UTeM

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UNIVERSITI TEKNIKAL MALAYSIA MELAKA

POSTGRADUATE *Academic Handbook* 2024/2025

FOR MASTER BY COURSEWORK

FACULTY OF INFORMATION AND COMMUNICATION TECHNOLOGY
UNIVERSITI TEKNIKAL MALAYSIA MELAKA

POSTGRADUATE ACADEMIC HANDBOOK

Master by Coursework

Session 2024/2025

FACULTY OF
INFORMATION AND COMMUNICATION TECHNOLOGY
UNIVERSITI TEKNIKAL MALAYSIA MELAKA

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TOP MANAGEMENT

PROF. DATUK TS. DR.
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UNIVERSITI TEKNIKAL MALAYSIA MELAKA

Universiti Teknikal Malaysia Melaka (UTeM) was established under Section 20 University and University College Act 1971 (Act 30) through "Perintah Universiti Teknikal Malaysia Melaka (Pemerbadanan 2007)" gazetted as P.U. (A) 43 on the 1st of February 2007.
UTeM was initially known as Kolej Universiti Kebangsaan Malaysia (KUTKM), established on the 1st of 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:

1. Promoting knowledge through innovative teaching and learning, research and technical scholarship.
2. Developing professional leaders with impeccable moral values.
3. 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 with industries for the prosperity of the Nation.
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.

FOREWORD BY THE DEAN

Assoc. Prof. Ts. Dr. Mohd Sanusi Azmi

Assalamualaikum w.r.t. and greetings,

Welcome to all new diploma, undergraduate, and postgraduate students in the 2024/2025 session. It is expected that the presence of students from various states and countries at the Faculty of Information and Communication Technology (FTMK), UTeM, this year will further enhance the lively atmosphere of the faculty with its teaching, learning, academic activities, and non-academic activities.

We at FTMK warmly welcome students to acquire knowledge and technical skills based on the application-oriented approach that is the strength of FTMK. FTMK students are trained in both theory and application so that their development as FTMK students at UTeM becomes a success for you and the UTeM community.

Therefore, in order to make FTMK students shine at UTeM, FTMK students need to be aware of and understand the academic handbook for 2024/2025, which will accompany them throughout their studies. Students need to plan their academic studies for each semester and understand credit calculations, prerequisite courses, as well as the rules and guidelines outlined in this academic handbook.

Students are expected to fully utilize the academic handbook for 2024/2025. We hope students will continue their high learning momentum by enhancing their knowledge and skills before entering the workforce.

As members of FTMK and UTeM, we will always be with the students and pray for the success of all students.

FTMK Truly World!

Thank you.

Faculty Vision

To become a creative, innovative and world class centre of excellence in education, research and services of information and communication technology field.

Faculty Mission

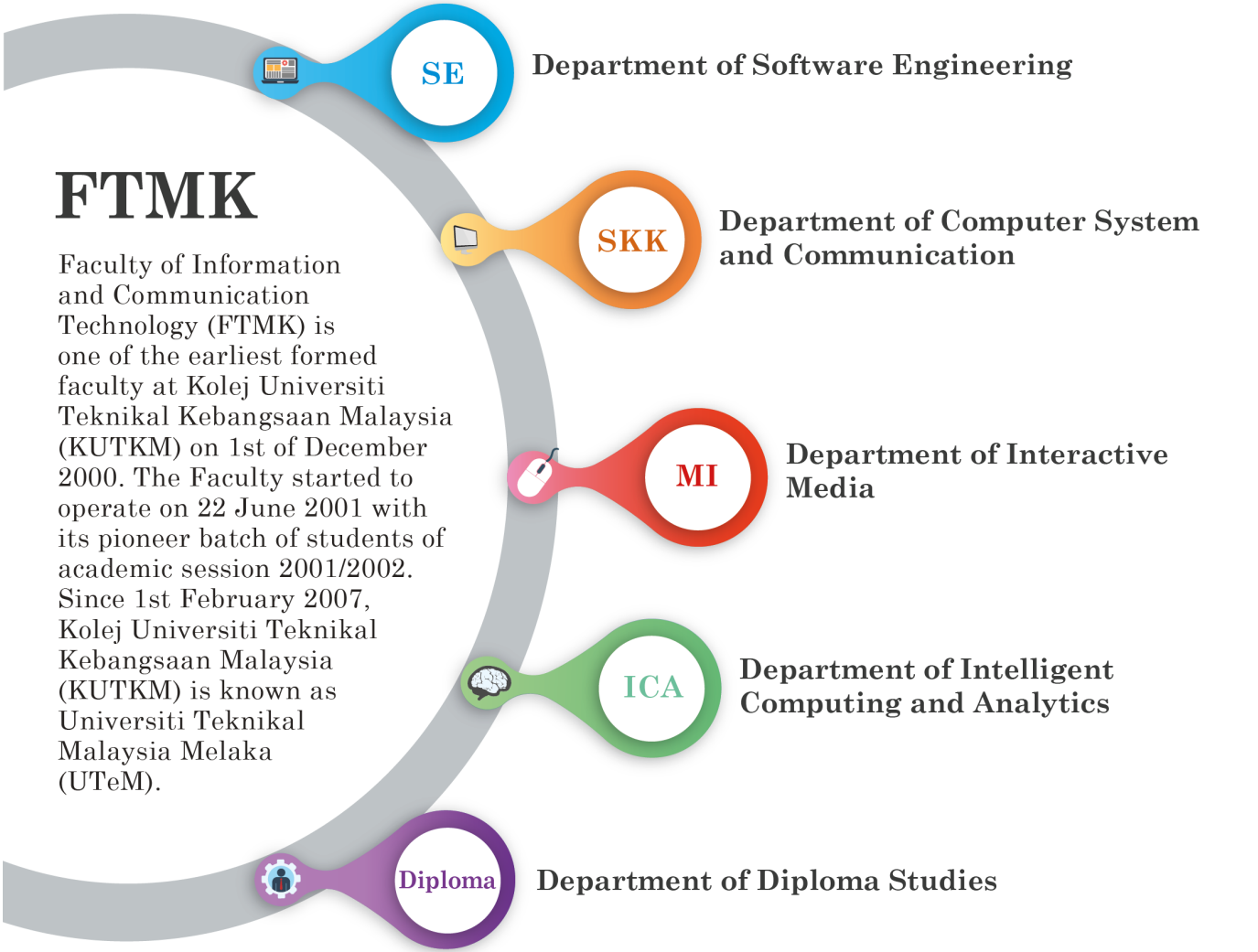
To develop highly competent professionals with outstanding personalities through a world class technical education on the basis of **application-oriented teaching, learning** and **research** with smart partnership with industry and university.

Faculty Objectives

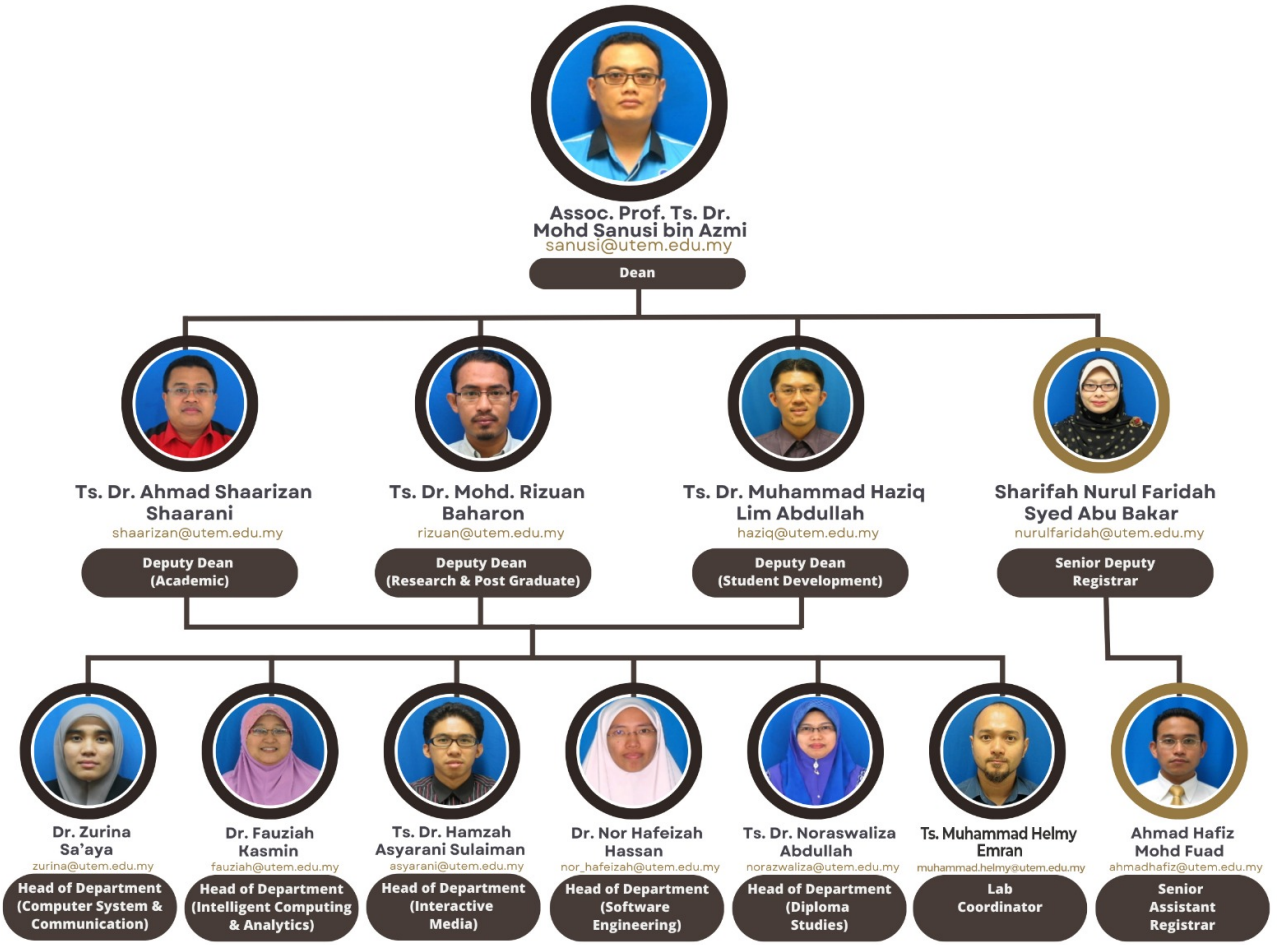
i. To create ethical, competent and skilful ICT professionals of local, international and industry's choice.
ii. To spearhead and develop applied research in the ICT field to produce new knowledge and innovative technology needed by the industry which can be commercialized and recognized internationally.
iii. To improve staff professionalism and competence and contribute to university income through consultation, professional training and continuous quality teaching.
iv. To improve ICT understanding, promote ICT culture in the society and provide social services which leads to social well-being and economic development.
v. To create continuous smart partnership with local and foreign industry and institutions of excellence.
vi. To develop high quality infrastructure and faculty administration system and support programme development to achieve faculty objectives.

FTMK

Faculty of Information and Communication Technology (FTMK) is one of the earliest formed faculty at Kolej Universiti Teknikal Kebangsaan Malaysia (KUTKM) on 1st of December 2000. The Faculty started to operate on 22 June 2001 with its pioneer batch of students of academic session 2001/2002. Since 1st February 2007, Kolej Universiti Teknikal Kebangsaan Malaysia (KUTKM) is known as Universiti Teknikal Malaysia Melaka (UTeM).



FTMK ORGANIZATION STRUCTURE



List of Programme offered (Postgraduate)

Doctor of Philosophy

1. Doctor of Philosophy in Information and Communication Technology, PITA.
2. Doctor of Information Technology, PDIT.

Master's Degree

By research:

1. Master in Information and Communication Technology, MITA.

By coursework:

1. Master of Computer Science (Multimedia Computing), MCSM.
2. Master of Computer Science (Database Technology), MITD.
3. Master of Computer Science (Internetworking Technology), MITI.
4. Master in Computer Science (Software Engineering), MITS
5. Master of Computer Science (Security Science), MITZ.
6. Master in Mobile Software Development, MMSD.
7. Master of Technology (Data Science & Analytics), MTDS.
8. Master of Technology in Data Science & Analytics, MTDL.

Postgraduate Coordinator and Programme Coordinators

Postgraduate Coordinator

Ts. Dr. Lizawati binti Salahuddin.

Programme Coordinators

1) **Master of Computer Science (Multimedia Computing), MCSM**
   Ts. Dr. Che Ku Nuraini binti Che Ku Mohd

2) **Master of Computer Science (Database Technology), MITD**
   Dr. Syahida binti Mohtar

3) **Master of Computer Science (Internetworking Technology), MITI**
   Ts. Dr. Mohd Najwan bin Md Khambari

4) **Master in Computer Science (Software Engineering), MITS**
   Ts. Maslita binti Abd. Aziz

5) **Master of Computer Science (Security Science), MITZ**
   Ts. Dr. S. M. Warusia Mohamed bin S. M. M. Yassin

6) **Master in Mobile Software Development, MMSD.**
   Dr. Zahriah binti Othman

7) **Master of Technology (Data Science & Analytics), MTDS**
   Ts. Dr. Sek Yong Wee

8) **Master of Technology in Data Science & Analytics, MTDL**
   Ts. Dr. Siti Azirah binti Asmai

Facilities

Lab Facilities

Faculty of Information and Communication Technology (FTMK) 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 FTMK.

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 FTMK 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 FTMK environment.

Loan Facilities on Lab Equipment

Students are allowed to loan 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 12 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 15 pax
Virtual Reality Studio	Laboratory for motion capture and games development
Photography/Recording Studio	Multimedia recording and editing studio
Research Laboratories	1. Innovative Software System & Services (IS3) Laboratory 2. Information Security Forensics & Computer Networking (INSFORNET) Laboratory 3. Optimization, Modelling, Analytics and Simulation (OptiMAS) Laboratory 4. Computational Intelligence and Technologies (CIT) Laboratory 5. Human Centered Computing and Information Systems Lab (HCC-ISL) Laboratory 6. Pervasive Computing & Educational Technology (PET) Laboratory 7. Biomedical and Engineering (BIOCORE) 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
Teaching Laboratories	1. Computer Game Laboratory 2. Software Engineering Lab 1, 2 and 3 3. Programming Laboratory 1, 2, 3 and 4 4. Database Laboratory 1, 2 and 3 5. Network Laboratory 1 and 2 6. CCNA & CCNP Laboratory 7. Fiber Optic Laboratory 8. Security Laboratory 9. System / Hardware Laboratory 10. Wireless Laboratory 11. Virtual Reality Laboratory 12. Multimedia Laboratory 1, 2, 3 and 4 13. Artificial Intelligence Laboratory 1, 2, 3 and 4 14. Student Workshop Laboratory
Other Facilities	1. Visiting Professor Rooms 2. Executive Laboratory 3. Administration Office – Level 2 & 3 4. FICTS Room 5. Student Common Room 6. Surau or Prayer Room 7. Lobby Area 8. Parking Area for students and staffs

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.

ENTRY REQUIREMENTS

University General Requirements

a) A Bachelor's degree (Level 6, MQF) in Computing or related fields with a minimum CGPA of 2.50, as accepted by the HEP Senate; OR

b) A Bachelor's degree (Level 6, MQF) in Computing or related fields with a minimum CGPA of 2.00 and not meeting a CGPA of 2.50 can be accepted subject to a thorough rigorous assessment as determined by the HEP; OR

c) A Bachelor's degree (Level 6, MQF) in a Non-Computing field with a minimum CGPA of 2.00 can be accepted subject to a thorough rigorous assessment as determined by the HEP to identify the appropriate prerequisite courses that are equivalent to their working experience in the Computing or related fields; OR

d) A Bachelor's degree (Level 6, MQF) in a Non-Computing field with a minimum CGPA of 2.00 can be accepted subject to appropriate prerequisite courses; OR

e) Other qualifications equivalent to a Bachelor's degree (Level 6, MQF) in Computing or related fields recognised by the Government of Malaysia must fulfil the requirement on item i) or ii).

Note: For candidates without Computing Degree, prerequisite modules in computing must be offered to adequately prepare them for their advanced study.

Language Requirements

For international applicants, the following additional requirements must be fulfilled:

a) Achieve a minimum of Band 4 in MUET or equivalent to CEFR (Low B2).

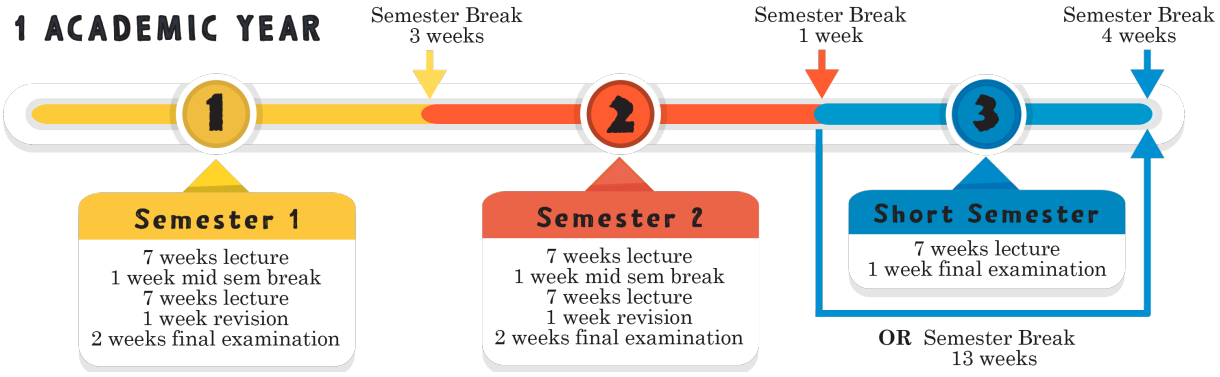
If a student does not meet this requirement, the HEP must offer English proficiency courses to ensure that the student's proficiency is sufficient to meet the needs of the programme.

The university has implemented its academic system according to semester system. Every academic year comprises of two semesters and in some instances the faculty also offers a special semester which is arranged during the semester break.

Specifically, there are 18 weeks per semester, which is divided as follows:

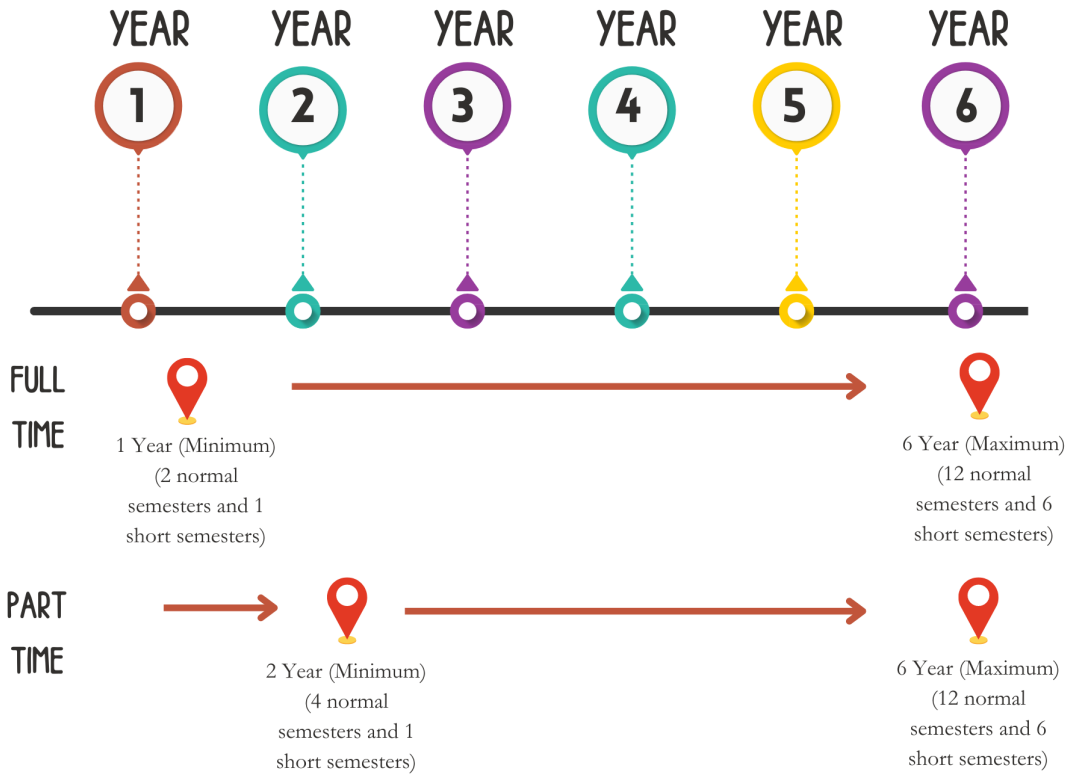
- 7 weeks for the first part of lecture.
- 1 week of mid semester break.
- 7 weeks for the second part of lecture.
- 1 week of revision.
- 2 weeks for final examination.

While for the short semester, there are only a total of 8 weeks of implementation, which include 7 weeks of lecture and 1 week of final examination.



Duration of Studies

Duration of Studies for ODL Mode



Grading System

The university has implemented its academic system according to semester system. The semester system is widely used in local higher learning institutions in Malaysia.

While student's achievement in courses taken is shown by grades. The relationship between marks, grades and evaluation points is shown in the following table.

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 (Redeemable)	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

Grade Point Average (GPA)

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

$$\begin{aligned} \text{Total Grade Point (TGP)} &= k_1m_1 + k_2m_2 + \ldots + k_nm_n \\ \text{Total Calculated Point (TCP)} &= k_1 + k_2 + \ldots + k_n \\ \text{GPA} &= \frac{TGP}{TCP} \end{aligned}$$

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

Cumulative Grade Point Average (CGPA):

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

$$\text{CGPA} = \frac{TGP_1 + TGP_2 + \ldots + TGP_n}{TCP_1 + TCP_2 + \ldots + TCP_n}$$

Academic Standing

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

MCSM
MASTER OF COMPUTER SCIENCE
(MULTIMEDIA COMPUTING)

MASTER OF COMPUTER SCIENCE (Multimedia Computing)

Programme Details

This programme is specifically designed to equip students with security elements in information and communication technology related to management, data and infrastructure.

Programme Educational Objectives (PEO)

This program is specifically designed to equip students with the use of the latest technologies to design and develop high-level multimedia based applications that meet industry needs.

Below are the PEO for this programme:

PEO 1: Practice in-depth and specialist knowledge and skills of Computer Science in Multimedia Computing to support organizational goals.

PEO 2: Demonstrate higher-order thinking skills and sustained learning in adapting to a constantly changing field through professional development, research and life-long learning.

PEO 3: Demonstrate effective leadership and communication to a wide variety of audiences or multi-disciplinary teams, tolerate and value different global perspectives and cultures.

PEO 4: Practice professional, ethical and societal responsibilities, and show adaptability in different roles and surroundings in contributing to the community.

Programme outcomes

Programme Outcomes (PO) are statements describing what students are expected to know and be able to perform or attain by the time of graduation. These are related to the Knowledge (K), Skills (S), and Attitude (A) that students acquire throughout the programme.

Below is the list of PO for this programme:

PO1: Have in-depth skills and strong mastery knowledge in Computer Science (Multimedia Computing);

PO2: Gain a substantial knowledge of entrepreneurship in Information and Communication Technology area;

PO3: Ability to consistently explore and expand contemporary knowledge in targeted discipline (Multimedia Computing);

PO4: Ability to gain employment for career development in related Computer Science field (Multimedia Computing);

PO5: Demonstrate the ability to identify, analyze and implement efficient solutions to problems with effective communication;

PO6: Ability to apply expertise in working environment; and

PO7: Demonstrate the ability to lead, manage and coordinate effectively and ethically as an individual or a team player.

Programme Structure - Full Time

September Intake:

Semester 1 (September)		
Course Code	**Course**	**Credit**
MPSW 5013	Research Methodology	3
MITP 5113	Algorithm Analysis and Design	3
MITS 5313	Advanced Data Communications and Network	3
MITS 5113	Computer Architecture & Compiler	3
MITM XXXX	Elective 1	3
MITM XXXX	Elective 2	3
	Total credit	**18**
Semester 2 (February)		
Course Code	**Course**	**Credit**
MITI 5213	Computational Methods	3
MITM 5313	Advanced Human Computer Interaction	3
MITU 5213	Project 1	3
MITM XXXX	Elective 3	3
MITM XXXX	Elective 4	3
MPSW XXXX	University Core Course	3
	Total credit	**18**
Semester 3 (Short Semester)		
Course Code	**Course**	**Credit**
MITU 5226	Project 2	6
	Total credit	**6**

February Intake:

Semester 2 (February)		
Course Code	**Course**	**Credit**
MITI 5213	Computational Methods	3
MITM 5313	Advanced Human Computer Interaction	3
MPSW 5013	Research Methodology	3
MITM XXXX	Elective 1	3
MITM XXXX	Elective 2	3
MPSW XXXX	University Core Course	3
	Total credit	**18**
Semester 3 (Short Semester)		
Course Code	**Course**	**Credit**
MITU 5213	Project 1	3
MITM XXXX	Elective 3	3
	Total credit	**6**
Semester 1 (September)		
Course Code	**Course**	**Credit**
MITU 5226	Project 2	6
MITP 5113	Algorithm Analysis and Design	3
MITS 5313	Advanced Data Communications and Network	3
MITS 5113	Computer Architecture & Compiler	3
MITM XXXX	Elective 4	3
	Total credit	**18**

University Core Courses - choose ONE (1) only:

Course Code	Course	Credit
MPSW 5033	Engineering and Technology Management	3
MPSW 5053	Quality System Management	3
MPSW 5063	Entrepreneurship	3
MPSW 5073	Project Management	3

Elective Courses - choose FOUR (4) only:

Course Code	Course	Credit
MITM 5323	Mobile Application Development	3
MITM 5333	Multimedia Based Instructional Design	3
MITM 5413	Multimedia Professional Ethics	3
MITM 5233	Computer Graphics & Visualization	3
MITM 5223	Advance 3D Animation	3
MITM 5113	Advanced Web Programming	3
MITM 5123	Advanced Audio and Video Technology	3
MITM 5213	3D Modelling	3

Note: Total credit hours = 42 credits

Programme Structure - Part Time

September Intake:

Semester 1 (September)		
Course Code	**Course**	**Credit**
MPSW 5043	Research Methodology	3
MITI 5213	Computational Methods	3
MITM XXXX	Elective 1	3
	Total credit	**9**
Semester 2 (February)		
Course Code	**Course**	**Credit**
MPSW XXXX	University Course	3
MITP 5113	Algorithm Analysis and Design	3
MITM XXXX	Elective 2	3
	Total credit	**9**
Semester 3 (September)		
Course Code	**Course**	**Credit**
MITM 5313	Advanced Human Computer Interaction	3
MITS 5113	Computer Architecture and Compiler	3
MITU 5213	Project 1	3
MITM XXXX	Elective 3	3
	Total credit	**12**
Semester 4 (February)		
Course Code	**Course**	**Credit**
MITS 5313	Advanced Data Communications and Network	3
MTPU 5226	Project 2	6
MITM XXXX	Elective 4	3
	Total credit	**12**

Elective courses - choose TWO (2) only:

University Courses - choose ONE (1) only:

Course Code	Course	Credit
MPSW 5033	Engineering and Technology Management	3
MPSW 5053	Quality System Management	3
MPSW 5063	Entrepreneurship	3
MPSW 5073	Project Management	3

Elective Courses - choose FOUR (4) only:

Course Code	Course	Credit
MITM 5323	Mobile Application Development	3
MITM 5333	Multimedia Based Instructional Design	3
MITM 5413	Multimedia Professional Ethics	3
MITM 5233	Computer Graphics & Visualization	3
MITM 5223	Advance 3D Animation	3
MITM 5113	Advanced Web Programming	3
MITM 5123	Advanced Audio and Video Technology	3
MITM 5213	3D Modelling	3

Note: Total credit hours = 42 credits

MPSW 5013 Research Methodology

Learning Outcomes:

At the end of the course, students should be able to:

CLO1: Propose a research proposal with an improvement of existing knowledge.

CLO2: Synthesize relevant literature to address the knowledge gaps.

CLO3: Apply ethical research skills in constructing research questions, objectives and hypotheses (if any) relevant to research problem.

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.

References:

1. Kumar, R., Research methodology: A step-by-step guide for beginners. Sage Publications Limited, 2019.
2. Gray, D. E., Doing research in the business world. Sage Publications Limited, 2019.
3. Creswell, J. W., & Creswell, J. D., Research Design: Qualitative, Quantitative, and Mixed Methods Approaches. In Research Design: Qualitative, Quantitative, and Mixed Methods Approaches, 2018.
4. Tang, H., Engineering Research: Design, Methods, and Publication. John Wiley & Sons, 2020.
5. Sidek, S., Kamalrudin, M. & Mat Deris, M., Research Survival Toolkit: Writing a winning fundamental research proposal, Melaka: University Publisher, UTeM, 2017.
6. Zobel, J., 3rd Edition, Writing for Computer Science, Springer-Verlag London, 2014.
7. Arkoudas, K., Musser, D., Fundamental Proof Methods in Computer Science: A Computer-Based Approach, MIT Press, 2017.
8. Creswell, J. W., & Poth, C. N., Qualitative inquiry and research design: Choosing

among five approaches. Sage publications, 2016.

MPSW 5063 Entrepreneurship

Learning Outcomes:

At the end of the course, students should be able to:

CLO1: Analyse entrepreneurial skills in identifying and exploiting entrepreneurial opportunities.

CLO2: Apply commercially viable ideas, projects, products prototypes for commercialization within the context of societal framework and to deliver business model canvassing and business value proposition.

CLO3: Develop creative and viable high tech business models and strategies.

Synopsis:

The objectives of this course are to provide students a robust foundation in theories relevant to the improvement of entrepreneurial behaviour and capabilities 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 key 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 areas of entrepreneurial expertise necessary in order to found and/or grow a technology venture.

References:

1. Duening, Thomas N., Robert A. Hisrich, and Michael A. Lechter. Technology Entrepreneurship: Taking Innovation to the Marketplace. Academic Press, 2020.
2. Sergi, B. S., & Scanlon, C. C. (Eds.), Entrepreneurship and Development in the 21st Century. Emerald Publishing Limited, 2019.
3. Bianchi, C., Glavas, C., & Mathews, S., SME international performance in Latin America: The role of entrepreneurial and technological capabilities. Journal of Small Business and Enterprise Development, 24(1), 176–195, 2017.
4. Patrict Van Der Pjil, Justin Lokitz, Lisa Kay Solomon, Design a Better Business: New Tools, Skills, and Mindset for Strategy and Innovation. Wiley, 2016.
5. Baldock, R., North, D., & Ullah, F., New Technology-Based Firms in the New Millennium. New Technology Based Firms in the New Millennium, 11, 203–226, 2015.
6. Alexander Osterwalder & Yvnes Pigneur, Value Proposition Design: How to Create

Products and Services Customers Want. Wiley, 2015.
7. Alexander Osterwalder & Yvnes Pigneur, Business Model Generation: A Handbook for Visionaries, Game Changers, and Challengers, Wiley, 2010.

MPSW 5073 Project Management

Learning Outcomes:

At the end of the course, students should be able to:

CLO1: Analyze the core concepts and principles, functions, and process in project management.
CLO2: Develop a comprehensive & viable project proposal.
CLO3: Evaluate best practices and methodology in project management.

Synopsis:

This subject focuses on the principles of project management based on Project Management Body of Knowledge (PMBOK). Students will be familiarized with the Project Management process group functions (initiating, planning, executing, controlling and closing) and project knowledge areas (integration, scope, time, cost, quality and human resources). Various tools for supporting the analysis of works in project management will be introduced. Topics including initiating and planning the project, working with the management, project appraisal & sensitivity, work breakdown structure, managing uncertainty, building project plan, implementing and revising project plan, completing the project and contract laws. Microsoft Project (MS Project) will be introduced as project management software tools.

References:

1. Project Management Institute, A Guide to the Project Management Body of Knowledge (PMBOK® Guide) – Fifth Edition, 2018.
2. Project Management Institute, A Guide to the Project management Body of Knowledge (PMBOK® Guide) – Sixth Edition, 2017.
3. Clifford F. Gray · Erik W. Larson, Project Management the Managerial Process, McGraw Hill, 2021.
4. Meredith, J., Mantel, S. and Mantel, S. Jr., Project Management: A Strategic Managerial Approach. New York, Wiley, 2017.
5. Trevor L Young, Successful Project Management, Kogan Page Publishers, 2016.

MPSW 5033 Engineering Technology Management

Learning Outcomes:

At the end of the course, students should be able to:

CLO1: Identify the principles of engineering management and technology management across different industries.

CLO2: Apply relevant issues in engineering management and technology management across different industries.

CLO3: Analysis the impact of relevant issues in the context of engineering management and technology management across different industries.

Synopsis:

The course consists of two components, i.e., Engineering Management and Technology Management. Topics in Engineering Management provide a vehicle for engineers and technical specialist to enhance their knowledge on management, organizational structure and behavior of engineering/technical organizations. Additional topics will enhance the knowledge and competencies in the management of engineering activities such as design, operations, and quality. The Technology Management part of the course will equip students with contemporary views and tools on management of technology and its impact on an organization. It emphasizes management of innovation and new product development as well as managing technology and knowledge. The interaction of technology and the law, particularly the knowledge management and intellectual property will be covered.

References:

1. Paul Trott, Innovation Management and New Product Development (6th Edition) 6th Edition, Pearson; 6 editions, 2016.
2. A. Thomas Roper, Thomas W. Mason, Frederick A. Rossini, Forecasting and Management of Technology, Alan L. Porter, Scott W. Cunningham, Jerry Banks, John Wiley & Sons, 2011.
3. William J Stevenson, Operations Management 13th Edition, McGraw-Hill Education, 2017.
4. by Jim Hall, Tina Scott, Lean Six Sigma: Beginner's Guide to Understanding and Practicing Lean Six Sigma CreateSpace Independent Publishing Platform, 2016.
5. Sharon Armstrong, Barbara Mitchell Weiser, The Essential HR Handbook, 10th Edition: A Quick and Handy Resource for Any Manager or HR Professional , 2019.

MPSW 5053 Quality Systems Management

Learning Outcomes:

At the end of the course, students should be able to:

CLO1: Explain the conceptual understanding of Quality.

CLO2: Identify Quality System Management information.

CLO3: Propose Quality System Management techniques and tools in the practice of organizations.

Synopsis:

This course presents the fundamental elements of Quality Management System including the importance of quality as a strategy for continuous improvement in business performance. It explains the strategies for competitive quality in design and manufacture as well as in terms of customer supply chain concept of total quality aspect. Such topics include Management systems ISO, variability, Six Sigma, Taguchi method, failure mode and effect analysis (FMEA) and quality function deployment. Several quality control tools such as Pareto chart, bar chart and scatter diagram will be cover in statistical data collection, measurement and analysis. Finally, concepts of benchmarking and ISO standards with respect to control elements will be integrated with the Total Quality Management (TQM) as part of quality Management system.

References:

1. S. Thomas Foster, Managing Quality: Integrating the Supply Chain, 6th Edition, Pearson, 2017.
2. Howard S. Gitlow, Richard J. Melnyck and David M. Levine, Guide to Six Sigma and Process Improvement for Practitioners and Students, A: Foundations, DMAIC, Tools, Cases, and Certification, 2nd Edition, 2015.
3. Gitlow, H. S., Quality Management systems: A Practical Guide, St. Lucie Press, 2001.
4. Mukherjee, P. N., Total Quality Management, Prentice Hall, 2006.
5. Manual Procedure for Malaysia Halal Certification, 3rd Revision, Jabatan Kemajuan Islam Malaysia, 2015.

MITU 5213 Project 1

Learning Outcomes:

At the end of the course, students should be able to:

CLO1: Formulate the problems, objectives and scope based on complex technology solutions.

CLO2: Perform literature review and appropriate methodology to complete the project.

CLO3: Defend the proposed project solutions in written and verbal forms.

Synopsis:

This course is the first part of project that requires a student to prepare a master research proposal based on the theories and techniques of technologies learnt previously. Student is required to write three chapters of dissertation i.e. Chapter 1: Introduction, Chapter 2: Literature Review and Chapter 3: Research Methodology. Besides writing the proposal, student needs to present and defend his/her proposal. Student is expected to demonstrate ability to identify and propose solutions to the identified problems.

References:

1. Thesis Writing and Guidelines, http://www.utem.edu.my/pps/.
2. Cresswell, J. W., and Creswell, J.D., Research Design: Qualitative, Quantitative, and Mixed Methods Approaches, 5th Edition, California: SAGE Publications, Incorporated, 2020.

MITU 5226 Project 2

Learning Outcomes:

At the end of the course, students should be able to:

CLO1: Demonstrate solutions to the proposed project.
CLO2: Verify solutions to understand the strengths, weaknesses and limitations of the project.
CLO3: Defend the contributions of the project in written and verbal forms.

Synopsis:

This course is the second part of project that show the ability of student in applying the theories and techniques of technologies learnt previously. Student must write the second fold of dissertation which consists of four 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 solution developed as the end product of this project. Student is required to justify the contribution of the proposed solution throughout the presentation sessions.

References:

1. Thesis Writing and Guidelines, http://www.utem.edu.my/pps/.
2. Cresswell, J. W., and Creswell, J.D., Research Design: Qualitative, Quantitative, and Mixed Methods Approaches, 5th Edition, California: SAGE Publications, Incorporated, 2020.

MITP 5113 Algorithm Analysis and Design

Learning Outcomes:

At the end of the course, students should be able to:

CLO1: Identify algorithm design technique and method of analysis.

CLO2: Explain algorithms efficiency in terms of the amount of resources, which are time and storage space required to execute the algorithm.

CLO3: Explain algorithm design technique based on problem type.

Synopsis:

This course introduces the students to the fundamentals principles of design and analysis of algorithms. It covers formal techniques to support the design and analysis of algorithms that emphasizes on both the underlying mathematical theory and practical considerations of efficiency. By learning a range of algorithm design techniques as Brute Force, Divide & Conquer, Decrease & Conquer, Transform and Conquer, Greedy Algorithms and Dynamic Programming, students should be able to develop efficient algorithms for simple computational tasks and reasoning about the correctness of them. Through the complexity measures, different range of behaviors of algorithms and the notion of tractable and intractable problems will be discussed.

References:

1. Levitin, A., Introduction to the Design and Analysis of Algorithm, Addison Wesley, 2017.
2. Puntambekar, A., Design and Analysis of Algorithms. Technical Publications, 2018.
3. Arora, A., Analysis and Design of Algorithms, 3rd Edition, Cognella Academic Publishing, 2017.
4. Mueller, J. P. and Massaron, L., Algorithms For Dummies (For Dummies (Computers)) 1st Edition. For Dummies, 2017.
5. Bhasin, H., Algorithms: Design and Analysis Paperback. Oxford Univ Pr (Sd), 2015.
6. Malik. D. S., C++ Programming: From Problem Analysis to Program Design 8th Edition. Course Technology, 2017.
7. Dimri, S. C., Malik, P., and Ram, M., Algorithms: Design and Analysis, De Gruyter, 2021.

MITS 5313 Advanced Data Communications and Network

Learning Outcomes:

At the end of the course, students should be able to:

CLO1: Evaluate the theory of data communications related to the

network models in current technologies.

CLO2: Manipulate the implementation in managing network infrastructure and services with the emerging trends and technologies.

CLO3: Relate the present research in data communications and networking in order to apply in the real environment based on the concept.

Synopsis:

This course introduces the fundamental concepts and terminology of data communication and networking, encompassing both technical and managerial aspects and to help students better understand the challenges and opportunities faced by modern business. Topics will include fundamentals of telecommunications, data transmission mechanisms, telecommunication media and technologies, considerations for LAN and WAN implementations, the Internet and intranet applications, emerging telecommunications technologies, and trends in the telecommunications industry. Students will also be able to understand, explain and apply the fundamentals of data communication and network technology concepts and skills in network applications, troubleshooting, and configuring the computer networks using guided or unguided media.

References:

1. Jerry FitzGerald, Alan Dennis, Alexandra Durcikova, Business Data Communications and Networking, 14th Edition, Wiley, 2020.
2. Forouzan, Behrouz A., Data Communications and Networking, 5th Edition, McGraw-Hill, 2013.
3. James Kurose and Keith Ross, Computer Networking: A Top-Down Approach, 7th Edition, Pearson, 2017.
4. Manish Agrawal and Rekha Sharma, Business Data Communications and IT Infrastructures, Prospect Press, 2016.
5. Curt M. White, Data Communications and Computer Networks, 8th Edition, Cengage Learning, 2015.
6. William Stallings, Data and Computer Communications, 10th Edition, Pearson, 2015.

MITI 5213 Computational Methods

Learning Outcomes:

At the end of the course, students should be able to:

CLO1: Construct solution in computational methods through simple modelling.

CLO2: Design a concept of computational methods to support algorithms and computer programs.

CLO3: Formulate computational methods in computer science problems.

Synopsis:

This course covers on the topic of computational methods for computer science, which covers the topic on systems of equations and eigenvalues. The course also covers the interpolation, differentiation and integration. Finally, the topic on ordinary differential equations and partial differential equations are introduced as an advanced topic in this course.

References:

1. MirHassani S. A. and Hooshmand F., Methods and Models in Mathematical Programming (First Edition), Springer, 2019.
2. Angela B. S. and George W. S., Introduction to Computational Science: Modeling and Simulation for the Sciences, 2nd Edition, Princeton University Press, 2014.
3. James B. R., Computational Methods for Engineers with MATLAB Applications, Ferret Publishing, 2013.
4. Peter G. C., Computational Mathematics: Theory, Methods and Applications, Nova Science Publishers, 2011.
5. Venkateshan S.P. and Prasanna S., Computational Methods in Engineering, Ane Books Pvt. Ltd, 2014.
6. Dan G.C, Ionel M.N and Mihaela I-B, Computational Methods for Data Evaluation and Assimilation, Chapman and Hall/CRC, 2014.

MITM 5313 Advanced Human Computer Interaction

Learning Outcomes:

At the end of the course, students should be able to:

CLO1: Explain how multi-discipline areas in HCI influence the design of interactive applications/systems .

CLO2: Follow and explain the process of designing and evaluating interactive applications/systems.

CLO3: Construct a design solution to HCI problems.

Synopsis:

This course aims to extend the students' basic knowledge of the multi-discipline areas rooted in the HCI body of knowledge. It will equip the students with the current and advanced knowledge of the main issues, theories and methodologies, and how the knowledge should be applied. The topics covered in this course are: cognitive psychology, interaction design methodology, usability evaluation, multisensory and advanced user-interface design, human factors, ergonomics and emerging issues in HCI and interaction design. The teaching methods consist of lectures, lab

activities and guided independent learning for some of the challenging topics.

References:

1. Jennifer Preece, Yvonne Rogers and Helen Sharp, Interaction Design: beyond human-computer interaction, 5th Edition, John Wiley & Sons, 2019.
2. Mike Kuniavsky, Smart Things: Ubiquitous Computing User Experience Design, Elsevier, 2010.
3. José A. Macías, Toni Granollers, Pedro M. Latorre, New Trends on Human-Computer Interaction: A Research, Development, New Tools and Methods, Springer, 2009.
4. Niels Ole Bernsen and Laila Dybkjaer, Multimodal Usability, Springer, 2009.
5. Dov Te'eni, Jane Carey and Ping Zhang, Human Computer Interaction: Developing Effective Organizational Information Systems, John Wiley & Sons, 2007.

MITS 5113 Computer Architecture & Compiler

Learning Outcomes:

At the end of the course, students should be able to:

CLO1: Explain computer architecture concept including the detailed interactions in computer system and its performance, and how computer architecture is influenced by the needs of compiled program.

CLO2: Revise the compiler structure and relate the impact of compiler structure on programming language design.

CLO3: Apply the knowledge of current trend in computer architecture and compiler design.

Synopsis:

This subject covers advanced topics in computer architecture, including multiprocessor and internal memory architecture. It incorporates the latest research and development on topics such as branch prediction, instruction-level parallelism, multithreading, and cache hierarchy design. It also covers the fundamental of compilers design including lexical analysis, various types of parsers, intermediate and object code generation and code optimization. The impact compiler structure on the programming language design will also be examined. The students shall have the knowledge of computer system organization.

References:

1. William Stallings, Computer Organization & Architecture, 10th Edition, Prentice Hall, 2016.
2. Linda Null, Essentials of Computer

Organization and Architecture, 5th Edition, Jones & Bartlett Learning, 2018.
3. David A. Patterson and John L. Hennessy, Computer Architecture: A Quantitative Approach, 5th Edition, Morgan Kauffman, 2017.
4. Keith Cooper and Linda Torczon, Engineering A Compiler, 2nd Edition, Morgan Kaufmann, 2011.
5. Charles N. Fisher, Ron K. Cytron and Richard J. LeBlanc, Crafting A Compiler, Addison Wesley, 2010.
6. Alfred V. Aho, Monica S. Lam and Ravi Sethi, Compilers: Principles, Techniques and Tools, 2nd Edition, Pearson Education, 2012.

MITM 5323 Mobile Application Development

Learning Outcomes:

At the end of the course, students should be able to:

CLO1: Explain the fundamental technologies of mobile database system and issues in creating, designing and managing the mobile database system.

CLO2: Illustrate important concept and architecture in mobile database system including Mobile Database Recovery Schemes, Querying Location Dependent Data, and Data Caching and Broadcast.

CLO3: Develop a mobile database application to provide solution to a simple open mobile database problem.

Synopsis:

The database field has experienced rapid and incessant growth since the development of centralized relational databases. This course will discuss topics that are of growing importance in both the database research community and industry. Topics covered include conceptual, logical, and physical design of mobile database systems, technologies required for mobile databases, replication requirements for mobile databases, query processing and transaction management in mobile database systems, mobile database security, mobile database recovery schemes, the relationship between mobile database applications and the World Wide Web, communication facilities, data confidentiality and current issues in mobile databases.

References:

1. Vijay, K., Mobile Database Systems, Wiley-Interscience, 2006.
2. Laberge, R. & V. Srdjan, Building PDA Databases for Wireless and Mobile Development, Wiley, 2002.
3. Zaniolo, C., Advanced Database Systems, Morgan Kaufmann Publishers Inc, 1997.
4. Mukherjea, S., Mobile Application Development, Usability, and Security:

Advances in Multimedia and Interactive Technologies, IGI Global, 2016.
5. Gerardus, B., Mobile Database, 3rd Edition, Emereo Pty Limited, 2018

MITM 5333 Multimedia Based Instructional Design

Learning Outcomes:

At the end of the course, students should be able to:

CLO1: Demonstrate a clear understanding of the theories, philosophies, and current research driving the field of Educational Technology, Instructional Design and Web TV.

CLO2: Discuss and compare a working knowledge of the instructional design process and its application in a media development situation.

CLO3: Distinguish between the use of instructional technologies to deliver instruction and using instructional technologies to provide meaningful learning.

Synopsis:

The purpose of this course is to assist students in learning how to adapt and apply instruction design techniques to multimedia based in both face-to-face (F2F) and distance/online settings. In this subject, students will be introduced to an overview of the field of Instructional Technology. This course focuses on helping students to develop an awareness and understanding of the theories and philosophies driving the field. In addition, this course will explore common computer-related technologies used within most learning environments. This subject will also explore the variety of interactive instructional techniques possible with computer-based instruction. The student will also learn the concepts and development process of iBook, CD or Web-based multimedia applications and produce products that integrate multimedia applications into effective e-Learning instructions. This subject also covers the principles and techniques used to design and develop content for multimedia production. Specific topics in writing include an introduction to communication, the elements of story creation and correct formats for linear and interactive scripts will be explored. At the end of the semester, the students are required to write and present a concept paper on a proposed multimedia production for a real client.

References:

1. Robert Reiser and John V. Dempsey, Trends and Issues in Instructional Design and Technology, 4th Edition, 2017.
2. Charles Reigeluth, Instructional-Design Theories and Models : Building a Common

Knowledge Base, Jossey-Bass, 2015.
3. Peggy Ertmer, James Quinn and Krista Glazewski, The ID Casebook : Case Studies in Instructional Design, 4th Edition, Pearson, 2019.
4. Rita Richey, James Klein & Monica Tracy, The Instructional Design Knowledge and Practice, Routledge, 2010.
5. Walter Dick, Lou Carey & James Carey, The Systematic Design of Instruction, Pearson, 2014.

MITM 5413 Multimedia Professional Ethics

Learning Outcomes:

At the end of the course, students should be able to:

CLO1: Develop an in depth understanding of the nature and function of multimedia issues and values especially in Malaysia.

CLO2: Measure form and content of multimedia issues and values contributing to the development of the MSC.

CLO3: Interpret application of multimedia issues and values and regulation in current and future multimedia industry.

Synopsis:

A general introduction to multimedia issues and values and the statutory, regulatory, industry codes and ethical conventions operating in Malaysia. Topics covered include: Broadcasting, Content and Audio-Visual Production/Screen Industries, Free Speech and Defamation, Information Equity, Internet and Online Services, Media Ownership, Print Media, Journalism and Media Ethics, Privacy, Spectrum Management, Telecommunications, Universal Service and Regional Communications. General Principles of Intellectual Property will be covered, as well as copyright issues, and relevant entertainment law. The emphasis will be on the harmonization of these issues into the present and future cyber laws in Malaysia, and the relevance and implications of media law in the MSC and Government initiatives, in accordance with the 2020 Vision.

References:

1. Lawrie Zion & David Craig, Ethics for Digital Journalist: Emerging Best Practices, Routledge Taylor & Francis Group, New York & London, 2014.
2. Multimedia Bill 1998, Copyright Act 1987, Printing Presses and Publications Act 1984, Digital Signature Act 1997, Computer Crime Act 1997, Advertising Code and Regulations.

3. Larry P. Gross, John Stuart Katz, Jay Ruby, Image Ethics in Digital Edge, University of Minnesota Press, 2003.
4. Khaw Lake Tee & Tay Pek San, Copyright Law in Malaysia. Lexis Nexis Sdn Bhd, 4th edition, 2017.
5. Smedinghoff, T. J. ed. Online Law: Legal Guide to doing business on the Internet, Pearson Technology Group, 2007.
6. Nathan M. Crystal, Professional Responsibility: Problems of Practice and the Profession, Wolters Kluwer; 7 edition, 2019.
7. Christopher Meyers,The Professional Ethics Toolkit, Wiley-Blackwell, 1st edition, 2018.

MITM 5233 Computer Graphics & Visualization

Learning Outcomes:

At the end of the course, students should be able to:

CLO1: Apply computer graphics concepts which are necessary to model problems in different fields such as film special effects, games development, virtual reality, and data visualization.

CLO2: Present coherent technical and scientific results both orally and in writing and have an understanding of the non-technical aspects to effectively cooperate with other specialists towards the solutions of complex technical problems.

CLO3: Design and develop software tools to create animation for a real life in certain environment such as architecture and precise engineering.

Synopsis:

This course assumes a good knowledge of fundamental methods in computer graphics and will start with the basic concepts that underline all graphics applications like computer games, movies, medicine and information visualization. It will provide the student with a sound, broad technical basis in high performance computer graphics in the areas of high quality image generation and interactive graphics. Student will be equipped for projects in specific application areas related to gaming, film special effects, virtual reality and visualization in the final stage of the program. This course will also provide a practical class on advanced computer graphics programming. It will cover major aspects of digital image generation: geometric modelling, computer animation, and rendering. The goal of the course is to provide a strong foundation for computer graphics principles, and provide a hands-on introduction to recent advanced topics, e.g., subdivision surfaces, real-time global illumination, and physically based animation.

References:

1. John, Huges, Andries van Dam, Morgan McGuire, David Sklar, James Foley, Steven Feiner, Kurt Akeley, Computer Graphics: Principles and Practice, 3rd Edition, Addison-Wesley Professional, 2013.
2. Steven Gortler, Foundation of 3D Computer Graphics, MIT Press, 2012.
3. Jonas Gomes, Luiz Velho, Computer Graphics : Theory and Practice, A K Peters/CRC Press, 2012.
4. Sumanta Guha, Computer Grahics through OpenGL, Chapman and Hall/CRC, 2010.
5. Colin Ware, Information Visualization 3rd Edition: Perception for Design (Interactive Technologies), Morgan Kaufmann, 2012.
6. Gonzalez, R.C, Woods, R. E., Digital Image Processing, 4th Edition, Prentice Hall, 2018.

MITM 5223 Advance 3D Animation

Learning Outcomes:

At the end of the course, students should be able to:

CLO1: Elaborate and develop advance working animation using key features of modeling, lighting and rendering.

CLO2: Explain the methods of distributed rendering in scientific research and the animation industry.

CLO3: Built the relationship between current streams of 3D design and animation research.

CLO4: Explore distributed rendering on a large-scale project using a specific animation package.

Synopsis:

This course concentrates on the principles and common techniques to all animation. Students will get experience in a number of specific animation methods. The course will equip the students with the current and advanced knowledge of the computer animation and rigging techniques, rendering concept, shading and surface characteristics, image resolution and visual effect techniques. They will also learn lighting and rendering techniques, High Dynamic Range Image (HDRI) as well as implement the principle of animations in the projects. The teaching methods consist of lectures, activities and guided independent learning for some of the challenging topics.

References:

1. Jonathan Cooper, Game Anim: Video Game Animation Explained, A K Peters/CRC Press, 2019. .
2. Andy Beane, 3D Animation Essentials, Sybex, 2015.
3. David Rodriquez, Animation Methods: The Only Book You'll Ever Need,

CreateSpace Independent Publishing Platform, 2016.
4. Ami Copine, 3D Art Essentials : The Fundamentals of 3D Modeling, Texturing and Animation, Focal Press, 2016.
5. Rick Parent, Computer Animation 3rd Edition : Algorithms and Techniques, Morgan Kauffmann, 2016.

MITM 5113 Advanced Web Programming

Learning Outcomes:

At the end of the course, students should be able to:

CLO1: Explain and integrate knowledge of advanced web design techniques and technologies.

CLO2: Using and apply important components and necessary tools in developing web application.

CLO3: Develop web applications with back-end databases and PHP.

Synopsis:

This advanced hands-on course will teach you to effectively plan, design, program, maintain, administer, and troubleshoot dynamic websites, web servers and web-based database systems using the latest technology including Ajax, JQuery Apache Server and PHP. It emphasis 4 components in developing web applications which are; Client Site Technologies: HTML5, CSS3 and Ajax; Server Site Technologies: JQuery and PHP; Database Server: MySQL; and Web Servers : Apache.

References:

1. Christopher Murphy, Richard Clark, Oli Studholme, Divya Manian, Beginning HTML5 and CSS3: The Web Evolved, Apress, 2012.
2. Michael B. White, Mastering JavaScript: A Complete Programming Guide Including jQuery, AJAX, Web Design, Scripting and Mobile Application Development, Newstone Publishing, 2019.
3. Jonathan Hayward, Django JavaScript Integration: AJAX and jQuery, Packt Publishing, 2011.
4. Andrew Curioso, Ronald Bradford, Patrick Galbraith, Expert PHP and MySQL (Wrox Programmer to Programmer), Wrox, 2010.
5. XML Guild, Advanced XML Applications from the Experts at the XML Guild, Course Technology PTR, 2006.
6. Jermaine G. Anderson, Beginning Flash, Flex and AIR Development for Mobile Devices, Wrox, 2011.
7. Imar Spaanjaar, Beginning ASP.Net 4: in C# and VB, Wrox, 2014.

MITM 5123 Advanced Audio and Video Technology

Learning Outcomes:

At the end of the course, students should be able to:

CLO1: Conceive advance knowledge in digital audio and video technology.

CLO2: Demonstrate advanced skills in using audio video software for video editing and audio analysis that meets industrial standards.

CLO3: Adapt best practices when developing audio and video application.

Synopsis:

This course provides students with the knowledge and advanced skills they required to understand and produce a high quality video that meet the industrial standards using fundamental audio video concepts and tools. Students will also be introduced to applied speech and audio processing techniques. The course is also structured to equip students with the foundation to start research work in fields related to audio and video technology.

References:

1. Ken Pohlmann, Principles of Digital Audio, 6th.Edition, McGraw-Hill/TAB Electronics, 2010.
2. Jan Roberts-Breslin, Making Media Foundations of Sound and Image Production, 4th Edition, Elsevier Science & Technology, 2017.
3. Beg Waggoner, Compression for Great Video and Audio, 2nd Edition, Focal Press, 2009.
4. Ken Dancyger, The Technoque of Film and Video Editing: History, Theory and Practices. A Focal Press Book, 2019.
5. Walter Fischer, Digital Video and Audio Broadcasting Technology: A Practical Engineering Guide (Signals and Communication Technology) (4th Ed). Springer, 2020.

MITD
MASTER OF COMPUTER SCIENCE
(DATABASE TECHNOLOGY)

MASTER OF COMPUTER SCIENCE (Database Technology)

Programme Details

This programme is specifically designed to equip students with the knowledge and technical skills on technology, design and database management that can meet industry needs.

Programme Educational Objectives (PEO)

Programme Educational Objectives (PEO) are specific goals describing the expected achievement of graduates in their career and professional life after 5 years of graduation.

Below are the PEO for this programme:

PEO 1: Practice in-depth knowledge and skills of Computer Science with specialization in Database Technology field.

PEO 2: Demonstrate effective leadership and communication to a wide variety of audiences or multi-disciplinary teams, tolerate and value different global perspectives and cultures towards lifelong learning.

PEO 3: Demonstrate knowledge of current issues in technology through learning and research activities using scientific methods.

PEO 4: Practice professional, ethical and societal responsibilities, and show adaptability in different roles and surroundings in contributing to the community and business.

Programme Outcomes (PO)

Programme Outcomes (PO) are statements describing what students are expected to know and be able to perform or attain by the time of graduation. These are related to the Knowledge (K), Skills (S), and Attitude (A) that students acquire throughout the programme.

Below is the list of PO for this programme:

PO 1: Demonstrate originality and independence in undertaking analytical and critical evaluation, and synthesis of complex information, specialized concepts, theories, methods and practice in Computer Science;

PO 2: Apply knowledge critically and collectively to manage and resolve complex problems or issues in field of database technology;

PO 3: Apply the practical skill in working environment related to database technology field;

PO 4: Communicate effectively the knowledge, skills, ideas, critique and rationale in both written and verbal forms using appropriate methods to peers, experts, and non-experts;

PO 5: Competently use a wide range of suitable digital technologies and quantitative mechanisms to design and plan evaluation activities for enhancing study, research and practice;

PO 6: Demonstrate significant autonomy, independence and leadership skills at work and class with self-advancement through continuous academic or professional development; and

PO 7: Initiate or lead entrepreneurial projects and adhere to legal, ethical, professional and sustainable practices.

Programme Structure - Full Time

September Intake:

Semester 1 (September)		
Course Code	**Course**	**Credit**
MPSW 5013	Research Methodology	3
MPSW XXXX	University Course	3
MITP 5113	Algorithm Analysis and Design	3
MITS 5313	Advanced Data Communications and Network	3
MITP 53533	Spatial Database	3
MXXX XXXX	Elective 1	3
	Total credit	**18**
Semester 2 (February)		
Course Code	**Course**	**Credit**
MITP 5523	Database Administration and Security	3
MITP 5563	Advanced Database Systems Principles	3
MITP 5364	Big Data Analytics	4
MITU 5213	Project 1	3
MXXX XXXX	Elective 2	3
	Total credit	**16**
Semester 3 (Short Semester)		
Course Code	**Course**	**Credit**
MITU 5226	Project 2	6
	Total credit	**6**

February Intake:

Semester 2 (February)		
Course Code	**Course**	**Credit**
MPSW 5013	Research Methodology	3
MPSW XXXX	University Course	3
MITP 5523	Database Administration and Security	3
MITP 5563	Advanced Database Systems Principles	3
MITP 5364	Big Data Analytics	4
MITP XXXX	Elective 1	3
	Total credit	**19**
Semester 3 (Short Semester)		
Course Code	**Course**	**Credit**
MITU 5213	Project 1	3
MXXX XXXX	Elective 2	3
	Total credit	**6**
Semester 1 (September)		
Course Code	**Course**	**Credit**
MITP 5113	Algorithm Analysis and Design	3
MITS 5313	Advanced Data Communications and Network	3
MITP 5353	Spatial Database	3
MITU 5226	Project 2	6
	Total credit	**18**

University Core Courses - choose ONE (1) only:

Course Code	Course	Credit
MPSW 5033	Engineering and Technology Management	3
MPSW 5053	Quality System Management	3
MPSW 5063	Entrepreneurship	3
MPSW 5073	Project Management	3

Elective Courses - choose TWO (2) only:

Course Code	Course	Credit
MITP 5553	Data Warehousing and Data Mining	3
MITP 5343	Data Integration	3
MITP 5253	Software Quality	3
MMSD 5213	Agile Project Management	3

Note: Total credit hours = 40 credits

Programme Structure - Part Time

September Intake:

Semester 1 (September)		
Course Code	**Course**	**Credit**
MPSW 5043	Research Methodology	3
MITS 5313	Advanced Data Communications and Network	3
MITP 5353	Spatial Database	3
	Total credit	**9**
Semester 2 (February)		
Course Code	**Course**	**Credit**
MITP 5523	Database Administration and Security	3
MITP 5563	Advanced Database Systems Principles	3
MITP 5364	Big Data Analytics	4
	Total credit	**10**
Semester 3 (Short Semester)		
Course Code	**Course**	**Credit**
MITP XXXX	Elective 1	3
	Total credit	**3**
Semester 4 (September)		
Course Code	**Course**	**Credit**
MPSW XXXX	University Course	3
MITP 5113	Algorithm Analysis and Design	3
MITU 5213	Project 1	3
	Total credit	**9**
Semester 5 (February)		
Course Code	**Course**	**Credit**
MTPU 5226	Project 2	6
MXXX XXXX	Elective 2	3
	Total credit	**9**

University Courses - choose ONE (1) only:

Course Code	Course	Credit
MPSW 5033	Engineering and Technology Management	3
MPSW 5053	Quality System Management	3
MPSW 5063	Entrepreneurship	3
MPSW 5073	Project Management	3

Elective Courses - choose TWO (2) only:

Course Code	Course	Credit
MITP 5553	Data Warehousing and Data Mining	3
MITP 5343	Data Integration	3
MITP 5253	Software Quality	3
MMSD 5213	Agile Project Management	3

Note: Total credit hours = 40 credits

MPSW 5013 Research Methodology

Learning Outcomes:

At the end of the course, students should be able to:

CLO1: Propose a research proposal with an improvement of existing knowledge.

CLO2: Synthesize relevant literature to address the knowledge gaps.

CLO3: Apply ethical research skills in constructing research questions, objectives and hypotheses (if any) relevant to research problem.

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.

References:

1. Kumar, R., Research methodology: A step-by-step guide for beginners. Sage Publications Limited, 2019.
2. Gray, D. E., Doing research in the business world. Sage Publications Limited, 2019.
3. Creswell, J. W., & Creswell, J. D., Research Design: Qualitative, Quantitative, and Mixed Methods Approaches. In Research Design: Qualitative, Quantitative, and Mixed Methods Approaches, 2018.
4. Tang, H., Engineering Research: Design, Methods, and Publication. John Wiley & Sons, 2020.
5. Sidek, S., Kamalrudin, M. & Mat Deris, M., Research Survival Toolkit: Writing a winning fundamental research proposal, Melaka: University Publisher, UTeM, 2017.
6. Zobel, J., 3rd Edition, Writing for Computer Science, Springer-Verlag London, 2014.
7. Arkoudas, K., Musser, D., Fundamental Proof Methods in Computer Science: A Computer-Based Approach, MIT Press, 2017.
8. Creswell, J. W., & Poth, C. N., Qualitative inquiry and research design: Choosing

among five approaches. Sage publications, 2016.

MPSW 5063 Entrepreneurship

Learning Outcomes:

At the end of the course, students should be able to:

CLO1: Analyse entrepreneurial skills in identifying and exploiting entrepreneurial opportunities.

CLO2: Apply commercially viable ideas, projects, products prototypes for commercialization within the context of societal framework and to deliver business model canvassing and business value proposition.

CLO3: Develop creative and viable high tech business models and strategies.

Synopsis:

The objectives of this course are to provide students a robust foundation in theories relevant to the improvement of entrepreneurial behaviour and capabilities 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 key 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 areas of entrepreneurial expertise necessary in order to found and/or grow a technology venture.

References:

1. Duening, Thomas N., Robert A. Hisrich, and Michael A. Lechter. Technology Entrepreneurship: Taking Innovation to the Marketplace. Academic Press, 2020.
2. Sergi, B. S., & Scanlon, C. C. (Eds.), Entrepreneurship and Development in the 21st Century. Emerald Publishing Limited, 2019.
3. Bianchi, C., Glavas, C., & Mathews, S., SME international performance in Latin America: The role of entrepreneurial and technological capabilities. Journal of Small Business and Enterprise Development, 24(1), 176–195, 2017.
4. Patrict Van Der Pjil, Justin Lokitz, Lisa Kay Solomon, Design a Better Business: New Tools, Skills, and Mindset for Strategy and Innovation. Wiley, 2016.
5. Baldock, R., North, D., & Ullah, F., New Technology-Based Firms in the New Millennium. New Technology Based Firms in the New Millennium, 11, 203–226, 2015.
6. Alexander Osterwalder & Yvnes Pigneur, Value Proposition Design: How to Create

Products and Services Customers Want. Wiley, 2015.
7. Alexander Osterwalder & Yvnes Pigneur, Business Model Generation: A Handbook for Visionaries, Game Changers, and Challengers, Wiley, 2010.

MPSW 5073 Project Management

Learning Outcomes:

At the end of the course, students should be able to:

CLO1: Analyze the core concepts and principles, functions, and process in project management.
CLO2: Develop a comprehensive & viable project proposal.
CLO3: Evaluate best practices and methodology in project management.

Synopsis:

This subject focuses on the principles of project management based on Project Management Body of Knowledge (PMBOK). Students will be familiarized with the Project Management process group functions (initiating, planning, executing, controlling and closing) and project knowledge areas (integration, scope, time, cost, quality and human resources). Various tools for supporting the analysis of works in project management will be introduced. Topics including initiating and planning the project, working with the management, project appraisal & sensitivity, work breakdown structure, managing uncertainty, building project plan, implementing and revising project plan, completing the project and contract laws. Microsoft Project (MS Project) will be introduced as project management software tools.

References:

1. Project Management Institute, A Guide to the Project Management Body of Knowledge (PMBOK® Guide) – Fifth Edition, 2018.
2. Project Management Institute, A Guide to the Project management Body of Knowledge (PMBOK® Guide) – Sixth Edition, 2017.
3. Clifford F. Gray · Erik W. Larson, Project Management the Managerial Process, McGraw Hill, 2021.
4. Meredith, J., Mantel, S. and Mantel, S. Jr., Project Management: A Strategic Managerial Approach. New York, Wiley, 2017.
5. Trevor L Young, Successful Project Management, Kogan Page Publishers, 2016.

MPSW 5033 Engineering Technology Management

Learning Outcomes:

At the end of the course, students should be able to:

CLO1: Identify the principles of engineering management and technology management across different industries.

CLO2: Apply relevant issues in engineering management and technology management across different industries.

CLO3: Analysis the impact of relevant issues in the context of engineering management and technology management across different industries.

Synopsis:

The course consists of two components, i.e., Engineering Management and Technology Management. Topics in Engineering Management provide a vehicle for engineers and technical specialist to enhance their knowledge on management, organizational structure and behavior of engineering/technical organizations. Additional topics will enhance the knowledge and competencies in the management of engineering activities such as design, operations, and quality. The Technology Management part of the course will equip students with contemporary views and tools on management of technology and its impact on an organization. It emphasizes management of innovation and new product development as well as managing technology and knowledge. The interaction of technology and the law, particularly the knowledge management and intellectual property will be covered.

References:

1. Paul Trott, Innovation Management and New Product Development (6th Edition) 6th Edition, Pearson; 6 editions, 2016.
2. A. Thomas Roper, Thomas W. Mason, Frederick A. Rossini, Forecasting and Management of Technology, Alan L. Porter, Scott W. Cunningham, Jerry Banks, John Wiley & Sons, 2011.
3. William J Stevenson, Operations Management 13th Edition, McGraw-Hill Education, 2017.
4. by Jim Hall, Tina Scott, Lean Six Sigma: Beginner's Guide to Understanding and Practicing Lean Six Sigma CreateSpace Independent Publishing Platform, 2016.
5. Sharon Armstrong, Barbara Mitchell Weiser, The Essential HR Handbook, 10th Edition: A Quick and Handy Resource for Any Manager or HR Professional , 2019.

MPSW 5053 Quality Systems Management

Learning Outcomes:

At the end of the course, students should be able to:

CLO1: Explain the conceptual understanding of Quality.

CLO2: Identify Quality System Management information.

CLO3: Propose Quality System Management techniques and tools in the practice of organizations.

Synopsis:

This course presents the fundamental elements of Quality Management System including the importance of quality as a strategy for continuous improvement in business performance. It explains the strategies for competitive quality in design and manufacture as well as in terms of customer supply chain concept of total quality aspect. Such topics include Management systems ISO, variability, Six Sigma, Taguchi method, failure mode and effect analysis (FMEA) and quality function deployment. Several quality control tools such as Pareto chart, bar chart and scatter diagram will be cover in statistical data collection, measurement and analysis. Finally, concepts of benchmarking and ISO standards with respect to control elements will be integrated with the Total Quality Management (TQM) as part of quality Management system.

References:

1. S. Thomas Foster, Managing Quality: Integrating the Supply Chain, 6th Edition, Pearson, 2017.
2. Howard S. Gitlow, Richard J. Melnyck and David M. Levine, Guide to Six Sigma and Process Improvement for Practitioners and Students, A: Foundations, DMAIC, Tools, Cases, and Certification, 2nd Edition, 2015.
3. Gitlow, H. S., Quality Management systems: A Practical Guide, St. Lucie Press, 2001.
4. Mukherjee, P. N., Total Quality Management, Prentice Hall, 2006.
5. Manual Procedure for Malaysia Halal Certification, 3rd Revision, Jabatan Kemajuan Islam Malaysia, 2015.

MITU 5213 Project 1

Learning Outcomes:

At the end of the course, students should be able to:

CLO1: Formulate the problems, objectives and scope based on complex technology solutions.

CLO2: Perform literature review and appropriate methodology to complete the project.

CLO3: Defend the proposed project solutions in written and verbal forms.

Synopsis:

This course is the first part of project that requires a student to prepare a master research proposal based on the theories and techniques of technologies learnt previously. Student is required to write three chapters of dissertation i.e. Chapter 1: Introduction, Chapter 2: Literature Review and Chapter 3: Research Methodology. Besides writing the proposal, student needs to present and defend his/her proposal. Student is expected to demonstrate ability to identify and propose solutions to the identified problems.

References:

1. Thesis Writing and Guidelines, http://www.utem.edu.my/pps/.
2. Cresswell, J. W., and Creswell, J.D., Research Design: Qualitative, Quantitative, and Mixed Methods Approaches, 5th Edition, California: SAGE Publications, Incorporated, 2020.

MITU 5226 Project 2

Learning Outcomes:

At the end of the course, students should be able to:

CLO1: Demonstrate solutions to the proposed project.

CLO2: Verify solutions to understand the strengths, weaknesses and limitations of the project.

CLO3: Defend the contributions of the project in written and verbal forms.

Synopsis:

This course is the second part of project that show the ability of student in applying the theories and techniques of technologies learnt previously. Student must write the second fold of dissertation which consists of four 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 solution developed as the end product of this project. Student is required to justify the contribution of the proposed solution throughout the presentation sessions.

References:

1. Thesis Writing and Guidelines, http://www.utem.edu.my/pps/.
2. Cresswell, J. W., and Creswell, J.D., Research Design: Qualitative, Quantitative, and Mixed Methods Approaches, 5th Edition, California: SAGE Publications, Incorporated, 2020.

MITP 5113 Algorithm Analysis and Design

Learning Outcomes:

At the end of the course, students should be able to:

CLO1: Identify algorithm design technique and method of analysis.

CLO2: Explain algorithms efficiency in terms of the amount of resources, which are time and storage space required to execute the algorithm.

CLO3: Explain algorithm design technique based on problem type.

Synopsis:

This course introduces the students to the fundamentals principles of design and analysis of algorithms. It covers formal techniques to support the design and analysis of algorithms that emphasizes on both the underlying mathematical theory and practical considerations of efficiency. By learning a range of algorithm design techniques as Brute Force, Divide & Conquer, Decrease & Conquer, Transform and Conquer, Greedy Algorithms and Dynamic Programming, students should be able to develop efficient algorithms for simple computational tasks and reasoning about the correctness of them. Through the complexity measures, different range of behaviors of algorithms and the notion of tractable and intractable problems will be discussed.

References:

1. Levitin, A., Introduction to the Design and Analysis of Algorithm, Addison Wesley, 2017.
2. Puntambekar, A., Design and Analysis of Algorithms. Technical Publications, 2018.
3. Arora, A., Analysis and Design of Algorithms, 3rd Edition, Cognella Academic Publishing, 2017.
4. Mueller, J. P. and Massaron, L., Algorithms For Dummies (For Dummies (Computers)) 1st Edition. For Dummies, 2017.
5. Bhasin, H., Algorithms: Design and Analysis Paperback. Oxford Univ Pr (Sd), 2015.
6. Malik. D. S., C++ Programming: From Problem Analysis to Program Design 8th Edition. Course Technology, 2017.
7. Dimri, S. C., Malik, P., and Ram, M., Algorithms: Design and Analysis, De Gruyter, 2021.

MITS 5313 Advanced Data Communications and Network

Learning Outcomes:

At the end of the course, students should be able to:

CLO1: Evaluate the theory of data communications related to the network models in current technologies.

CLO2: Manipulate the implementation in managing network infrastructure and services with the emerging trends and technologies.

CLO3: Relate the present research in data communications and networking in order to apply in the real environment based on the concept.

Synopsis:

This course introduces the fundamental concepts and terminology of data communication and networking, encompassing both technical and managerial aspects and to help students better understand the challenges and opportunities faced by modern business. Topics will include fundamentals of telecommunications, data transmission mechanisms, telecommunication media and technologies, considerations for LAN and WAN implementations, the Internet and intranet applications, emerging telecommunications technologies, and trends in the telecommunications industry. Students will also be able to understand, explain and apply the fundamentals of data communication and network technology concepts and skills in network applications, troubleshooting, and configuring the computer networks using guided or unguided media.

References:

1. Jerry FitzGerald, Alan Dennis, Alexandra Durcikova, Business Data Communications and Networking, 14th Edition, Wiley, 2020.
2. Forouzan, Behrouz A., Data Communications and Networking, 5th Edition, McGraw-Hill, 2013.
3. James Kurose and Keith Ross, Computer Networking: A Top-Down Approach, 7th Edition, Pearson, 2017.
4. Manish Agrawal and Rekha Sharma, Business Data Communications and IT Infrastructures, Prospect Press, 2016.
5. Curt M. White, Data Communications and Computer Networks, 8th Edition, Cengage Learning, 2015.
6. William Stallings, Data and Computer Communications, 10th Edition, Pearson, 2015.

MITP 5364 Big Data Analytics

Learning Outcomes:

At the end of the course, students should be able to:

CLO1: Distinguish the eco system for big data.

CLO2: Demonstrate the performance of various data analytics techniques.

CLO3: Implement star schemas and data mining techniques.

Synopsis:

This course not only explores the fundamentals of big data, but also the eco system, challenges and applications of big data. Students are exposed to the framework (Hadoop), distributed data processing programming (MapReduce), programming languages/tools (e.g. R, Python) and NoSQL storage solution (e.g. Cassandra, MongoDB) and data analytics techniques (e.g. association rules, classification, clustering and text analysis).

References:

1. Rathinaraja Jeyaraj, Ganeshkumar Pugalendhi & Anand Paul, Big Data with Hadoop MapReduce: A Classroom Approach, Apple Academic Press, 2020.
2. Fabio Nelli, Python Data Analytics, Apress, 2018.
3. Venkat Ankam, Big Data Analytics, Packt, 2016.
4. Simon Walkowiak, Big Data Analytics with R, Packt, 2016.
5. Benjamin Bengfort & Jenny Kim, Data Analytics with Hadoop: An Introduction for Data Scientists, O'Reilly, 2016.

MITP 5523 Database Administration and Security

Learning Outcomes:

At the end of the course, students should be able to:

CLO1: Examine the concepts, techniques, and issues in the administration and security of the database systems, environments, and applications.

CLO2: Demonstrate the ability to apply appropriate technical and investigative techniques in solving problems related to database administration and security using recent technologies and solutions.

CLO3: Propose the application of efficient administration and security methods in databases and other areas such as network and the internet.

Synopsis:

This course covers the concepts, techniques, and issues in the administration and security of database systems, environments, and applications. Students will gain knowledge on the current database administration and security techniques and practices. They will also explore how to manage various structures in the database and conduct performance monitoring, user management as well as backup and recovery techniques. As for database security, students will learn how to

secure the database from potential attacks and threats. Topics include data availability, integrity, and security, security architecture, database application security models, virtual private databases, and database auditing. In this course, students will also exercise information seeking about issues and recent technologies in database administration and data security.

References:

1. Fogel, S. et. al, Oracle Database Administrator's. Oracle Corp, 2015.
2. William, S. & Lawrie, B., Computer Security: Principles and Practice 4th Edition, Pearson, 2017.
3. Pavlovic, Z. & Veselica, M., Oracle Database 12c Security Cookbook, Packt Publishing, 2016.
4. Afyouni, Hassan A., Database Security and Auditing – Protecting Data Integrity and Accessibility. Thomson-Course Technology, 2006.
5. Kosseff, J., Cybersecurity Law, Wiley, 2019.

MITP 5353 Spatial Databases

Learning Outcomes:

At the end of the course, students should be able to:

CLO1: Identify the trend of different topics in spatial data via independent study and research.
CLO2: Develop skills of using Spatial Analysis for solving practical problems.
CLO3: Apply the knowledge in current trend of spatial data projects.

Synopsis:

The aim of the subject is to facilitate students' critical appreciation of current developments and concerns in spatial database and its use in business, environmental and resources managements, prediction future scenario. Students will evaluate the impact of the current developments and issues for their own work roles. The content will be a negotiated set of topics based on current developments in spatial database and spatial information development. The course also give students experience in critical reading and analyzing journal literature's.

References:

1. Paul Bolstad, GIS Fundamentals: A First Text on Geographic Information Systems, 4th edition 4th Edition, XanEdu Publishing Inc., 2012.
2. Wilper L. Gorr and Kristen S. Kurland, GIS Tutorial 1: Basic Workbook, 10.1 Edition, Fifth Edition, Esri Press, 2013.
3. Michael Law & Amy Collins, Getting to Know ArcGIS Desktop, Esri Press, 2018.

4. Wilper L. Gorr & Kristen S. Kurland, GIS Tutorial 1 for ArcGIS Pro: A Platform Workbook, Esri Press, 2017.
5. Shekar, S. and Crawla, S., Spatial Databases: A Tour. Prentice Hall, 2013.
6. Rigaux, P., Scholl, M., Voisard, A., Spatial Applications - with Application to GIS, Morgan Kaufmann, 2001.

MITP 5563 Advanced Database System Principles

Learning Outcomes:

At the end of the course, students should be able to:

CLO1: Explain advanced data modeling concepts, query processing and issues in designing, developing and managing database systems.

CLO2: Construct advanced data model and queries based on user requirements of a database system.

CLO3: Identify various issues in managing database systems such as security, data quality and ethics.

Synopsis:

Understanding how to analyze and model the data in the organization is fundamental to the management of databases. This course will have advanced topics component that aim at knowledge regarding the implementation of database management systems as well as insights into the development and administration of database systems in various environments. This course explores key aspects of database system analysis, design and implementation, focusing on various topics from advanced concepts in modeling, query processing, performance tuning, transaction management and other current issues.

References:

1. Thomas Conolly, Carolyn Begg, Database Systems: A Practical Approach to Design, Implementation, and Management, 6th Edition, Pearson, 2015.
2. Carlos Coronel & Steven Morris, Database Principles: Fundamental of Design, Implementation, and Management, 13th Edition, Course Technology, 2019.
3. Jeffrey A. Hoffer, Ramesh Venkataraman & Heikki Topi, Modern Database Management, 12th Edition, Pearson, 2016.
4. Elmasri Ramez & Shamkant B. Navathe, Fundamentals of Database System, 7th Edition, Pearson, 2017.
5. Abraham Silberschatz, Henry F. Korth & S. Sudarshan, Database System Concepts, 7th Edition, New York: McGraw-Hill, 2020.
6. Avi Silberschatz, Henry F. Korth & S. Sudarshan, Database System Concepts. McGraw-Hill, 2010.

MITP 5553 Data Warehousing and Data Mining

Learning Outcomes:

At the end of the course, students should be able to:

CLO1: Design data warehouses based on the data warehousing model and lifecycle.

CLO2: Demonstrate the performance of data warehousing and data mining techniques.

CLO3: Implement star schemas and data mining techniques.

Synopsis:

This subject focuses on two parts: data warehousing and data mining. The data warehousing portion covers the fundamentals of data warehousing, multidimensional data analysis and factors involved in the analysis, planning, design, loading, maintenance and exploitation of successful data warehouse. The data mining portion covers the fundamentals of data mining, techniques, algorithms, tools and topics in knowledge discovery.

References:

1. Parteek Bhatia, Data Mining and Data Warehousing: Principles and Practical Techniques, 1st Edition, Cambridge University Press, 2019.
2. Han, J., Kamber, M. & Pei, J., Data Mining: Concepts and Techniques, 3rd Edition, Morgan Kaufman, 2011.
3. Ponniah, P., Data Warehousing Fundamentals for IT professionals, 2nd Edition, John Wiley & Sons, 2010.
4. Provost, F. & Fawcett, T., Data Science for Business, O'Reilly Media Inc., 2013.
5. Witten, I., Frank, E. & Hall, M. A., Data Mining: Practical Machine Learning Tools and Techniques, Morgan Kaufman, 2011.

MITP 5343 Data Integration

Learning Outcomes:

At the end of the course, students should be able to:

CLO1: Design data integration strategy using string, schema and data matching.

CLO2: Examine query processing requirements for data integration.

CLO3: Prepare data integration implementation report.

Synopsis:

Data integration problems arise whenever data from separate sources need to be combined as the basis for new applications. The availability of integrated data from multiple independent, heterogeneous data sources is crucial for many applications. The course introduces the fundamental of data integration, where issues arising in data integration, the theoretical foundations of the area, and algorithms and

software systems that facilitating integration will be covered.

References:

1. AnHai Doan, Alon Halevy & Zachary Ives, Principles of Data Integration, Morgan Kaufmann Publishers, 2012.
2. Gerardus Blokdyk, Web Data Integration A Complete Guide - 2020 Edition, 5STARCooks, 2020.

MITP 5253 Software Quality

Learning Outcomes:

At the end of the course, students should be able to:

CLO1: Explain software quality assurance, standards, metrics and measurements.

CLO2: Integrate the current scenario or issues related to software quality topics.

CLO3: Practice software quality assurance plan which include organization, procedure, documentation, standard model measurement and metrics.

Synopsis:

The course discuss on quality term as a multifaced concept which can be described from many perspectives. Then this quality issues is extended into software context where assuring software quality is critical in software development. Therefore an organization requires planned quality assurance to ensure quality embedded into the software. Software metrics are tools of measurement attributes of a system, component or process possess a given attribute are essential in software engineering. The use of process standards in the entire software development and product standards are also integral part of assuring quality.

References:

1. Claude Y. Laporte Alain April, "Software Quality Assurance", 1st edition, IEEE Computer Society, IEEE Press, 2018.
2. Tarlinder, A., "Developer Testing: Building Quality into Software", 1st edition, Addison-Wesley Signature Series, 2016.
3. Munta, J. B., "Software Quality and Java Automation Engineer Survival Guide: Basic Concepts, Self Review, Interview Preparation", Everydayon Inc, 2016.
4. Linz, T., "Testing in Scrum: A guide for Software Quality Assurance in the Agile World", 1st edition, Rock Nook Computing, 2014.
5. Jones, C., "The Economics of Software Quality", 1st Edition, Addision-Wesley Professional, 2011.
6. Tian, J., "Software Quality Engineering: Tesing, quality assurance, and Quantifiable Improvement", John Wiley & Sons Inc. Publication, 2005.

MMSD 5213 Agile Project Management

Learning Outcomes:

At the end of the course, students should be able to:

CLO1: Explain the concept of agile project management for any IT projects.

CLO2: Present on the principles and practices of agile project management in the IT projects.

CLO3: Demonstrate the standard guideline to produce a project vision and the product roadmap in a collaborative team environment for the purpose of IT project completion.

Synopsis:

This subject introduces the basic concept of agile project management to the student. It covers the agile project management process which includes agile tools and techniques for today knowledge-based projects. A knowledge-based project requires the project manager to manage, optimize and facilitate knowledge as a resource throughout the duration. This subject also covers support areas such as risk management. This subject exposes the student to the transition of a traditional project management into an agile project management.

References:

1. Taylor, T. 2023, Agile Project Management for Beginners 2023, independently published.
2. Stern, T.V. 2020, Lean and Agile Project Management: How to Make Any Project Better, Faster, and More Cost Effective 2e, Taylor & Francis.
3. Edge, J. 2020, Agile: An Essential Guide to Agile Project Management the Kanban Process and Lean Thinking + A Comprehensive Guide to Scrum, Moliva Ab.
4. Wright, J. 2020, Project Management 6 Books in 1: The Complete Guide to Agile Project Management Lean Analytics Scrum Kanban Kaizen and Six Sigma, Josh Wright.
5. Smith, L. 2019, Agile Software Development with C#, Scrum, eXtreme Programming, and Kanban 2e, independently published.

MITI
MASTER OF COMPUTER SCIENCE (INTERNETWORKING TECHNOLOGY)

MASTER OF COMPUTER SCIENCE (Internetworking Technology)

Programme Details

This programme is specifically designed to equip students with the latest technical knowledge and advanced technology in internetworking that can meet industry needs.

Programme Educational Objectives (PEO)

Programme Educational Objectives (PEO) are specific goals describing the expected achievement of graduates in their career and professional life after 5 years of graduation.

Below are the PEO for this programme:

PEO 1: Practice in-depth knowledge and skills of Computer Science with specialization in Internetworking Technology field.

PEO 2: Demonstrate effective leadership and communication to a wide variety of audiences or multi-disciplinary teams, tolerate and value different global perspectives and cultures towards lifelong learning.

PEO 3: Demonstrate knowledge of current issues in technology through learning and research activities using scientific methods.

PEO 4: Practice professional, ethical and societal responsibilities, and show adaptability in different roles and surroundings in contributing to the community and business.

Programme Outcomes (PO)

Programme Outcomes (PO) are statements describing what students are expected to know and be able to perform or attain by the time of graduation. These are related to the Knowledge (K), Skills (S), and Attitude (A) that students acquire throughout the programme.

Below is the list of PO for this programme:

PO 1: Demonstrate originality and independence in undertaking analytical and critical evaluation, and synthesis of complex information, specialized concepts, theories, methods and practice in Computer Science;

PO 2: Apply knowledge critically and collectively to manage and resolve complex problems or issues in field of internetworking technology;

PO 3: Apply the practical skill in working environment related to internetworking technology field;

PO 4: Communicate effectively the knowledge, skills, ideas, critique and rationale in both written and verbal forms using appropriate methods to peers, experts, and non-experts;

PO 5: Competently use a wide range of suitable digital technologies and quantitative mechanisms to design and plan evaluation activities for enhancing study, research and practice;

PO 6: Demonstrate significant autonomy, independence and leadership skills at work and class with self-advancement through continuous academic or professional development; and

PO 7: Initiate or lead entrepreneurial projects and adhere to legal, ethical, professional and sustainable practices.

Programme Structure - Full Time

September Intake:

Semester 1 (September)		
Course Code	**Course**	**Credit**
MPSW 5013	Research Methodology	3
MPSW XXXX	University Course	3
MITP 5113	Algorithm Analysis and Design	3
MITS 5313	Advanced Data Communications and Network	3
MITS 5213	Distributed Computing Systems	3
MITS XXXX	Elective 1	3
	Total credit	**18**
Semester 2 (February)		
Course Code	**Course**	**Credit**
MITS 5523	Advanced Mobile Computing	3
MITS 5343	Advanced Network Design and Diagnostics	3
MITS 5354	Internet Security	4
MITU 5213	Project 1	3
MITS XXXX	Elective 2	3
	Total credit	**16**
Semester 3 (Short Semester)		
Course Code	**Course**	**Credit**
MITU 5226	Project 2	6
	Total credit	**6**

February Intake:

Semester 2 (February)		
Course Code	**Course**	**Credit**
MPSW 5013	Research Methodology	3
MPSW XXXX	University Core Course	3
MITS 5523	Advanced Mobile Computing	3
MITS 5343	Advanced Network Design and Diagnostics	3
MITS 5354	Internet Security	4
MITS XXXX	Elective 1	3
	Total credit	**19**
Semester 3 (Short Semester)		
Course Code	**Course**	**Credit**
MITU 5213	Project 1	3
MITS XXXX	Elective 2	3
	Total credit	**6**
Semester 1 (September)		
Course Code	**Course**	**Credit**
MITP 5113	Algorithm Analysis and Design	3
MITS 5313	Advanced Data Communications and Network	3
MITS 5213	Distributed Computing Systems	3
MITU 5226	Project 2	6
	Total credit	**15**

University Courses - choose ONE (1) only;

Course Code	Course	Credit
MPSW 5033	Engineering and Technology Management	3
MPSW 5053	Quality System Management	3
MPSW 5063	Entrepreneurship	3
MPSW 5073	Project Management	3

Elective Courses - choose TWO (2) only:

Course Code	Course	Credit
MITS 5323	Advanced Scalable Internetworking	3
MITS 5333	Advanced High Performance Networks	3
MITS 5363	Internet Governance	3
MITS 5373	Network and Internet Programming	3
MITS 5383	Emerging Internetworking Technology	3

Note: Total credit hours = 40 credits

Programme Structure - Part Time

September Intake:

Semester 1 (September)		
Course Code	**Course**	**Credit**
MPSW 5043	Research Methodology	3
MITS 5313	Advanced Data Communications and Network	3
MITS 5213	Distributed Computing Systems	3
	Total credit	**9**
Semester 2 (February)		
Course Code	**Course**	**Credit**
MPSW XXXX	University Course	3
MITS 5523	Advanced Mobile Computing	3
MITS 5343	Advanced Network Design and Diagnostics	3
	Total credit	**9**
Semester 3 (Short Semester)		
Course Code	**Course**	**Credit**
MITS 5354	Internet Security	4
	Total credit	**4**
Semester 4 (September)		
Course Code	**Course**	**Credit**
MITP 5113	Algorithm Analysis and Design	3
MITU 5213	Project 1	3
MITS XXXX	Elective 1	3
	Total credit	**9**
Semester 5 (February)		
Course Code	**Course**	**Credit**
MTPU 5226	Project 2	6
MITS XXXX	Elective 2	3
	Total credit	**9**

Elective courses - choose TWO (2) only:

University Courses - choose ONE (1) only:

Course Code	Course	Credit
MPSW 5033	Engineering and Technology Management	3
MPSW 5053	Quality System Management	3
MPSW 5063	Entrepreneurship	3
MPSW 5073	Project Management	3

Elective Courses - choose TWO (2) only:

Course Code	Course	Credit
MITS 5323	Advanced Scalable Internetworking	3
MITS 5333	Advanced High Performance Networks	3
MITS 5363	Internet Governance	3
MITS 5373	Network and Internet Programming	3
MITS 5383	Emerging Internetworking Technology	3

Note: Total credit hours = 40 credits

MPSW 5013 Research Methodology

Learning Outcomes:

At the end of the course, students should be able to:

CLO1: Propose a research proposal with an improvement of existing knowledge.
CLO2: Synthesize relevant literature to address the knowledge gaps.
CLO3: Apply ethical research skills in constructing research questions, objectives, and hypotheses (if any) relevant to the research problem.

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.

References:

1. Kumar, R., Research methodology: A step-by-step guide for beginners. Sage Publications Limited, 2019.
2. Gray, D. E., Doing research in the business world. Sage Publications Limited, 2019.
3. Creswell, J. W., & Creswell, J. D., Research Design: Qualitative, Quantitative, and Mixed Methods Approaches. In Research Design: Qualitative, Quantitative, and Mixed Methods Approaches, 2018.
4. Tang, H., Engineering Research: Design, Methods, and Publication. John Wiley & Sons, 2020.
5. Sidek, S., Kamalrudin, M. & Mat Deris, M., Research Survival Toolkit: Writing a winning fundamental research proposal, Melaka: University Publisher, UTeM, 2017.
6. Zobel, J., 3rd Edition, Writing for Computer Science, Springer-Verlag London, 2014.
7. Arkoudas, K., Musser, D., Fundamental Proof Methods in Computer Science: A Computer-Based Approach, MIT Press, 2017.
8. Creswell, J. W., & Poth, C. N., Qualitative inquiry and research design: Choosing among five approaches. Sage publications, 2016.

MPSW 5063 Entrepreneurship

Learning Outcomes:

At the end of the course, students should be able to:

CLO1: Analyse entrepreneurial skills in identifying and exploiting entrepreneurial opportunities.

CLO2: Apply commercially viable ideas, projects, products prototypes for commercialization within the context of societal framework and to deliver business model canvassing and business value proposition.

CLO3: Develop creative and viable high tech business models and strategies.

Synopsis:

The objectives of this course are to provide students a robust foundation in theories relevant to the improvement of entrepreneurial behaviour and capabilities 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 key 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 areas of entrepreneurial expertise necessary in order to found and/or grow a technology venture.

References:

1. Duening, Thomas N., Robert A. Hisrich, and Michael A. Lechter. Technology Entrepreneurship: Taking Innovation to the Marketplace. Academic Press, 2020.
2. Sergi, B. S., & Scanlon, C. C. (Eds.), Entrepreneurship and Development in the 21st Century. Emerald Publishing Limited, 2019.
3. Bianchi, C., Glavas, C., & Mathews, S., SME international performance in Latin America: The role of entrepreneurial and technological capabilities. Journal of Small Business and Enterprise Development, 24(1), 176–195, 2017.
4. Patrict Van Der Pjil, Justin Lokitz, Lisa Kay Solomon, Design a Better Business: New Tools, Skills, and Mindset for Strategy and Innovation. Wiley, 2016.
5. Baldock, R., North, D., & Ullah, F., New Technology-Based Firms in the New Millennium. New Technology Based Firms in the New Millennium, 11, 203–226, 2015.
6. Alexander Osterwalder & Yvnes Pigneur, Value Proposition Design: How to Create Products and Services Customers Want. Wiley, 2015.
7. Alexander Osterwalder & Yvnes Pigneur, Business Model Generation: A Handbook

for Visionaries, Game Changers, and Challengers, Wiley, 2010.

MPSW 5073 Project Management

Learning Outcomes:

At the end of the course, students should be able to:

CLO1: Analyze the core concepts and principles, functions, and process in project management.
CLO2: Develop a comprehensive & viable project proposal.
CLO3: Evaluate best practices and methodology in project management.

Synopsis:

This subject focuses on the principles of project management based on Project Management Body of Knowledge (PMBOK). Students will be familiarized with the Project Management process group functions (initiating, planning, executing, controlling and closing) and project knowledge areas (integration, scope, time, cost, quality and human resources). Various tools for supporting the analysis of works in project management will be introduced. Topics including initiating and planning the project, working with the management, project appraisal & sensitivity, work breakdown structure, managing uncertainty, building project plan, implementing and revising project plan, completing the project and contract laws. Microsoft Project (MS Project) will be introduced as project management software tools.

References:

1. Project Management Institute, A Guide to the Project Management Body of Knowledge (PMBOK® Guide) – Fifth Edition, 2018.
2. Project Management Institute, A Guide to the Project management Body of Knowledge (PMBOK® Guide) – Sixth Edition, 2017.
3. Clifford F. Gray · Erik W. Larson, Project Management the Managerial Process, McGraw Hill, 2021.
4. Meredith, J., Mantel, S. and Mantel, S. Jr., Project Management: A Strategic Managerial Approach. New York, Wiley, 2017.
5. Trevor L Young, Successful Project Management, Kogan Page Publishers, 2016.

MPSW 5033 Engineering Technology Management

Learning Outcomes:

At the end of the course, students should be able to:

CLO1: Identify the principles of engineering management and technology

management across different industries.

CLO2: Apply relevant issues in engineering management and technology management across different industries.

CLO3: Analysis the impact of relevant issues in the context of engineering management and technology management across different industries.

Synopsis:

The course consists of two components, i.e., Engineering Management and Technology Management. Topics in Engineering Management provide a vehicle for engineers and technical specialist to enhance their knowledge on management, organizational structure and behavior of engineering/technical organizations. Additional topics will enhance the knowledge and competencies in the management of engineering activities such as design, operations, and quality. The Technology Management part of the course will equip students with contemporary views and tools on management of technology and its impact on an organization. It emphasizes management of innovation and new product development as well as managing technology and knowledge. The interaction of technology and the law, particularly the knowledge management and intellectual property will be covered.

References:

1. Paul Trott, Innovation Management and New Product Development (6th Edition) 6th Edition, Pearson; 6 editions, 2016.
2. A. Thomas Roper, Thomas W. Mason, Frederick A. Rossini, Forecasting and Management of Technology, Alan L. Porter, Scott W. Cunningham, Jerry Banks, John Wiley & Sons, 2011.
3. William J Stevenson, Operations Management 13th Edition, McGraw-Hill Education, 2017.
4. by Jim Hall, Tina Scott, Lean Six Sigma: Beginner's Guide to Understanding and Practicing Lean Six Sigma CreateSpace Independent Publishing Platform, 2016.
5. Sharon Armstrong, Barbara Mitchell Weiser, The Essential HR Handbook, 10th Edition: A Quick and Handy Resource for Any Manager or HR Professional , 2019.

MPSW 5053 Quality Systems Management

Learning Outcomes:

At the end of the course, students should be able to:

CLO1: Explain the conceptual understanding of Quality.

CLO2: Identify Quality System Management information.
CLO3: Propose Quality System Management techniques and tools in the practice of organizations.

Synopsis:

This course presents the fundamental elements of Quality Management System including the importance of quality as a strategy for continuous improvement in business performance. It explains the strategies for competitive quality in design and manufacture as well as in terms of customer supply chain concept of total quality aspect. Such topics include Management systems ISO, variability, Six Sigma, Taguchi method, failure mode and effect analysis (FMEA) and quality function deployment. Several quality control tools such as Pareto chart, bar chart and scatter diagram will be cover in statistical data collection, measurement and analysis. Finally, concepts of benchmarking and ISO standards with respect to control elements will be integrated with the Total Quality Management (TQM) as part of quality Management system.

References:

1. S. Thomas Foster, Managing Quality: Integrating the Supply Chain, 6th Edition, Pearson, 2017.
2. Howard S. Gitlow, Richard J. Melnyck and David M. Levine, Guide to Six Sigma and Process Improvement for Practitioners and Students, A: Foundations, DMAIC, Tools, Cases, and Certification, 2nd Edition, 2015.
3. Gitlow, H. S., Quality Management systems: A Practical Guide, St. Lucie Press, 2001.
4. Mukherjee, P. N., Total Quality Management, Prentice Hall, 2006.
5. Manual Procedure for Malaysia Halal Certification, 3rd Revision, Jabatan Kemajuan Islam Malaysia, 2015.

MITU 5213 Project 1

Learning Outcomes:

At the end of the course, students should be able to:
CLO1: Formulate the problems, objectives and scope based on complex technology solutions.
CLO2: Perform literature review and appropriate methodology to complete the project.
CLO3: Defend the proposed project solutions in written and verbal forms.

Synopsis:

This course is the first part of project that requires a student to prepare a master research proposal based on the theories and techniques of technologies learnt previously. Student is required to write three chapters of dissertation

i.e. Chapter 1: Introduction, Chapter 2: Literature Review and Chapter 3: Research Methodology. Besides writing the proposal, student needs to present and defend his/her proposal. Student is expected to demonstrate ability to identify and propose solutions to the identified problems.

References:

1. Thesis Writing and Guidelines, http://www.utem.edu.my/pps/.
2. Cresswell, J. W., and Creswell, J.D., Research Design: Qualitative, Quantitative, and Mixed Methods Approaches, 5th Edition, California: SAGE Publications, Incorporated, 2020.

MITU 5226 Project 2

Learning Outcomes:

At the end of the course, students should be able to:

CLO1: Demonstrate solutions to the proposed project.

CLO2: Verify solutions to understand the strengths, weaknesses and limitations of the project.

CLO3: Defend the contributions of the project in written and verbal forms.

Synopsis:

This course is the second part of project that show the ability of student in applying the theories and techniques of technologies learnt previously. Student must write the second fold of dissertation which consists of four 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 solution developed as the end product of this project. Student is required to justify the contribution of the proposed solution throughout the presentation sessions.

References:

1. Thesis Writing and Guidelines, http://www.utem.edu.my/pps/.
2. Cresswell, J. W., and Creswell, J.D., Research Design: Qualitative, Quantitative, and Mixed Methods Approaches, 5th Edition, California: SAGE Publications, Incorporated, 2020.

MITP 5113 Algorithm Analysis and Design

Learning Outcomes:

At the end of the course, students should be able to:

CLO1: Identify algorithm design technique and method of analysis.

CLO2: Explain algorithms efficiency in terms of the amount of resources, which are time and storage space required to execute the algorithm.

CLO3: Explain algorithm design technique based on problem type.

Synopsis:

This course introduces the students to the fundamentals principles of design and analysis of algorithms. It covers formal techniques to support the design and analysis of algorithms that emphasizes on both the underlying mathematical theory and practical considerations of efficiency. By learning a range of algorithm design techniques as Brute Force, Divide & Conquer, Decrease & Conquer, Transform and Conquer, Greedy Algorithms and Dynamic Programming, students should be able to develop efficient algorithms for simple computational tasks and reasoning about the correctness of them. Through the complexity measures, different range of behaviors of algorithms and the notion of tractable and intractable problems will be discussed.

References:

1. Levitin, A., Introduction to the Design and Analysis of Algorithm, Addison Wesley, 2017.
2. Puntambekar, A., Design and Analysis of Algorithms. Technical Publications, 2018.
3. Arora, A., Analysis and Design of Algorithms, 3rd Edition, Cognella Academic Publishing, 2017.
4. Mueller, J. P. and Massaron, L., Algorithms For Dummies (For Dummies (Computers)) 1st Edition. For Dummies, 2017.
5. Bhasin, H., Algorithms: Design and Analysis Paperback. Oxford Univ Pr (Sd), 2015.
6. Malik. D. S., C++ Programming: From Problem Analysis to Program Design 8th Edition. Course Technology, 2017.
7. Dimri, S. C., Malik, P., and Ram, M., Algorithms: Design and Analysis, De Gruyter, 2021.

MITS 5313 Advanced Data Communications and Network

Learning Outcomes:

At the end of the course, students should be able to:

CLO1: Evaluate the theory of data communications related to the network models in current technologies.

CLO2: Manipulate the implementation in managing network infrastructure and services with the emerging trends and technologies.

CLO3: Relate the present research in data communications and networking in order to apply in the real environment based on the concept.

Synopsis:

This course introduces the fundamental concepts and terminology of data communication and networking, encompassing both technical and managerial aspects and to help students better understand the challenges and opportunities faced by modern business. Topics will include fundamentals of telecommunications, data transmission mechanisms, telecommunication media and technologies, considerations for LAN and WAN implementations, the Internet and intranet applications, emerging telecommunications technologies, and trends in the telecommunications industry. Students will also be able to understand, explain and apply the fundamentals of data communication and network technology concepts and skills in network applications, troubleshooting, and configuring the computer networks using guided or unguided media.

References:

1. Jerry FitzGerald, Alan Dennis, Alexandra Durcikova, Business Data Communications and Networking, 14th Edition, Wiley, 2020.
2. Forouzan, Behrouz A., Data Communications and Networking, 5th Edition, McGraw-Hill, 2013.
3. James Kurose and Keith Ross, Computer Networking: A Top-Down Approach, 7th Edition, Pearson, 2017.
4. Manish Agrawal and Rekha Sharma, Business Data Communications and IT Infrastructures, Prospect Press, 2016.
5. Curt M. White, Data Communications and Computer Networks, 8th Edition, Cengage Learning, 2015.
6. William Stallings, Data and Computer Communications, 10th Edition, Pearson, 2015.

MITS 5354 Internet Security

Learning Outcomes:

At the end of the course, students should be able to:

CLO1: Explain the concept, issues, and trends of internet security.

CLO2: Perform a case study about the current attack trends towards the social, ethical issues, and the related cyber laws.

CLO3: Construct the appropriate security mechanism to defense from the attacks.

Synopsis:

This course provides a study of various attack techniques at the network, transport, and application layer. Students also are exposed to the current attacks trend and the related cyber laws and ethical issues. In addition, the basics of cryptography and the applications are also introduced in the topic. This course also covers the defense mechanisms in the three layers; network, transport, and application.

References:

1. Wenliang Du (2019). Internet Security: A Hands-on Approach. ISBN: 1733003924, 9781733003926
2. Wm. Arthur Conklin, Greg White, Chuck Cothren, Roger L. Davis, Dwayne Williams (2021). Principles of Computer Security: CompTIA Security+ and Beyond, Sixth Edition (Exam SY0-601), McGraw-Hill, 6th Edition. ISBN: 9781260474329
3. Fernando Maymi, Shon Harris (2021).CISSP All-in-One Exam Guide, 9th Edition. McGraw-Hill. ISBN: 1260467376
4. Tim Rains (2020). Cybersecurity Threats, Malware Trends, and Strategies: Learn to mitigate exploits, malware, phishing, and other social engineering attacks. ISBN: 1800206011, Packt Publishing.
5. Wenliang Du, (2019). Computer & Internet Security: A Hands-on Approach. ISBN: 1733003932.
6. Charles J. Brooks, Christopher Grow, Philip Craig, and Donald Short, (2018). Cybersecurity Essentials. ISBN: 9781119362395. Sybex

MITS 5213 Distributed Computing Systems

Learning Outcomes:

At the end of the course, students should be able to:

CLO1: Organize the heterogeneous main components architectures in distributed system.

CLO2: Display knowledge about the design principles of distributed system architecture.

CLO3: Propose solution on large-scale heterogeneous distributed system performances problem.

Synopsis:

This course is concerned with the principles and implementation of the software necessary to manage system resources, particularly in a distributed environment. A core knowledge of basic operating systems concepts (virtual memory, I/O, process management and communication) is assumed. The design issues and distributed system concepts are covered such as coverage of large-scale applications, fault modelling and fault tolerance, models of

system execution, and technology related to distributed systems.

References:

1. Steen M. V., Tanenbaum, A. Distributed Systems, 4th Edition, CreateSpace Independent Publishing Platform, 2023
2. Raptis, D. Distributed Systems for practitioners, 2020, Kindle Edition, 2020
3. Ghosh, S. Distributed Systems: An Algorithmic Approach, 2nd Edition, Chapman and Hall/CRC, 2020
4. Tanenbaum, A., Steen M. V. Distributed Systems: Principles and Paradigms. 2nd Edition. CreateSpace Independent Publishing Platform, 2016.
5. Burns, B. Designing Distributed Systems: Patterns and Paradigms for Scalable, Reliable Services, 1st edition, O'Reilly Media; 2018
6. Stallings, W. Operating Systems: Internals and Design Principles. 9th Edition, Pearson, 2017.
7. Hennesey, J.L., Patterson, D.A. Computer Architecture: A Quantitative Approach. 6th Edition. Morgan Kauffman, 2017.

MITS 5523 Advanced Mobile Computing

Learning Outcomes:

At the end of the course, students should be able to:

CLO1: Describe the concept and different technologies of mobile computing.

CLO2: Relate the advancement in mobile computing with the changes of all aspects of human life.

CLO3: Propose mobile computing application to solve current issues in certain area.

Synopsis:

This course introduces to students the fundamental concept of mobile computing and mobile application development. Mobile computing will be discussed from the perspectives of mobile technology, application development, and user interaction. The course wills overview various mobile computing applications, technologies, and wireless communication. This course also introduced the uses of mobile application frameworks and development environments to reinforce concepts covered in lectures. Students will obtain hands-on experiences through mobile computing projects to solve any aspects of human life such as personal communication, education, business and healthcare. The course will look at some current research

in mobile computing and identify potential research problems in this field.

References:

1. Raj Kamal, Mobile Computing, Oxford University Press India, 3Ed, 2019.
2. M. Bala Krishna and Jaime Lloret Mauri, Advances in Mobile Computing and Communication: Perspectives and Emerging Trends in 5G Networks, CRC Press, 2016.
3. Sunilkumar S. Manvi and Mahabaleshwar S. Kakkasageri, Wireless and Mobile Networks, Concepts And Protocols, 2Ed, Wiley, 2016.
4. Koushik Sinha, Sasthi C. Ghosh and Bhabani P. Sinha, Wireless Networks and Mobile Computing, Chapman and Hall / CRC Press, 2016.
5. Rafael Barrett, Wireless Networks and Mobile Computing, Wilford Press, 2016.

MITS 5343 Advanced Network Design And Diagnostics

Learning Outcomes:

At the end of the course, students should be able to:

CLO1: Design networks project that meets a customer's business and technical goals.

CLO2: Identify the processes and tools used in order to understand traffic flow, protocol behavior, and internetworking technologies.

CLO3: Explain the acquired understanding of tools and language during analysis and design of a network structure which can fulfill the customer requirement in terms of network performance, security, capacity, and weight.

Synopsis:

This course covers a top-down approach to network design, the concept, guidelines, practice, and diagnostics for requirement analysis and flows analysis. The technology choices, interconnection mechanism and network management, and security will be covered in logical design. Some issues on network design will be included in physical design and addressing and routing.

References:

1. Michael G. Solomon, David Kim (2021), Fundamentals of Communications and Networking, 3rd Edition, Publisher(s): Jones & Bartlett Learning, ISBN: 9781284200126
2. Michel Thomatis (2019), "Network Design Cookbook", 2nd Edition, Cisco Press (ISBN: 9781387224715).
3. Ergun, O (2019), "Service Provider

Networks: Design and Architecture Perspective", (ISBN: 978-1096289395).
4. White, Michael B. (2018), "Computer Networking: The Complete Guide to Understanding Wireless Technology, Network Security, Computer Architecture and Communications Systems (Including Cisco, CCNA and CCENT)", Newstone, (ISBN: 978-1727672916)
5. P. Stephen (2017), "Managing Networks in Project-Based Organisations", John Wiley & Sons Ltd, (ISBN: 9781118929926)
6. R, White and D, Donohue (2014), "The Art of Network Architecture, The: Business-Driven Design (Networking Technology)", 1st Edition, Cisco Press, (ISBN: 978-1587143755)
7. Oppenheimer, P (2010), "Top Down Network Design", 3rd Edition, Cisco Press, (ISBN: 978-1587202834).

MITS 5373 Network and Internet Programming

Learning Outcomes:

At the end of the course, students should be able to:

CLO1: Demonstrate an understanding of the usage of the application programming interfaces for each of the different network protocols with emphasis on the application and transport layers.

CLO2: Form an integrated solution for Internet application problems using suitable network programming interfaces.

CLO3: Formulate and integrate appropriate network programming interfaces to solve Internet application problems in a small group environment.

Synopsis:

This course reviews concepts, techniques, and systems issues in advanced Internet application development, and explores new challenges and research issues that are critical for developing network and Internet applications, such as network monitoring, web servers, and web services. One of the important goals of the course is to look beyond the present status of the Internet and conjecture what possible future technologies and applications will evolve. The course will include a significant project component that will typically require programming skills.

References:

1. Pradeeban Kathiravelu, Dr. M. O. Faruque Sarker, Python Network Programming Cookbook - Second Edition: Practical solutions to overcome real-world networking challenges, Packt Publishing, 2017.
2. Eric Chou, Mastering Python Networking: Your one-stop solution to using Python for

network automation,programmability, and DevOps, 3rd Edition, Packt Publishing, 2020.
3. Mat Ryer, Go Programming Blueprints: Build real-world, production-ready solutions in Go using cutting-edge technology and techniques, Second Edition, Packt Publishing, 2016.
4. Jan Newmarch, Network Programming with Go: Essential Skills for Using and Securing Networks, Apress, 2017.
5. Maarten van Steen, Andrew S. Tanenbaum, Distributed Systems, Pearson Education, 2018.

MITS 5323 Advanced Scalable Internetworking

Learning Outcomes:

At the end of the course, students should be able to:

CLO1: Explain in detail the network requirement and current trend technology for building the advanced scalable network.

CLO2: Design the advanced scalable network by integration remote access and reliable routing protocol.

CLO3: Demonstrate routing protocol operation, configurations, troubleshooting and network monitoring activities.

Synopsis:

This subject emphasizes the theory of building advanced scalable network. It also involves the use of internetworking architecture and network equipment. The theory and technique on routing protocol and remote access technologies will be emphasized to build a scalable internetwork. The hands-on covers the configuration of routing protocol and network monitoring tools. In addition, it exposes WAN technologies including VPN, Frame Relay, Software Defined Network (SDN).

References:

1. Cisco System, Inc. Scaling Networks v6 Companion Guide: Official Certificate Guide (Cisco Networking Academy Program). Cisco Press, 2017.
2. Cisco System, Inc. Switching, Routing and Wireless Essentials Companion Guide (CCNAv7): Official Certificate Guide (Cisco Networking Academy Program). Cisco Press, 2020.
3. Cisco System, Inc. Enterprise Networking, Security, and Automation Companion Guide (CCNAv7), (Cisco Networking Academy Program). Cisco Press. 2020.
4. John W. Capobianco, Automate Your Network: Introducing the Modern Approach to Enterprise Network Management, Kindle, 2019.

5. Thomas D. Nadeau, Software-defined networks: An Authoritative Review of Network Programmability Technologies, 1st Edition, O'Reilly Media, 2013.
6. Paul Goransson, Software Defined Networks: A Comprehensive Approach, 1st Edition, Morgan Kaufmann, 2014.
7. John Tiso, Inc. Designing Cisco Network Service Architectures (ARCH) Foundation Learning Guide, 3rd Edition, Cisco Press, 2011.

MITS 5333 Advanced High Performance Networks

Learning Outcomes:

At the end of the course, students should be able to:

CLO1: Evaluate high performance networks with guaranteed QoS, particularly in a saturated/congested networks.
CLO2: Identify the main techniques and mechanism of queue management that provide high quality of service (QoS).
CLO3: Propose solutions to the problems in poorly designed network by utilizing efficient queuing algorithm and efficient traffic control scheme.

Synopsis:

This course is an in-depth study of the theory, design and performance analysis of high-performance networks. Topics include specific high-performance network implementations and emerging technologies, including multimedia transmission, routing protocols, traffic control management, quality of service (QoS), and next generation networks. Performance analysis of networks will include simulation of basic queuing models.

References:

1. Jerry FitzGerald, Alan Dennis, Alexandra Durcikova, 2020. Business Data Communications and Networking, 14th Edition, Wiley.
2. Forouzan, Behrouz A., 2021. ISE Data Communications and Networking with TCP/IP Protocol Suite, 6th Edition, McGraw-Hill.
3. James Kurose and Keith Ross, 2017. Computer Networking: A Top-Down Approach, 7th Edition, Pearson.
4. Manish Agrawal and Rekha Sharma, 2016. Business Data Communications and IT Infrastructures, Prospect Press.
5. Curt M. White, 2015. Data Communications and Computer Networks, 8th Edition, Cengage Learning
6. William Stallings, 2015. Data and Computer Communications, 10th Edition, Pearson.

MITS 5363 Internet Governance

Learning Outcomes:

At the end of the course, students should be able to:

CLO1: Elaborate the concepts, architecture and application of the related Internet Governance models and technologies.

CLO2: Integrate knowledge concerning current issues, impact to society and open issues in Internet Governance.

CLO3: Identify the key elements, factors, benefit, risks and ethics that drive the successful adoption of Internet Governance and Security in a business case.

Synopsis:

This course focuses on the technical, security, legal, economic, development, sociocultural, and human rights aspects of Internet governance. Providing a brief introduction, a summary of major questions and debates, and a survey of different views and approaches for each issue related and offers a practical framework for analysis and discussion of Internet governance and security.

References:

1. Jovan Kurbalija, An introduction to internet governance, Diplo Foundation, 2016.
2. Laura Denardis and Derrick Cogburn, Researching Internet Governance: Methods, Frameworks, Futures (Information Policy), The MIT Press, 2020.
3. Roxana Radu, Negotiating internet governance". Oxford University Press, 2019.
4. Alison Harcourt, George Christou, and Seamus Simpson, Global Standard Setting in Internet Governance, OUP Oxford, 2020.
5. Carol Glen, Controlling Cyberspace: The Politics of Internet Governance and Regulation, Praeger, 2017.
6. Wade Hoxtell and David Nonhoff, Internet Governance: Past, Present and Future, Konrad-Adenauer-Stiftung, 2019.
7. Funk, Gerhard, et al., Implementation Guideline ISO/IEC 27001:2013; A practical guideline for implementing an ISMS in accordance with the international standard ISO/IEC 27001:2013, ISACA Germany Chapter e.V., 2017.
8. Laura B. Madsen, Healthcare Business Intelligence: A Guide to Empowering Successful Data Reporting and Analytics; Data Governance Policies and Procedures, John Wiley & Sons, Inc., 2012.
9. John Ladley, Data Governance: How to Design, Deploy, and Sustain an Effective Data Governance Program, Academic Press, 2019.

MITS 5383 Emerging Internetworking Technology

Learning Outcomes:

At the end of the course, students should be able to:

CLO1: Elaborate on the concept, architecture, and application of the related emerging technologies.

CLO2: Perform literature study on the current trends, impact to society, and open issues of the related emerging technologies.

CLO3: Identify the key attributes, factors, benefits, and risks that drive the successful adoption of emerging technologies in a business case.

Synopsis:

This course will provide state-of-art of emerging technologies in internetworking which covers topics in three main areas: smart networking technologies and application, large-scale distributed system, and next-generation wireless communication. For each topic, students will be introduced to the platform, system architecture, and principle designs. In addition, existing barriers, challenges, and opportunities of emerging internetworking technology are presented.

References:

1. Perry Lea, IoT and Edge Computing for Architects: Implementing edge and IoT systems from sensors to clouds with communication systems, analytics, and security, Packt Publishing, 2020.
2. Anand Nayyar, Handbook of Cloud Computing: Basic to Advance research on the concepts and design of Cloud Computing, 2019.
3. Afif Osseiran, 5G Mobile and Wireless Communications, Cambridge University Press, 2016.
4. Benny Bing, 5G Technologies and Applications: An Introduction to the Next Wireless Frontier, Amazon, 2019.
5. Pablo Aguilera, 802.11ax: A Hyperconnected World and the Next-Generation WiFi, 2016.
6. Kuo Hung Huang, Changing Humanities and Smart Application of Digital Technologies, 2017.
7. Akhilesh, K. B., Möller, Dietmar P.F, Smart Technologies Scope and Applications, Springer, 2020.
8. A. Gehlot, R. Singh, R.K. Sharma, K.K Sharma, LoRA and IoT Networks for Applications in Industry 4.0, 2020.
9. Bharat S. Chaudhari and Marco Z., LPWAN Technologies for IoT and M2M Applications. Science Direct, 2020.

MITS
MASTER OF COMPUTER
SCIENCE
(SOFTWARE ENGINEERING)

MASTER OF COMPUTER SCIENCE (Software Engineering)

Programme Details

The Master of Computer Science (Software Engineering), for short MITS, is specifically designed to equip students with knowledge and technical skills on software engineering and software engineering management that can meet industry needs.

Programme Educational Objectives (PEO)

Programme Educational Objectives (PEO) are specific goals describing the expected achievement of graduates in their career and professional life after 5 years of graduation.

Below are the PEO for this programme:

PEO 1: Practice in-depth and specialist knowledge and skills of Computer Science in software engineering to support organizational goals.

PEO 2: Demonstrate higher-order thinking skills and sustained learning in adapting to a constantly changing field through professional development, research and life-long learning.

PEO 3: Demonstrate knowledge of current issues in technology through learning and research activities using scientific methods.

PEO 4: Practice professional, ethical and societal responsibilities, and show adaptability in different roles and surroundings in contributing to the community and business.

Programme Outcomes (PO)

Programme Outcomes (PO) are statements describing what students are expected to know and be able to perform or attain by the time of graduation. These are related to the Knowledge (K), Skills (S), and Attitude (A) that students acquire throughout the programme.

Below is the list of PO for this programme:

PO 1: Demonstrate originality and independence in undertaking analytical and critical evaluation, and synthesis of complex information, specialized concepts, theories, methods and practice in Computer Science;

PO 2: Apply knowledge and quantitative skills critically and collectively to manage and resolve complex problems or issues in the field of Software Engineering;

PO 3: Apply the practical skill in working environment related to software engineering field;

PO 4: Communicate effectively the knowledge, skills, ideas, critique and rationale in both written and verbal forms using appropriate methods to peers, experts, and non-experts;

PO 5: Competently use a wide range of suitable digital technologies to design and plan evaluation activities for enhancing study, research and practice.;

PO 6: Demonstrate significant autonomy, independence and leadership skills at work and class with self-advancement through continuous academic or professional development; and

PO 7: Initiate or lead entrepreneurial projects and adhere to legal, ethical, professional and sustainable practices.

Programme Structure - Full Time

September Intake:

Semester 1 (September)		
Course Code	**Course**	**Credit**
MPSW 5013	Research Methodology	3
MPSW XXXX	University Course	3
MITP 5113	Algorithm Analysis and Design	3
MITS 5313	Advanced Data Communications and Network	3
MITP 5213	Advanced Software Engineering	3
MITP XXXX	Elective 1	3
	Total credit	**18**
Semester 2 (February)		
Course Code	**Course**	**Credit**
MITP 5244	Advanced Software Project Management	4
MITP 5233	Requirements Engineering	3
MITP 5263	Software Testing	3
MITU 5213	Project 1	3
MITP XXXX	Elective 2	3
	Total credit	**16**
Semester 3 (Short Semester)		
Course Code	**Course**	**Credit**
MITU 5226	Project 2	6
	Total credit	**6**

February Intake:

Semester 2 (February)		
Course Code	**Course**	**Credit**
MPSW 5013	Research Methodology	3
MPSW XXXX	University Course	3
MITP 5244	Advanced Software Project Management	4
MITP 5233	Requirements Engineering	3
MITP 5263	Software Testing	3
MXXX XXXX	Elective 1	3
	Total credit	**19**
Semester 3 (Short Semester)		
Course Code	**Course**	**Credit**
MITU 5213	Project 1	3
MXXX XXXX	Elective 2	3
	Total credit	**6**
Semester 1 (September)		
Course Code	**Course**	**Credit**
MITP 5113	Algorithm Analysis and Design	3
MITS 5313	Advanced Data Communications and Network	3
MITP 5213	Advanced Software Engineering	3
MITU 5226	Project 2	6
	Total credit	**15**

University Courses - choose ONE (1) only:

Course Code	Course	Credit
MPSW 5033	Engineering and Technology Management	3
MPSW 5053	Quality System Management	3
MPSW 5063	Entrepreneurship	3
MPSW 5073	Project Management	3

Elective Courses - choose TWO (2) only:

Course Code	Course	Credit
MITP 5253	Software Quality	3
MITP 5273	Secure Software Development	3
MITP 5563	Advanced Database System Principles	3
MSMD 5123	Internet of Things Application Development	3

Note: Total credit hours = 40 credits

Programme Structure - Part Time

September Intake:

Semester 1 (September)		
Course Code	**Course**	**Credit**
MPSW 5013	Research Methodology	3
MITP 5113	Algorithm Analysis and Design	3
MITP 5213	Advanced Software Engineering	3
	Total credit	**9**
Semester 2 (February)		
Course Code	**Course**	**Credit**
MITP 5244	Advanced Software Project Management	4
MITP 5233	Requirements Engineering	3
MITP 5263	Software Testing	3
	Total credit	**10**
Semester 3 (Short Semester)		
Course Code	**Course**	**Credit**
MXXX XXXX	Elective 1	3
	Total credit	**3**
Semester 4 (September)		
Course Code	**Course**	**Credit**
MPSW XXXX	University Course	3
MITS 5313	Advanced Data Communications and Network	3
MITU 5213	Project 1	3
	Total credit	**9**
Semester 5 (February)		
Course Code	**Course**	**Credit**
MITU 5226	Project 2	6
MXXX XXXX	Elective 2	3
	Total credit	**9**

Programme Structure - Part Time

February Intake:

Semester 1 (February)		
Course Code	**Course**	**Credit**
MPSW 5013	Research Methodology	3
MITP 5233	Requirements Engineering	3
MITP 5263	Software Testing	3
	Total credit	**9**
Semester Khas		
Course Code	**Course**	**Credit**
MXXX XXXX	Elective 1	3
	Total credit	**3**
Semester 2 (September)		
Course Code	**Course**	**Credit**
MITP 5113	Algorithm Analysis and Design	3
MITP 5213	Advance Software Engineering	3
MITP 5244	Advance Software Project Management	4
	Total credit	**10**
Semester 3 (February)		
Course Code	**Course**	**Credit**
MITP 5313	Advance Data Communications and Network	3
MITU 5213	Project 1	3
MPSW 50XX	Elective University	3
	Total credit	**9**
Semester Khas		
Course Code	**Course**	**Credit**
MITU 5226	Project 2	6
MXXX XXXX	Elective 2	3
	Total credit	**9**

Elective courses - choose TWO (2) only:

University Courses - choose ONE (1) only:

Course Code	Course	Credit
MPSW 5033	Engineering and Technology Management	3
MPSW 5053	Quality System Management	3
MPSW 5063	Entrepreneurship	3
MPSW 5073	Project Management	3

Elective Courses - choose TWO (2) only:

Course Code	Course	Credit
MITP 5253	Software Quality	3
MITP 5273	Secure Software Development	3
MITP 5563	Advanced Database System Principles	3
MSMD 5123	Internet of Things Application Development	3

Note: Total credit hours = 40 credits

MPSW 5013 Research Methodology

Learning Outcomes:

At the end of the course, students should be able to:

CLO1: Propose a research proposal with an improvement of existing knowledge.
CLO2: Synthesize relevant literature to address the knowledge gaps.
CLO3: Apply ethical research skills in constructing research questions, objectives and hypotheses (if any) relevant to research problem.

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.

References:

1. Kumar, R., Research methodology: A step-by-step guide for beginners. Sage Publications Limited, 2019.
2. Gray, D. E., Doing research in the business world. Sage Publications Limited, 2019.
3. Creswell, J. W., & Creswell, J. D., Research Design: Qualitative, Quantitative, and Mixed Methods Approaches. In Research Design: Qualitative, Quantitative, and Mixed Methods Approaches, 2018.
4. Tang, H., Engineering Research: Design, Methods, and Publication. John Wiley & Sons, 2020.
5. Sidek, S., Kamalrudin, M. & Mat Deris, M., Research Survival Toolkit: Writing a winning fundamental research proposal, Melaka: University Publisher, UTeM, 2017.
6. Zobel, J., 3rd Edition, Writing for Computer Science, Springer-Verlag London, 2014.
7. Arkoudas, K., Musser, D., Fundamental Proof Methods in Computer Science: A Computer-Based Approach, MIT Press, 2017.
8. Creswell, J. W., & Poth, C. N., Qualitative inquiry and research design: Choosing

among five approaches. Sage publications, 2016.

MPSW 5063 Entrepreneurship

Learning Outcomes:

At the end of the course, students should be able to:

CLO1: Analyse entrepreneurial skills in identifying and exploiting entrepreneurial opportunities.

CLO2: Apply commercially viable ideas, projects, products prototypes for commercialization within the context of societal framework and to deliver business model canvassing and business value proposition.

CLO3: Develop creative and viable high tech business models and strategies.

Synopsis:

The objectives of this course are to provide students a robust foundation in theories relevant to the improvement of entrepreneurial behaviour and capabilities 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 key 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 areas of entrepreneurial expertise necessary in order to found and/or grow a technology venture.

References:

1. Duening, Thomas N., Robert A. Hisrich, and Michael A. Lechter. Technology Entrepreneurship: Taking Innovation to the Marketplace. Academic Press, 2020.
2. Sergi, B. S., & Scanlon, C. C. (Eds.), Entrepreneurship and Development in the 21st Century. Emerald Publishing Limited, 2019.
3. Bianchi, C., Glavas, C., & Mathews, S., SME international performance in Latin America: The role of entrepreneurial and technological capabilities. Journal of Small Business and Enterprise Development, 24(1), 176–195, 2017.
4. Patrict Van Der Pjil, Justin Lokitz, Lisa Kay Solomon, Design a Better Business: New Tools, Skills, and Mindset for Strategy and Innovation. Wiley, 2016.
5. Baldock, R., North, D., & Ullah, F., New Technology-Based Firms in the New Millennium. New Technology Based Firms in the New Millennium, 11, 203–226, 2015.
6. Alexander Osterwalder & Yvnes Pigneur, Value Proposition Design: How to Create

Products and Services Customers Want. Wiley, 2015.
7. Alexander Osterwalder & Yvnes Pigneur, Business Model Generation: A Handbook for Visionaries, Game Changers, and Challengers, Wiley, 2010.

MPSW 5073 Project Management

Learning Outcomes:

At the end of the course, students should be able to:

CLO1: Analyze the core concepts and principles, functions, and process in project management.
CLO2: Develop a comprehensive & viable project proposal.
CLO3: Evaluate best practices and methodology in project management.

Synopsis:

This subject focuses on the principles of project management based on Project Management Body of Knowledge (PMBOK). Students will be familiarized with the Project Management process group functions (initiating, planning, executing, controlling and closing) and project knowledge areas (integration, scope, time, cost, quality and human resources). Various tools for supporting the analysis of works in project management will be introduced. Topics including initiating and planning the project, working with the management, project appraisal & sensitivity, work breakdown structure, managing uncertainty, building project plan, implementing and revising project plan, completing the project and contract laws. Microsoft Project (MS Project) will be introduced as project management software tools.

References:

1. Project Management Institute, A Guide to the Project Management Body of Knowledge (PMBOK® Guide) – Fifth Edition, 2018.
2. Project Management Institute, A Guide to the Project management Body of Knowledge (PMBOK® Guide) – Sixth Edition, 2017.
3. Clifford F. Gray · Erik W. Larson, Project Management the Managerial Process, McGraw Hill, 2021.
4. Meredith, J., Mantel, S. and Mantel, S. Jr., Project Management: A Strategic Managerial Approach. New York, Wiley, 2017.
5. Trevor L Young, Successful Project Management, Kogan Page Publishers, 2016.

MPSW 5033 Engineering Technology Management

Learning Outcomes:

At the end of the course, students should be able to:

CLO1: Identify the principles of engineering management and technology management across different industries.

CLO2: Apply relevant issues in engineering management and technology management across different industries.

CLO3: Analysis the impact of relevant issues in the context of engineering management and technology management across different industries.

Synopsis:

The course consists of two components, i.e., Engineering Management and Technology Management. Topics in Engineering Management provide a vehicle for engineers and technical specialist to enhance their knowledge on management, organizational structure and behavior of engineering/technical organizations. Additional topics will enhance the knowledge and competencies in the management of engineering activities such as design, operations, and quality. The Technology Management part of the course will equip students with contemporary views and tools on management of technology and its impact on an organization. It emphasizes management of innovation and new product development as well as managing technology and knowledge. The interaction of technology and the law, particularly the knowledge management and intellectual property will be covered.

References:

1. Paul Trott, Innovation Management and New Product Development (6th Edition) 6th Edition, Pearson; 6 editions, 2016.
2. A. Thomas Roper, Thomas W. Mason, Frederick A. Rossini, Forecasting and Management of Technology, Alan L. Porter, Scott W. Cunningham, Jerry Banks, John Wiley & Sons, 2011.
3. William J Stevenson, Operations Management 13th Edition, McGraw-Hill Education, 2017.
4. by Jim Hall, Tina Scott, Lean Six Sigma: Beginner's Guide to Understanding and Practicing Lean Six Sigma CreateSpace Independent Publishing Platform, 2016.
5. Sharon Armstrong, Barbara Mitchell Weiser, The Essential HR Handbook, 10th Edition: A Quick and Handy Resource for Any Manager or HR Professional , 2019.

MPSW 5053 Quality Systems Management

Learning Outcomes:

At the end of the course, students should be able to:

CLO1: Explain the conceptual understanding of Quality.

CLO2: Identify Quality System Management information.

CLO3: Propose Quality System Management techniques and tools in the practice of organizations.

Synopsis:

This course presents the fundamental elements of Quality Management System including the importance of quality as a strategy for continuous improvement in business performance. It explains the strategies for competitive quality in design and manufacture as well as in terms of customer supply chain concept of total quality aspect. Such topics include Management systems ISO, variability, Six Sigma, Taguchi method, failure mode and effect analysis (FMEA) and quality function deployment. Several quality control tools such as Pareto chart, bar chart and scatter diagram will be cover in statistical data collection, measurement and analysis. Finally, concepts of benchmarking and ISO standards with respect to control elements will be integrated with the Total Quality Management (TQM) as part of quality Management system.

References:

1. S. Thomas Foster, Managing Quality: Integrating the Supply Chain, 6th Edition, Pearson, 2017.
2. Howard S. Gitlow, Richard J. Melnyck and David M. Levine, Guide to Six Sigma and Process Improvement for Practitioners and Students, A: Foundations, DMAIC, Tools, Cases, and Certification, 2nd Edition, 2015.
3. Gitlow, H. S., Quality Management systems: A Practical Guide, St. Lucie Press, 2001.
4. Mukherjee, P. N., Total Quality Management, Prentice Hall, 2006.
5. Manual Procedure for Malaysia Halal Certification, 3rd Revision, Jabatan Kemajuan Islam Malaysia, 2015.

MITU 5213 Project 1

Learning Outcomes:

At the end of the course, students should be able to:

CLO1: Formulate the problems, objectives and scope based on complex technology solutions.

CLO2: Perform literature review and appropriate methodology to complete the project.
CLO3: Defend the proposed project solutions in written and verbal forms.

Synopsis:

This course is the first part of project that requires a student to prepare a master research proposal based on the theories and techniques of technologies learnt previously. Student is required to write three chapters of dissertation i.e. Chapter 1: Introduction, Chapter 2: Literature Review and Chapter 3: Research Methodology. Besides writing the proposal, student needs to present and defend his/her proposal. Student is expected to demonstrate ability to identify and propose solutions to the identified problems.

References:

1. Thesis Writing and Guidelines, http://www.utem.edu.my/pps/.
2. Cresswell, J. W., and Creswell, J.D., Research Design: Qualitative, Quantitative, and Mixed Methods Approaches, 5th Edition, California: SAGE Publications, Incorporated, 2020.

MITU 5226 Project 2

Learning Outcomes:

At the end of the course, students should be able to:

CLO1: Demonstrate solutions to the proposed project.
CLO2: Verify solutions to understand the strengths, weaknesses and limitations of the project.
CLO3: Defend the contributions of the project in written and verbal forms.

Synopsis:

This course is the second part of project that show the ability of student in applying the theories and techniques of technologies learnt previously. Student must write the second fold of dissertation which consists of four 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 solution developed as the end product of this project. Student is required to justify the contribution of the proposed solution throughout the presentation sessions.

References:

1. Thesis Writing and Guidelines, http://www.utem.edu.my/pps/.

2. Cresswell, J. W., and Creswell, J.D., Research Design: Qualitative, Quantitative, and Mixed Methods Approaches, 5th Edition, California: SAGE Publications, Incorporated, 2020.

MITP 5113 Algorithm Analysis and Design

Learning Outcomes:

At the end of the course, students should be able to:

CLO1: Identify algorithm design technique and method of analysis.
CLO2: Explain algorithms efficiency in terms of the amount of resources, which are time and storage space required to execute the algorithm.
CLO3: Explain algorithm design technique based on problem type.

Synopsis:

This course introduces the students to the fundamentals principles of design and analysis of algorithms. It covers formal techniques to support the design and analysis of algorithms that emphasizes on both the underlying mathematical theory and practical considerations of efficiency. By learning a range of algorithm design techniques as Brute Force, Divide & Conquer, Decrease & Conquer, Transform and Conquer, Greedy Algorithms and Dynamic Programming, students should be able to develop efficient algorithms for simple computational tasks and reasoning about the correctness of them. Through the complexity measures, different range of behaviors of algorithms and the notion of tractable and intractable problems will be discussed.

References:

1. Levitin, A., Introduction to the Design and Analysis of Algorithm, Addison Wesley, 2017.
2. Puntambekar, A., Design and Analysis of Algorithms. Technical Publications, 2018.
3. Arora, A., Analysis and Design of Algorithms, 3rd Edition, Cognella Academic Publishing, 2017.
4. Mueller, J. P. and Massaron, L., Algorithms For Dummies (For Dummies (Computers)) 1st Edition. For Dummies, 2017.
5. Bhasin, H., Algorithms: Design and Analysis Paperback. Oxford Univ Pr (Sd), 2015.
6. Malik. D. S., C++ Programming: From Problem Analysis to Program Design 8th Edition. Course Technology, 2017.
7. Dimri, S. C., Malik, P., and Ram, M., Algorithms: Design and Analysis, De Gruyter, 2021.

MITS 5313 Advanced Data Communications and Network

Learning Outcomes:

At the end of the course, students should be able to:

CLO1: Evaluate the theory of data communications related to the network models in current technologies.

CLO2: Manipulate the implementation in managing network infrastructure and services with the emerging trends and technologies.

CLO3: Relate the present research in data communications and networking in order to apply in the real environment based on the concept.

Synopsis:

This course introduces the fundamental concepts and terminology of data communication and networking, encompassing both technical and managerial aspects and to help students better understand the challenges and opportunities faced by modern business. Topics will include fundamentals of telecommunications, data transmission mechanisms, telecommunication media and technologies, considerations for LAN and WAN implementations, the Internet and intranet applications, emerging telecommunications technologies, and trends in the telecommunications industry. Students will also be able to understand, explain and apply the fundamentals of data communication and network technology concepts and skills in network applications, troubleshooting, and configuring the computer networks using guided or unguided media.

References:

1. Jerry FitzGerald, Alan Dennis, Alexandra Durcikova, Business Data Communications and Networking, 14th Edition, Wiley, 2020.
2. Forouzan, Behrouz A., Data Communications and Networking, 5th Edition, McGraw-Hill, 2013.
3. James Kurose and Keith Ross, Computer Networking: A Top-Down Approach, 7th Edition, Pearson, 2017.
4. Manish Agrawal and Rekha Sharma, Business Data Communications and IT Infrastructures, Prospect Press, 2016.
5. Curt M. White, Data Communications and Computer Networks, 8th Edition, Cengage Learning, 2015.
6. William Stallings, Data and Computer Communications, 10th Edition, Pearson, 2015.

MITP 5244 Advanced Software Project Management

Learning Outcomes:

At the end of the course, students should be able to:

CLO1: Analyse various methodologies to improve success of a software project.
CLO2: Display the best-practices for cross-functional teams in a software project.
CLO3: Propose a risk management plan for managing risk activities on a software project.

Synopsis:

This course involves managing a project from inception to completion and the successful attainment of the project's objectives. The course provides the opportunity to gain the understanding, knowledge and skills necessary for performing the role of project manager in leading a cross-functional team in a certain project. It also exposes students to analyse project methodologies in managing and monitoring people, budget and schedule as well as to manage risks that might occur in a software project.

References:

1. Schwalbe K., Information Technology Project management, 9th Edition, Cengaged learning, 2018.
2. Project Management Institute, A Guide To The Project Management Body Of Knowledge (PMBOK® Guide) 6th Edition, 2017..
3. Anna P. Murray, The Complete Software Project Manager, Wiley. Mastering Technology from Planning to Launch and Beyond, Wiley, ISBN: 978-1119161837, 2016.
4. Jack T.Marchewka, Information Technology Project Management, 4th Edition,Wiley, 2013.
5. Harold R. Kerzner, Project Management: A Systems Approach to Planning, Scheduling, and Controlling, 11th Edition, Wiley, 2012.
6. Salnikov, D., Project management in software development, Our Knowledge Publishing, 2021.

MITP 5213 Advanced Software Engineering

Learning Outcomes:

At the end of the course, students should be able to:

CLO1: Analyze the concepts and develop a contemporary knowledge of software engineering.
CLO2: Explain software engineering methodology or model with the appropriate concepts in an efficient and ethical manner.

CLO3: Integrate different software engineering methodology or models for problem solving applications.

Synopsis:

This course provides students with software engineering methodology, knowledge, skills and discipline in developing application software. The course exposes student to Enterprise Architecture approach in software engineering process including software development process and technique, requirement engineering, software testing and quality, and software cost estimation. At the end of the course the student should be able to manage a software development project effectively and systematically, and produce a software product in a quality manner.

References:

1. Sommerville, I., Engineering Software Products: An introduction to Modern Software Engineering, Pearson, 2020.
2. Sommerville, I., Software Engineering, 10th Edition, Pearson, 2018.
3. Rajib Mall, Fundamentals of Software Engineering. 5th Edition PHI Learnig, Private Limited, 2018.
4. Mark Richard, Fundamental of Software Architecture: An Engineering Approach,. 1st Edition. O'Reilly, 2018.
5. Kent. Beck, Test Driven Development: By Example, 1st Edition, 2021.

MITP5233 Requirements Engineering

Learning Outcomes:

At the end of the course, students should be able to:

CLO1: Analyse the concept of requirements engineering process in software development practice.

CLO2: Discriminate the best techniques to improve problem understanding, requirements elicitation, analysis, specification and validation.

CLO3: Prepare quality software requirements specifications through requirements engineering best practices..

Synopsis:

Requirements are a critical factor in the success or failure of software engineering projects. A large proportion of errors detected in released software can be traced back to faulty requirements or a poor understanding of the problem domain. The aim of this course is to explore the development of requirements, to provide a deeper understanding of requirements engineering process, the role and impact of requirements on software projects and the techniques and tools for improving problem understanding, requirements analysis and requirements specification.

References:

1. Dick, J., Hull, E., Jackson, K., Requirements Engineering. Springer, 2017.
2. Laplante, Philip. A., Requirements Engineering for Software and Systems, 3rd Edition, CRC Press, 2017.
3. Bron, Jean-Yves, System Requirements Engineering: A SysML Supported Requirements Engineering Method. First Edition. Wiley-ISTE, 2020.
4. Pohl, K., Rupp, C., Requirements Engineering Fundamentals: A Study Guide for the Certified Professional for Requirements Engineering Exam Foundation Level, 2nd Edition, Rocky Nook, 2015.
5. Lamsweerde, A.van, Requirements Engineering: From System Goals to UML Models to Software Specifications, John Wiley & Sons, 2014.

MITP 5263 Software Testing

Learning Outcomes:

At the end of the course, students should be able to:

CLO1: Recommend a suitable software testing level, types and techniques in software development.

CLO2: Perform software testing activity in software projects.

CLO3: Practice testing management ethically to assure software quality using testing techniques and tools.

Synopsis:

This course discusses software faults and techniques to reduce defects and improve software quality. Software systems are some of the most complex human artefacts ever built and some of the most critical means to ensure our safety, wellbeing, and prosperity. This course covers techniques to ensure software systems perform their function correctly. The course will discuss how tests can be derived from requirements and specifications, design artefacts, or the source code, and introduce proper testing tools used in several exercises.

References:

1. Roman, A., A Study Guide to the ISTQB® Foundation Level 2018 Syllabus-Test Techniques and Sample Mock Exams, Springer, 2018.
2. Galin, D., Software Quality: Concepts and Practice: Concepts and Practice, First Edition, Wiley, 2018.
3. Klaus O., Tauhida P., Rex B., et al., ISTQB Certified Tester Foundation Level Syllabus Version 2018, International Software Testing Qualification Board, 2018.
4. Bierig, R., Brown, S., Galvan, E., and Timoney, J., Essentials of Software

Testing, Cambridge University Press, 2021.

MITP 5253 Software Quality

Learning Outcomes:

At the end of the course, students should be able to:

CLO1: Explain software quality assurance, standards, metrics and measurements.

CLO2: Integrate the current scenario or issues related to software quality topics.

CLO3: Practice software quality assurance plan which include organization, procedure, documentation, standard model measurement and metrics.

Synopsis:

The course discuss on quality term as a multifaced concept which can be described from many perspectives. Then this quality issues is extended into software context where assuring software quality is critical in software development. Therefore an organization requires planned quality assurance to ensure quality embedded into the software. Software metrics are tools of measurement attributes of a system, component or process possess a given attribute are essential in software engineering. The use of process standards in the entire software development and product standards are also integral part of assuring quality.

References:

1. Claude Y. Laporte Alain April, "Software Quality Assurance", 1st edition, IEEE Computer Society, IEEE Press, 2018.
2. Tarlinder, A., "Developer Testing: Building Quality into Software", 1st edition, Addison-Wesley Signature Series, 2016.
3. Munta, J. B., "Software Quality and Java Automation Engineer Survival Guide: Basic Concepts, Self Review, Interview Preparation", Everydayon Inc, 2016.
4. Linz, T., "Testing in Scrum: A guide for Software Quality Assurance in the Agile World", 1st edition, Rock Nook Computing, 2014.
5. Jones, C., "The Economics of Software Quality", 1st Edition, Addision-Wesley Professional, 2011.
6. Tian, J., "Software Quality Engineering: Tesing, quality assurance, and Quantifiable Improvement", John Wiley & Sons Inc. Publication, 2005.
7. Cloudt, G., What is Software Quality?: Understanding what really matters in software development, Independently Published, 2021.

MITP 5273 Secure Software Development

Learning Outcomes:

At the end of the course, students should be able to:

CLO1: Evaluate suitable secure software development models, methodologies and techniques to be used in the software development lifecycle.

CLO2: Prepare secure software development activities for software projects.

CLO3: Propose appropriate techniques and tools to develop secure software systems.

Synopsis:

This course discusses software faults and techniques to reduce defects and improve software quality. Software systems are some of the most complex human artefacts ever built and some of the most critical means to ensure our safety, wellbeing, and prosperity. This course covers techniques to ensure software systems perform their function correctly. The course will discuss how tests can be derived from requirements and specifications, design artefacts, or the source code, and introduce proper testing tools used in several exercises.

References:

1. Roman, A., A Study Guide to the ISTQB® Foundation Level 2018 Syllabus-Test Techniques and Sample Mock Exams, Springer, 2018.
2. Galin, D., Software Quality: Concepts and Practice: Concepts and Practice, First Edition, Wiley, 2018.
3. Klaus O., Tauhida P., Rex B., et al., ISTQB Certified Tester Foundation Level Syllabus Version 2018, International Software Testing Qualification Board, 2018.
4. Blokdyk, G., Secure Software Development A Complete Guide - 2020 Edition, 5starcooks, 2019.

MITP 5563 Advanced Database System Principles

Learning Outcomes:

At the end of the course, students should be able to:

CLO1: Explain advanced data modeling concepts, query processing and issues in designing, developing and managing database systems.

CLO2: Construct advanced data model and queries based on user requirements of a database system.

CLO3: Identify various issues in managing database systems such as security, data quality and ethics.

Synopsis:

Understanding how to analyze and model the data in the organization is fundamental to the management of databases. This course will have advanced topics component that aim at knowledge regarding the implementation of database management systems as well as insights into the development and administration of database systems in various environments. This course explores key aspects of database system analysis, design and implementation, focusing on various topics from advanced concepts in modeling, query processing, performance tuning, transaction management and other current issues.

References:

1. Thomas Conolly & Carolyn Begg, Database Systems: A Practical Approach to Design, Implementation, and Management. 6th Edition. Pearson, 2015.
2. Carlos Coronel & Steven Morris, Database System: Design, Implementation and Management. Course Technology. 13th Edition, 2019.
3. Jeffrey A. Hoffer, V. Ramesh & Heikki Topi, Modern Database Management 12th Edition. Pearson, 2016.
4. Ramez Elmasri, Shamkant B.Navathe, Fundamentals of Database Systems. 7th Edition. Addison-Wesley, 2017.
5. Abraham Silberschatz, Henry F. Korth & S. Sudarshan, Database System Concepts, 7th Edition, New York: McGraw-Hill, 2020.
6. Avi Silberschatz, Henry F. Korth & S. Sudarshan, Database System Concepts. McGraw-Hill,2010.

MSMD 5123 Internet of Things Application Development

Learning Outcomes:

At the end of the course, students should be able to:

CLO1: Discover convergence of technologies and emerging applications of IoT.
CLO2: Evaluate of IoT products, platforms, and applications.
CLO3: Design and develop smart IoT applications.

Synopsis:

The student will learn to develop Internet of Things (IoT) applications for various purposes on the latest cloud and mobile phone platforms. The Internet of Things allows billions of devices, sensors, cloud infrastructure and business intelligence tools to come together to enable people to make informed decisions. This helps businesses to drive more innovation and services. Graduates

from this course would be in high demand as they would have acquired the right skills to develop smart applications and services to respond to industry's needs. This course covers the concepts of the Internet of Things (IoT), its conceptual framework and how the IoT contributes to business and daily life. It will also cover the IoT architecture and gives an overview of the core technologies required for supporting IoT. It also provides knowledge on both the underlying technologies which support IoT and M2M communications, and engages the students in the creative development of simulation scenarios for innovative Internet of Things applications.

References:

1. Anand Tamboli, Build Your Own IoT Platform: Develop a Fully Flexible and Scalable Internet of Things Platform in 24 Hours, APress, 2019.
2. Simone Cirani, Gianluigi Ferrari, Marco Picone & Luca Veltri, Internet of Things: Architectures, Protocols and Standards, 1st Edition, Wiley, 2018.
3. Giacomo Veneri & Antonio Capasso, Hands-On Industrial Internet of Things: Create a powerful Industrial IoT infrastructure using Industry 4.0, Packt Publishing, 2018.
4. Cameron Kelly Coursey, The Practitioner's Guide to Cellular IoT, Artech House, 2020.

MITZ
MASTER OF COMPUTER SCIENCE
(SECURITY SCIENCE)

MASTER OF COMPUTER SCIENCE (Security Science)

Programme Details

This programme is specifically designed to equip students with security elements in information and communication technology related to management, data and infrastructure.

Programme Educational Objectives (PEO)

Programme Educational Objectives (PEO) are specific goals describing the expected achievement of graduates in their career and professional life after 5 years of graduation.

Below are the PEO for this programme:

PEO 1: Practice in-depth knowledge and skills of Computer Science with specialization in Security Science field.

PEO 2: Demonstrate effective leadership and communication to a wide variety of audiences or multi-disciplinary teams, tolerate and value different global perspectives and cultures towards lifelong learning.

PEO 3: Demonstrate knowledge of current issues in technology through learning and research activities using scientific methods.

PEO 4: Practice professional, ethical and societal responsibilities, and show adaptability in different roles and surroundings in contributing to the community and business.

Programme Outcomes (PO)

Programme Outcomes (PO) are statements describing what students are expected to know and be able to perform or attain by the time of graduation. These are related to the Knowledge (K), Skills (S), and Attitude (A) that students acquire throughout the programme.

Below is the list of PO for this programme:

PO 1: Demonstrate originality and independence in undertaking analytical and critical evaluation, and synthesis of complex information, specialized concepts, theories, methods and practice in Computer Science;

PO 2: Apply knowledge critically and collectively to manage and resolve complex problems or issues in field of security science;

PO 3: Apply the practical skill in working environment related to security science field;

PO 4: Communicate effectively the knowledge, skills, ideas, critique and rationale in both written and verbal forms using appropriate methods to peers, experts, and non-experts;

PO 5: Competently use a wide range of suitable digital technologies and quantitative mechanisms to design and plan evaluation activities for enhancing study, research and practice;

PO 6: Demonstrate significant autonomy, independence and leadership skills at work and class with self-advancement through continuous academic or professional development; and

PO 7: Initiate or lead entrepreneurial projects and adhere to legal, ethical, professional and sustainable practices.

Programme Structure - Full Time

September Intake:

Semester 1 (September)		
Course Code	**Course**	**Credit**
MPSW 5013	Research Methodology	3
MPSW XXXX	University Course	3
MITP 5113	Algorithm Analysis and Design	3
MITS 5313	Advanced Data Communications and Network	3
MITS 5463	Security Management Practices	3
MITS XXXX	Elective 1	3
	Total credit	**18**
Semester 2 (February)		
Course Code	**Course**	**Credit**
MITS 5484	Cyber Threat Intelligence	4
MITS 5443	Cryptography and Data Security	3
MITS 5433	System and Network Ethical Hacking	3
MITU 5213	Project 1	3
MITS XXXX	Elective 2	3
	Total credit	**16**
Semester 3 (Short Semester)		
Course Code	**Course**	**Credit**
MITU 5226	Project 2	6
	Total credit	**6**

February Intake:

Semester 2 (February)		
Course Code	**Course**	**Credit**
MPSW 5013	Research Methodology	3
MPSW XXXX	University Course	3
MITS 5484	Cyber Threat Intelligence	4
MITS 5443	Cryptography and Data Security	3
MITS 5433	System and Network Ethical Hacking	3
MITS XXXX	Elective 1	3
	Total credit	**19**
Semester 3 (Short Semester)		
Course Code	**Course**	**Credit**
MITU 5213	Project 1	3
MITS XXXX	Elective 2	3
	Total credit	**6**
Semester 1 (September)		
Course Code	**Course**	**Credit**
MITP 5113	Algorithm Analysis and Design	3
MITS 5313	Advanced Data Communications and Network	3
MITS 5463	Security Management Practices	3
MITU 5226	Project 2	6
	Total credit	**15**

University Courses - choose ONE (1) only:

Course Code	Course	Credit
MPSW 5033	Engineering and Technology Management	3
MPSW 5053	Quality System Management	3
MPSW 5063	Entrepreneurship	3
MPSW 5073	Project Management	3

Elective Courses - choose TWO (2) only:

Course Code	Course	Credit
MITS 5413	Public Key Infrastructure	3
MITS 5423	Computer Forensics	3
MITS 5453	Intrusion Detection and Prevention	3
MITS 5473	Watermarking	3
MITS 5223	Secure Software Design and Development	3
MITS 5493	Security Audit and Assessment	3

Note: Total credit hours = 40 credits

Programme Structure - Part Time

September Intake:

Semester 1 (September)		
Course Code	**Course**	**Credit**
MPSW 5043	Research Methodology	3
MITS 5313	Advanced Data Communications and Network	3
MITS 5463	Security Management Practices	3
	Total credit	**9**
Semester 2 (February)		
Course Code	**Course**	**Credit**
MITS 5433	System and Network Ethical Hacking	3
MITS 5443	Cryptography and Data Security	3
MITS 5484	Cyber Threat Intelligence	4
	Total credit	**10**
Semester 3 (Short Semester)		
Course Code	**Course**	**Credit**
MITS XXXX	Elective 1	3
	Total credit	**3**
Semester 4 (September)		
Course Code	**Course**	**Credit**
MPSW XXXX	University Course	3
MITP 5113	Algorithm Analysis and Design	3
MITU 5213	Project 1	3
	Total credit	**9**
Semester 5 (February)		
Course Code	**Course**	**Credit**
MTPU 5226	Project 2	6
MITS XXXX	Elective 2	3
	Total credit	**9**

Elective courses - choose TWO (2) only:

University Courses - choose ONE (1) only:

Course Code	Course	Credit
MPSW 5033	Engineering and Technology Management	3
MPSW 5053	Quality System Management	3
MPSW 5063	Entrepreneurship	3
MPSW 5073	Project Management	3

Elective Courses - choose TWO (2) only:

Course Code	Course	Credit
MITS 5413	Public Key Infrastructure	3
MITS 5423	Computer Forensics	3
MITS 5453	Intrusion Detection and Prevention	3
MITS 5473	Watermarking	3
MITS 5223	Secure Software Design and Development	3
MITS 5493	Security Audit and Assessment	3

Note: Total credit hours = 40 credits

MPSW 5013 Research Methodology

Learning Outcomes:

At the end of the course, students should be able to:

CLO1: Propose a research proposal with an improvement of existing knowledge.
CLO2: Synthesize relevant literature to address the knowledge gaps.
CLO3: Apply ethical research skills in constructing research questions, objectives and hypotheses (if any) relevant to research problem.

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.

References

1. Kumar, R., Research methodology: A step-by-step guide for beginners. Sage Publications Limited, 2019.
2. Gray, D. E., Doing research in the business world. Sage Publications Limited, 2019.
3. Creswell, J. W., & Creswell, J. D., Research Design: Qualitative, Quantitative, and Mixed Methods Approaches. In Research Design: Qualitative, Quantitative, and Mixed Methods Approaches, 2018.
4. Tang, H., Engineering Research: Design, Methods, and Publication. John Wiley & Sons, 2020.
5. Sidek, S., Kamalrudin, M. & Mat Deris, M., Research Survival Toolkit: Writing a winning fundamental research proposal, Melaka: University Publisher, UTeM, 2017.
6. Zobel, J., 3rd Edition, Writing for Computer Science, Springer-Verlag London, 2014.
7. Arkoudas, K., Musser, D., Fundamental Proof Methods in Computer Science: A Computer-Based Approach, MIT Press, 2017.
8. Creswell, J. W., & Poth, C. N., Qualitative inquiry and research design: Choosing

among five approaches. Sage publications, 2016.

MPSW 5063 Entrepreneurship

Learning Outcomes:

At the end of the course, students should be able to:

CLO1: Analyse entrepreneurial skills in identifying and exploiting entrepreneurial opportunities.
CLO2: Apply commercially viable ideas, projects, products prototypes for commercialization within the context of societal framework and to deliver business model canvassing and business value proposition.
CLO3: Develop creative and viable high tech business models and strategies.

Synopsis:

The objectives of this course are to provide students a robust foundation in theories relevant to the improvement of entrepreneurial behaviour and capabilities 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 key 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 areas of entrepreneurial expertise necessary in order to found and/or grow a technology venture.

References

1. Duening, Thomas N., Robert A. Hisrich, and Michael A. Lechter. Technology Entrepreneurship: Taking Innovation to the Marketplace. Academic Press, 2020.
2. Sergi, B. S., & Scanlon, C. C. (Eds.), Entrepreneurship and Development in the 21st Century. Emerald Publishing Limited, 2019.
3. Bianchi, C., Glavas, C., & Mathews, S., SME international performance in Latin America: The role of entrepreneurial and technological capabilities. Journal of Small Business and Enterprise Development, 24(1), 176–195, 2017.
4. Patrict Van Der Pjil, Justin Lokitz, Lisa Kay Solomon, Design a Better Business: New Tools, Skills, and Mindset for Strategy and Innovation. Wiley, 2016.
5. Baldock, R., North, D., & Ullah, F., New Technology-Based Firms in the New Millennium. New Technology Based Firms in the New Millennium, 11, 203–226, 2015.
6. Alexander Osterwalder & Yvnes Pigneur, Value Proposition Design: How to Create

Products and Services Customers Want. Wiley, 2015.
7. Alexander Osterwalder & Yvnes Pigneur, Business Model Generation: A Handbook for Visionaries, Game Changers, and Challengers, Wiley, 2010.

MPSW 5073 Project Management

Learning Outcomes:

At the end of the course, students should be able to:

CLO1: Analyze the core concepts and principles, functions, and process in project management.
CLO2: Develop a comprehensive & viable project proposal.
CLO3: Evaluate best practices and methodology in project management.

Synopsis:

This subject focuses on the principles of project management based on Project Management Body of Knowledge (PMBOK). Students will be familiarized with the Project Management process group functions (initiating, planning, executing, controlling and closing) and project knowledge areas (integration, scope, time, cost, quality and human resources). Various tools for supporting the analysis of works in project management will be introduced. Topics including initiating and planning the project, working with the management, project appraisal & sensitivity, work breakdown structure, managing uncertainty, building project plan, implementing and revising project plan, completing the project and contract laws. Microsoft Project (MS Project) will be introduced as project management software tools.

References:

1. Project Management Institute, A Guide to the Project Management Body of Knowledge (PMBOK® Guide) – Fifth Edition, 2018.
2. Project Management Institute, A Guide to the Project management Body of Knowledge (PMBOK® Guide) – Sixth Edition, 2017.
3. Clifford F. Gray · Erik W. Larson, Project Management the Managerial Process, McGraw Hill, 2021.
4. Meredith, J., Mantel, S. and Mantel, S. Jr., Project Management: A Strategic Managerial Approach. New York, Wiley, 2017.
5. Trevor L Young, Successful Project Management, Kogan Page Publishers, 2016.

MPSW 5033 Engineering Technology Management

Learning Outcomes:

At the end of the course, students should be able to:

CLO1: Identify the principles of engineering management and technology management across different industries.

CLO2: Apply relevant issues in engineering management and technology management across different industries.

CLO3: Analysis the impact of relevant issues in the context of engineering management and technology management across different industries.

Synopsis:

The course consists of two components, i.e., Engineering Management and Technology Management. Topics in Engineering Management provide a vehicle for engineers and technical specialist to enhance their knowledge on management, organizational structure and behavior of engineering/technical organizations. Additional topics will enhance the knowledge and competencies in the management of engineering activities such as design, operations, and quality. The Technology Management part of the course will equip students with contemporary views and tools on management of technology and its impact on an organization. It emphasizes management of innovation and new product development as well as managing technology and knowledge. The interaction of technology and the law, particularly the knowledge management and intellectual property will be covered.

References:

1. Paul Trott, Innovation Management and New Product Development (6th Edition) 6th Edition, Pearson; 6 editions, 2016.
2. A. Thomas Roper, Thomas W. Mason, Frederick A. Rossini, Forecasting and Management of Technology, Alan L. Porter, Scott W. Cunningham, Jerry Banks, John Wiley & Sons, 2011.
3. William J Stevenson, Operations Management 13th Edition, McGraw-Hill Education, 2017.
4. by Jim Hall, Tina Scott, Lean Six Sigma: Beginner's Guide to Understanding and Practicing Lean Six Sigma CreateSpace Independent Publishing Platform, 2016.
5. Sharon Armstrong, Barbara Mitchell Weiser, The Essential HR Handbook, 10th Edition: A Quick and Handy Resource for Any Manager or HR Professional , 2019.

MPSW 5053 Quality Systems Management

Learning Outcomes:

At the end of the course, students should be able to:

CLO1: Explain the conceptual understanding of Quality.

CLO2: Identify Quality System Management information.

CLO3: Propose Quality System Management techniques and tools in the practice of organizations.

Synopsis:

This course presents the fundamental elements of Quality Management System including the importance of quality as a strategy for continuous improvement in business performance. It explains the strategies for competitive quality in design and manufacture as well as in terms of customer supply chain concept of total quality aspect. Such topics include Management systems ISO, variability, Six Sigma, Taguchi method, failure mode and effect analysis (FMEA) and quality function deployment. Several quality control tools such as Pareto chart, bar chart and scatter diagram will be cover in statistical data collection, measurement and analysis. Finally, concepts of benchmarking and ISO standards with respect to control elements will be integrated with the Total Quality Management (TQM) as part of quality Management system.

References:

1. S. Thomas Foster, Managing Quality: Integrating the Supply Chain, 6th Edition, Pearson, 2017.
2. Howard S. Gitlow, Richard J. Melnyck and David M. Levine, Guide to Six Sigma and Process Improvement for Practitioners and Students, A: Foundations, DMAIC, Tools, Cases, and Certification, 2nd Edition, 2015.
3. Gitlow, H. S., Quality Management systems: A Practical Guide, St. Lucie Press, 2001.
4. Mukherjee, P. N., Total Quality Management, Prentice Hall, 2006.
5. Manual Procedure for Malaysia Halal Certification, 3rd Revision, Jabatan Kemajuan Islam Malaysia, 2015.

MITU 5213 Project 1

Learning Outcomes:

At the end of the course, students should be able to:

CLO1: Formulate the problems, objectives and scope based on complex technology solutions.

CLO2: Perform literature review and appropriate methodology to complete the project.
CLO3: Defend the proposed project solutions in written and verbal forms.

Synopsis:

This course is the first part of project that requires a student to prepare a master research proposal based on the theories and techniques of technologies learnt previously. Student is required to write three chapters of dissertation i.e. Chapter 1: Introduction, Chapter 2: Literature Review and Chapter 3: Research Methodology. Besides writing the proposal, student needs to present and defend his/her proposal. Student is expected to demonstrate ability to identify and propose solutions to the identified problems.

References:

1. Thesis Writing and Guidelines, http://www.utem.edu.my/pps/.
2. Cresswell, J. W., and Creswell, J.D., Research Design: Qualitative, Quantitative, and Mixed Methods Approaches, 5th Edition, California: SAGE Publications, Incorporated, 2020.

MITU 5226 Project 2

Learning Outcomes:

At the end of the course, students should be able to:

CLO1: Demonstrate solutions to the proposed project.
CLO2: Verify solutions to understand the strengths, weaknesses and limitations of the project.
CLO3: Defend the contributions of the project in written and verbal forms.

Synopsis:

This course is the second part of project that show the ability of student in applying the theories and techniques of technologies learnt previously. Student must write the second fold of dissertation which consists of four 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 solution developed as the end product of this project. Student is required to justify the contribution of the proposed solution throughout the presentation sessions.

References:

1. Thesis Writing and Guidelines, http://www.utem.edu.my/pps/.

2. Cresswell, J. W., and Creswell, J.D., Research Design: Qualitative, Quantitative, and Mixed Methods Approaches, 5th Edition, California: SAGE Publications, Incorporated, 2020.

MITP 5113 Algorithm Analysis and Design

Learning Outcomes:

At the end of the course, students should be able to:

CLO1: Identify algorithm design technique and method of analysis.
CLO2: Explain algorithms efficiency in terms of the amount of resources, which are time and storage space required to execute the algorithm.
CLO3: Explain algorithm design technique based on problem type.

Synopsis:

This course introduces the students to the fundamentals principles of design and analysis of algorithms. It covers formal techniques to support the design and analysis of algorithms that emphasizes on both the underlying mathematical theory and practical considerations of efficiency. By learning a range of algorithm design techniques as Brute Force, Divide & Conquer, Decrease & Conquer, Transform and Conquer, Greedy Algorithms and Dynamic Programming, students should be able to develop efficient algorithms for simple computational tasks and reasoning about the correctness of them. Through the complexity measures, different range of behaviors of algorithms and the notion of tractable and intractable problems will be discussed.

References:

1. Levitin, A., Introduction to the Design and Analysis of Algorithm, Addison Wesley, 2017.
2. Puntambekar, A., Design and Analysis of Algorithms. Technical Publications, 2018.
3. Arora, A., Analysis and Design of Algorithms, 3rd Edition, Cognella Academic Publishing, 2017.
4. Mueller, J. P. and Massaron, L., Algorithms For Dummies (For Dummies (Computers)) 1st Edition. For Dummies, 2017.
5. Bhasin, H., Algorithms: Design and Analysis Paperback. Oxford Univ Pr (Sd), 2015.
6. Malik. D. S., C++ Programming: From Problem Analysis to Program Design 8th Edition. Course Technology, 2017.
7. Dimri, S. C., Malik, P., and Ram, M., Algorithms: Design and Analysis, De Gruyter, 2021.

MITS 5313 Advanced Data Communications and Network

Learning Outcomes:

At the end of the course, students should be able to:

CLO1: Evaluate the theory of data communications related to the network models in current technologies.

CLO2: Manipulate the implementation in managing network infrastructure and services with the emerging trends and technologies.

CLO3: Relate the present research in data communications and networking in order to apply in the real environment based on the concept.

Synopsis:

This course introduces the fundamental concepts and terminology of data communication and networking, encompassing both technical and managerial aspects and to help students better understand the challenges and opportunities faced by modern business. Topics will include fundamentals of telecommunications, data transmission mechanisms, telecommunication media and technologies, considerations for LAN and WAN implementations, the Internet and intranet applications, emerging telecommunications technologies, and trends in the telecommunications industry. Students will also be able to understand, explain and apply the fundamentals of data communication and network technology concepts and skills in network applications, troubleshooting, and configuring the computer networks using guided or unguided media.

References:

1. Jerry FitzGerald, Alan Dennis, Alexandra Durcikova, Business Data Communications and Networking, 14th Edition, Wiley, 2020.
2. Forouzan, Behrouz A., Data Communications and Networking, 5th Edition, McGraw-Hill, 2013.
3. James Kurose and Keith Ross, Computer Networking: A Top-Down Approach, 7th Edition, Pearson, 2017.
4. Manish Agrawal and Rekha Sharma, Business Data Communications and IT Infrastructures, Prospect Press, 2016.
5. Curt M. White, Data Communications and Computer Networks, 8th Edition, Cengage Learning, 2015.
6. William Stallings, Data and Computer Communications, 10th Edition, Pearson, 2015.

MITS 5443 Cryptography and Data Security

Learning Outcomes:

At the end of the course, students should be able to:

CLO1: Explain the concept and components of cryptography.
CLO2: Relate the basic theory and practice of secure systems, and the types of security services needed for computer and network security.
CLO3: Demonstrate some aspect of cryptography in depth.

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.

References:

1. W. Stalling, Cryptography and Network Security: Principles and Practices, 8th Edition, Pearson, 2020.
2. Jonathan K., and Yehuda L., Introduction to Modern Cryptography, 3rd Edition, Chapman and Hall/CRC, 2020.
3. James K., and Lawrence W., An Introduction to Number Theory with Cryptography, 2nd Edition, Chapman and Hall/CRC, 2018.
4. Dan Boneh and Victor Shoup, Applied Cryptography, Kindle Edition, 2021.
5. Daniel Garfield, Cryptography and Data Security: Book 1: Proper Guide to Data Security in Communication Networks. Cryptography and Data Security in Practice, Independently published/ Kindle Edition, 2023.
6. Daniel Garfield, Cryptography and Data Security: Book 2: Best Practices for Cryptography and Data Security, Independently published/ Kindle Edition, 2023.

MITS 5433 Systems and Network Ethical Hacking

Learning Outcomes:

At the end of the course, students should be able to:

CLO1: Explain the fundamentals steps that a hacker performs, and common tools hackers use in conducting attacks.

CLO2: Demonstrate exploitation on system and network vulnerability as proof of concept by using appropriate hacking tools.

CLO3: Formulate the tools and methods of protecting systems and networks against hacker attacks.

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.

References:

1. Michael T. Simpson and Nicholas Antill, Hands-On Ethical Hacking and Network Defense 4th Edition, Cengage Learning, 2022.
2. Web Academy, Hacking with Kali Linux: A Practical Guide for Beginners to Learn Ethical Hacking Including Penetration Testing, Wireless Network and CyberSecurity, Giorosahec Ltd, 2020.
3. Yuri Diogenes and Erdal Ozkaya, Cybersecurity – Attack and Defense Strategies: Counter modern threats and employ state-of-the-art tools and techniques to protect your organization against cybercriminals, 2nd Edition, Packt Publishing, 2020.
4. Vijay Kumar Velu , Robert Beggs , Mastering Kali Linux for Advanced Penetration Testing: Secure your network with Kali Linux 2019.1 – the ultimate white hat hackers' toolkit, 3rd Edition, Packt Publishing, 2019.
5. Vijay Kumar Velu, Mastering Kali Linux for Advanced Penetration Testing: Become a cybersecurity ethical hacking expert using Metasploit, Nmap, Wireshark, and Burp Suite, 4th Edition, Packt Publishing, 2022.

MITS 5463 Security Management Practices

Learning Outcomes:

At the end of the course, students should be able to:

CLO1: Asses risks in information security and implement protection and control efforts.

CLO2: Organize an information security program.

CLO3: Design the requirement of regulatory, standards and best practices and apply them in the working environment.

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.

References:

1. John Warsinske, Mark Graff, Kevin Henry, Christopher Hoover, Ben Malisow, Sean Murphy, C. Paul Oakes, George Pajari, Jeff T. Parker, David Seidl, Mike Vasquez. The Official (ISC)2 Guide to the CISSP CBK Reference, 5th Edition, Wiley, 2019.
2. Shon Harris, Fernando Maymi. CISSP All-In-One Exam Guide, 9th Edition, McGraw-Hill, 2021.
3. R. Sarma Danturthi. 70 Tips and Tricks for Mastering the CISSP Exam, Apress, 2020.
4. Eric Conrad, Seth Misenar, Joshua Feldman. Eleventh Hour CISSP®, 4th Edition, Syngress, 2024.
5. Mike Chapple, James Michael Stewart and Darril Gibson, (ISC)2 CISSP Certified Information Systems Security Professional Official Study Guide, 9th Edition, Sybex, 2021.
6. Rob Witcher, John Berti, Lou Hablas, and Nick Mitropoulos, Destination CISSP: A Concise Guide, Destination Certification Inc., 2023.

MITS 5484 Cyber Threat Intelligence

Learning Outcomes:

At the end of the course, students should be able to:

CLO1: Explain the concept of intelligence detection againts cyberthreat.

CLO2: Relate relevant approach in cyberthreat detection challenges.

CLO3: Identify suitable approach in detecting cyberthreat collaboratively.

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.

References:

1. Clarence Chio and David Freeman, Machine Learning and Security, Protecting Systems with Data and Algorithms, Publisher, O'Reilly Media, Inc, 2018.
2. Leslie F. Sikos and Kim- Kwang Raymond Choo, Data Science in Cybersecurity and Cyberthreat Intelligence, Intelligent Systems Reference Library, Springer. Feb 6, 2020.
3. Nick Hed, et al., Data Science for Cyber-Security (Security Science and Technology) . World Scientific Publishing Europe Ltd. 2019.
4. Cybersecurity in the Electricity Sector: Managing Critical Infrastructure, Leszczyna, R., Springer International Publishing, 2019.
5. Al-Turjman, F. and Imran, M, IoT Technologies in Smart-Cities: From Sensors to Big Data, Security and Trust, Institution of Engineering & Technology, 2020.
6. Thomas A Johnson, Cybersecurity: Protecting Critical Infrastructures from Cyber Attack and Cyber Warfare, Taylor & Francis Group, 2020.
7. John Soldatos, James Philpot, Gabriele Giunta, Cyber-Physical Threat Intelligence for Critical Infrastructures Security: A Guide to Integrated Cyber-Physical Protection of Modern Critical Infrastructures, , Now Publishers, 2020.

MITS 5413 Public Key Infrastructure

Learning Outcomes:

At the end of the course, students should be able to:

CLO1: Explain the issues related to the successful deployment of digital certificates to meet business and security requirements.

CLO2: 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.

CLO3: 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.

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.

References:

1. Desmedt, Yvo G. Secure Public Key Infrastructure: Standards, PGP and Beyond: - Focus on security aspects of public key infrastructures. Springer, 2021.
2. Menezes, Alfred; van Oorschot, Paul; Vanstone, Scott. Handbook of Applied Cryptography, eBook, Boca Raton, Florida: CRC Press, 2020.
3. mrita Mitra. Cryptography And Public Key Infrastructure. Kindle Edition, ASIN Publications, 15 May 2020.
4. Jeff Stapleton and W. Clay Epstein, Security without Obscurity: A Guide to PKI Operations, 1st Edition, Auerbach Publications, 2020.
5. A Scholtens, Basics on Public Key Infrastructure (PKI), Sas155, 2023.

MITS 5423 Computer Forensics

Learning Outcomes:

At the end of the course, students should be able to:

CLO1: Explain the emerging field of computer forensics in obtaining and analyzing the evidence from computers.

CLO2: Prepare the investigation procedures for investigating the computer crime.

CLO3: Demonstrate the use of forensic tools to complete the investigating process

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.

References:

1. Nelson B., Philips A., Enfinger F. and Steuart C., Guide To Computer Forensics and Investigations, 6th Edition, Thomson Course Technology, 2018.
2. Jason T. Luttgens and Matthew Pepe, Incident Response & Computer Forensics, 3rd Edition, McGraw-Hill Education, 2014.
3. Gerard J., Digital Forensics And Incident Response: Incident Response Techniques And Procedures to Respond to Modern Cyber Threats, 2nd Edition, Packt Publishing, 2020.
4. Lee Reiber, Mobile Forensic Investigations: A Guide to Evidence Collection, Analysis, and Presentation, 2nd Edition, McGraw-Hill Education, 2019.
5. Darren R. Hayes. Practical Guide to Digital Forensics Investigations, 2nd Edition, Pearson IT Certification, 2020.
6. Darren R. Hayes. Practical Guide to Digital Forensics Investigations, 2nd Edition, Pearson IT Certification, 2020.

MITS 5453 Intrusion Detection and Prevention

Learning Outcomes:

At the end of the course, students should be able to:

CLO1: Explain the various types of intrusions and attacks on a network.

CLO2: Organize the mechanism or tools which can be used to detect and prevent the intrusions by integration of technique and technology of security management.

CLO3: Demonstrate intrusion detection system for preventing the illegal intrusion.

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.

References:

1. Eric C. Thompson, Cybersecurity Incident Response: How to Contain, Eradicate, and Recover from Incidents, Apress, 2018.
2. Sébastien Ziegler, Internet of Things Security and Data Protection, Springer, 2019.
3. Kwangjo Kim, Muhamad Erza Aminanto, Harry Chandra Tanuwidjaja, Network Intrusion Detection using Deep Learning: A Feature Learning Approach, Springer, 2018.
4. Yuri Diogenes, Dr. Erdal Ozkaya, Cybersecurity – Attack and Defense Strategies: Improve your security posture to mitigate risks and prevent attackers from infiltrating your system, 3rd Edition, Packt Publishing Ltd, 2022.
5. William (Chuck), Computer Security Fundamentals, Pearson IT Certification, 2019.
6. Radha B., Sakthivel Duraisamy and Arunraj Gopalsamy, Intrusion Detection and Prevention Concepts and Techniques: A Simple Guide to Beginners, LAP LAMBERT Academic Publishing, 2021.

MITS 5473 Watermarking

Learning Outcomes:

At the end of the course, students should be able to:

CLO1: Manipulate the concept, theory, method and practice in Digital Watermarking for analysis and evaluation.

CLO2: Use the knowledge needed to resolve problems in digital watermarking based on techniques.

CLO3: Demonstrate practical skills of development using current and latest tools for intellectual property management and protection of multimedia.

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.

References:

1. Frank Y. Shih, Digital Watermarking and Steganography: Fundamentals and Techniques, CRC Press, 2020.
2. Foram Suratwala, Digital Watermarking Techniques for Image Security Paperback, LAP LAMBERT Academic Publishing, 2019.
3. Stefan Katzenbeisser, Information Hiding Techniques for Steganography and Digital Watermarking, Kindle Edition, 2022.
4. Lixin Fan, Chee Seng Chan and Qiang Yang, Digital Watermarking for Machine Learning Model: Techniques, Protocols and Applications, Springer, 2023.
5. David Meg´ıas, Wojciech Mazurczyk and Minoru Kuribayashi, Data Hiding and Its Applications: Digital Watermarking and Steganography, Mdpi AG, 2022.

MITS 5223 Secure Software Design and Development

Learning Outcomes:

At the end of the course, students should be able to:

CLO1: Explain concepts related to the core software security requirements and foundational design principles.

CLO2: Propose a secured software requirement in developing secure application.

CLO3: Formulate a software using secure coding principles that can effectively protect it from vulnerabilities.

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.

References:

1. Wm. Arthur Conklin, Daniel Paul Shoemaker. CSSLP Certification All-in-One Exam Guide, McGraw-Hill, 2nd Edition, 2019.
2. Mano Paul. Official (ISC)2 Guide to the CSSLP, 2nd Edition, CRC Press, 2016.

3. Phil Martin. Essential CSSLP Exam Guide, 2nd Edition, Nonce Corp, 2019.
4. Dan Bergh Johnsson, Daniel Deogun, Daniel Sawano. Secure by Design, Manning Publications, 2019.
5. Wm. Arthur Conklin and Daniel Shoemaker, CSSLP Certified Secure Software Lifecycle Professional All-in-One Exam Guide, 3rd Edition, McGraw Hill, 2022.

MITS 5493 Security Audit and Assessment

Learning Outcomes:

At the end of the course, students should be able to:

CLO1: Analyze the concepts of computer audit and risk management.
CLO2: Perform an audit process in the computerized environment.
CLO3: Propose the appropriate response in conformity with security issues in computer security audit.

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.

References:

1. Chris Davis, Mike Schiller, Kevin Wheeler, It Auditing Using Controls To Protect Information Assets. Mcgraw Hill, 2019.
2. Chopra, A, Implementing An Information Security Management System: Security Management Based On Iso 27001 Guidelines. Apress, 2019.
3. D. Landoll, The Security Risk Assessment Handbook, 3rd Edition Crc Press, 2021.
4. Chris Davis, Mike Schiller and Kevin Wheeler, IT Auditing Using Controls to Protect Information Assets, 3rd Edition, McGraw Hill, 2019.
5. Michael Workman, Information Security Management, 2nd Edition, Jones & Bartlett Learning, 2021.

MMSD
MASTER IN MOBILE
SOFTWARE DEVELOPMENT

MASTER IN MOBILE SOFTWARE DEVELOPMENT

Programme Details

The goal of this programme is to produce expert developers and designers of mobile applications within the ICT practitioner and related disciplines, which can strengthen their role and become the leader that instil innovative and entrepreneurial values on the global stage by applying suitable mobile application development's principles and techniques.

Programme Educational Objectives (PEO)

Programme Educational Objectives (PEO) are specific goals describing the expected achievement of graduates in their career and professional life after 5 years of graduation.

Below are the PEO for this programme:

PEO 1: Computing specialists who have in-depth knowledge and can apply enhanced technical, digital, and numeracy skills with specializations to provide innovative solutions in mobile software development.

PEO 2: Computing specialists who have leadership, interpersonal and communication skills to interact with a wide variety of audiences effectively.

PEO 3: Computing specialists who engage and advocate lifelong learning activities using scientific methods and have an entrepreneurial mindset.

PEO 4: Computing specialists who uphold professional practices ethically and with integrity.

Programme Outcomes (PO)

Programme Outcomes (PO) are statements describing what students are expected to know and be able to perform or attain by the time of graduation. These are related to the Knowledge (K), Skills (S), and Attitude (A) that students acquire throughout the programme.

Below is the list of PO for this programme:

PO 1: Ability to integrate in-depth knowledge to promote computing solutions.

PO 2: Ability to recommend innovative solutions using advanced mobile software development technology.

PO 3: Ability to demonstrate practical skill in developing computing solutions or tools that are functional, efficient or effective.

PO 4: Ability to demonstrate effective interaction and participate in mobile software solutions discussion within a group or with a diverse audience.

PO 5: Ability to display effective communication within a group or with a diverse audience by producing and presenting technical materials in mobile software development.

PO 6: Ability to practice digital skills to acquire, interpret and extend knowledge in computing.

PO 7: Ability to apply numerical skills to acquire, interpret and extend knowledge in computing solutions.

PO 8: Ability to demonstrate leadership, teamwork, autonomy and responsibility in delivering services related to mobile software solutions.

PO 9: Ability to display capabilities of self-advancement through life-long learning.

PO 10: Ability to display capabilities of having an entrepreneurial mindset in delivering solutions.

PO 11: Ability to conduct ethical, professional and sustainable practices in managing research and services in relevant fields.

Programme Structure - Full Time

September Intake:

Semester 1 (September)		
Course Code	**Course**	**Credit**
MPSW 5013	Research Methodology	3
MMSD 5113	Native Mobile Development I	3
MMSD 5123	User Experience Management & User Interface Design	3
MMSD 5153	Mobile Back-end	3
MMSD XXXX	Elective 1	3
	Total credit	**15**
Semester 2 (February)		
Course Code	**Course**	**Credit**
MMSD 5133	Mobile Application Security and Privacy	3
MMSD 5143	Mobile Application Testing	3
MMSD 5163	Mobile Application Architecture	3
MMSD XXXX	Elective 2	3
MMSD XXXX	Elective 3	3
MMSD 5314	Project I	4
	Total credit	**19**
Semester 3 (Short Semester)		
Course Code	**Course**	**Credit**
MMSD 5326	Project II	6
	Total credit	**6**

February Intake:

Semester 1 (February)		
Course Code	**Course**	**Credit**
MPSW 5013	Research Methodology	3
MMSD 5133	Mobile Application Security and Privacy	3
MMSD 5143	Mobile Application Testing	3
MMSD 5163	Mobile Application Architecture	3
MMSD XXXX	Elective 1	3
MMSD XXXX	Elective 2	3
	Total credit	**18**
Semester 2 (Short Semester)		
Course Code	**Course**	**Credit**
MMSD 5314	Project I	4
	Total credit	**4**
Semester 3 (September)		
Course Code	**Course**	**Credit**
MMSD 5113	Native Mobile Development I	3
MMSD 5123	User Experience Management & User Interface Design	3
MMSD 5153	Mobile Back-end	3
MMSD XXXX	Elective 3	3
MMSD 5326	Project II	6
	Total credit	**18**

Elective courses - choose THREE (3) only:

Course Code	Course	Credit
MMSD 5213	Agile Project Management	3
MMSD 5223	Native Mobile Development II	3
MMSD 5233	Mobile Analytics	3
MMSD 5243	Internet of Things Application Development	3
MPSW 5063	Entrepreneurship	3

Note: Total credit hours = 40 credits

Programme Structure - Part Time

September Intake:

Semester 1 (September)		
Course Code	**Course**	**Credit**
MMSD 5113	Native Mobile Development I	3
MMSD 5153	Mobile Back-end	3
MMSD XXXX	Elective 1	3
	Total credit	**9**
Semester 2 (February)		
Course Code	**Course**	**Credit**
MPSW 5013	Research Methodology	3
MMSD 5163	Mobile Application Architecture	3
MMSD XXXX	Elective 2	3
	Total credit	**9**
Semester 3 (September)		
Course Code	**Course**	**Credit**
MMSD 5123	User Experience Management & User Interface Design	3
MMSD 5314	Project I	4
	Total credit	**7**
Semester 4 (February)		
Course Code	**Course**	**Credit**
MMSD 5133	Mobile Application Security and Privacy	3
MMSD 5143	Mobile Application Testing	3
MMSD XXXX	Elective 3	3
	Total credit	**9**
Semester 5 (Short Semester)		
Course Code	**Course**	**Credit**
MMSD 5326	Project II	6
	Total credit	**6**

Programme Structure - Part Time

February Intake:

Semester 1 (February)		
Course Code	**Course**	**Credit**
MPSW 5013	Research Methodology	3
MMSD 5163	Mobile Application Architecture	3
MMSD XXXX	Elective 1	3
	Total credit	**9**
Semester 2 (September)		
Course Code	**Course**	**Credit**
MMSD 5113	Native Mobile Development I	3
MMSD 5153	Mobile Back-end	3
MMSD XXXX	Elective 2	3
	Total credit	**9**
Semester 3 (February)		
Course Code	**Course**	**Credit**
MMSD 5133	Mobile Application Security and Privacy	3
MMSD 5143	Mobile Application Testing	3
MMSD XXXX	Elective 3	3
	Total credit	**9**
Semester 4 (Short Semester)		
Course Code	**Course**	**Credit**
MMSD 5314	Project I	4
	Total credit	**4**
Semester 5 (September)		
Course Code	**Course**	**Credit**
MMSD 5123	User Experience Management & User Interface Design	3
MMSD 5326	Project II	6
	Total credit	**9**

Elective courses - choose THREE (3) only:

Course Code	Course	Credit
MMSD 5213	Agile Project Management	3
MMSD 5223	Native Mobile Development II	3
MMSD 5233	Mobile Analytics	3
MMSD 5243	Internet of Things Application Development	3
MPSW 5063	Entrepreneurship	3

Note: Total credit hours = 40 credits

MPSW 5013 Research Methodology

Learning Outcomes:

At the end of the course, students should be able to:

CLO1: Propose a research proposal with an improvement of existing knowledge.
CLO2: Synthesize relevant literature to address the knowledge gaps.
CLO3: Apply ethical research skills in constructing research questions, objectives, and hypotheses (if any) relevant to the research problem.

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.

References:

1. Nathan R. Durdella, Qualitative Dissertation Methodology: A Guide for Research Design and Methods, 1st Edition, SAGE Publications, 2018.
2. Willie Chee Keong Tan, Research Methods: A Practical Guide for Students and Researchers, World Scientific Publishing Company, 2017.
3. Robert K. Yin, Case Study Research and Applications: Design and Methods, 6th Edition, SAGE Publications, 2017.
4. Konstantine Arkoudas, David Musser, Fundamental Proof Methods in Computer Science: A Computer-Based Approach, MIT Press, 2017.
5. Jessica DeCuir-Gunby and Paul A. Schutz, Developing a Mixed Methods Proposal: A Practical Guide for Beginning Researchers (Mixed Methods Research Series), 1st Edition, SAGE Publications, 2016.
6. John W. Creswell, Research Design: Qualitative, Quantitative and Mixed Methods Approaches, 4th Edition, SAGE Publications, 2014.
7. Justin Zobel, Writing for Computer Science, 3rd Edition, Springer-Verlag London, 2014.

8. Siti Uzairiah Mohd Tobi, Qualitative Research and Nvivo 10 Exploration, Aras Publication, 2014.

MPSW 5063 Enterpreneurship

Learning Outcomes:

At the end of the course, students should be able to:

CLO1: Explain the conceptual understanding of 'Entrepreneurship', 'Marketing' and 'Business Plan'.

CLO2: Identify commercially viable ideas, projects, prototypes products & compelling Intellectual Property (IP) for commercialisation.

CLO3: Develop a cohesive and robust business plan on a chosen topic.

CLO4: Identify the constrains and interactions within the technological, business, global and social environments.

CLO5: Develop an awareness of important ethical and societal issues and carries out his or her business plan at the highest ethical standards.

Synopsis:

This course is designed for ambitious new competences, engineers and scientists in creating acquiring and existing business, or working in industries serving the entrepreneurs, or post-grads interested in acquiring and developing their talent as well as familiarising with the concepts, issues, and techniques of new venture creation. It addresses challenging issues on high technology venturing, intellectual property and intellectual property development, the installation of innovative organisation, the effective control of the innovation, and the management of the supply chain. A key element of the Entrepreneurship program is the development of business plan by teams aiming to create new ventures. Topics include development of successful ideas, developing a profitable business models, writing a business plan, market opportunities for high-tech products enabled by technology, technology and innovation, intellectual property rights, inventions inventors and invention ownership, strategic control for new ventures and venture legal aspects.

References:

1. Bruce R. Barringer & R. Duanne Ireland, Entrepreneurship: The Successful Launch of New Ventures, 5th Edition, Prentice Hall, 2015.
2. Bygrave & Zacharakis, Entrepreneurship, John Wiley & Son, 2008.
3. Mary Coulter, Entrepreneurship in Action, 2nd Edition, Prentice Hall, 2003.
4. Kuratko & Hodgetts, Entrepreneurship, 3rd Edition, Dryden Press, 2004.

MMSD 5113 Native Mobile Development I

Learning Outcomes:

At the end of the course, students should be able to:

CLO1: Explain the concept and fundamentals of native mobile application and development.

CLO2: Build an application using Android native language.

CLO3: Integrate the application with existing API services available on the internet and device's hardware.

Synopsis:

This course will offer a comprehensive preliminary to native mobile application development using java. Topics that will be included in this course includes decentralized data storage plus centralizing data via web service call, multi-threaded programming in native as well as incorporating existing API service available on the internet such as Google API and Firebase API. In addition, students are exposed to integrate the application with available hardware available on devices such as sensors and GPS.

References:

1. Neil Smyth, Android Studio Electric Eel Essentials - Kotlin Edition: Developing Android Apps Using Android Studio 2022.1.1 and Kotlin, Payload Media, 2023.
2. Aleksei Sedunov, "Kotlin In-Depth: A Guide To A Multipurpose Programming Language for Server-Side, Front-End, Android, and Multiplatform Mobile (English Edition)", BPB Publications, 2022.
3. Greg Lim, Beginning Android Development with Kotlin (2022-2023), Independently Published , 2021.
4. Duncan Mcgregor and Nat Pryce, Java To Kotlin: A Refactoring Guidebook, O'Reilly Media, 2021.

MMSD 5123 User Experience Management and User Interface Design

Learning Outcomes:

At the end of the course, students should be able to:

CLO1: Integrate user behavior and cognitive processes to inform UI/UX design decisions

CLO2: Propose engaging mobile app interfaces to create meaningful user experiences

CLO3: Adhere to effective communication and collaboration skills for UI/UX design projects

Synopsis:

This course will equip students with the knowledge and skills to create compelling, user-friendly mobile app interfaces. Through theoretical concepts and hands-on practical exercises, students will learn to develop a deep understanding of user behaviour, design intuitive interfaces, and manage the overall user experience. Furthermore, students will be well-prepared to design user-centric mobile app interfaces that meet users' needs and expectations while creating engaging and meaningful experiences.

References:

1. Russ Unger and Carolyn Chandler (2023), A Project Guide to UX Design for User Experience Designers in the Field or in the Making, Pearson Education (ISBN: 9780138188061).
2. Dylan Christian (2022), UX Programming for Beginners - Your First Step Towards Creating the Best UI/UX Designs, Amazon Digital Services (ISBN: 9798848030174).
3. Allen Veronica (2021), "The New 2022 UI/UX for Beginners And Experts: UX/UI Design for Automatic Designers", Amazon Digital Services LLC - Kdp, (ISBN: 9798490026525).
4. Pamala B. Deacon (2020), "UX and UI Strategy: A Step-by-Step Guide on UX and UI Design", Independently Published (ISBN: 9798580234182).

MMSD 5133 Mobile Application Security and Privacy

Learning Outcomes:

At the end of the course, students should be able to:

CLO1: Explain the concept of security and privacy for mobile application development.
CLO2: Practice coherent design strategies for secured mobile applications.
CLO3: Propose safeguarding mobile solutions

Synopsis:

This course will provide an understanding of security and privacy requirements before building a secure mobile application. It also provides the knowledge to understand the mobile application security and privacy risks especially on mobile device and ways to protect it. Further, the subjects provide the skill to the students to be able to design and develop a safeguarding mobile application.

References:

1. Guide To Assessment Of Security For Mobile Application Kindle Edition 2021, David Du
2. Security Vulnerabilities In Mobile Operating Systems A Complete Guide -

2020 Edition, Gerardus Blokdyk, Kindle Edition.
3. Handbook of Research on Emerging Developments in Data Privacy, 2019.
4. Brian Walker, Cyber Security: Comprehensive Beginners Guide to Learn the Basics and Effective Methods of Cyber Security, Independently Published, 2019.
5. Nancy R. Mead & Saeed Abu-Nimeh, Security and Privacy Requirements Engineering, 2019

MMSD 5143 Mobile Application Testing

Learning Outcomes:

At the end of the course, students should be able to:

CLO1: Evaluate risks, as well as to implement a testing solution to assist minimize such risks.

CLO2: Propose the quality characteristics for a mobile application and identify an appropriate testing approach to address those characteristics.

CLO3: Prepare the test case, analyze the results, and report the findings effectively.

Synopsis:

This course gives exposure to the students about the mobile application testing concept and focus on process to develop and implement types of mobile testing such as hardware testing, software or application testing. Topics include how to plan and conduct mobile application testing, and how to report results from the testing. In this course, students will be guide to use mobile application testing tools.

References:

1. Daniel Knott (2022), Hands-On Mobile App Testing - 2nd Edition, Independently published.
2. Dorothy Graham, Rex Black, Erik Van Veenendaal (2020), Foundations of Software Testing : ISTQB certification, BCS, Hampshire, United Kingdom : Cengage Learning EMEA
3. Parveen (2018), Beginner's Guide to Mobile App Testing - Kindle Edition.
4. Vijay Kumar Velu (2016), Mobile Application Penetration Testing, Packt Publishing Ltd.
5. Narayanan Palani (2014), Mobile Software Testing, BecomeShakespeare.com.

MMSD 5153 Mobile Back-end

Learning Outcomes:

At the end of the course, students should be able to:

CLO1: Explain the emerging elements in mobile back-end development.

CLO2: Construct program for back-end application.

CLO3: Propose a mobile back-end application by using appropriate tools.

Synopsis:

This course introduces the practices and tools of the mobile back-end development. It covers creating an API for mobile, server to server connection, cloud technology, mobile app back-end services, performance and security. Using current technologies and tools, students will create a basic mobile back-end application. As a whole, the course will expose students to state-of-the-art, tools and techniques to develop mobile back-end application.

References:

1. Amundsen, M. (2022). Restful Web Api Patterns & Practices Cookbook: Connecting and Orchestrating Microservices and Distributed Data. O'reilly Media.
2. Parri, P., Building Node.js REST API with TDD approach : 10 steps complete guide for Node.js, Express.js & MongoDB RESTful service with test-driven development, Independently Published, 2018.
3. Wilkins, M., Learning Amazon Web Services (AWS): a hands-on guide to the fundamentals of AWS cloud, Addison-Wesley, 2020.
4. Brendan, B., Designing Distributed Systems: Patterns and Paradigms for Scalable, Reliable Services, O'reilly, 2018.
5. Kanikathottu, H., Serverless Programming Cookbook, Packt Publishing, 2019.

MMSD 5163 Mobile Application Architecture

Learning Outcomes:

At the end of the course, students should be able to:

CLO1: Describe the basics, features and requirements of mobile application architecture.

CLO2: Propose an architecture of mobile application according to best practices and standards.

CLO3: Compare and defend the architecture design based on case scenarios.

Synopsis:

This course covers a wide range of topics related to mobile application architecture including design principles, architecture patterns, security architecture and architecture processes as well as the best practices and mobile trends. It is designed to provide a comprehensive understanding of mobile application architecture basics,

features and requirements include its implementation in different platforms and scenarios in order to build fully structured mobile application based on vendor-specific, industry standards and procedures.

References:

1. Cybellium (2023), "Mastering Enterprise Security Architecture", Cybellium Ltd. (ISBN: 9798859063956)
2. Eric Vennaro (2023), "IOS Development at Scale: App Architecture and Design Patterns for Mobile Engineers", Apress (ISBN: 9781484294550)
3. Petros Efthymiou (2022), Clean Mobile Architecture, Amazon (ISBN: 9786188600706)
4. Mark Richards, Neal Ford (2020), Fundamentals of Software Architecture: An Engineering Approach, O'Reilly Media (ISBN: 9781492043409)
5. Valentino Lee, Heather Schneider, Robbie Schell (2004), "Mobile Application: Architecture, Design and Development", Prentice Hall (ISBN: 9780131172630)

MSMD 5213 Agile Project Management

Learning Outcomes:

At the end of the course, students should be able to:

CLO1: Explain the concept of agile project management for any IT projects.

CLO2: Present on the principles and practices of agile project management in the IT projects.

CLO3: Demonstrate the standard guideline to produce a project vision and the product roadmap in a collaborative team environment for the purpose of IT project completion.

Synopsis:

This subject introduces the basic concept of agile project management to the student. It covers the agile project management process which includes agile tools and techniques for today knowledge-based projects. A knowledge-based project requires the project manager to manage, optimize and facilitate knowledge as a resource throughout the duration. This subject also covers support areas such as risk management. This subject exposes the student to the transition of a traditional project management into an agile project management.

References:

1. Taylor, T. 2023, Agile Project Management for Beginners 2023, independently published.
2. Stern, T.V. 2020, Lean and Agile Project Management: How to Make Any Project Better, Faster, and More Cost Effective 2e, Taylor & Francis.
3. Edge, J. 2020, Agile: An Essential

Guide to Agile Project Management the Kanban Process and Lean Thinking + A Comprehensive Guide to Scrum, Moliva Ab.
4. Wright, J. 2020, Project Management 6 Books in 1: The Complete Guide to Agile Project Management Lean Analytics Scrum Kanban Kaizen and Six Sigma, Josh Wright.
5. Smith, L. 2019, Agile Software Development with C#, Scrum, eXtreme Programming, and Kanban 2e, independently published.

MMSD 5223 Native Mobile Development II

Learning Outcomes:

At the end of the course, students should be able to:

CLO1: Describe the process of creating iOS apps and programming best practices.
CLO2: Construct a mobile application code using iOS programming.
CLO3: Integrate iOS API features and examine app functionality into properly designed components.

Synopsis:

This course will provide the knowledge of iOS development concepts as well as iOS programming (i.e. Swift) and the Apple toolset through the creation of iOS native applications as reflected in the design of iOS platform (i.e. iPhone, iPad, iTunes), the Model-View-Controller (MVC) paradigm and various high and low-level iOS's frameworks. It also provides basic concepts about designing intuitive and usable interfaces. The course includes live demos and extensive individual lab work.

References:

1. Apple Education, Develop With Swift, Fundamentals (Xcode 13 Edition), Apple Inc., 2021.
2. Apple Education, Develop With Swift, Data Collections (Xcode 13 Edition), Apple Inc., 2021.
3. Raywenderlich Tutorial Team, Rene Cacheaux & Josh Berlin, Advanced iOS App Architecture (First Edition): Real-world app architecture in Swift, Razeware LLC, 2019.
4. Etash Kalra, From Zero to iOS Hero: Swift Development for Kids and Teens, Independently Published, 2019
5. Wallace Wang, 2019 Pro iPhone Development with Swift 5: Design and Manage Top Quality Apps, Apress, 2019.
6. Christian Keur and Aaron Hillegass, iOS Programming: The Big Nerd Ranch Guide, 7th Edition, Big Nerd Ranch Guides, 2019.
7. Darryl Bartlett, Swift Programming in easy steps: Develop iOS apps - covers iOS

12 and Swift 5, In Easy Steps Limited, 2019.

MMSD 5233 Mobile Analytics

Learning Outcomes:

At the end of the course, students should be able to:

CLO1: Elaborate the fundamentals of mobile analytic.
CLO2: Discuss the role of mobile analytics in improving software and app quality.
CLO3: Demonstrate the application of mobile analytics tool in a sample mobile app case.

Synopsis:

This course introduces the students to analytics incorporated into a mobile app described as in-app analytics. It explains how mobile analytics complement mobile apps testing to help in improving software quality. Using current technologies and tools, students will apply mobile analytics on a sample mobile app to analyze how the app is being used and its performance for the end users. The course will also expose the students to the issues and challenges of mobile analytics as well as how the data collected can be analyzed using data mining for the purpose of descriptive, predictive and prescriptive analysis.

References:

1. Google (2024) Google Analytics, https://firebase.google.com/docs/analytics
2. Delen D. (2020) Predictive Analytics: Data Mining, Machine Learning and Data Science for Practitioners (Pearson Business Analytics Series).
3. Jeffrey D. Camm, James J. (2019). Business Analytics.
4. Beer, W (2016). Mobile App Analytics.

MMSD 5243 Internet of Things Application Development

Learning Outcomes:

At the end of the course, students should be able to:

CLO1: Describe convergence of technologies and emerging applications of IoT.
CLO2: Manipute IoT products, platforms, and applications.
CLO3: Propose smart IoT applications.

Synopsis:

This course will cover the concepts of the Internet of Things (IoT), its conceptual framework and how the IoT contributes to business and daily life. It will also cover the IoT architecture and gives an overview of the core technologies required for supporting IoT. It also provides knowledge on both the underlying technologies which support

IoT and M2M communications, and engages the students in the creative development of simulation scenarios for innovative Internet of Things applications.

References:

1. Rajkumar Buyya & Amir Vahid Dastjerdi, Internet of Things: Principles and Paradigms 2016, Elsevier.
2. Arshdeep Bahga, Vijay Madisetti, "Internet of Things – A hands-on approach", Universities Press, 2015.
3. Francis daCosta, "Rethinking the Internet of Things: A Scalable Approach to Connecting Everything", 1st Edition, Apress Publications, 2013.
4. Interconnecting Smart Objects with IP: The Next Internet, Jean-Philippe Vasseur, Adam Dunkels, Morgan Kuffmann, 2010
5. Zakiah Ayop, Nurul Azma Zakaria, Internet Of Things : Real-World Application Of IoT Technology, 2022, Penerbit UTeM

MMSD 5314 Project I

Learning Outcomes:

At the end of the course, students should be able to:

CLO1: Identify the problems, objectives and scope based on current trends of technologies.

CLO2: Perform comprehensive literature review and appropriate procedures to complete the project.

CLO3: Explain the suitable key answers to clarify the contribution in application domain.

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, Chapter 3: Research Methodology and Chapter 4: Analysis & Design. In addition, student must accomplish the project design and justify the proposed solution during presentation.

References:

1. Project Guidelines for Master by Taught Course Version 2022, FTMK, UTeM.
2. Taylor, T. 2023, Agile Project Management for Beginners 2023, independently published.
3. Stern, T.V. 2020, Lean and Agile Project Management: How to Make Any Project Better, Faster, and More Cost Effective 2e, Taylor & Francis.
4. Edge, J. 2020, Agile: An Essential Guide to Agile Project Management the Kanban Process and Lean Thinking + A

Comprehensive Guide to Scrum, Moliva Ab.
5. Kirill Dubovikov (2019), Managing Data Science: Effective strategies to manage data science projects and build a sustainable team, Packt Publishing; 1st Edition (November 12, 2019).

MMSD 5326 Project II

Learning Outcomes:

At the end of the course, students should be able to:

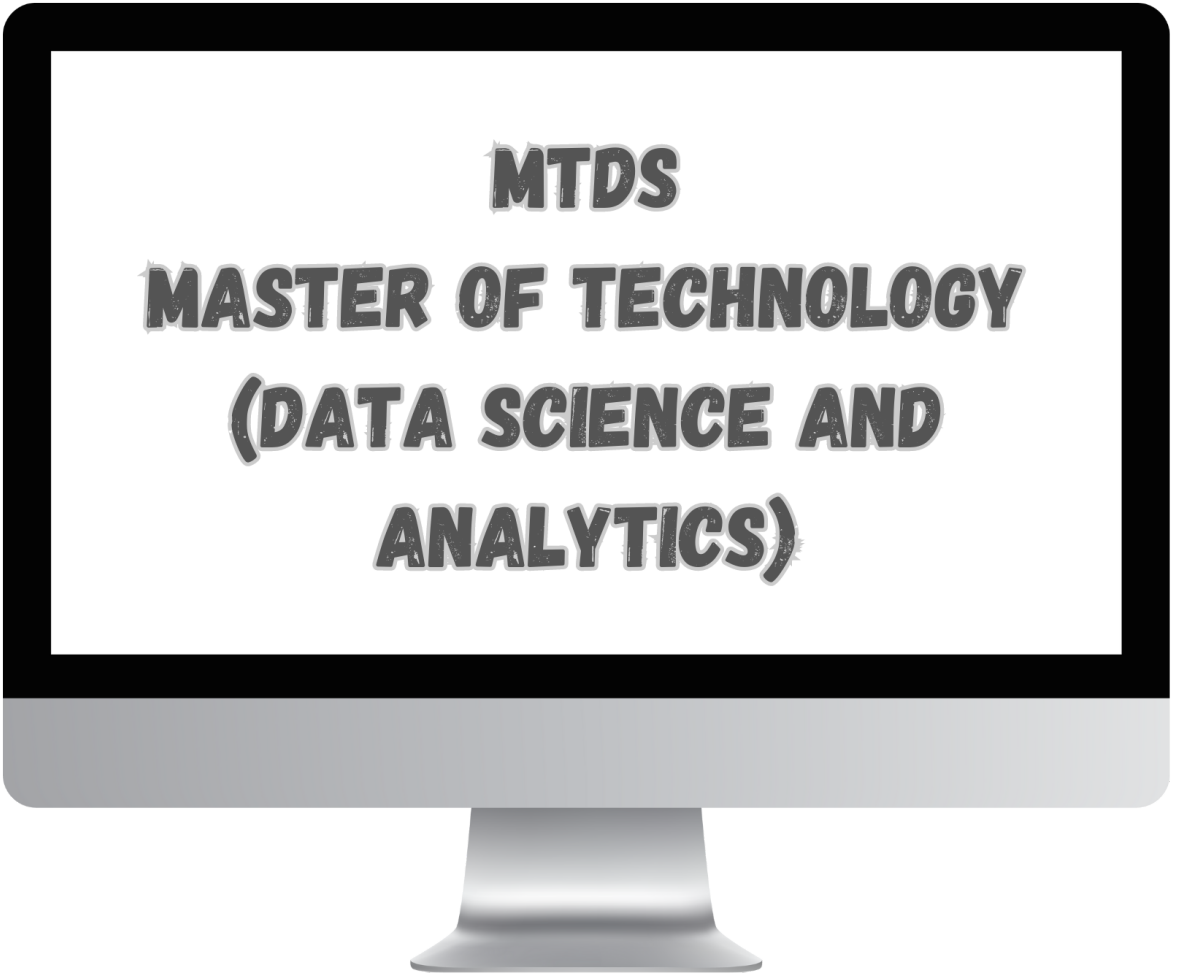
CLO1: Demonstrate the solutions with significance contribution to the application domain.
CLO2: Verify the proposed solutions to understand the strengths, weaknesses and limitations of the study.
CLO3: Defend the proposed solution by articulating the series of processes to achieve the end results of the domain business requirements.
CLO4: Justify the solution and relevant contributions of the application domain.

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 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.

References:

1. Project Guidelines for Master by Taught Course Version 2022, FTMK, UTeM.
2. Taylor, T. 2023, Agile Project Management for Beginners 2023, independently published.
3. Stern, T.V. 2020, Lean and Agile Project Management: How to Make Any Project Better, Faster, and More Cost Effective 2e, Taylor & Francis.
4. Edge, J. 2020, Agile: An Essential Guide to Agile Project Management the Kanban Process and Lean Thinking + A Comprehensive Guide to Scrum, Moliva Ab.
5. Kirill Dubovikov (2019), Managing Data Science: Effective strategies to manage data science projects and build a sustainable team, Packt Publishing; 1st Edition (November 12, 2019)


MTDS
MASTER OF TECHNOLOGY
(DATA SCIENCE AND
ANALYTICS)

MASTER OF TECHNOLOGY (Data Science & Analytics)

Programme Details

The Master of Technology (Data Science and Analytics), for short MTDS, 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 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 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)

Programme Educational Objectives (PEO) are specific goals describing the expected achievement of graduates in their career and professional life after 5 years of graduation.

Below are the PEO for this programme:

PEO 1: Practice in-depth and specialist knowledge, technology and skills of Science and Analytics, and related disciplines in solving emerging challenges.

PEO 2: Demonstrate business acumen in solving complex problems and sustain intellectual curiosity through life-long learning.

PEO 3: Demonstrate effective leadership and communication to a wide variety of audiences or multi-disciplinary teams, tolerate and value different global perspectives and cultures.

PEO 4: Practice professional, ethical and societal responsibilities, and show adaptability in different roles and surroundings in contributing to the community.

Programme Outcomes (PO)

Programme Outcomes (PO) are statements describing what students are expected to know and be able to perform or attain by the time of graduation. These are related to the Knowledge (K), Skills (S), and Attitude (A) that students acquire throughout the programme.

Below is the list of PO for this programme:

PO 1: Ability to integrate Data Science and Analytics knowledge for effective and excellent practice as a Data Scientist and Data Analyst.

PO 2: Ability to 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.

PO 3: Ability to apply critical and creative thinking and conduct systematic investigations into complex Big Data, analytics and decisions problems to generate innovative solutions and extend knowledge in Data Science and Analytics.

PO 4: Ability to effectively communicate, orally and in writing, Data Science and Analytics solutions to peers, superiors, clients and experts.

PO 5: Ability to apply independent and life-long learning skills to keep up with latest relevant knowledge and cutting edge technologies in Data Science and Analytics, and build up further professional and information management skills.

PO 6: Ability to work and function 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.

PO 7: Ability to prepare, publish and present technical material to a diverse audience applying ethics, values, attitude, professionalism and sustainable practices.

PO 8: Ability to demonstrate entrepreneurial and management skills.

Programme Structure - Full Time

September Intake:

Semester 1 (September)		
Course Code	**Course**	**Credit**
MPSW 5013	Research Methodology	3
MPSW 5063	Entrepreneurship	3
MTDS 5113	Fundamental of Data Science	3
MTDS 5123	Big Data Management	3
MTDS 5133	Applied Statistical Methods	3
MTDS 5143	Applied Machine Learning	3
	Total credit	**18**
Semester 2 (February)		
Course Code	**Course**	**Credit**
MTPU 5314	Project 1	4
MTDS 5153	Big Data Analytics and Visualization	3
MTDS 5163	Modelling and Decision Making	3
MTDS XXXX	Elective 1	3
MTDS XXXX	Elective 2	3
	Total credit	**16**
Semester 3 (Short Semester)		
Course Code	**Course**	**Credit**
MTPU 5326	Project 2	6
	Total credit	**6**

February Intake:

Semester 1 (February)		
Course Code	**Course**	**Credit**
MPSW 5013	Research Methodology	3
MTDS 5113	Fundamental of Data Science	3
MTDS 5123	Big Data Management	3
MTDS 5133	Applied Statistical Methods	3
MTDS 5143	Applied Machine Learning	3
MTDS 5153	Big Data Analytics and Visualization	3
	Total credit	**18**
Semester 2 (Short Semester)		
Course Code	**Course**	**Credit**
MTPU 5314	Project 1	4
MTDS XXXX	Elective 1	3
	Total credit	**7**
Semester 3 (September)		
Course Code	**Course**	**Credit**
MTPU 5326	Project 2	6
MTDS 5163	Modelling and Decision Making	3
MPSW 5063	Entrepreneurship	3
MTDS XXXX	Elective 2	3
	Total credit	**15**

Elective courses - choose TWO (2) only:

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

Note: Total credit hours = 40 credits

Programme Structure - Part Time

September Intake:

Semester 1 (September)		
Course Code	**Course**	**Credit**
MPSW 5013	Research Methodology	3
MTDS 5113	Fundamental of Data Science	3
MTDS 5133	Applied Statistical Methods	3
	Total credit	**9**
Semester 2 (February)		
Course Code	**Course**	**Credit**
MTDS 5153	Big Data Analytics and Visualization	3
MTDS 5143	Applied Machine Learning	3
MTDS 5123	Big Data Management	3
	Total credit	**9**
Semester 3 (Short Semester)		
Course Code	**Course**	**Credit**
MTPU 5314	Project 1	4
	Total credit	**4**
Semester 4 (September)		
Course Code	**Course**	**Credit**
MTDS 5163	Modelling and Decision Making	3
MTDS XXXX	Elective 1	3
MTDS XXXX	Elective 2	3
	Total credit	**9**
Semester 5 (February)		
Course Code	**Course**	**Credit**
MTPU 5326	Project 2	6
MPSW 5063	Entrepreneurship	3
	Total credit	**9**

Elective courses - choose TWO (2) only:

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

Note: Total credit hours = 40 credits

MPSW 5013 Research Methodology

Learning Outcomes:

At the end of the course, students should be able to:

CLO1: Propose a research proposal with an improvement of existing knowledge.
CLO2: Synthesize relevant literature to address the knowledge gaps.
CLO3: Apply ethical research skills in constructing research questions, objectives, and hypotheses (if any) relevant to the research problem.

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.

References:

1. Kumar, R., Research methodology: A step-by-step guide for beginners. Sage Publications Limited, 2019.
2. Gray, D. E., Doing research in the business world. Sage Publications Limited, 2019.
3. Creswell, J. W., & Creswell, J. D., Research Design: Qualitative, Quantitative, and Mixed Methods Approaches. In Research Design: Qualitative, Quantitative, and Mixed Methods Approaches, 2018.
4. Tang, H., Engineering Research: Design, Methods, and Publication. John Wiley & Sons, 2020.
5. Sidek, S., Kamalrudin, M. & Mat Deris, M., Research Survival Toolkit: Writing a winning fundamental research proposal, Melaka: University Publisher, UTeM, 2017.
6. Zobel, J., 3rd Edition, Writing for Computer Science, Springer-Verlag London, 2014.
7. Arkoudas, K., Musser, D., Fundamental Proof Methods in Computer Science: A Computer-Based Approach, MIT Press, 2017.
8. Creswell, J. W., & Poth, C. N., Qualitative inquiry and research design: Choosing

among five approaches. Sage publications, 2016.

MPSW 5063 Entrepreneurship

Learning Outcomes:

At the end of the course, students should be able to:

CLO1: Analyse entrepreneurial skills in identifying and exploiting entrepreneurial opportunities.
CLO2: Apply commercially viable ideas, projects, products prototypes for commercialization within the context of societal framework and to deliver business model canvassing and business value proposition.
CLO3: Develop creative and viable high tech business models and strategies.

Synopsis:

The objectives of this course are to provide students a robust foundation in theories relevant to the improvement of entrepreneurial behaviour and capabilities 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 key 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 areas of entrepreneurial expertise necessary in order to found and/or grow a technology venture.

References:

1. Duening, Thomas N., Robert A. Hisrich, and Michael A. Lechter. Technology Entrepreneurship: Taking Innovation to the Marketplace. Academic Press, 2020.
2. Sergi, B. S., & Scanlon, C. C. (Eds.), Entrepreneurship and Development in the 21st Century. Emerald Publishing Limited, 2019.
3. Bianchi, C., Glavas, C., & Mathews, S., SME international performance in Latin America: The role of entrepreneurial and technological capabilities. Journal of Small Business and Enterprise Development, 24(1), 176–195, 2017.
4. Patrict Van Der Pjil, Justin Lokitz, Lisa Kay Solomon, Design a Better Business: New Tools, Skills, and Mindset for Strategy and Innovation. Wiley, 2016.
5. Baldock, R., North, D., & Ullah, F., New Technology-Based Firms in the New Millennium. New Technology Based Firms in the New Millennium, 11, 203–226, 2015.
6. Alexander Osterwalder & Yvnes Pigneur, Value Proposition Design: How to Create

Products and Services Customers Want. Wiley, 2015.
7. Alexander Osterwalder & Yvnes Pigneur, Business Model Generation: A Handbook for Visionaries, Game Changers, and Challengers, Wiley, 2010.

MTDS 5113 Fundamentals of Data Science

Learning Outcomes:

At the end of the course, students should be able to:

CLO1: Explain what Data Science is and analyze the skill sets needed to be a data scientist.
CLO2: Identify the Data Analytic Life-cycle and how its components interact.
CLO3: Construct computer program to carry out basic statistical modeling and analysis.

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 Big 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-analytics thinking. The course ends by examining students understanding on integration and synthesis of concepts and their application to solving problems.

References:

1. Chirag Shah, A Hands-On Introduction to Data Science, Cambridge University Press, 1st edition, April 2, 2020.
2. Jeffrey S. Saltz and Jeffrey M. Stanton, An Introduction to Data Science, SAGE Publications, Inc, First edition, October 6, 2017.
3. Samuel Burns, Fundamentals of Data Science: Take the first Step to Become a Data Scientist (Step-by-Step Tutorial For Beginners), Independently published, September 17, 2019.
4. Joel Grus. Data Science from Scratch: First Principles with Python, O'Reilly

Media, 2 edition May 16, 2019.
5. Vlad Sozonov, The Fundamentals of Data Science: Big Data, Deep Learning, and Machine Learning: What you need to know about data science and why it matters, Data Science Case Study, November 20, 2019.

MTDS 5123 Big Data Management

Learning Outcomes:

At the end of the course, students should be able to:

CLO1: To distinguish the requirements of traditional data management and big data management.

CLO2: To compare the characteristics of big data solutions in the market.

CLO3: To build a big data management application using selected big data solutions.

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.

References:

1. Kuan-Ching Li, Hai Jiang, Albert Zomaya. Big Data Management and Processing. Chapman and Hall/CRC, 2017.
2. Viktor Mayer-Schönberger, Big Data: A Revolution That Will Transform How We Live, Work and Think, Eamon Dolan/Mariner Books, 2014.

3. Tom White, Hadoop: The Definitive Guide: Storage and Analysis at Internet Scale, 4th Edition, O'Reilly Media, 2015.
4. Edward Capriolo, Dean Wampler, Jason Rutherglen, Programming Hive: Data Warehouse and Query Language for Hadoop, O'Reilly Media Inc, 2017.

MTDS 5133 Applied Statistical Methods

Learning Outcomes:

At the end of the course, students should be able to:

CLO1: Find solutions for statistical problems using appropriate statistical techniques.
CLO2: Analyse solutions for real life statistical problems.
CLO3: Formulate solutions for statistical problems using statistical software.
CLO4: Integrate solution plan to application problems based on available data.

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.

References:

1. Black, K. Business Statistics for Contemporary Decision Making. 10th Edition, Wiley, 2020.
2. Hair, J. F., Black, W. C., Babin, B. J., Anderson, R. E., & Tatham, R. L., Multivariate Data Analysis. 8th edition. Pearson New International Edition, 2018.
3. Denis D.J., Univariate, Bivariate and Multivariate Statistics Using R – Quantitative Tools for Data Analysis and

Data Science, Wiley, 2020.
4. Krispin, R., Hands-On Time Series Analysis with R: Perform time series analysis and forecasting using R., Packt Publishing, 2019.
5. Kabacoff, R.I., R in action: Data Analysis and Graphics with R, Second Edition, Manning Pub. Co., 2015.
6. Schumacker, E. R., Using R with Multivariate Statistics. Sage Publications, Inc., 2016.

MTDS 5143 Applied Machine Learning

Learning Outcomes:

At the end of the course, students should be able to:

CLO1: Explain the concepts and principles of machine learning.

CLO2: Evaluate different machine learning techniques in terms of their applicability to different Machine Learning problems.

CLO3: Manipulate appropriate tools to apply suitable machine learning techniques to the data set given to solve the problem.

CLO4: Formulate a systematic approach to conduct scientific experimental investigations.

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 emphases on the implementation and evaluation of machine learning systems. The main 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.

References:

1. Kelleher, John D., Brian Mac Namee, Aoife D'Arcy, Fundamentals of machine learning for predictive data analytics: algorithms, worked examples, and case studies, MIT Press, 2015.
2. Patternson, Josh, & Gibson, Adam. Deep Learning: A Practitioner'sapproach, O'Reilly, Inc., 2017.
3. Brink, Henrik, J. Richards, Mark Fetherolf, Real-world machine learning, Manning, 2017.
4. Goodfellow, Ian, Yoshua Bengio, Aaron Courville, Deep learning, MIT Press, 2016.
5. Witten, Ian H., et al., Data Mining: Practical machine learning tools and techniques, Morgan Kaufmann, 2016.
6. Alpaydin, Ethem, Machine Learning: The new AI, MIT Press, 2016.

MTDS 5153 Big Data Analytics and Visualization

Learning Outcomes:

At the end of the course, students should be able to:

CLO1: Identify the concepts, fundamentals and methodologies of big data analytics.

CLO2: Interpret massive volumes of unstructured data using data analytics software.

CLO3: Construct big data analytics and visualization strategy in a proper and meaningful way using appropriate techniques.

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 analysing 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.

References:

1. Dipanjan Sarkar, Text Analytics with Python (2nd edition), 2019, Apress.

(QA76.9.D343.S27 2019)
2. Lawrence Rabiner and Ronald Schafer. Theory and Applications of Digital Speech Processing (1st. ed.). Prentice Hall Press, USA, 2010.
3. Daniel Jurafsky and James H Martin, Speech and Language Processing, Prentice Hall, 2009.
4. Rafael C. Gonzalez, Richard E. Woods, Digital Image Processing (2nd Edition) 2002, Pearson. (TA1637 G66 2002) – to buy new edition (4th edition), 2018.
5. Alexandru C. Telea, Data Visualization: Principles and Practice, 2nd Edition, CRC Press, 2015.
6. Jan Erik Solem, Programming Computer Vision with Python, O'Reily, 2012.
7. Ben Jones, Communicating Data with Tableau: Designing, Developing, and Delivering Data Visualizations, O'reilly, 2014.
8. Cole Nussbaumer Knaflic, Storytelling with Data: A Data Visualization Guide for Business Professionals, John Wiley & Sons, 2017.

MTDS 5163 Modelling and Decision Making

Learning Outcomes:

At the end of the course, students should be able to:

CLO1: Interpret knowledge of modelling and prescriptive analytics with data science for data-driven and evidence-based decision making.

CLO2: Choose appropriate and relevant modelling and prescriptive analytics technique using Big data input to solve complex decision problems.

CLO3: Propose prescriptive models and solutions using appropriate software tools and analysis of Big data, and communicate the results.

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.

References:

1. Rudolf Grunig and Richard Kuhn, Successful Decision-Making: A Systematic Approach to Complex Problems, Springer, 2013.
2. H. Paul Williams, Model Building in Mathematical Programming. 5th Edition. Wiley, 2013.
3. Frederick S. Hillier, Mark S, Hillier, Introduction to Management Science: A Modelling and Case Studies Approach, McGraw Hill, 2014.
4. Hamdy A. Taha, Operations Research: An Introduction. 10th Edition. Pearson, 2017.
5. John D. Sterman, Business Dynamics System Thinking and Modeling for a Complex World. McGraw-Hill Education, 2000.

MTDS 5213 Special Topics in Applied Data Science

Learning Outcomes:

At the end of the course, students should be able to:

CLO1: Analyze emerging technologies in data science.
CLO2: Integrate new data science concepts and skills to selected application domains.
CLO3: Demonstrate data science results to various stakeholders.

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.

References:

1. Pramod Kumar, Anuradha Tomar, et al. (2021). Emerging Technologies in Computing: Theory, Practice and Advances. CRC Press.
2. Heru Susanto, Fang-Yie Leu, et al. (2021). The Emerging Technology of Big Data. CRC Press.
3. Dwayne Anderson (2020) Thriving in an Era of Emerging Technologies and Constant Disruption: Future of Work in New Digital Era Independent Publisher.
4. Ahmed F. Zobaa, Trevor J. Bihl. (2019). Big data analytics in future power systems. CRC Press.
5. Kuan-Ching Li, Hai Jiang, Albert Y. Zomaya (2017). Big data management and processing. Boca Rotan CRC Press.
6. Vijayan Sugumaran, Arun Kumar Sangaiah, Arunkumar Thangavelu (2017). Computational intelligence applications in business intelligence and big data analytics. Boca Raton, FL CRC Press/ Taylor & Francis Group.
7. Hwaiyu Geng (2017) Internet of Things and data Analytics Handbook. John Wiley- Blackwell.

MTDS 5223 Manufacturing Analytics

Learning Outcomes:

At the end of the course, students should be able to:

CLO1: Illustrate analytics use cases in manufacturing systems.
CLO2: Formulate analytics models for manufacturing systems.
CLO3: Accommodate appropriate tools to implement analytics model for manufacturing use cases.

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 emphases 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.

References:

1. Kalpakjian, Serope, Steven R. Schmid, Manufacturing Engineering and Technology, Person Education, 2018.
2. Zhang, Yingfeng, Fei Tao, Optimization of Manufacturing Systems Using the Internet of Things, Academic Press, 2016.
3. Diego Galar Pascual, Pasquale Daponte, Uday Kumar. Handbook of Industry 4.0 and SMART Systems, CRC Press, 2019.
4. Isak Karabegovi, Ahmed Kovaevi, Lejla Banjanovi-Mehmedovi, Predrag Dai. Handbook of Research on Integrating Industry 4.0 in Business and Manufacturing, IGI Global, 2020.
5. Seider, Warren D., Junior D. Seader, Daniel R. Lewin, Product and Process Design Principles: Synthesis, Analysis And Evaluation, John Wiley & Sons, 2016.
6. Felix Liao, Smart Data Discovery Using SAS Viya: Powerful Techniques for Deeper Insights, SAS Institute, 2020.

MTDS 5233 Social Media Analytics

Learning Outcomes:

At the end of the course, students should be able to:

CLO1: Analyze the fundamentals and concepts of social media data mining.

CLO2: Prepare appropriate solution steps for social media data analysis based on text mining methods.

CLO3: Build computer program based on appropriate text mining methods for practical uses in social media analytics.

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.

References:

1. Matthew A. Russell, Mining the Social Web: Data Mining Facebook, Twitter, LinkedIn, Google+, GitHub, and More, 3rd Edition, 2019.

2. Thushan Ganegedara, Natural Language Processing with TensorFlow. Packt Publishing, 2018.
3. Marco Bonzanini, Mastering Social Media Mining with Python. Packt Publishing, 2016.
4. Helen Kennedy, Post, Mine, Repeat: Social Media Data Mining Becomes Ordinary, Palgrave Macmillan, Springer Nature, 2016.
5. Siddhartha Chatterjee, Michal Krystyanczuk, Python Social Media, 2017.

MTDS 5243 Geospatial Analytics

Learning Outcomes:

At the end of the course, students should be able to:

CLO1: Analyse geospatial analytics approaches on various geospatial data.
CLO2: Integrate required knowledge and skills to solve real-world geospatial analytics problems.
CLO3: Construct multi-step workflows in variety of geospatial analytics applications.

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 space borne 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.

References:

1. John R.Jensen, Introductory Digital Image Processing: A Remote Sensing Perspective. Pearson Series in Geographic Information Science, 4th Edition, Pearson, 2015.
2. De Smith, Goodchild, Longley, Geospatial Analysis: A Comprehensive Guide to Principles, Techniques and Software Tools, The Winchelsea Press, 2018.
3. Eric Cheng, Aerial Photography and Videography Using Drones, Peachpit Press, 2015.
4. Rafael C. Gonzalez, Richard E. Woods,

Steven L. Eddins, Digital Image Processing Using MATLAB, McGraw Hill Education, 2013.
5. Joel Lawhead, Learning Geospatial Analysis with Python: Understand GIS Fundamentals and Perform Remote Sensing Data Analysis using Python 3.7, 3rd Edition, Packt Publishing, 2019.
6. Rafael C. Gonzalez and Richard E. Woods, Digital Image Processing, 4th Edition, Pearson, 2018.

MTDS 5253 Healthcare Analytics

Learning Outcomes:

At the end of the course, students should be able to:

CLO1: Construct solution in healthcare analytics through simple modelling and simulation.
CLO2: Evaluate a concept of healthcare analytics to support the data sciences analysis and design.
CLO3: Formulate the healthcare analytics in solving problems data science problems.

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 behaviour and sentiment data (patient behaviours and preferences). By the end of this course, students are able to design, analyse and implement the healthcare analytics concepts in data sciences.

References:

1. J. Burke, Health Analytics: Gaining the Insights to Transform Health Care, Wiley, 2013.
2. J. Schrom, Machine Learning for Healthcare: Case Studies and Algorithms for Working with Data, 1st Edition, O'Reilly, 2016.
3. S. Dua, U. R. Acharya, P. Dua, Machine Learning in Healthcare Informatics (Intelligent Systems Reference Library), Springer, 2014.
4. K. Marconi, H. Lehmann, Big Data and Health Analytics, 1st Edition, CRC Press, 2015.

5. L. B. Madsen, Data-Driven Healthcare: How Analytics and BI are Transforming the Industry, Wiley, 2014.

MTDS 5263 Tourism Analytics

Learning Outcomes:

At the end of the course, students should be able to:

CLO1: Evaluate each one of the concepts in tourism analytics.
CLO2: Propose appropriate solution for tourism application problems using analytics software.
CLO3: Solve tourism application problems using appropriate analytics method.

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.

References:

1. Xiang, Z., Fesenmaier, D. R., Analytics in Smart Tourism Design: Concepts and Methods, Springer International Publishing Switzerland, 2017.
2. Stephen L. J Smith, Tourism Analysis: A Handbook, 2nd Edition, London: Routledge Taylor & Francis Group, 2016.
3. Uysal, M., Schwartz, Z., Sirakaya-Turk, E., Management Science in Hospitality and Tourism: Theory, Practice, and Applications, Apple Academic Press, 2016.
4. F. Provost, T. Fawcett, Data Science for Business, O'Reilly Media, 2013.

MTDS 5273 Customer and Financial Analytics

Learning Outcomes:

At the end of the course, students should be able to:

CLO1: Analyze analytics use cases in customer behaviour and financial systems.
CLO2: Propose appropriate solution steps for customer behaviour and financial systems.
CLO3: Build computer program based on appropriate methods for practical uses in customer and financial analytics.

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.

References:

1. Art Weinstein, Superior Customer Value: Strategies for Winning and Retaining Customers, 3rd Edition, CRC Press, 2016.
2. Michael Munson,Customer Analysis, Mc Graw Hill, 2014.
3. Ron S. Kenett, Silvia Salini, Modern Analysis of Customer Surveys: with Applications using R, 1st Edition, Wiley, 2012.
4. John C Lee, Cheng F Lee, Financial Analysis, Planning & Forecasting: Theory and Application, 3rd Edition, World Scientific, 2016.
5. Stephen Bloomfield, Understanding and Interpreting Company Accounts: A practical guide to published accounts for non-specialists, Robinson, 2016.
6. Clifford S. Ang, Analyzing Financial Data and Implementing Financial Models Using R, Springer, 2016.
7. Tableau Support, https://www.tableau.com/support/help/
8. SAS Documentation, https://support.sas.com/documentation/

MTPU 5314 Project 1

Learning Outcomes:

At the end of the course, students should be able to:

CLO1: Identify the problems, objectives and scope based on current trends of technologies.

CLO2: Perform a comprehensive literature review and appropriate procedures to complete the project.

CLO3: Justify the suitable key answers to clarify the contribution in application domain.

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, Chapter

3: Research Methodology and Chapter 4: Analysis & Design. In addition, student must accomplish the project design and justify the proposed solution during presentation.

References:

1. Project Guidelines for Master by Taught Course Version 2022, FTMK, UTeM.
2. Rubin, K.S., Essential Scrum: A Practical Guide to the Most Popular Agile Process, Addison-Wesley Profesional, 2012.
3. O'Brien, H., Agile : Agile Project Management, A QuickStart Beginners 's Guide To Mastering Agile Project Management, 3rd Edition, Addison-Wesley, 2016.
4. Cresswell, J.W., Research Design: Qualitative, Quantitative, and Mixed Methods Approaches, 4th Edition, California: SAGE Publications, Incorporated, 2014.
5. Kirill Dubovikov, Managing Data Science: Effective strategies to manage data science projects and build a sustainable team, Packt Publishing; 1st Edition, November 12, 2019.

MTPU 5326 Project 2

Learning Outcomes:

At the end of the course, students should be able to:

CLO1: Demonstrate the solutions with significance contribution to the application domain.

CLO2: Verify the proposed solutions to understand the strengths, weaknesses and limitations of the study.

CLO3: Defend the proposed solution by articulating the series of processes to achieve the end results of the domain business requirements.

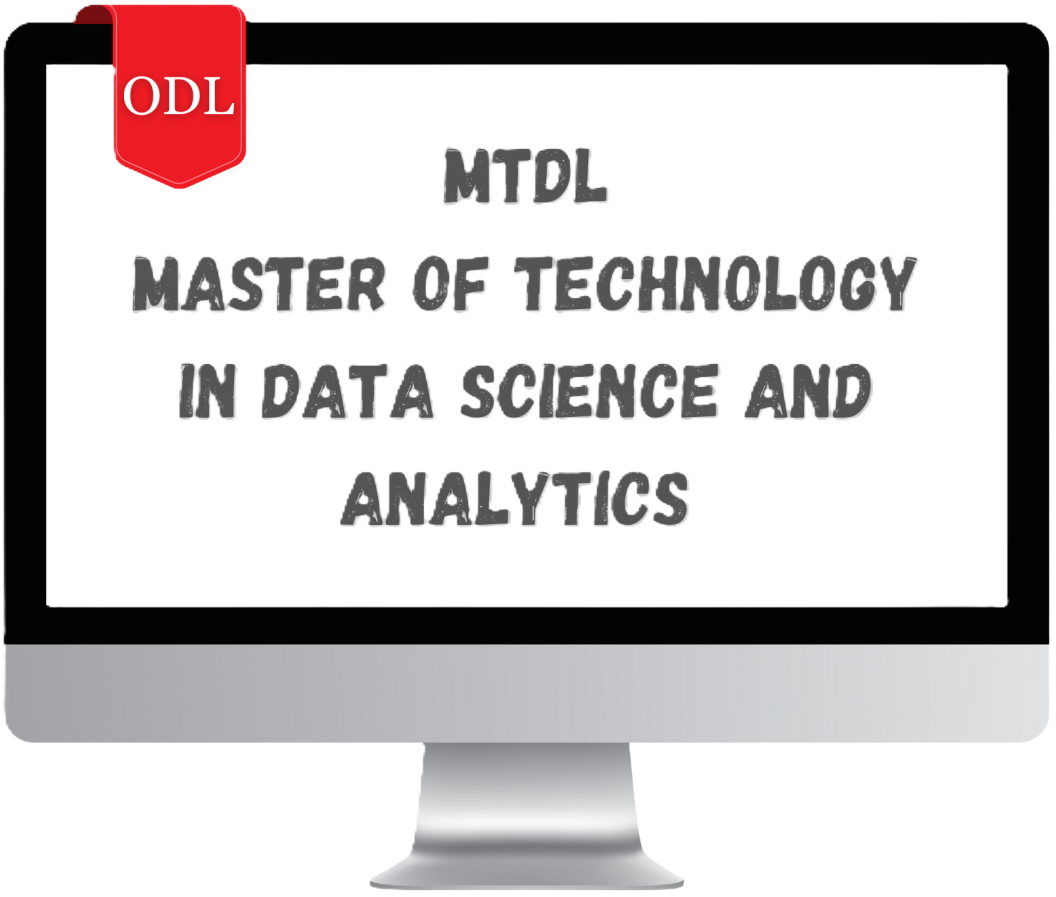
Synopsis:

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 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.

References:

1. Project Guidelines for Master by Taught Course Version 2022, FTMK, UTeM.
2. Rubin, K.S., Essential Scrum: A Practical Guide to the Most Popular Agile Process, Addison-Wesley Profesional, 2012.

3. O'Brien, H., Agile : Agile Project Management, A QuickStart Beginners 's Guide To Mastering Agile Project Management, 3rd Edition, Addison-Wesley, 2016.
4. Cresswell, J. W., Research Design: Qualitative, Quantitative, and Mixed Methods Approaches, 4th Edition. California: SAGE Publications, Incorporated, 2014.
5. Kirill Dubovikov, Managing Data Science: Effective strategies to manage data science projects and build a sustainable team, Packt Publishing; 1st Edition, November 12, 2019.


ODL
MTDL
MASTER OF TECHNOLOGY
IN DATA SCIENCE AND
ANALYTICS

MASTER OF TECHNOLOGY in Data Science & Analytics

Programme Details

The Master of Technology in Data Science and Analytics programme, delivered in Open and Distance Learning (ODL) mode, is designed for recent graduates and industry professionals seeking to enhance their analytical and computing skills. This programme offers both foundational and applied knowledge, empowering students to analyze big data, utilize advanced data science tools, and apply analytics techniques across various domains. The ODL mode provides flexible, self-directed learning, making it ideal for working professionals. With strong university-industry partnerships, the programme emphasizes state-of-the-art technologies and methodologies. Graduates will be well-prepared for exciting careers as data scientists, data analysts, and other roles in the rapidly growing field of data science.

Programme Educational Objectives (PEO)

Programme Educational Objectives (PEO) are specific goals describing the expected achievement of graduates in their career and professional life after 3-5 years of graduation.

Below are the PEO for this programme:

PEO 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.

PEO 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.

PEO 3: Engage and advocate lifelong learning activities and have an entrepreneurial mindset.

PEO 4: Practise professional, ethical and societal responsibilities with integrity, and show adaptability in different roles and surroundings in contributing to the community.

Programme Outcomes (PO)

Programme Outcomes (PO) are statements describing what students are expected to know and be able to perform or attain by the time of graduation.

Below is the list of PO for this programme:

PO 1: Utilize data science and analytics knowledge for effective and excellent practice as a data scientist and data analyst.

PO 2: Conduct systematic investigations and apply critical and creative thinking to generate innovative solutions in data science and analytics.

PO 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.

PO 4: Effectively interact with diverse peers, superiors, clients and experts.

PO 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.

PO 6: Practise digital skills to acquire, interpret and extend knowledge in data science and analytics.

PO 7: Determine suitable numerical tools to manage and resolve data science and analytics problems.

PO 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.

PO 9: Apply independent and lifelong learning skills to keep up with latest relevant knowledge and cutting edge technologies in Data Science and Analytics.

PO 10: Demonstrate entrepreneurial and managerial skills.

PO 11: Manage research and services by applying ethics, values, attitude, professionalism and sustainable practices in data science dan analytics.

Programme Structure - Full Time

September Intake:

Semester 1 (September)		
Course Code	**Course**	**Credit**
MPSW 5013	Research Methodology	3
MPSW 5063	Elective 1: Entrepreneurship	3
MTDL 5113	Fundamental of Data Science	3
MTDL 5123	Big Data Management	3
MTDL 5133	Applied Statistical Methods	3
MTDL 5143	Applied Machine Learning	3
	Total credit	**18**
Semester 2 (February)		
Course Code	**Course**	**Credit**
MTPL 5314	Project 1	4
MTDL 5153	Big Data Analytics and Visualization	3
MTDL 5163	Modelling and Decision Making	3
MTDL 52X3	Elective 2	3
MTDL 52X3	Elective 3	3
	Total credit	**16**
Semester 3 (Short Semester)		
Course Code	**Course**	**Credit**
MTPL 5326	Project 2	6
	Total credit	**6**

February Intake:

Semester 1 (February)		
Course Code	**Course**	**Credit**
MPSW 5013	Research Methodology	3
MTDL 5113	Fundamental of Data Science	3
MTDL 5123	Big Data Management	3
MTDL 5133	Applied Statistical Methods	3
MTDL 5143	Applied Machine Learning	3
MTDL 5153	Big Data Analytics and Visualization	3
	Total credit	**18**
Semester 2 (Short Semester)		
Course Code	**Course**	**Credit**
MTPL 5314	Project 1	4
MTDL 52X3	Elective 2	3
	Total credit	**7**
Semester 3 (September)		
Course Code	**Course**	**Credit**
MTPL 5326	Project 2	6
MTDL 5163	Modelling and Decision Making	3
MPSW 5063	Elective 1: Entrepreneurship	3
MTDL 52X3	Elective 3	3
	Total credit	**15**

Elective courses - choose TWO (2) only:

Course Code	Course	Credit
MTDL 5223	Manufacturing Analytics	3
MTDL 5233	Social Media Analytics	3
MTDL 5253	Healthcare Analytics	3
MTDL 5273	Customer and Financial Analytics	3

Note: Total credit hours = 40 credits

Programme Structure - Part Time

September Intake:

Semester 1 (September)		
Course Code	**Course**	**Credit**
MPSW 5013	Research Methodology	3
MTDL 5113	Fundamental of Data Science	3
MTDL 5133	Applied Statistical Method	3
	Total credit	**9**
Semester 2 (February)		
Course Code	**Course**	**Credit**
MTDL 5153	Big Data Analytics and Visualization	3
MTDL 5143	Applied Machine Learning	3
MTDL 5123	Big Data Management	3
	Total credit	**9**
Semester 3 (Short Semester)		
Course Code	**Course**	**Credit**
MTPL 5314	Project 1	4
	Total credit	**4**
Semester 4 (September)		
Course Code	**Course**	**Credit**
MTDL 5163	Modelling and Decision Making	3
MTDL 52X3	Elective 2	3
MTDL 52X3	Elective 3	3
	Total credit	**9**
Semester 5 (February)		
Course Code	**Course**	**Credit**
MTPL 5326	Project 2	6
MPSW 5063	Elective 1: Entrepreneurship	3
	Total credit	**9**

Programme Structure - Part Time

February Intake:

Semester 1 (February)		
Course Code	**Course**	**Credit**
MPSW 5013	Research Methodology	3
MTDL 5113	Fundamental of Data Science	3
MTDL 5133	Applied Statistical Method	3
	Total credit	**9**
Semester 2 (September)		
Course Code	**Course**	**Credit**
MTDL 5153	Big Data Analytics and Visualization	3
MTDL 5143	Applied Machine Learning	3
MTDL 5123	Big Data Management	3
	Total credit	**9**
Semester 3 (February)		
Course Code	**Course**	**Credit**
MTDL 5163	Modelling and Decision Making	3
MTDL 52X3	Elective 2	3
MTDL 52X3	Elective 3	3
	Total credit	**9**
Semester 4 (Short Semester)		
Course Code	**Course**	**Credit**
MTPL 5314	Project 1	4
	Total credit	**4**
Semester 5 (September)		
Course Code	**Course**	**Credit**
MTPL 5326	Project 2	6
MPSW 5063	Elective 1: Entrepreneurship	3
	Total credit	**9**

Elective courses - choose TWO (2) only:

Course Code	Course	Credit
MTDL 5223	Manufacturing Analytics	3
MTDL 5233	Social Media Analytics	3
MTDL 5253	Healthcare Analytics	3
MTDL 5273	Customer and Financial Analytics	3

Note: Total credit hours = 40 credits

MPSW 5013 Research Methodology

Learning Outcomes:

At the end of the course, students should be able to:

CLO1: Propose a research proposal with an improvement of existing knowledge.
CLO2: Synthesize relevant literature to address the knowledge gaps.
CLO3: Apply ethical research skills in constructing research questions, objectives and hypotheses (if any) relevant to research problem.

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.

References:

1. Kumar, R., Research methodology: A step-by-step guide for beginners. Sage Publications Limited, 2019.
2. Gray, D. E., Doing research in the business world. Sage Publications Limited, 2019.
3. Creswell, J. W., & Creswell, J. D., Research Design: Qualitative, Quantitative, and Mixed Methods Approaches. In Research Design: Qualitative, Quantitative, and Mixed Methods Approaches, 2018.
4. Tang, H., Engineering Research: Design, Methods, and Publication. John Wiley & Sons, 2020.
5. Sidek, S., Kamalrudin, M. & Mat Deris, M., Research Survival Toolkit: Writing a winning fundamental research proposal, Melaka: University Publisher, UTeM, 2017.
6. Zobel, J., 3rd Edition, Writing for Computer Science, Springer-Verlag London, 2014.
7. Arkoudas, K., Musser, D., Fundamental Proof Methods in Computer Science: A Computer-Based Approach, MIT Press, 2017.
8. Creswell, J. W., & Poth, C. N., Qualitative inquiry and research design: Choosing

among five approaches. Sage publications, 2016.

MPSW 5063 Entrepreneurship

Learning Outcomes:

At the end of the course, students should be able to:

CLO1: Analyse entrepreneurial skills in identifying and exploiting entrepreneurial opportunities.
CLO2: Apply commercially viable ideas, projects, products prototypes for commercialization within the context of societal framework and to deliver business model canvassing and business value proposition.
CLO3: Develop creative and viable high tech business models and strategies.

Synopsis:

The objectives of this course are to provide students a robust foundation in theories relevant to the improvement of entrepreneurial behaviour and capabilities 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 key 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 areas of entrepreneurial expertise necessary in order to found and/or grow a technology venture.

References:

1. Duening, Thomas N., Robert A. Hisrich, and Michael A. Lechter. Technology Entrepreneurship: Taking Innovation to the Marketplace. Academic Press, 2020.
2. Sergi, B. S., & Scanlon, C. C. (Eds.), Entrepreneurship and Development in the 21st Century. Emerald Publishing Limited, 2019.
3. Bianchi, C., Glavas, C., & Mathews, S., SME international performance in Latin America: The role of entrepreneurial and technological capabilities. Journal of Small Business and Enterprise Development, 24(1), 176–195, 2017.
4. Patrict Van Der Pjil, Justin Lokitz, Lisa Kay Solomon, Design a Better Business: New Tools, Skills, and Mindset for Strategy and Innovation. Wiley, 2016.
5. Baldock, R., North, D., & Ullah, F., New Technology-Based Firms in the New Millennium. New Technology Based Firms in the New Millennium, 11, 203–226, 2015.
6. Alexander Osterwalder & Yvnes Pigneur, Value Proposition Design: How to Create

Products and Services Customers Want. Wiley, 2015.
7. Alexander Osterwalder & Yvnes Pigneur, Business Model Generation: A Handbook for Visionaries, Game Changers, and Challengers, Wiley, 2010.

MTDL 5113 Fundamentals of Data Science

Learning Outcomes:

At the end of the course, students should be able to:

CLO1: Explain what Data Science is and analyze the skill sets needed to be a data scientist.

CLO2: Identify the Data Analytic Life-cycle and how its components interact.

CLO3: Construct computer program to carry out basic statistical modeling and analysis.

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.

References:

1. Kelleher, John D., et al. Fundamentals of Machine Learning for Predictive Data Analytics : Algorithms, Worked Examples, and Case Studies, MIT Press, 2020. ProQuest Ebook Central, https://ebookcentral.proquest.com/lib/kutkm-ebooks/detail.action?docID=6383434. Memon, Q.A., & Khoja, S.A. (Eds.). (2019). Data Science: Theory, Analysis and Applications (1st ed.). CRC Press. https://doi.org/10.1201/9780429263798
2. Chirag Shah, A Hands-On Introduction to Data Science, Cambridge University Press, 1st edition, April 2, 2020.

3. Jeffrey S. Saltz and Jeffrey M. Stanton, An Introduction to Data Science, SAGE Publications, Inc, First edition, October 6, 2017.
4. Samuel Burns, Fundamentals of Data Science: Take the first Step to Become a Data Scientist (Step-by-Step Tutorial For Beginners), Independently published, September 17, 2019.
5. Joel Grus. Data Science from Scratch: First Principles with Python, O'Reilly Media, 2 edition May 16, 2019.
6. Vlad Sozonov, The Fundamentals of Data Science: Big Data, Deep Learning, and Machine Learning: What you need to know about data science and why it matters, Data Science Case Study, November 20, 2019.
7. Kalita, J. K., Bhattacharyya, D. K., & Roy, S. "Fundamentals of Data Science: Theory and Practice." Elsevier. (November 2023).

MTDL 5123 Big Data Management

Learning Outcomes:

At the end of the course, students should be able to:

CLO1: To distinguish the requirements of traditional data management and big data management.

CLO2: To compare the characteristics of big data solutions in the market.

CLO3: To build a big data management application using selected big data solutions.

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.

References:

1. Kuan-Ching Li, Hai Jiang, Albert Zomaya. Big Data Management and Processing. Chapman and Hall/CRC, 2017.
2. Viktor Mayer-Schönberger, Big Data: A Revolution That Will Transform How We Live, Work and Think, Eamon Dolan/Mariner Books, 2014.
3. Tom White, Hadoop: The Definitive Guide: Storage and Analysis at Internet Scale, 4th Edition, O'Reilly Media, 2015.
4. Edward Capriolo, Dean Wampler, Jason Rutherglen, Programming Hive: Data Warehouse and Query Language for Hadoop, O'Reilly Media Inc, 2017.

MTDL 5133 Applied Statistical Methods

Learning Outcomes:

At the end of the course, students should be able to:

CLO1: Find solutions for statistical problems using appropriate statistical techniques.

CLO2: Analyse solutions for real life statistical problems.

CLO3: Formulate solutions for statistical problems using statistical software.

CLO4: Integrate solution plan to application problems based on available data.

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.

References:

1. Black, K. Business Statistics for Contemporary Decision Making. 10th Edition, Wiley, 2020.
2. Hair, J. F., Black, W. C., Babin, B. J., Anderson, R. E., & Tatham, R. L., Multivariate Data Analysis. 8th edition. Pearson New International Edition, 2018.
3. Denis D.J., Univariate, Bivariate and Multivariate Statistics Using R – Quantitative Tools for Data Analysis and Data Science, Wiley, 2020.
4. Krispin, R., Hands-On Time Series Analysis with R: Perform time series analysis and forecasting using R., Packt Publishing, 2019.
5. Kabacoff, R.I., R in action: Data Analysis and Graphics with R, Second Edition, Manning Pub. Co., 2015.
6. Schumacker, E. R., Using R with Multivariate Statistics. Sage Publications, Inc., 2016.

MTDL 5143 Applied Machine Learning

Learning Outcomes:

At the end of the course, students should be able to:

CLO1: Explain the concepts and principles of machine learning.

CLO2: Evaluate different machine learning techniques in terms of their applicability to different Machine Learning problems.

CLO3: Manipulate appropriate tools to apply suitable machine learning techniques to the data set given to solve the problem.

CLO4: Formulate a systematic approach to conduct scientific experimental investigations.

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 emphases on the implementation and evaluation of machine learning systems. The main 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.

References:

1. Kelleher, John D., Brian Mac Namee, Aoife D'Arcy, Fundamentals of machine learning for predictive data analytics: algorithms, worked examples, and case studies, MIT Press, 2015.
2. Patternson, Josh, & Gibson, Adam. Deep Learning: A Practitioner'sapproach, O'Reilly, Inc., 2017.
3. Brink, Henrik, J. Richards, Mark Fetherolf, Real-world machine learning, Manning, 2017.
4. Goodfellow, Ian, Yoshua Bengio, Aaron Courville, Deep learning, MIT Press, 2016.
5. Witten, Ian H., et al., Data Mining: Practical machine learning tools and techniques, Morgan Kaufmann, 2016.
6. Alpaydin, Ethem, Machine Learning: The new AI, MIT Press, 2016.

MTDL 5153 Big Data Analytics and Visualization

Learning Outcomes:

At the end of the course, students should be able to:

CLO1: Identify the concepts, fundamentals and methodologies of big data analytics.

CLO2: Interpret massive volumes of unstructured data using data analytics software.

CLO3: Construct big data analytics and visualization strategy in a proper and meaningful way using appropriate techniques.

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 analysing 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.

References:

1. Dipanjan Sarkar, Text Analytics with Python (2nd edition), 2019, Apress. (QA76.9.D343.S27 2019)
2. Lawrence Rabiner and Ronald Schafer. Theory and Applications of Digital Speech Processing (1st. ed.). Prentice Hall Press, USA, 2010.
3. Daniel Jurafsky and James H Martin, Speech and Language Processing, Prentice Hall, 2009.
4. Rafael C. Gonzalez, Richard E. Woods, Digital Image Processing (2nd Edition) 2002, Pearson. (TA1637 G66 2002) – to buy new edition (4th edition), 2018.
5. Alexandru C. Telea, Data Visualization: Principles and Practice, 2nd Edition, CRC Press, 2015.
6. Jan Erik Solem, Programming Computer Vision with Python, O'Reily, 2012.
7. Ben Jones, Communicating Data with Tableau: Designing, Developing, and Delivering Data Visualizations, O'reilly, 2014.
8. Cole Nussbaumer Knaflic, Storytelling with Data: A Data Visualization Guide for Business Professionals, John Wiley & Sons, 2017.

MTDL 5163 Modelling and Decision Making

Learning Outcomes:

At the end of the course, students should be able to:

CLO1: Interpret knowledge of modelling and prescriptive analytics with data science for data-driven and evidence-based decision making.

CLO2: Choose appropriate and relevant modelling and prescriptive analytics technique using Big data input to solve complex decision problems.

CLO3: Propose prescriptive models and solutions using appropriate software tools and analysis of Big data, and communicate the results.

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.

References:

1. Rudolf Grunig and Richard Kuhn, Successful Decision-Making: A Systematic Approach to Complex Problems, Springer, 2013.
2. H. Paul Williams, Model Building in Mathematical Programming. 5th Edition. Wiley, 2013.
3. Frederick S. Hillier, Mark S, Hillier, Introduction to Management Science: A Modelling and Case Studies Approach, McGraw Hill, 2014.
4. Hamdy A. Taha, Operations Research: An Introduction. 10th Edition. Pearson, 2017.
5. John D. Sterman, Business Dynamics System Thinking and Modeling for a Complex World. McGraw-Hill Education, 2000.

MTDL 5223 Manufacturing Analytics

Learning Outcomes:

At the end of the course, students should be able to:

CLO1: Illustrate analytics use cases in manufacturing systems.

CLO2: Formulate analytics models for manufacturing systems.

CLO3: Accommodate appropriate tools to implement analytics model for manufacturing use cases.

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 emphases 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.

References:

1. Kalpakjian, Serope, Steven R. Schmid, Manufacturing Engineering and Technology, Person Education, 2018.
2. Zhang, Yingfeng, Fei Tao, Optimization of Manufacturing Systems Using the Internet of Things, Academic Press, 2016.
3. Diego Galar Pascual, Pasquale Daponte, Uday Kumar. Handbook of Industry 4.0 and SMART Systems, CRC Press, 2019.
4. Isak Karabegovi, Ahmed Kovaevi, Lejla Banjanovi-Mehmedovi, Predrag Dai. Handbook of Research on Integrating Industry 4.0 in Business and Manufacturing, IGI Global, 2020.
5. Seider, Warren D., Junior D. Seader, Daniel R. Lewin, Product and Process Design Principles: Synthesis, Analysis And Evaluation, John Wiley & Sons, 2016.
6. Felix Liao, Smart Data Discovery Using SAS Viya: Powerful Techniques for Deeper Insights, SAS Institute, 2020.

MTDL 5233 Social Media Analytics

Learning Outcomes:

At the end of the course, students should be able to:

CLO1: Analyze the fundamentals and concepts of social media data mining.

CLO2: Prepare appropriate solution steps for social media data analysis based on text mining methods.

CLO3: Build computer program based on appropriate text mining methods for practical uses in social media analytics.

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.

References:

1. Matthew A. Russell, Mining the Social Web: Data Mining Facebook, Twitter, LinkedIn, Google+, GitHub, and More, 3rd Edition, 2019.
2. Thushan Ganegedara, Natural Language Processing with TensorFlow. Packt Publishing, 2018.
3. Marco Bonzanini, Mastering Social Media Mining with Python. Packt Publishing, 2016.
4. Helen Kennedy, Post, Mine, Repeat: Social Media Data Mining Becomes Ordinary, Palgrave Macmillan, Springer Nature, 2016.
5. Siddhartha Chatterjee, Michal Krystyanczuk, Python Social Media, 2017.

MTDL 5253 Healthcare Analytics

Learning Outcomes:

At the end of the course, students should be able to:

CLO1: Construct solution in healthcare analytics through simple modelling and simulation.

CLO2: Evaluate a concept of healthcare analytics to support the data sciences analysis and design.

CLO3: Formulate the healthcare analytics in solving problems data science problems.

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 behaviour and sentiment data (patient behaviours and preferences). By

the end of this course, students are able to design, analyse and implement the healthcare analytics concepts in data sciences.

References:

1. J. Burke, Health Analytics: Gaining the Insights to Transform Health Care, Wiley, 2013.
2. J. Schrom, Machine Learning for Healthcare: Case Studies and Algorithms for Working with Data, 1st Edition, O'Reilly, 2016.
3. S. Dua, U. R. Acharya, P. Dua, Machine Learning in Healthcare Informatics (Intelligent Systems Reference Library), Springer, 2014.
4. K. Marconi, H. Lehmann, Big Data and Health Analytics, 1st Edition, CRC Press, 2015.
5. L. B. Madsen, Data-Driven Healthcare: How Analytics and BI are Transforming the Industry, Wiley, 2014.

MTDL 5273 Customer and Financial Analytics

Learning Outcomes:

At the end of the course, students should be able to:

CLO1: Analyze analytics use cases in customer behaviour and financial systems.

CLO2: Propose appropriate solution steps for customer behaviour and financial systems.

CLO3: Build computer program based on appropriate methods for practical uses in customer and financial analytics.

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.

References:

1. Art Weinstein, Superior Customer Value: Strategies for Winning and Retaining Customers, 3rd Edition, CRC Press, 2016.

2. Michael Munson,Customer Analysis, Mc Graw Hill, 2014.
3. Ron S. Kenett, Silvia Salini, Modern Analysis of Customer Surveys: with Applications using R, 1st Edition, Wiley, 2012.
4. John C Lee, Cheng F Lee, Financial Analysis, Planning & Forecasting: Theory and Application, 3rd Edition, World Scientific, 2016.
5. Stephen Bloomfield, Understanding and Interpreting Company Accounts: A practical guide to published accounts for non-specialists, Robinson, 2016.
6. Clifford S. Ang, Analyzing Financial Data and Implementing Financial Models Using R, Springer, 2016.
7. Tableau Support, https://www.tableau.com/support/help/
8. SAS Documentation, https://support.sas.com/documentation/

MTPL 5314 Project 1

Learning Outcomes:

At the end of the course, students should be able to:

CLO1: Identify the problems, objectives and scope based on current trends of technologies.

CLO2: Perform a comprehensive literature review and appropriate procedures to complete the project.

CLO3: Justify the suitable key answers to clarify the contribution in application domain.

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, Chapter 3: Research Methodology and Chapter 4: Analysis & Design. In addition, student must accomplish the project design and justify the proposed solution during presentation.

References:

1. Project Guidelines for Master by Taught Course Version 2022, FTMK, UTeM.
2. Rubin, K.S., Essential Scrum: A Practical Guide to the Most Popular Agile Process, Addison-Wesley Profesional, 2012.
3. O'Brien, H., Agile : Agile Project Management, A QuickStart Beginners 's Guide To Mastering Agile Project Management, 3rd Edition, Addison-Wesley, 2016.
4. Cresswell, J.W., Research Design: Qualitative, Quantitative, and Mixed Methods Approaches, 4th Edition, California: SAGE Publications, Incorporated, 2014.

5. Kirill Dubovikov, Managing Data Science: Effective strategies to manage data science projects and build a sustainable team, Packt Publishing; 1st Edition, November 12, 2019.

MTPL 5326 Project 2

Learning Outcomes:

At the end of the course, students should be able to:

CLO1: Demonstrate the solutions with significance contribution to the application domain.

CLO2: Verify the proposed solutions to understand the strengths, weaknesses and limitations of the study.

CLO3: Defend the proposed solution by articulating the series of processes to achieve the end results of the domain business requirements.

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 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.

References:

1. Project Guidelines for Master by Taught Course Version 2022, FTMK, UTeM.
2. Rubin, K.S., Essential Scrum: A Practical Guide to the Most Popular Agile Process, Addison-Wesley Profesional, 2012.
3. O'Brien, H., Agile : Agile Project Management, A QuickStart Beginners 's Guide To Mastering Agile Project Management, 3rd Edition, Addison-Wesley, 2016.
4. Cresswell, J. W., Research Design: Qualitative, Quantitative, and Mixed Methods Approaches, 4th Edition. California: SAGE Publications, Incorporated, 2014.
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