Learning Outcomes:**

1. Find solutions for statistical problems using appropriate statistical techniques.
2. Analyse solutions for real life statistical problems.
3. Formulate solutions for statistical problems using statistical software.
4. Integrate solution plan to application problems based on available data.

Course Synopsis:

Applied statistical methods covers the fundamental understanding of statistical methods necessary to deal with a wide variety of practical problems. The course offers a curriculum that provides a balanced approach towards learning of statistical theory and its applications. The core courses give a thorough grounding in advanced statistical methods. Topics covered in this course stresses clarity of understanding, interpretation, and method of application. Various qualitative and quantitative methods in research will be discussed in this course. This includes also on how to compute, evaluate and analyze qualitative and quantitative data. This course also covers the discovery and exploration of complex multivariate relationships among variables. Multivariate analysis is a set of statistical techniques used for analysis of data that contain more than one variable. The underlying theory required to understand the multivariate methods, as well as their applications in data analysis will be discussed. Methods in time series analysis also will be discussed where it comprises methods for analyzing time series data to extract meaningful statistics of the data as well as forecasting future values.

MAXS 5143**Applied Machine Learning****Course Learning Outcomes:**

1. Explain the concepts and principles of machine learning.
2. Evaluate different machine learning techniques in terms of their applicability to different Machine Learning problems.
3. Manipulate appropriate tools to apply suitable machine learning techniques to the data set given to solve the problem.
4. Formulate a systematic approach to conduct scientific experimental investigations and assessment.

Course Synopsis:

Machine learning is a rapidly growing field at the intersection of computer science and statistics, which concerns about finding patterns in real data. The learning evolved from the study of pattern recognition and computational learning theory in artificial intelligence to explore the construction of algorithms for making prediction on data. This course aims to provide practical skills in applying machine learning algorithms on real applications. It emphasizes on the implementation and evaluation of machine learning systems. The focus will be placed on applying machine learning model for problem solving more than the fundamental understanding of learning algorithm. Students will be exposed to the tasks on design, implementation, training and evaluation of a machine learning systems. Topics of discussion include: introduction to machine learning; real-world data; feature engineering; classification techniques; predicting continuous target variables; model evaluation, parameter tuning; clustering analysis; association analysis; ensemble learning; reinforcement learning; deep learning; and scaling machine learning workflows.

MAXS 5153**Big Data Analytics and Visualization****Course Learning Outcomes:**

1. Identify the concepts, fundamentals and methodologies of big data analytics.
2. Interpret massive volumes of unstructured data into a meaningful form, using data analytics software.
3. Construct big data analytics and visualization strategy in a proper and meaningful way using appropriate techniques.

Course Synopsis:

This course consists of two parts: Big Data Analytics and Data Visualization. In the first part, the course brings together several key information technologies used in manipulating, storing, and analyzing big data especially unstructured data. The unstructured data are text, images, videos, audio/speech. R or Python or other tools will be used as the tool for analyzing the unstructured data. In the second part of this course, data visualization is covered to enables multi-level analysis of data. The fundamental concepts in data visualization will be covered, including the various types of data visualization according to input types, different approaches in determining good data visualization techniques and methods, good practices for amplifying cognition, revealing better insights and unveiling underlying structure. Students will also learn how to develop interactive visualizations and applications, use various data exploratory functions and how to present the data.

MAXS 5163**Modelling and Decision Making****Course Learning Outcomes:**

1. Interpret knowledge of modelling and prescriptive analytics with data science for data-driven and evidence-based decision making.
2. Choose appropriate and relevant modelling and prescriptive analytics technique using Big data input to solve complex decision problems.
3. Propose prescriptive models and solutions using appropriate software tools and analysis of Big data.

Course Synopsis:

In Data Science, prescriptive analytics is the final frontier of analytics, which entails the application of mathematical modelling, simulation, optimization and computational intelligence to suggest decision options, taking advantage of the results from the earlier analytic stages of descriptive and predictive analytics. Prescriptive analytics optimizes decision making and able to suggest or prescribe what actions to take in order to maximize output, given constraints and key objectives, and shows the implication of each decision option. In this course, students are exposed to operations research modelling, and meta-heuristics and soft computing based optimizations, and showed how to exploit them to solve real-world decision problems. The course covers the arts of decision making, decision making and modelling process, decision analysis and method of decision science which involves the application of selected operations research and optimization (hard and soft) techniques, to strategic and managerial decision problems.

The focus is to impart analytical systems level thinking and problem solving skills in complex decision making contexts. At the end of the course students will have exposure and deep understanding on how organizational decisions are made in the present of Big data, what appropriate and relevant modelling and analytics solutions should be provided to support well-informed, in-time and effective decision making.

MPSW 5063**Entrepreneurship****Course Learning Outcomes:**

1. Explain entrepreneurial skills in identifying and exploiting entrepreneurial opportunities.
2. Formulate a business model canvas for business value proposition.
3. Propose a creative and viable high tech business models/plan and strategies.

Course Synopsis:

The objectives of this course are to provide students with a robust foundation in theories relevant to entrepreneurial behaviour in the context of technology ventures and to stimulate them to think and behave like an entrepreneur. First, the course covers fundamental issues such as the influence of risk and uncertainty, the role of technology in entrepreneurship, opportunity recognition, business model creation, life cycle and critical stages of the entrepreneurial business and the development of an operational and financial foundation of a technology venture. Second, the course provides students with actionable knowledge by familiarising them with the necessary entrepreneurial expertise to establish and scaling up a technology venture.

MAXS 5213**Special Topic in Applied Science****Course Learning Outcomes:**

1. Analyze emerging technologies in data science.
2. Integrate new data science concepts and skills to selected application domains.
3. Demonstrate data science results to various stakeholders.

Course Synopsis:

The course starts by introducing the current computing culture in selected applications domain. Data Science in the selected applications domain are discussed as well as its scenario in Malaysia and globally. Then the course provides a comprehensive examination of data science as it is applied to real organizations and processes within the application domain. Students will be introduced to real-world examples and have the opportunity to learn from industry case studies on organizations that have successfully applied data science to their advantage. This course will also provide the students with an understanding of the use of emerging technologies in data science. Communicating data science results to various stakeholders is also emphasized in this course.

MAXS 5223**Manufacturing Analytics****Course Learning Outcomes:**

1. Illustrate analytics use cases in manufacturing systems.
2. Formulate analytics models for manufacturing systems.
3. Accomodate appropriate tools to implement analytics model for manufacturing use cases.

Course Synopsis:

Manufacturing analytics aims to analyse the production data to generate added value. The analytics models are purpose-built to improve decision-making and boost production performance. Manufacturers take advantage of the actionable insights to reduce process flaws, increase performance, save time and cost. This course aims to provide a general overview of implementing analytics in manufacturing domain. It emphasises on practical issues and application of advanced analytics on manufacturing challenges. The main focus will be placed on designing the manufacturing use cases using analytics tools toward actionable intelligence. Topics of discussion include: introduction to manufacturing analytics; the return of investments in manufacturing analytics; product design analysis; the manufacturing process; automation and computer-aided manufacturing; IoT-enabled manufacturing system; manufacturing performance management, performances analysis method, and production scheduling system; and the human side of analytics in manufacturing industry.

MAXS 5233**Social Media Analytics****Course Learning Outcomes:**

1. Analyze the fundamentals and concepts of social media data mining.
2. Prepare appropriate solution steps for social media data analysis based on text mining methods.
3. Build computer program based on appropriate methods for practical uses in social media analytics.

Course Synopsis:

This course will introduce social media content analytics. Text data mining, especially data from social media has been gaining attention as the available volume of online social media information grows at a rate that is by far higher than our human capacity to handle and process such a huge volume of data from the web. Topics that will be covered in this course includes overview of social media data mining, mining social media data, mining blog pages and other social web analysis.

MAXS 5243**Geospatial Analytics****Course Learning Outcomes:**

1. Analyse geospatial analytics approaches on various geospatial data.
2. Integrate required knowledge and skills to solve real-world geospatial analytics problems.
3. Construct multi-step workflows in variety of geospatial analytics applications.

Course Synopsis:

Geospatial analytics offers revolutionary approaches in discovering how and why location matters in problem solving and decision-making. This course elaborates the acquisition, processing, analysis and interpretation of objects, areas and phenomena by utilising geospatial analysis for various domains, such as environmental sustainability, urban planning, agriculture and natural resources. It aims to provide knowledge and skill in geospatial analysis particularly by making use of remotely sensed data captured from sensors mounted on airborne and spaceborne platforms. In order to understand an object, area or phenomenon, students will be integrating knowledge and skills in image processing that involves the use of fundamental and advanced algorithms, analysing, visualizing and interpreting of geospatial data for problem solving and decision making.

MAXS 5253**Healthcare Analytics****Course Learning Outcomes:**

1. Construct solution in healthcare analytics through simple modelling and simulation.
2. Evaluate the concept of healthcare analytics to support the data sciences analysis and design.
3. Formulate the healthcare analytics in solving data science related problems.

Course Synopsis:

This course covers the transformation of big data by creating enormous opportunities for companies, researchers and other related area in healthcare to improve patient outcomes. Healthcare analytics powers data-driven transformations that combine strategy, big data and advanced analytics, and implementation processes to change the way healthcare companies especially think, decide, and act. The four areas within healthcare are considered as a case study; claims and cost data (retail purchases e.g. data captured in running stores), pharmaceutical and research and development (R&D) data, clinical data (collected from electronic medical records (EHRs)), and patient behavior and sentiment data (patient behaviors and preferences). By the end of this course, students are able to design, analyze and implement the healthcare analytics concepts in data sciences.

MAXS 5263**Tourism Analytics****Course Learning Outcomes:**

1. Analyze each one of the concepts in tourism analytics.
2. Propose appropriate solution for tourism application problems using analytics software.
3. Solve tourism application problems using appropriate analytics method.

Course Synopsis:

The course covers the development of analytics in tourism. There are three types of analytics including descriptive, diagnostic and predictive analytics in this course. Moreover, the sentiment analysis for the tourism data will also be implemented. At the end of the course, the student is required to produce a dashboard.

MAXS 5273**Customer and Financial Analytics****Course Learning Outcomes:**

1. Analyze analytics use cases in customer behaviour and financial systems.
2. Propose appropriate solution steps for customer behaviour and financial systems.
3. Build computer program based on appropriate methods for practical uses in customer and financial analytics.

Course Synopsis:

Customer analytics is a process by which data from customer behaviour is used to help make key business decisions via market segmentation and predictive analytics. This information is used by businesses for direct marketing, site selection, and customer relationship management. Marketing provides services in order to satisfy customers. With that, the productive system is considered from its beginning at the production level, to the end of the cycle at the consumer. Customer analytics plays a very important role in the prediction of customer behaviour today. Financial analytics explores how financial statement data and non-financial metrics can be linked to financial performance. In this course, students will learn how data is used to assess what drives financial performance and to forecast future financial scenarios.

MAXS 5214**Project I****Course Learning Outcomes:**

1. Identify the problems, objectives and scope based on current trends of technologies.
2. Perform a comprehensive literature review and appropriate procedures to complete the project.
3. Justify the suitable key answers to clarify the contribution in application domain.

Course Synopsis:

This course is the first part of project that contains the results based on the theories and techniques of current technologies learnt previously. Besides writing the proposal, student is required to write four chapters of dissertation, i.e.;

- Chapter 1: Introduction,
- Chapter 2: Literature Review, and
- Chapter 3: Research Methodology.

In addition, student must accomplish the project design and justify the proposed solution during presentation.

MAXS 5226**Project II****Course Learning Outcomes:**

1. Demonstrate the solutions with significance contribution to the application domain.
2. Verify the proposed solutions to understand the strengths, weaknesses and limitations of the study.
3. Defend the proposed solution by articulating the series of processes to achieve the end results of the domain business requirements.

Course Synopsis:

This course is the second part of project that show the ability of student in applying the theories and techniques of knowledge and technologies learnt previously. Student must write the second fold of dissertation which consists of three chapters of dissertation, i.e.;

- Chapter 4: Analysis & Design,
- Chapter 5: Implementation,
- Chapter 6: Evaluation, and
- Chapter 7: Conclusion & Future Works.

These chapters must align with the proposed solutions developed as the end product of this project. Student is required to justify the contribution of the proposed solutions throughout the presentation and demonstration sessions.

MAXL

**Master of Technology in
Data Science and Analytics**
(with Open and Distance Learning - ODL)

Master of Technology in Data Science and Analytics (MQA/PA 17473) (ODL mode)

Programme Overview

The Master of Technology in Data Science and Analytics with ODL mode, for short MAXL, is aimed at recent graduates and industry practitioners from various academic disciplines with strong analytic and computing skills or experience. The programme is designed to equip the students with fundamental and applied knowledge, technical skills, and current technologies in the data science and analytics area. These include the fundamental principles of data science, the capability to analyse a diversity of big data, the skills of using data science tools and applying the data analytics techniques to various domain, as well as the capability to present the analytics results to the intended audience. The materials emphasise state-of-the-practice techniques, tools, and technology, and recognised methodology through university-industry collaborations. Graduates from this programme will have career opportunities as data scientists, data analysts and many more.

Programme Educational Objectives (PEO)

Program Educational Objectives (PEO) are specific goals describing graduates' expected achievements in their career and professional life after graduation. Following are the PEO for the Master of Technology in Data Science and Analytics:

1. Have in-depth knowledge and apply enhanced technical, digital, and numeracy skills of data science and analytics, and related disciplines to provide innovative solutions in computing.
2. Demonstrate effective leadership, interpersonal, and communication skills to interact effectively with a wide variety of audiences or multi-disciplinary teams, tolerate and value different global perspectives and cultures.
3. Engage and advocate lifelong learning activities and have an entrepreneurial mindset.
4. Practise professional, ethical and societal responsibilities with integrity, and show adaptability in different roles and surroundings in contributing to the community.

Programme Learning Outcomes (PLO)

Programme Learning Outcomes (PLO) are statements describing what students are expected to know and be able to perform or attain by the time of graduation. These relate to the skills, knowledge, and behaviours that students acquire through their program of studies.

1. Utilize data science and analytics knowledge for effective and excellent practice as a data scientist and data analyst.
2. Conduct systematic investigations and apply critical and creative thinking to generate innovative solutions in data science and analytics.
3. Apply knowledge, technology and skills of data science and analytics to discover potential yet hidden information, knowledge and insights for data-driven and well-informed decision making.
4. Effectively interact with diverse peers, superiors, clients and experts.
5. Display effective communication, both orally and in writing, for data science and analytics solutions, to a diverse audience, including peers, superiors, clients, and experts.
6. Practise digital skills to acquire, interpret and extend knowledge in data science and analytics.
7. Determine suitable numerical tools to manage and resolve data science and analytics problems.
8. Operate effectively in community and multidisciplinary teams either as a leader or a group member, demonstrate respect for cultural diversity and contribute to their organization and society.
9. Apply independent and lifelong learning skills to keep up with latest relevant knowledge and cutting edge technologies in Data Science and Analytics.
10. Demonstrate entrepreneurial and managerial skills.
11. Manage research and services by applying ethics, values, attitude, professionalism and sustainable practices in data science and analytics.

Career Prospects

There is a wide range of career opportunities in the field of computer science and information technology available for graduates who are specialised in data science and analytics. Among the career opportunities are:

1. Principle Data Scientist.
2. Senior Data Scientist.
3. Principle Data Analyst.
4. Senior Data Analyst.
5. Principle Data Engineer.
6. Senior Data Engineer.
7. Data Architect.

Programme Structure - Full Time

September Intake:

Semester 1 (September/October)			
Course Code	Course	Classification	Credit
MPSW 5013	Research Methodology	Core	3
MAXL 5113	Fundamental of Data Science	Core	3
MAXL 5123	Big Data Management	Core	3
MAXL 5133	Applied Statistical Methods	Core	3
MAXL 5143	Applied Machine Learning	Core	3
MPSW 5063	Elective I (Entrepreneurship)	Elective	3
Total credit			18
Semester 2 (February/March)			
Course Code	Course	Classification	Credit
MAXL 5153	Big Data Analytics and Visualization	Core	3
MAXL 5163	Modelling and Decision Making	Core	3
MAXL ****	Elective II	Elective	3
MAXL ****	Elective III	Elective	3
MAXU 5214	Project I	Master Project	4
Total credit			16
Semester 3 (Short Semester - July)			
Course Code	Course	Classification	Credit
MAXU 5226	Project II	Master Project	6
Total credit			6
Total graduated credit			40

February Intake:

Semester 1 (February/March)			
Course Code	Course	Classification	Credit
MPSW 5013	Research Methodology	Core	3
MAXL 5113	Fundamental of Data Science	Core	3
MAXL 5123	Big Data Management	Core	3
MAXL 5133	Applied Statistical Methods	Core	3
MAXL 5143	Applied Machine Learning	Core	3
MAXL 5153	Big Data Analytics and Visualization	Core	3
Total credit			18
Semester 2 (Short Semester - July)			
Course Code	Course	Classification	Credit
MAXL ****	Elective I	Elective	3
MAXU 5214	Project I	Master Project	4
Total credit			7
Semester 3 (September/October)			
Course Code	Course	Classification	Credit
MAXL 5163	Modelling and Decision Making	Core	3
MPSW 5063	Elective II (Entrepreneurship)	Elective	3
MAXL ****	Elective III	Elective	3
MAXU 5226	Project II	Master Project	6
Total credit			15
Total graduated credit			40

Elective - choose THREE (3) only:

Course Code	Course	Credit
MPSW 5063	Entrepreneurship	3
MAXL 5223	Manufacturing Analytics	3
MAXL 5233	Social Media Analytics	3
MAXL 5253	Healthcare Analytics	3
MAXL 5273	Customer and Financial Analytics	3

Programme Structure - Part Time

September Intake:

Semester 1 (September/October)			
Course Code	Course	Classification	Credit
MPSW 5013	Research Methodology	Core	3
MAXL 5113	Fundamental of Data Science	Core	3
MAXL 5133	Applied Statistical Methods	Core	3
Total credit			9
Semester 2 (February)			
Course Code	Course	Classification	Credit
MAXL 5123	Big Data Management	Core	3
MAXL 5143	Applied Machine Learning	Core	3
MAXL 5153	Big Data Analytics and Visualization	Core	3
Total credit			9
Semester 3 (Short Semester - July)			
Course Code	Course	Classification	Credit
MAXU 5214	Project I	Master Project	4
Total credit			4
Semester 4 (September/October)			
Course Code	Course	Classification	Credit
MAXL 5163	Modelling and Decision Making	Core	3
MAXL ****	Elective I	Elective	3
MAXL ****	Elective II	Elective	3
Total credit			9
Semester 5 (February/March)			
Course Code	Course	Classification	Credit
MPSW 5063	Elective III (Entrepreneurship)	Elective	3
MAXU 5226	Project II	Master Project	6
Total credit			9
Total graduated credit			40

February Intake:

Semester 1 (February/March)			
Course Code	Course	Classification	Credit
MPSW 5013	Research Methodology	Core	3
MAXL 5113	Fundamental of Data Science	Core	3
MAXL 5133	Applied Statistical Methods	Core	3
Total credit			9
Semester 2 (September/October)			
Course Code	Course	Classification	Credit
MAXL 5123	Big Data Management	Core	3
MAXL 5143	Applied Machine Learning	Core	3
MAXL 5153	Big Data Analytics and Visualization	Core	3
Total credit			9
Semester 3 (February/March)			
Course Code	Course	Classification	Credit
MAXL 5163	Modelling and Decision Making	Core	3
MAXL ****	Elective I	Elective	3
MAXL ****	Elective II	Elective	3
Total credit			9
Semester 4 (Short Semester - July)			
Course Code	Course	Classification	Credit
MAXU 5214	Project I	Master Project	4
Total credit			4
Semester 5 (September/October)			
Course Code	Course	Classification	Credit
MPSW 5063	Elective III (Entrepreneurship)	Elective	3
MAXU 5226	Project II	Master Project	6
Total credit			9
Total graduated credit			40

Elective - choose THREE (3) only:

Course Code	Course	Credit
MPSW 5063	Entrepreneurship	3
MAXL 5223	Manufacturing Analytics	3
MAXL 5233	Social Media Analytics	3
MAXL 5253	Healthcare Analytics	3
MAXL 5273	Customer and Financial Analytics	3

Course Learning Outcomes and Synopsis

MPSW 5013

Research Methodology

Course Learning Outcomes:

1. Apply ethical research skills in constructing research questions, objectives and hypothesis (if any) relevant to the research problem.
2. Synthesize relevant literature to address the knowledge gaps.
3. Propose a research work for an improvement of existing knowledge.

Course Synopsis:

The primary goal of this course is to provide students with the necessary knowledge and skills in preparing for their Master dissertation. In this course, students will be exposed to the important concepts of conducting scientific research and managing ethical research. The course is designed to introduce students to the principles and good practices of conducting research. Activities at each step of the research process will be elaborated in order to develop the skills and competencies required to facilitate a successful research project at postgraduate level. At the end of the course, students are expected to submit a research proposal relevant to their field of study.

MAXL 5113

Fundamental of Data Science

Course Learning Outcomes:

1. Explain the concept of Data Science and the skill sets needed to be a data scientist.
2. Identify the Data Analytic Lifecycle and how its components interact.
3. Construct computer program to carry out basic statistical modeling and analysis.

Course Synopsis:

The course provides an introduction to data science, which is the study of the generalizable extraction of knowledge from data. Being a data scientist requires an integrated skill set spanning mathematics, statistics, machine learning, databases and other branches of computer science along with a good understanding of the craft of problem formulation to engineer effective solutions. This course provides an overview of today's data environment, the rationale and opportunity for a new approach to analytics, the roles required, including the Data Scientist, and representative examples of big data analytics in industry. This course introduces students to the fundamental principles of data science that underlie the algorithms, processes, methods, and data-analytic thinking. It also introduces students to algorithms and tools based on these principles, and frameworks to support problem-focused data-analytic thinking. The course ends by examining students understanding on integration and synthesis of concepts and their application to solving problems.

MAXL 5123**Big Data Management****Course Learning Outcomes:**

1. Discover the challenges, ecosystem, trends, and technologies for big data management.
2. Manipulate the learnt technologies to solve challenges in managing big data.
3. Integrate the different technologies in planning and designing comprehensive solution for big data management.

Course Synopsis:

Big data is the new norm for many organizations. Meaningful insights obtained from this huge amount of collected data help organizations remain competitive. Hence it is important that organizations manage their big data properly. In this course, the many challenges in managing big data such as data quality, data security, data privacy, data storage, data processing and data analytics are exposed. Ecosystem and future trends are elaborated to get better insight in managing big data. This course introduces NoSQL data storage like MongoDB, Cassandra, and Neo4J which stores non-relational data model easily. To deal with the huge amount data that need to be stored and processed, Hadoop which is the de-facto technology for big data management is explored by this course. HDFS which is Hadoop data storage component and MapReduce which is Hadoop data processing component are delved into. This course also discusses Hadoop ecosystem which provides added functionalities for managing big data such as Flume and Sqoop for data ingestion. For analyzing big data, this course introduces Spark and its ecosystem to provide different types of analytics. At the end of the course, students will have exposure and understanding in managing big data, what tools are appropriate and relevant to manipulate and to integrate in planning and designing comprehensive solution for big data management.

MAXL 5133**Applied Statistical Methods****Course Learning Outcomes:**

1. Apply appropriate statistical techniques for statistical problems.
2. Analyse solutions for real life statistical problems.
3. Formulate solutions for statistical problems using statistical software.
4. Integrate solution plan to application problems based on available data.

Course Synopsis:

Applied statistical methods covers the fundamental understanding of statistical methods necessary to deal with a wide variety of practical problems. The course offers a curriculum that provides a balanced approach towards learning of statistical theory and its applications. The core courses give a thorough grounding in advanced statistical methods. Topics covered in this course stresses clarity of understanding, interpretation, and method of application. Various qualitative and quantitative methods in research will be discussed in this course. This includes also on how to compute, evaluate and analyze qualitative and quantitative data. This course also covers the discovery and exploration of complex multivariate relationships among variables. Multivariate analysis is a set of statistical techniques used for analysis of data that contain more than one variable. The underlying theory required to understand the multivariate methods, as well as their applications in data analysis will be discussed. Methods in time series analysis also will be discussed where it comprises methods for analyzing time series data to extract meaningful statistics of the data as well as forecasting future values.

MAXL 5143**Applied Machine Learning****Course Learning Outcomes:**

1. Apply the concepts and principles of machine learning for problem solving.
2. Evaluate different machine learning techniques in terms of their applicability to different Machine Learning problems.
3. Manipulate appropriate tools to apply suitable machine learning techniques to the data set given to solve the problem.
4. Formulate a systematic approach to conduct scientific experimental investigations and assessment.

Course Synopsis:

Machine learning is a rapidly growing field at the intersection of computer science and statistics, which concerns about finding patterns in real data. The learning evolved from the study of pattern recognition and computational learning theory in artificial intelligence to explore the construction of algorithms for making prediction on data. This course aims to provide practical skills in applying machine learning algorithms on real applications. It emphasizes on the implementation and evaluation of machine learning systems. The focus will be placed on applying machine learning model for problem solving more than the fundamental understanding of learning algorithm. Students will be exposed to the tasks on design, implementation, training and evaluation of a machine learning systems. Topics of discussion include: introduction to machine learning; real-world data; feature engineering; classification techniques; predicting continuous target variables; model evaluation, parameter tuning; clustering analysis; association analysis; ensemble learning; reinforcement learning; deep learning; and scaling machine learning workflows.

MAXL 5153**Big Data Analytics and Visualization****Course Learning Outcomes:**

1. Identify the concepts, fundamentals and methodologies of big data analytics.
2. Interpret massive volumes of unstructured data into a meaningful form, using data analytics software.
3. Construct big data analytics and visualization strategy in a proper and meaningful way using appropriate techniques.

Course Synopsis:

This course consists of two parts: Big Data Analytics and Data Visualization. In the first part, the course brings together several key information technologies used in manipulating, storing, and analyzing big data especially unstructured data. The unstructured data are text, images, videos, audio/speech. R or Python or other tools will be used as the tool for analyzing the unstructured data. In the second part of this course, data visualization is covered to enables multi-level analysis of data. The fundamental concepts in data visualization will be covered, including the various types of data visualization according to input types, different approaches in determining good data visualization techniques and methods, good practices for amplifying cognition, revealing better insights and unveiling underlying structure. Students will also learn how to develop interactive visualizations and applications, use various data exploratory functions and how to present the data.

MAXL 5163**Modelling and Decision Making****Course Learning Outcomes:**

1. Interpret knowledge of modelling and prescriptive analytics with data science for data-driven and evidence-based decision making.
2. Generate appropriate and relevant modelling and prescriptive analytics technique using Big data input to solve complex decision problems.
3. Propose prescriptive models and solutions using appropriate software tools and analysis of Big data.

Course Synopsis:

In Data Science, prescriptive analytics is the final frontier of analytics, which entails the application of mathematical modelling, simulation, optimization and computational intelligence to suggest decision options, taking advantage of the results from the earlier analytic stages of descriptive and predictive analytics. Prescriptive analytics optimizes decision making and able to suggest or prescribe what actions to take in order to maximize output, given constraints and key objectives, and shows the implication of each decision option. In this course, students are exposed to operations research modelling, and meta-heuristics and soft computing based optimizations, and showed how to exploit them to solve real-world decision problems. The course covers the arts of decision making, decision making and modelling process, decision analysis and method of decision science which involves the application of selected operations research and optimization (hard and soft) techniques, to strategic and managerial decision problems. The focus is to impart analytical systems level thinking and problem solving skills in complex decision making contexts. At the end of the course students will have exposure and deep understanding on how organizational decisions are made in the present of Big data, what appropriate and relevant modelling and analytics solutions should be provided to support well-informed, in-time and effective decision making.

MPSW 5063**Entrepreneurship****Course Learning Outcomes:**

1. Explain entrepreneurial skills in identifying and exploiting entrepreneurial opportunities.
2. Formulate a business model canvas for business value proposition.
3. Propose a creative and viable high tech business models/plan and strategies.

Course Synopsis:

The objectives of this course are to provide students with a robust foundation in theories relevant to entrepreneurial behaviour in the context of technology ventures and to stimulate them to think and behave like an entrepreneur. First, the course covers fundamental issues such as the influence of risk and uncertainty, the role of technology in entrepreneurship, opportunity recognition, business model creation, life cycle and critical stages of the entrepreneurial business and the development of an operational and financial foundation of a technology venture. Second, the course provides students with actionable knowledge by familiarising them with the necessary entrepreneurial expertise to establish and scaling up a technology venture.

MAXL 5223**Manufacturing Analytics****Course Learning Outcomes:**

1. Illustrate analytics use cases in manufacturing systems.
2. Formulate analytics models for manufacturing systems.
3. Manipulate appropriate tools to implement analytics model for manufacturing use cases.

Course Synopsis:

Manufacturing analytics aims to analyse the production data to generate added value. The analytics models are purpose-built to improve decision-making and boost production performance. Manufacturers take advantage of the actionable insights to reduce process flaws, increase performance, save time and cost. This course aims to provide a general overview of implementing analytics in manufacturing domain. It emphasises on practical issues and application of advanced analytics on manufacturing challenges. The main focus will be placed on designing the manufacturing use cases using analytics tools toward actionable intelligence. Topics of discussion include: introduction to manufacturing analytics; the return of investments in manufacturing analytics; product design analysis; the manufacturing process; automation and computer-aided manufacturing; IoT-enabled manufacturing system; manufacturing performance management, performances analysis method, and production scheduling system; and the human side of analytics in manufacturing industry.

MAXL 5233**Social Media Analytics****Course Learning Outcomes:**

1. Analyze the fundamentals and concepts of social media data mining.
2. Propose appropriate solution steps for social media data analysis based on text mining methods.
3. Build computer program based on appropriate methods for practical uses in social media analytics.

Course Synopsis:

This course will introduce social media content analytics. Text data mining, especially data from social media has been gaining attention as the available volume of online social media information grows at a rate that is by far higher than our human capacity to handle and process such a huge volume of data from the web. Topics that will be covered in this course includes overview of social media data mining, mining social media data, mining blog pages and other social web analysis.

MAXL 5253**Healthcare Analytics****Course Learning Outcomes:**

1. Construct solution in healthcare analytics through simple modelling and simulation.
2. Explain healthcare analytical case studies using data sciences approach.
3. Formulate the healthcare analytics in solving data science related problems.

Course Synopsis:

This course covers the transformation of big data by creating enormous opportunities for companies, researchers and other related area in healthcare to improve patient outcomes. Healthcare analytics powers data-driven transformations that combine strategy, big data and advanced analytics, and implementation processes to change the way healthcare companies especially think, decide, and act. The four areas within healthcare are considered as a case study; claims and cost data (retail purchases e.g., data captured in running stores), pharmaceutical and research and development (R&D) data, clinical data (collected from electronic medical records (EHRs)), and patient behavior and sentiment data (patient behaviors and preferences). By the end of this course, students are able to design, analyze and implement the healthcare analytics concepts in data sciences.

MAXL 5273**Customer and Financial Analytics****Course Learning Outcomes:**

1. Analyze analytics use cases in customer behaviour and financial systems.
2. Identify appropriate solution steps for customer behaviour and financial systems.
3. Build computer program based on appropriate methods for practical uses in customer and financial analytics.

Course Synopsis:

Customer analytics is a process by which data from customer behaviour is used to help make key business decisions via market segmentation and predictive analytics. This information is used by businesses for direct marketing, site selection, and customer relationship management. Marketing provides services in order to satisfy customers. With that, the productive system is considered from its beginning at the production level, to the end of the cycle at the consumer. Customer analytics plays a very important role in the prediction of customer behaviour today.

Financial analytics explores how financial statement data and non-financial metrics can be linked to financial performance. In this course, students will learn how data is used to assess what drives financial performance and to forecast future financial scenarios.

MAXU 5214**Project I****Course Learning Outcomes:**

1. Identify the problems, objectives and scope based on current trends of technologies.
2. Prepare a comprehensive literature review and appropriate procedures to complete the project.
3. Justify the suitable key answers to clarify the contribution in application domain.

Course Synopsis:

This course is the first part of project that contains the results based on the theories and techniques of current technologies learnt previously. Besides writing the proposal, student is required to write four chapters of dissertation, i.e.;

- Chapter 1: Introduction,
- Chapter 2: Literature Review, and
- Chapter 3: Research Methodology.

In addition, student must accomplish the project design and justify the proposed solution during presentation.

MAXU 5226**Project II****Course Learning Outcomes:**

1. Demonstrate the solutions with significance contribution to the application domain.
2. Verify the proposed solutions to understand the strengths, weaknesses and limitations of the study.
3. Modify the proposed solution by articulating the series of processes to achieve the end results of the domain business requirements.

Course Synopsis:

This course is the second part of project that show the ability of student in applying the theories and techniques of knowledge and technologies learnt previously. Student must write the second fold of dissertation which consists of three chapters of dissertation, i.e.;

- Chapter 4: Analysis & Design,
- Chapter 5: Implementation,
- Chapter 6: Evaluation, and
- Chapter 7: Conclusion & Future Works.

These chapters must align with the proposed solutions developed as the end product of this project. Student is required to justify the contribution of the proposed solutions throughout the presentation and demonstration sessions.

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