UNIVERSITI MALAYA

2024/2025

UNDERGRADUATE
PROGRAMME
HANDBOOK
FACULTY OF COMPUTER SCIENCE &
INFORMATION TECHNOLOGY

more info   fsktm_um   fsktm.um.edu.my

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CONTENTS

VISION

A global faculty impacting the world

MISION

Propelling computing technology and producing world class leaders

OBJECTIVES

- To sustain an outstanding faculty dedicated to excellence in undergraduate and postgraduate teaching, learning and research.
- To contribute towards the development of the nation through the production of quality research and publications.
- To provide innovative academic programs that can respond to the changing needs of the society.
- To produce quality graduates who are equipped with advanced knowledge and skills of computer science and information technology.

HISTORY OF THE FACULTY

The provision of computer facilities and services at the Universiti Malaya (UM) began soon after the Computer Centre was officially formed in 1965. This made the university one of the pioneers in computer usage in Malaysia.

In December 1969, the Computer Centre took on an additional role of teaching and research of computer science and information technology. The Computer Centre Board was formed, comprising the Vice-Chancellor (as Chairman), the Director of Computer Centre (as Secretary), and a representative from each Faculty, Institute, Centre and the University Senate.

In 1974, the Diploma in Computer Science programme was introduced. From its inception in the 1974/1975 Session to the 1997/1998 Session, a total of 300 students had been awarded the Diploma. The Master of Computer Science (MCS) and Doctor of Philosophy (Ph.D.) programme were two (2) higher degree programme by research approved by the Senate and had been administered by the Computer Centre since 1985. In addition, the Computer Centre offered a four (4) years Bachelor of Computer Science programme. The first undergraduate enrolment for the 1990/1991 Session was 50 students.

In April 1st, 1993, the University Senate agreed to the formation of the Computer Centre Study Board. The Board proposed the establishment of a faculty to be called the Faculty of Computer Science and Information Technology (FCSIT). The existing Computer Centre was to be annulled and replaced by a Computer Services Division which was placed under the Chancellery.

On September 22nd, 1994, the University of Malaya Council agreed to the formation of the Faculty of Computer Science and Information Technology (FCSIT), and the Computer Services Division. A sum of 4.2 million was obtained from the Ministry of Education under the Sixth Malaysian Plan to put up a new building for the faculty, with the necessary infrastructure for teaching, learning and research. The building was officially declared open by the Minister of Education, Dato' Sri Najib Tun Abdul Razak on September 26th, 1996.

HISTORY OF THE FACULTY

The Bachelor of Information Technology programme started in the 1996/1997 Session, with an initial intake of 50 students. To accommodate an increase student population, an additional building was built which was officially opened by Datuk Fong Chan Onn, Deputy Minister of Education on September 21st, 1998.

Since its establishment, the Faculty of Computer Science and Information Technology have been led by a number of distinguished persons. The following have served as Directors/Dean:

1967 – 1973	Mr. Ong Yin Fook
1973 – 1975	Professor Paul Peach
1975 – 1978	Dr. R.K. Pillay
1978 – 1982	Dr. Tan Bock Thiam
1982 – 1990	Assoc. Prof. Ir. Dr. Mashkuri Yaacob
1990 – 1992	Professor Lee Poh Aun
1992 – 2000	Professor Ir. Dr. Mashkuri Yaacob
2000 – 2002	Assoc. Prof. Dr. Siti Salwah Salim
2002 – 2004	Assoc. Prof. Dr. Zainab Awang Ngah
2004 – 2005	Professor Ir. Dr. N. Selvanathan
2005 – 2006	Assoc. Prof. Dr. Siti Salwah Salim
2006 – 2007	Professor Dato' Dr. Ir. Mashkuri Hj. Yaacob
2007 – 2009	Professor Dr. Mohd Sapiyan Baba
2009 – 2010	Professor Dr. David Ngo Chek Ling
2010 – 2011	Professor Dr. Wan Ahmad Tajuddin Wan Abdullah
2011 – 2014	Professor Dr. Siti Salwah Salim
2014 – 2017	Professor Dr. Abdullah Gani
2017 – 2019	Professor Dr. Abrizah Abdullah
2019 - 2021	Professor Datin Dr. Sameem Abdul Kareem
2022 –2024	Professor Dr. Loo Chu Kiong
2024 - current	Professor Ir. Dr. Chan Chee Seng

WELCOME MESSAGE

STAFF

STAFF

DEAN'S OFFICE

Dean : **Professor Ir. Dr. Chan Chee Seng**
B.Eng. (MMU), M.Sc. (Portsmouth), PhD (Portsmouth)

Deputy Dean (Undergraduate) : **Associate Professor Dr. Norisma Idris**
B.Comp.S (UM), M.Comp.Sc. (UM), PhD (UM)

Deputy Dean (Postgraduate) : **Associate Professor Dr. Ang Tan Fong**
BIT (UM), M.Comp.Sc. (UM), PhD (UM)

Deputy Dean (Research) : **Professor Dr. Mohd Yamani Idna Idris**
B.Eng. (UM), M.Comp.Sc. (UM), PhD (UM)

Deputy Dean (Student Affairs) : **Associate Professor Dr. Suraya Hamid**
BIT (UKM), MIT (UKM), PhD (Melbourne)

Deputy Dean (Development) : **Associate Professor Dr. Azah Anir Norman**
BIT (UKM), M.Sc. (London), PhD (UM)

Head of Department

Artificial Intelligence : **Dr. Erma Rahayu Mohd Faizal Abdullah**
B.Comp.Sc. (UM), M.Elect.Eng. (Oita University, Japan), PhD (UiTM)

Software Engineering : **Dr. Ong Sim Ying**
B.Comp.Sc. (UM), PhD (UM)

Information Systems : **Associate Professor Dr. Norjihan Abdul Ghani**
BIT (UUM), MIT (Sc.) (UKM), PhD (UTM)

Computer System and Technology :

Head of Unit

Multimedia : **Dr. Nurul Fazmidar Mohd Noor**
B.Comp.Sc. (UM), M.Sc. (Liverpool), PhD (UK)

Administration and Support Staff

Administrative Manager (N48) : Mohd Nasruddin Kachi Maiden

Assistant Registrar (N41) : Balqis Bahari
Noor Yusrina Hashim
Nur Nadia Arshad
Nursyahirah Mamat Yasin
Nurul Farhana Mohd Nasir
Siti Nurul Aisyah Zulzaidi

Accountant Assistant (W29) : Norazleen Ramli

Administrative Assistant (Finance) (W22) : Haida Izwani Che Mahmood

Administrative Assistant Officer (N29) : Nur Azleen Abdul Rahim
Siti Nor Anilawatie Muhammad

Senior Administrative Assistant : Ibrahim Hussin
(Clerical/Operational) (N22) Mohd Afiffudin Mohd Ali
Rohani Mohamed Arifin
Norazarina Bohari
Norhayati Mohd Supi
Norkusharina Nasir
Syahrul Hasnah Ahmad

Office Secretary (N32) : Zunaida Alwadood

Assistant Office Secretary (N19) : Nur Hidayah Mohd Sarbini
Nurfatehah M. Zahir
Nurnajwa Husna Mohd Rafi

Administrative Assistant : Al Zarinah Awang Mohktar
(Clerical/Operational) (N19) Farah Nadhirah Mohd Aznam
Norhanim Husaini
Nur Izzati Alias
Nurfaziela Ibrahim
Zaleha Sumairi

General Office Assistant (N11) : Mohd Fareek Muhiyeddin
Nanthini Krishnan

Driver (H11) : Mohd Haffes Rahim

Technical Staff

Assistant Information Technology Officer (FA32) : Azzyaty Razali
Haryati Masilan
Wan Mohd Hasanul Isyraf Wan Yusoff

Assistant Information Technology Officer (FA29) : Jamal Amran
Mohd Ridhwan Mohd Ezad
Tun Hairul Farid Ton Hamzah
Nor Azura Adnan

Assistant Engineer (JA29) : Mohd Azizie Aris
Mohd Noor Aizad Morad
Zulkefle Kassim

Senior Computer Technician (FT22) : Mohd Farhan Abdul Rahman

DEPARTMENT OF ARTIFICIAL INTELLIGENCE

Head of Department:
Erma Rahayu Mohd Faizal Abdullah, B.Comp.Sc. (UM), M.Elect.Eng. (Oita University, Japan), PhD (UiTM)

Honorary Professor
Datin Sameem Abdul Kareem, B.Sc. UM (1986), M.Cs., University of Wales, UK (1992),PhD, UM (2002)

Professor:
Ir. Chan Chee Seng, B.Eng. (MMU), M.Sc. (Portsmouth), PhD (Portsmouth)
Loo Chu Kiong, B.Mech.Eng. (UM), PhD (USM)

Associate Professor:
Ts. Aznul Qalid Md Sabri, B.Comp.Sc. (UM), M. (Vision & Robotics) (Heriot-Watt), M. (Robotic) (Uni. De Bourgogne), PhD (France)
Norisma Idris, B.Comp.Sc. (UM), M.Comp.Sc. (UM), PhD (UM)

Senior Lecturer:
Liew Wei Shiung, M.Eng (UM), B.Eng (MMU), PhD (UM)
Lim Chee Kau, B.Sc. (USM), M.Comp.Sc. (UM), PhD (UM)
Muhammad Shahreeza Safiruz Kassim, BEng (Electrical, Electronics and Information Engineering) (Japan) M.Sc (Artificial Intelligence) (UK), PhD (Southampton)
Nurul Japar, B.Sc (UM), PhD (UM)
Saw Shier Nee, B.Bio.Eng. (UM), PhD (NUS)
Siti Soraya Abdul Rahman, B.Sc.Information Technology (UK), M.Comp.Sc. (UM), PhD (UK)
Unaizah Hanum Obaidellah, B.Comp.Sc. (UM), M.Comp.Sc. (UM), PhD (UK)
Woo Chaw Seng, B.Comp.Sc. (UM), M.Comp.Sc. (UM), PhD (Australia)
Zati Hakim Azizul Hasan, B.Comp.Sc. (UM), M.Comp.Sc. (UM), PhD (New Zealand)

DEPARTMENT OF INFORMATION SYSTEMS

Head of Department:
Norjihan Abdul Ghani, BIT (UUM), MIT (Sc.) (UKM), PhD (UTM)

Professor:
Nor Liyana Mohd Shuib, B.Comp.Sc.(UTM), M.IT (UKM), PhD (UM)
Teh Ying Wah, B.Sc.(Oklahoma), M.Sc. (Oklahoma), PhD (UM)
Ts. Vimala A/P Balakrishnan, B.Comp.Sc.(USM), M.Sc. (Comp.Sc.) (USM), PhD (MMU)

Associate Professor:
Ts. Sri Devi A/P Ravana, BIT (UKM), MSE (UM), PhD (Melbourne)
Azah Anir Norman, BIT (UKM), M.Sc. (London), PhD (UM)
Norjihan Abdul Ghani, BIT (UUM), MIT (Sc.) (UKM), PhD (UTM)
Kasturi Dewi A/P Varathan, BIT (Uniten), M.Comp.Sc (MIS) (UM), PhD (UKM)
Maizatul Akmar Ismail, BIT (UM), M.Sc. (UPM), PhD (UM)
Suraya Hamid, BIT (UKM), MIT (UKM), PhD (Melbourne)
Tutut Herawan, B.Ed (Ahmad Dahlan University), M.Sc. (Gadjah Mada University), PhD (UTHM)

Senior Lecturer:
Ts. Mohd Shahrul Nizam Bin Mohd Danuri, BSc (USM), M.Sc (UKM), PhD (UITM)
Hoo Wai Lam, B.Comp.Sc. (UM), PhD (UM)
Riyaz Ahamed Ariyaluran Habeeb, B.E (CS) (Sathyabama University), MSE (UM), PhD (UM)

STAFF

DEPARTMENT OF COMPUTER SYSTEM AND TECHNOLOGY

Head of Department:

To be Confirm

Honorary Professor

Abdullah Gani, M.Sc. (Information Management), Hull University, UK, B.Phil, Hull University, UK PhD, University of Sheffield,UK

Professor:

Ts. Miss Laiha Mat Kiah, B.Comp. Sc. (UM), M.Sc. (London), PhD (London)
Ts. Nor Badrul Anuar Juma'at, B.Comp.Sc. (UM), M.Comp.Sc. (UM), PhD (UK)
Ts. Rafidah Md Noor, BIT (UUM), M.Sc. (UTM), PhD (Lancaster)
Mohd Yamani Idna Idris, B.Eng. (UM), M.Comp.Sc. (UM), PhD (UM)
Por Lip Yee @ Por Khoon Sun, B.Comp.Sc. (UM), M.Comp.Sc. (UM), PhD (UM)

Associate Professor:

Ts. Ismail Ahmedy, Dip.Comp.Sc. (UTM), B.Sc. (Computer) (UTM), M.Sc. (Computer Science) (Queensland), PhD (UTM)
Ang Tan Fong, BIT (UM), M.Comp.Sc. (UM), PhD (UM)
Liew Chee Sun, B.Comp.Sc. (USM), M.Comp.Sc. (USM), PhD (UK)
Ling Teck Chaw, B.Sc. (UM), M.Comp.Sc. (UM), PhD (UM)
Rosli Salleh, B.Comp.Sc. (UM), M.Sc. (Salford), PhD (Salford)
Tey Kok Soon, B.Eng. (Electrical) (UM), PhD (UM)

Senior Lecturer:

Bryan Raj A/L Peter Jabaraj, B.Comp.Sc. (Computer Systems and Networking) (UM), PhD (UM)
Muhammad Faiz Mohd Zaki, B.Comp.Sc. (UM), M.Sc (London), PhD (UM)
Muhammad Nur Firdaus Sahran, B.Comp.Sc. (Computer Systems and Networking) (UM), PhD (UM)
Saaidal Razalli Azzuhri, B.Eng. (UM), M.Sc. (IT) (MUST), PhD (Queensland)

Lecturer:

Burhan Ul Islam Khan, BTech (Pulwama), M.Sc. (Computer and Information Engineering) (IIUM), PhD (IIUM)
Emran Mohd Tamil, B.Eng. (UTM), M.Sc. (UiTM)
Fazidah Othman, B.Comp.Sc. (UTM), M.Sc. (UTM)
Noorzaily Mohamed Noor, B.Sc. (UM), M.Comp.Sc. (UM)

MULTIMEDIA UNIT

Head of Unit:
Nurul Fazmidar Mohd Noor, B.Comp.Sc. (UM), M.Sc. (Liverpool), PhD (UK)

Professor:
Ts. Ainuddin Wahid Abdul Wahab, B.Comp.Sc. (UM), M.Comp.Sc. (UM), PhD (UK)

Associate Professor:
Amirrudin Kamsin, BIT (UM), M.Sc. (Bournemouth), PhD (London)
Mohamad Nizam Ayub, B.Comp.Sc. (UM), M.Sc. (Edinburgh), PhD (UK)
Nor Aniza Abdullah, B.Comp.Sc. (UM), M.Sc. (London), PhD (Southampton)

Senior Lecturer:
Nurul Fazmidar Mohd Noor, B.Comp.Sc. (UM), M.Sc. (Liverpool), PhD (UK)
Rasha Ragheb Attaallah, B.Comp Edu (Al Aqsa), M.Sc. (Islamic university Gaza), PhD (UM)
Suzan Jabbar Obaiys, B.Sc. (Iraq), M.Sc. (UPM), PhD (UPM)

Lecturer:
Hannyzzura Pal @ Affal, B.Comp.Sc. (UM), M.Sc. (London)
Mas Idayu Md. Sabri, B.Comp.Sc. (UM), M.Sc. (Bath)
Nornazlita Hussin, B.Comp.Sc. (UM), M.Sc. (Bath)

DEPARTMENT OF SOFTWARE ENGINEERING

Head of Department:
Ong Sim Ying, B.Comp.Sc. (UM), PhD (UM)

Professor:
Chiew Thiam Kian, B.Comp.Sc. (UM), M.Comp.Sc. (UM), PhD (Glasgow)

Associate Professor:
Mumtaz Begum Peer Mustafa, B.Comp.Sc. (UPM), MSE (UM), PhD (UM)
Rodina Ahmad, B.Sc. (Hartford), M.Sc. (Comp.Sc.) (Hartford), PhD (UM)
Siti Hafizah Ab Hamid, B.Comp.Sc. (UTM), M.Sc. (Manchester), PhD (UM)

Senior Lecturer:
Adeleh Asemi Zavareh, B.Comp.Sc. (Iran), M.Comp.Sc. (India), PhD (UM)
Asmiza Abdul Sani, B.Comp.Sc. (UM), M.Sc. (Soft. Eng.) (UK), PhD (UK)
Chiam Yin Kia, B.Comp.Sc. (UM), M.Sc. (Info. Tech.) (UM), PhD (Australia)
Hema Subramaniam, BSc (IT) (UNISEL), M.Comp.Sc. (UNISEL), PhD (UPM)
Mohamad Hazim Md Hanif, B.Comp.Sc. (UM), M.Comp.Sc. (UM), PhD (Imperial)
Nazean Jomhari, B.Sc. (UKM), M.Sc. (Essex), PhD (Manchester)
Nur Nasuha Mohd Daud, B.Comp.Sc. (UM), PhD (UM)
Raja Jamilah Raja Yusof, B.Eng. (London), M.Comp.Sc. (UM), PhD (UM)
Su Moon Ting, B.Comp.Sc. (UPM), M.Comp.Sc. (UPM), PhD (Auckland)
Uzair Iqbal, B.SE (Pakistan), M.SE (Pakistan), PhD (UM)

ACADEMIC CALENDAR
2024/2025 ACADEMIC SESSION
(BACHELOR DEGREE LEVEL)

SEMESTER I					
Orientation Week			29.09.2024	-	06.10.2024
Lectures	7	weeks*	07.10.2024	-	24.11.2024
Mid Semester I Break	1	week	25.11.2024	-	01.12.2024
Lectures	7	weeks*	02.12.2024	-	19.01.2025
Revision Week	1	week*	20.01.2025	-	26.01.2025
Semester I Final Examination	3	weeks*	27.01.2025	-	16.02.2025
Semester I Break	4	weeks	17.02.2025	-	16.03.2025
	23	weeks			
SEMESTER II					
Lectures	7	weeks*	17.03.2025	-	04.05.2025
Mid Semester II Break	1	week	05.05.2025	-	11.05.2025
Lectures	7	weeks*	12.05.2025	-	29.06.2025
Revision Week	1	week*	30.06.2025	-	06.07.2025
Semester II Final Examination	3	weeks*	07.07.2025	-	27.07.2025
Semester II Break	4	weeks	28.07.2025	-	24.08.2025
	23	weeks			
SPECIAL SEMESTER					
Lectures	7	weeks*	28.07.2025	-	14.09.2025
Special Semester Final Examination	1	week*	15.09.2025	-	21.09.2025
Break	1	week	22.09.2025		28.09.2025
	9	weeks			

Nota:

(*) The Academic Calendar has taken into account public and festive holidays and is subject to change.

Deepavali	31 October 2024 (Thursday)
Christmas Day	25 December 2024 (Wednesday)
New Year	01 January 2025 (Wednesday)
Chinese New Year	29 & 30 January 2025 (Wednesday & Thursday)
Federal Territory Day	01 February 2025 ((Saturday)
Thaipusam	11 February 2025 (Tuesday)
Nuzul Al-Quran	17 March 2025 (Monday)
Eidul Fitri	31 March & 01 April 2025 (Monday & Tuesday)
Wesak Day	12 May 2025 (Monday)
His Majesty the King's Birthday	02 June 2025 (Monday)
Eidul Adha	06 June 2025 (Friday)
Awal Muharam	27 June 2025 (Friday)

PROGRAMME OFFERED

There are six (6) programmes offered under the Computer Science as follows:

1. Bachelor of Computer Science (Computer System and Network)
2. Bachelor of Computer Science (Artificial Intelligence)
3. Bachelor of Computer Science (Information Systems)
4. Bachelor of Computer Science (Software Engineering)
5. Bachelor of Computer Science (Multimedia Computing)
6. Bachelor of Computer Science (Data Science)

BACHELOR OF COMPUTER SCIENCE

COMPUTER SYSTEM & NETWORK

Programme Goals

To produce excellent graduates who are able to apply the knowledge and skills gained in the field of Computer Science and apply specific techniques to solve computer-based problems, as well as having an entrepreneurship mindset.

Programme Educational Objective:

1. Graduates will demonstrate their ability to advance their careers in the computing profession, and will be engaged in learning, understanding, and applying new ideas and technologies as the field evolves. (Professionalism).

2. Graduates will have continuously advanced their knowledge, and improved competency in computer science to meet current and future needs (Continuous Personal Development).

3. Graduates will contribute to sustainable development and the well-being of society through computer science practices (Societal Engagement).

PROGRAMME GOALS & LEARNING OUTCOMES

Learning Outcomes

At the end of the Bachelor of Computer Science (Computer System & Network) programme, graduates can:

PO1 — Acquire a wider breadth of knowledge in computer science areas and a deeper understanding of Computer System & Network) techniques.

PO2 — Apply an understanding of Computer Science domain to solve problems by exploring innovative practices for acquiring and analyzing information.

PO3 — Engage in practical solutions, which involves requirements gathering, designing, and developing algorithms and intelligence-based systems.

PO4 — Apply basic Mathematics and computer science theories specifically techniques in modelling and designing computer-based systems.

PO5 — Communicate effectively and engage in teamwork to solve issues related to intelligence-based computer science.

PO6 — Works effectively as individuals, and as a member of various technical teams.

PO7 — Initiate technical and/or societal innovation through technologies or entrepreneurship

PO8 — Practice professionalism and ethics in executing tasks related to computing.

CURRICULUM STRUCTURE
BACHELOR OF COMPUTER SCIENCE (COMPUTER SYSTEM AND NETWORK)
ACADEMIC SESSION 2024/2025

COURSE CODE	COURSE COMPONENT	CREDITS	SEMESTER
	UNIVERSITY COURSES		
GIG1012	Philosophy and Current Issues (for local student only)	2	2
GLT1049	Basic Malay Language (for international student)		
GIG1013	Appreciation of Ethics and Civilizations	2	1
GIG1003	Basic Entrepreneurship Culture	2	1
GLTXXXX	English for Communication (1)	2	1
GLTXXXX	English for Communication (2)	2	2
	Co-Curriculum (1)	2	2
	Co-Curriculum (2)	2	1
	Total	**14**	

COURSE CODE	FACULTY CORE COURSES	CREDITS	SEMESTER
WIX1001	Computing Mathematics I	3	1
WIX1002	Fundamentals of Programming	5	1
WIX1003	Computer Systems and Organization	3	1
WIX2001	Thinking and Communication Skills	3	1
WIX2002	Project Management	3	1
	Total	**17**	

COURSE CODE	EXTERNAL UNIVERSITY ELECTIVE COURSES STUDENT HOLISTIC EMPOWERMENT (SHE)	KREDIT	SEMESTER
	University Elective (Cluster 1) - Thinking Matters: Mind & Intellect	2	2
	University Elective (Cluster 2) - Technology/Artificial Intelligence and Data Analytics: i-Techie	2	2
	University Elective (Cluster 3 - Global Issues and Community Sustainability: Making the World a Better Place	2	1
	KIAR: Integrity and Anti-Corruption course	2	2
	Total	**8**	

COURSE CODE	PROGRAMME CORE COURSES	CREDITS	SEMESTER
WIA1002	Data Structure (#WIX1002)	5	2
WIA1003	Computer System Architecture (#WIX1003)	3	2
WIA1005	Network Technology Foundation	4	2
WIA1006	Machine Learning	3	2
WIA2001	Database	3	1
WIA2003	Probability and Statistics	3	1
WIA2004	Operating Systems	4	2
WIA2005	Algorithm Design and Analysis (#WIA1002)	4	2
WIA2006	System Analysis and Design	3	1
WIA2008	Advanced Network Technology (#WIA1005)	4	1
WIA2009	Digital Design and Hardware Description Language (#WIA1003 & #WIX1003)	3	1
WIA3001	Industrial Training *	12	1
WIA3002	Academic Project I **	3	2
WIA3003	Academic Project II (#WIA3002)	5	1
	Total	**59**	

COURSE CODE	SPECIALIZATION ELECTIVE COURSES (Choose only 10 courses)	CREDITS	SEMESTER
WIC2002	Network Security	3	1 or 2
WIC2004	Internet Technology	3	1 or 2
WIC2005	Programmable Network (#WIA2008)	3	1 or 2
WIC2006	Digital Forensic	3	1 or 2
WIC2007	Cyber Security	3	1 or 2
WIC2008	Internet of Things (#WIA1005)	3	1 or 2
WIC3001	Mathematics in Networking	3	1 or 2
WIC3002	Cryptography	3	1 or 2
WIC3003	Embedded System Programming	3	1 or 2
WIC3004	Computer Penetration	3	1 or 2
WIC3005	Enterprise Network Design and Management (#WIA1005)	3	1 or 2
WIC3006	Mobile Computing	3	1 or 2
WIC3007	Principles of Distributed System (#WIA1005)	3	1 or 2
WIC3008	Microprocessor	3	1 or 2
WIC3009	Parallel Programming	3	1 or 2
	Total	**30**	
	TOTAL CREDITS FOR GRADUATION	**128**	

\#   Pre-requisite.
*   Taken all Faculty and Programme Core Courses except Academic Project I and Academic Project II.
**   Pass all Faculty and Programme Core Courses except for Industrial Training and Academic Project II.

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COURSE PLANNING FOR BACHELOR OF COMPUTER SCIENCE (COMPUTER SYSTEM AND NETWORK)
ACADEMIC SESSION 2024/2025

Level	Course Code	Semester 1	Credits	Course Code	Semester 2	Credits
1	GIG1003	Basic Entrepreneurship Culture	2	GIG1012 / GLT1049	Philosophy and Current Issues *(for local student only)* / Basic Malay Language *(for international student)*	2
	GLTXXXX	English for Communication (1)	2	GLTXXXX	English for Communication (2)	2
	WIX1001	Computing Mathematics I	3	WIA1002	Data Structure (#WIX1002)	5
	WIX1002	Fundamentals of Programming	5	WIA1003	Computer System Architecture (#WIX1003)	3
	WIX1003	Computer Systems and Organization	3	WIA1005	Network Technology Foundation	4
	WIX2001	Thinking and Communication Skills	3	WIA1006	Machine Learning	3
		Total	**18**		**Total**	**19**

Level	Course Code	Semester 1	Credits	Course Code	Semester 2	Credits
2	GIG1013	Appreciation of Ethics and Civilizations	2		Co-Curriculum (1)	2
	WIX2002	Project Management	3	WIA2004	Operating Systems	4
	WIA2001	Database	3	WIA2005	Algorithm Design and Analysis (#WIA1002)	4
	WIA2003	Probability and Statistics	3		Specialization Elective (1) ⊗	3
	WIA2006	System Analysis and Design	3		Specialization Elective (2) ⊗	3
	WIA2008	Advanced Network Technology (#WIA1005)	4		Specialization Elective (3) ⊗	3
	WIA2009	Digital Design and Hardware Description Language (#WIX1003 & #WIA1003)	3		*KIAR: Integrity and Anti-Corruption course*	2
		Total	**21**		**Total**	**21**

Level	Course Code	Semester 1	Credits	Course Code	Semester 2	Credits
3	WIA3001	Industrial Training *	12	WIA3002	Academic Project I **	3
					Specialization Elective (4) ⊗	3
					Specialization Elective (5) ⊗	3
					Specialization Elective (6) ⊗	3
					Specialization Elective (7) ⊗	3
					University Elective (Cluster 1): Thinking Matters: Mind & Intellect	2
					University Elective (Cluster 2): Technology/Artificial Intelligence and Data Analytics: i-Techie	2
		Total	**12**		**Total**	**19**

Level	Course Code	Semester 1	Credits
4		Co-Curriculum (2)	2
	WIA3003	Academic Project II (#WIA3002)	5
		Specialization Elective (8) ⊗	3
		Specialization Elective (9) ⊗	3
		Specialization Elective (10) ⊗	3
		University Elective (Cluster 3): Global Issues and Community Sustainability: Making the World a Better Place	2
		Total	**18**

Credit Distribution

Course Component	Credits
University Courses	14
Faculty Core Courses	17
University Elective Courses	8
Programme Core Courses	59
Specialization Elective Courses	30
TOTAL CREDITS FOR GRADUATION	**128**

\#   Pre-requisite.
*   Taken all Faculty and Programme Core Courses except Academic Project I and Academic Project II.
**   Pass all Faculty and Programme Core Courses except for Industrial Training and Academic Project II.
⊗   Each Specialization Elective Course is only offered ONCE every academic session, either on Semester 1 OR Semester 2.

BACHELOR OF COMPUTER SCIENCE

ARTIFICIAL INTELLIGENCE

Programme Goals

To produce excellent graduates who are able to apply the knowledge and skills gained in the field of Computer Science and apply specific Artificial Intelligence techniques to solve computer-based problems, as well as having entrepreneurship mindset.

Programme Educational Objective:

1. Graduates will demonstrate their ability to advance their careers in the computing profession, and will be engaged in learning, understanding, and applying new ideas and technologies as the Artificial Intelligence field evolves. (Professionalism).

2. Graduates will have continuously advanced their knowledge, and improved competency in computer science and Artificial Intelligence to meet current and future needs (Continuous Personal Development).

3. Graduates will contribute to sustainable development and the well-being of society through computer science and Artificial Intelligence (Societal Engagement).

PROGRAMME GOALS & LEARNING OUTCOMES

Learning Outcomes

At the end of the Bachelor of Computer Science (Computer System & Network) programme, graduates can:

PO1   Acquire a wider breadth of knowledge in computer science areas and a deeper understanding of Artificial Intelligence techniques.

PO2   Apply an understanding of Artificial Intelligence domain to solve problems by exploring innovative practices for acquiring and analyzing information.

PO3   Engage in practical solutions, which involves requirements gathering, designing, and developing algorithms and intelligence-based systems.

PO4   Apply basic mathematics and computer science theories specifically Artificial Intelligence techniques in modelling and designing computer-based systems.

PO5   Communicate effectively and engage in teamwork to solve issues related to intelligence-based computer science.

PO6   Works effectively as individuals, and as a member of various technical teams.

PO7   Initiate technical and/or societal innovation through technologies or entrepreneurship.

PO8   Practice professionalism and ethics in executing tasks related to computing.

CURRICULUM STRUCTURE
BACHELOR OF COMPUTER SCIENCE (ARTIFICIAL INTELLIGENCE)
ACADEMIC SESSION 2024/2025

COURSE CODE	COURSE COMPONENT UNIVERSITY COURSES	CREDITS	SEMESTER
GIG1012	Philosophy and Current Issues *(for local student only)*	2	1
GLT1049	Malay Language Communication *(for international student)*		
GIG1013	Appreciation of Ethics and Civilizations	2	2
GIG1003	Basic Entrepreneurship Culture	2	3
GLTXXXX	English for Communication (1)	2	1
GLTXXXX	English for Communication (2)	2	2
	Co-Curriculum (1)	2	4
	Co-Curriculum (2)	2	7
	Total	**14**	

COURSE CODE	FACULTY CORE COURSES	CREDITS	SEMESTER
WIX1001	Computing Mathematics I	3	1
WIX1002	Fundamentals of Programming	5	1
WIX1003	Computer Systems and Organization	3	1
WIX2001	Thinking and Communication Skills	3	3
WIX2002	Project Management	3	3
	Total	**17**	

COURSE CODE	EXTERNAL UNIVERSITY ELECTIVE COURSES STUDENT HOLISTIC EMPOWERMENT (SHE)	CREDITS	SEMESTER
	University Elective (*Cluster 1*) - *Thinking Matters: Mind & Intellect*	2	4
	University Elective (*Cluster 2*) - *Technology/Artificial Intelligence and Data Analytics: i-Techie*	2	6
	University Elective (*Cluster 3 - Global Issues and Community Sustainability: Making the World a Better Place*	2	6
	KIAR: Integrity and Anti-Corruption course	2	2
	Total	**8**	

COURSE CODE	PROGRAMME CORE COURSES	CREDITS	SEMESTER
WIA1002	Data Structure (#WIX1002)	5	2
WIA1003	Computer System Architecture (#WIX1003)	3	2
WIA1005	Network Technology Foundation	4	2
WIA1006	Machine Learning	3	2
WIA1007	Introduction to Data Science	3	1
WIA2001	Database	3	3
WIA2003	Probability and Statistics	3	3
WIA2004	Operating Systems	4	4
WIA2005	Algorithm Design and Analysis (#WIA1002)	4	4
WIA2006	System Analysis and Design	3	3
WIA2007	Mobile Application Development	4	3
WIA3001	Industrial Training *	12	5
WIA3002	Academic Project I **	3	6
WIA3003	Academic Project II (#WIA3002)	5	7
	Total	**59**	

COURSE CODE	SPECIALIZATION ELECTIVE COURSES *(Choose only 10 courses)*	CREDITS	SEMESTER
WIC2008	Internet of Things (#WIA1005)	3	4
WID2001	Knowledge Representation and Reasoning	3	4
WID2002	Computing Mathematics II	3	4
WID2003	Cognitive Science	3	4
WID3001	Functional and Logic Programming	3	7
WID3002	Natural Language Processing	3	6
WID3007	Fuzzy Logic (#WIX1001)	3	7
WID3010	Autonomous Robots	3	6
WID3011	Deep Learning	3	6
WID3012	Evolutionary Computation	3	7
WID3013	Computer Vision and Pattern Recognition	3	6
WID3014	Practical Artificial Intelligence	3	7
WID3015	Numerical Analysis	3	7
WIG3004	Virtual Reality	3	6
	Total	**30**	
	TOTAL CREDITS FOR GRADUATION	**128**	

\#   Pre-requisite.
*   Taken all Faculty and Programme Core Courses except Academic Project I and Academic Project II.
**   Pass all Faculty and Programme Core Courses except for Industrial Training and Academic Project II.

COURSE PLANNING FOR BACHELOR OF COMPUTER SCIENCE (ARTIFICIAL INTELLIGENCE)
ACADEMIC SESSION 2024/2025

Level	Course Code	Semester 1	Credits	Course Code	Semester 2	Credits
1	GIG1003	Basic Entrepreneurship Culture	2	GIG1012 / GLT1049	Philosophy and Current Issues (*for local student only*) / Malay Language Communication (*for international student*)	2
	GLTXXXX	English for Communication (1)	2	GLTXXXX	English for Communication (2)	2
	WIX1001	Computing Mathematics I	3	WIA1002	Data Structure (#WIX1002)	5
	WIX1002	Fundamentals of Programming	5	WIA1003	Computer System Architecture (#WIX1003)	3
	WIX1003	Computer Systems and Organization	3	WIA1005	Network Technology Foundation	4
	WIA1007	Introduction to Data Science	3	WIA1006	Machine Learning	3
		Total	**18**		**Total**	**19**

Level	Course Code	Semester 1	Credits	Course Code	Semester 2	Credits
2	GIG1013	Appreciation of Ethics and Civilizations	2		Co-Curriculum (1)	2
	WIX2001	Thinking and Communication Skills	3	WIA2004	Operating Systems	4
	WIX2002	Project Management	3	WIA2005	Algorithm Design and Analysis (#WIA1002)	4
	WIA2001	Database	3		Specialization Elective (1)	3
	WIA2003	Probability and Statistics	3		Specialization Elective (2)	3
	WIA2006	System Analysis and Design	3		Specialization Elective (3)	3
	WIA2007	Mobile Application Development	4		*University Elective (Cluster 1)*	2
					Choose 3 electives of the following	
				WIC2008	*Internet of Things (#WIA1005)*	3
				WID2001	*Knowledge Representation and Reasoning*	3
				WID2002	*Computing Mathematics II*	3
				WID2003	*Cognitive Science*	3
		Total	**21**		**Total**	**21**

Level	Course Code	Semester 1	Credits	Course Code	Semester 2	Credits
3	WIA3001	Industrial Training *	12	WIA3002	Academic Project I **	3
					Specialization Elective (4)	3
					Specialization Elective (5)	3
					Specialization Elective (6)	3
					Specialization Elective (7)	3
					University Elective (Cluster 2)	2
					University Elective (Cluster 3)	2
					Choose 4 electives of the following	
				WID3002	*Natural Language Processing*	3
				WID3010	*Autonomous Robots*	3
				WID3011	*Deep Learning*	3
				WID3013	*Computer Vision and Pattern Recognition*	3
				WIG3004	*Virtual Reality*	3
		Total	**12**		**Total**	**19**

Level	Course Code	Semester 1	Credits
4		Co-Curriculum (2)	2
	WIA3003	Academic Project II (#WIA3002)	5
		Specialization Elective (8)	3
		Specialization Elective (9)	3
		Specialization Elective (10)	3
		University Elective (Cluster 3): Global Issues and Community Sustainability: Making the World a Better Place	2
		Choose 3 electives of the following	
	WID3001	*Functional and Logic Programming*	3
	WID3007	*Fuzzy Logic (#WIX1001)*	3
	WID3014	*Practical Artificial Intelligence*	3
	WID3015	*Numerical Analysis*	3
		Total	**18**

Credit Distribution

Course Component	Credits
University Courses	14
Faculty Core Courses	17
University Elective Courses	8
Programme Core Courses	59
University Courses	14
TOTAL CREDITS FOR GRADUATION	**128**

\#   Pre-requisite.
*   Taken all Faculty and Programme Core Courses except Academic Project I and Academic Project II.
**   Pass all Faculty and Programme Core Courses except for Industrial Training and Academic Project II.

BACHELOR OF COMPUTER SCIENCE

INFORMATION SYSTEMS

PROGRAMME GOALS & LEARNING OUTCOMES

Programme Goals

To produce excellent graduates who are able to apply the knowledge and skills gained in the field of Computer Science and apply specific Information Systems techniques to solve computer-based problems, as well as having an entrepreneurship mindset.

Programme Educational Objective:

1. Graduates will demonstrate their ability to advance their careers in the computing profession, and will be engaged in learning, understanding, and applying new ideas and technologies as the Information Systems field evolves. (Professionalism).

2. Graduates will have continuously advanced their knowledge, and improved competency in computer science and Information Systems to meet current and future needs (Continuous Personal Development).

3. Graduates will contribute to sustainable development and the well-being of society through computer science and Information Systems practices (Societal Engagement).

PROGRAMME GOALS & LEARNING OUTCOMES

Learning Outcomes

At the end of the Bachelor of Computer Science (Information Systems) programme, graduates can:

PO1	Acquire a wider breadth of knowledge in computer science areas and a deeper understanding of Information Systems techniques.
PO2	Apply an understanding of Information Systems domain to solve problems by exploring innovative practices for acquiring and analyzing information.
PO3	Engage in practical solutions, which involves requirements gathering, designing, and developing algorithms and intelligence-based systems.
PO4	Apply basic Mathematics and computer science theories specifically Information Systems techniques in modelling and designing computer-based systems..
PO5	Communicate effectively and engage in teamwork to solve issues related to intelligence-based computer science.
PO6	Works effectively as individuals, and as a member of various technical teams.
PO7	Initiate technical and/or societal innovation through technologies or entrepreneurship.
PO8	Practice professionalism and ethics in executing tasks related to computing

CURRICULUM STRUCTURE
BACHELOR OF COMPUTER SCIENCE (INFORMATION SYSTEMS)
ACADEMIC SESSION 2024/2025

COURSE CODE	COURSE COMPONENT UNIVERSITY COURSES	CREDITS	SEMESTER
GIG1012	Philosophy and Current Issues *(for local student only)*		
GLT1049	Malay Language Communication *(for international student)*	2	2
GIG1013	Appreciation of Ethics and Civilizations	2	1
GIG1003	Basic Entrepreneurship Culture	2	1
GLTXXXX	English for Communication (1)	2	1
GLTXXXX	English for Communication (2)	2	2
	Co-Curriculum (1)	2	2
	Co-Curriculum (1)	2	1
	Total	**14**	

COURSE CODE	FACULTY CORE COURSES	CREDITS	SEMESTER
WIX1001	Computing Mathematics I	3	1
WIX1002	Fundamentals of Programming	5	1
WIX1003	Computer Systems and Organization	3	1
WIX2001	Thinking and Communication Skills	3	1
WIX2002	Project Management	3	1
	Total	**17**	

COURSE CODE	EXTERNAL UNIVERSITY ELECTIVE COURSES STUDENT HOLISTIC EMPOWERMENT (SHE)	CREDITS	SEMESTER
	University Elective (*Cluster 1*) - *Thinking Matters: Mind & Intellect*	2	2
	University Elective (*Cluster 2*) - *Technology/Artificial Intelligence and Data Analytics: i-Techie*	2	2
	University Elective (*Cluster 3 - Global Issues and Community Sustainability: Making the World a Better Place*	2	1
	KIAR: Integrity and Anti-Corruption course	2	2
	Total	**8**	

COURSE CODE	PROGRAMME CORE COURSES	CREDITS	SEMESTER
WIA1001	Information Systems	3	1
WIA1002	Data Structure (#WIX1002)	5	2
WIA1003	Computer System Architecture (#WIX1003)	3	2
WIA1005	Network Technology Foundation	4	2
WIA1006	Machine Learning	3	2
WIA2001	Database	3	1
WIA2003	Probability and Statistics	3	1
WIA2004	Operating Systems	4	2
WIA2005	Algorithm Design and Analysis (#WIA1002)	4	2
WIA2006	System Analysis and Design	3	1
WIA2007	Mobile Application Development	4	1
WIA3001	Industrial Training *	12	1
WIA3002	Academic Project I **	3	2
WIA3003	Academic Project II (#WIA3002)	5	1
	Total	**59**	

COURSE CODE	SPECIALIZATION ELECTIVE COURSES *(Choose only 10 courses)*	CREDITS	SEMESTER
WIC2008	*Internet of Things*	3	1 or 2
WIE2001	Trends in Information Systems	3	1 or 2
WIE2002	Open-Source Programming: Application and Technology	3	1 or 2
WIE2003	Introduction to Data Science	3	1 or 2
WIE2005	Information Retrieval and Web Search	3	1 or 2
WIE3001	Advanced Database	3	1 or 2
WIE3002	Electronic Commerce	3	1 or 2
WIE3003	Information System Control and Security	3	1 or 2
WIE3005	Knowledge Management and Engineering	3	1 or 2
WIE3006	Information System Auditing	3	1 or 2
WIE3007	Data Mining and Warehousing	3	1 or 2
WIE3010	Data Visualization	3	1 or 2
WIE3012	Business Analytics and Intelligence	3	1 or 2
WIF2003	Web Programming	3	1 or 2
	Total	**30**	
	TOTAL CREDITS FOR GRADUATION	**128**	

\#   Pre-requisite.
*   Taken all Faculty and Programme Core Courses except Academic Project I and Academic Project II.
**   Pass all Faculty and Programme Core Courses except for Industrial Training and Academic Project II.
⊗   Each Specialization Elective Course is only offered ONCE every academic session, either on Semester 1 OR Semester 2.

COURSE PLANNING FOR BACHELOR OF COMPUTER SCIENCE (INFORMATION SYSTEMS)
ACADEMIC SESSION 2024/2025

Level	Course Code	Semester 1	Credits	Course Code	Semester 2	Credits
1	GIG1003	Basic Entrepreneurship Culture	2	GIG1012 / GLT1049	Philosophy and Current Issues *(for local student only)* / Malay Language Communication *(for international student)*	2
	GLTXXXX	English for Communication (1)	2	GLTXXXX	English for Communication (2)	2
	WIX1001	Computing Mathematics I	3	WIA1002	Data Structure (#WIX1002)	5
	WIX1002	Fundamentals of Programming	5	WIA1003	Computer System Architecture (#WIX1003)	3
	WIX1003	Computer Systems and Organization	3	WIA1005	Network Technology Foundation	4
	WIA1001	Information Systems	3	WIA1006	Machine Learning	3
		Total	**18**		**Total**	**19**

Level	Course Code	Semester 1	Credits	Course Code	Semester 2	Credits
2	GIG1013	Appreciation of Ethics and Civilizations	2		Co-Curriculum (1)	2
	WIX2001	Thinking and Communication Skills	3	WIA2004	Operating Systems	4
	WIX2002	Project Management	3	WIA2005	Algorithm Design and Analysis (#WIA1002)	4
	WIA2001	Database	3		Specialization Elective (1) ⊛	3
	WIA2003	Probability and Statistics	3		Specialization Elective (2) ⊛	3
	WIA2006	System Analysis and Design	3		Specialization Elective (3) ⊛	3
	WIA2007	Mobile Application Development	4		*KIAR: Integrity and Anti-Corruption course*	2
		Total	**21**		**Total**	**21**

Level	Course Code	Semester 1	Credits	Course Code	Semester 2	Credits
3	WIA3001	Industrial Training *	12	WIA3002	Academic Project I **	3
					Specialization Elective (4) ⊛	3
					Specialization Elective (5) ⊛	3
					Specialization Elective (6) ⊛	3
					Specialization Elective (7) ⊛	3
					University Elective (Cluster 1): Thinking Matters: Mind & Intellect	2
					University Elective (Cluster 2): Technology/Artificial Intelligence and Data Analytics: i-Techie	2
		Total	**12**		**Total**	**19**

Level	Course Code	Semester 1	Credits
4		Co-Curriculum (2)	2
	WIA3003	Academic Project II (#WIA3002)	5
		Specialization Elective (8) ⊛	3
		Specialization Elective (9) ⊛	3
		Specialization Elective (10) ⊛	3
		University Elective (Cluster 3): Global Issues and Community Sustainability: Making the World a Better Place	2
		Total	**18**

Credit Distribution

Course Component	Credits
University Courses	14
Faculty Core Courses	17
University Elective Courses	8
Programme Core Courses	59
Specialization Elective Courses	30
TOTAL CREDITS FOR GRADUATION	**128**

\#   Pre-requisite.
*   Taken all Faculty and Programme Core Courses except Academic Project I and Academic Project II.
**   Pass all Faculty and Programme Core Courses except for Industrial Training and Academic Project II.
⊛   Each Specialization Elective Course is only offered ONCE every academic session, either on Semester 1 OR Semester 2.

BACHELOR OF
COMPUTER SCIENCE
SOFTWARE
ENGINEERING

Programme Goals

To produce excellent graduates who are able to apply the knowledge and skills gained in the field of Computer Science and apply specific techniques to solve computer-based problems, as well as having an entrepreneurship mindset.

Programme Educational Objective:

1. Graduates will demonstrate their ability to advance their careers in the computing profession, and will be engaged in learning, understanding, and applying new ideas and technologies as the Software Engineering field evolves (Professionalism).

2. Graduates will have continuously advanced their knowledge, and improved competency in computer science, software development and related technologies to meet current and future needs (Continuous Personal Development).

3. Graduates will contribute to sustainable development and the well-being of society through professional practices (Societal Engagement).

PROGRAMME GOALS & LEARNING OUTCOMES

Learning Outcomes

At the end of the Bachelor of Computer Science (Software Engineering) programme, graduates can:

PO1 — Acquire a wider breadth of knowledge in computer science areas and a deeper understanding of Software Engineering techniques.

PO2 — Apply an understanding of Software Engineering domain to solve problems by exploring innovative practices for acquiring and analyzing information.

PO3 — Engage in requirements gathering, designing, implementing, and evaluating software or IT-related systems.

PO4 — Attain an ability to apply mathematical skills and/or toolset in the software development life cycle.

PO5 — Communicate effectively and engage in teamwork to solve software related problems.

PO6 — Function effectively as an individual, and as a member in diverse technical teams.

PO7 — Initiate technical and/or societal innovation through technologies or entrepreneurship.

PO8 — Practicing high ethics in the computer science profession, especially when it comes to computer systems, organizations, and society.

CURRICULUM STRUCTURE
BACHELOR OF COMPUTER SCIENCE (SOFTWARE ENGINEERING)
ACADEMIC SESSION 2024/2025

COURSE CODE	COURSE COMPONENT UNIVERSITY COURSES	CREDITS	SEMESTER
GIG1012	Philosophy and Current Issues *(for local student only)*	2	2
GLT1049	Malay Language Communication *(for international student)*		
GIG1013	Appreciation of Ethics and Civilizations	2	1
GIG1003	Basic Entrepreneurship Culture	2	1
GLTXXXX	English for Communication (1)	2	1
GLTXXXX	English for Communication (2)	2	2
	Co-Curriculum (1)	2	2
	Co-Curriculum (2)	2	1
	Total	**14**	

COURSE CODE	FACULTY CORE COURSES	CREDITS	SEMESTER
WIX1001	Computing Mathematics I	3	1
WIX1002	Fundamentals of Programming	5	1
WIX1003	Computer Systems and Organization	3	1
WIX2001	Thinking and Communication Skills	3	1
WIX2002	Project Management	3	1
	Total	**17**	

COURSE CODE	EXTERNAL UNIVERSITY ELECTIVE COURSES STUDENT HOLISTIC EMPOWERMENT (SHE)	CREDITS	SEMESTER
	University Elective *(Cluster 1) - Thinking Matters: Mind & Intellect*	2	2
	University Elective *(Cluster 2) - Technology/Artificial Intelligence and Data Analytics: i-Techie*	2	2
	University Elective *(Cluster 3) - Global Issues and Community Sustainability: Making the World a Better Place*	2	1
	KIAR: Integrity and Anti-Corruption course	2	2
	Total	**8**	

COURSE CODE	PROGRAMME CORE COURSES	CREDITS	SEMESTER
WIA1002	Data Structure (#WIX1002)	5	2
WIA1003	Computer System Architecture (#WIX1003)	3	2
WIA1005	Network Technology Foundation	4	2
WIA1006	Machine Learning	3	2
WIA2001	Database	3	1
WIA2002	Software Modeling	3	1
WIA2003	Probability and Statistics	3	1
WIA2004	Operating Systems	4	2
WIA2005	Algorithm Design and Analysis (#WIA1002)	4	2
WIA2007	Mobile Application Development	4	1
WIA2010	Human Computer Interaction	3	1
WIA3001	Industrial Training *	12	1
WIA3002	Academic Project I **	3	2
WIA3003	Academic Project II (#WIA3002)	5	1
	Total	**59**	

COURSE CODE	SPECIALIZATION ELECTIVE COURSES *(Choose only 10 courses)*	CREDITS	SEMESTER
WIF2002	Software Requirements Engineering	3	1 or 2
WIF2003	Web Programming	3	1 or 2
WIF3001	Software Testing	3	1 or 2
WIF3002	Software Process and Quality	3	1 or 2
WIF3004	Software Architecture and Design Paradigms (#WIA2002)	3	1 or 2
WIF3005	Software Maintenance and Evolution	3	1 or 2
WIF3006	Component Based Software Engineering (#WIA2002)	3	1 or 2
WIF3008	Real Time Systems	3	1 or 2
WIF3009	Python for Scientific Computing	3	1 or 2
WIF3010	Programming Language Paradigm	3	1 or 2
WIF3011	Concurrent and Parallel Programming (#WIX1002) (#WIA2004)	3	1 or 2
WIG3005	Game Development	3	1 or 2
WIC2008	Internet of Things (#WIA1005)	3	1 or 2
	Total	**30**	
	TOTAL CREDITS FOR GRADUATION	**128**	

\#   Prerequisite.
*   Taken all Faculty and Programme Core Courses except Academic Project I and Academic Project II.
**   Pass all Faculty and Programme Core Courses except for Industrial Training and Academic Project II.
⊗   Each Specialization Elective Course is only offered ONCE every academic session, either on Semester 1 OR Semester 2.

COURSE PLANNING FOR BACHELOR OF SOFTWARE ENGINEERING
ACADEMIC SESSION 2025/2026
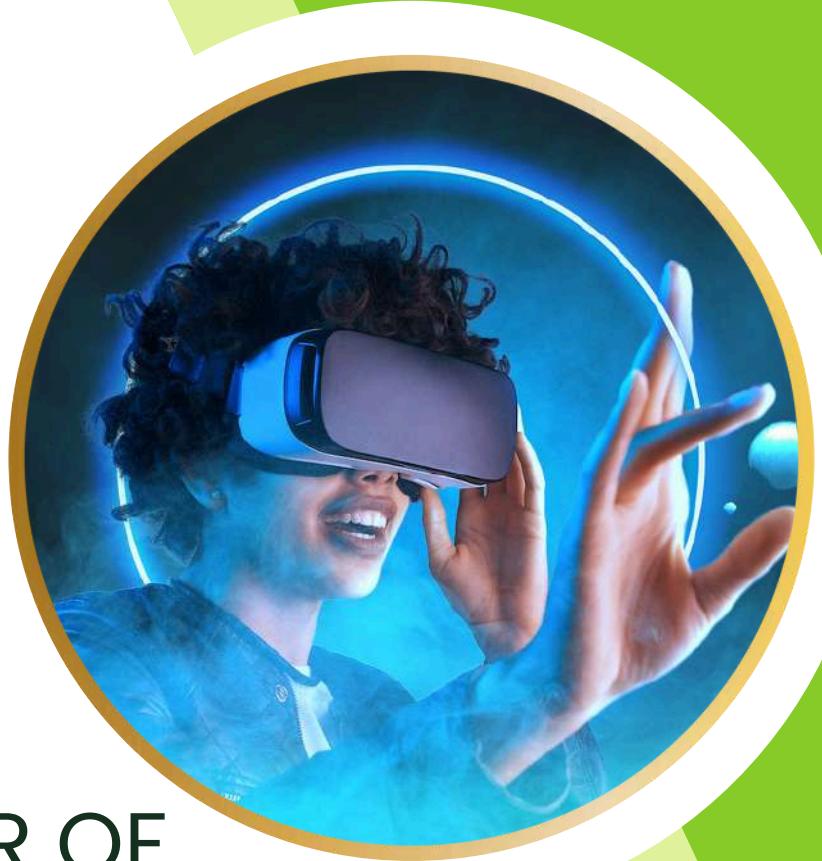
Level	Course Code	Semester 1	Credits	Course Code	Semester 2	Credits
1	GIG1003	Basic Entrepreneurship Culture	2	GIG1012 / GLT1049	Philosophy and Current Issues (for local student only) / Malay Language Communication (for international student)	2
	GLTXXXX	English for Communication (1)	2	GLTXXXX	English for Communication (2)	2
	WIX1001	Computing Mathematics I	3	WIA1002	Data Structure (#WIX1002)	5
	WIX1002	Fundamentals of Programming	5	WIA1003	Computer System Architecture (#WIX1003)	3
	WIX1003	Computer Systems and Organization	3	WIA1005	Network Technology Foundation	4
	WIA2010	Human Computer Interaction	3	WIA1006	Machine Learning	3
		Total	**18**		**Total**	**19**

Level	Course Code	Semester 1	Credits	Course Code	Semester 2	Credits
2	GIG1013	Appreciation of Ethics and Civilizations	2		Co-Curriculum (1)	2
	WIX2001	Thinking and Communication Skills	3	WIA2004	Operating Systems	4
	WIX2002	Project Management	3	WIA2005	Algorithm Design and Analysis (#WIA1002)	4
	WIA2001	Database	3		Specialization Elective (1) ⊗	3
	WIA2002	Software Modeling	3		Specialization Elective (2) ⊗	3
	WIA2003	Probability and Statistics	3		Specialization Elective (3) ⊗	3
	WIA2007	Mobile Application Development	4		KIAR: Integrity and Anti-Corruption course	2
		Total	**21**		**Total**	**21**

Level	Course Code	Semester 1	Credits	Course Code	Semester 2	Credits
3	WIA3001	Industrial Training *	12	WIA3002	Academic Project I **	3
					Specialization Elective (4) ⊗	3
					Specialization Elective (5) ⊗	3
					Specialization Elective (6) ⊗	3
					Specialization Elective (7) ⊗	3
					University Elective (Cluster 1): Thinking Matters: Mind & Intellect	2
					University Elective (Cluster 2): Technology/Artificial Intelligence and Data Analytics: i-Techie	2
		Total	**12**		**Total**	**19**

Level	Course Code	Semester 1	Credits	Credit Distribution		
4		Co-Curriculum (2)	2	Course Component		Credits
	WIA3003	Academic Project II (#WIA3002)	5	University Courses		14
		Specialization Elective (8) ⊗	3	Faculty Core Courses		17
		Specialization Elective (9) ⊗	3	University Elective Courses		8
		Specialization Elective (10) ⊗	3	Programme Core Courses		59
		University Elective (Cluster 3): Global Issues and Community Sustainability: Making the World a Better Place	2	Specialization Elective Courses ⊗		30
		Total	**18**	**TOTAL CREDITS FOR GRADUATION**		**128**

\#   Prerequisite.
*   Taken all Faculty and Programme Core Courses except Academic Project I and Academic Project II.
**   Pass all Faculty and Programme Core Courses except for Industrial Training and Academic Project II.
⊗   Each Specialization Elective Course is only offered ONCE every academic session, either on Semester 1 OR Semester 2.

BACHELOR OF COMPUTER SCIENCE
MULTIMEDIA COMPUTING

PROGRAMME GOALS & LEARNING OUTCOMES

Programme Goals

To produce excellent graduates who are able to apply the knowledge and skills gained in the field of Computer Science and apply specific techniques to solve computer-based problems, as well as having entrepreneurship mindset.

Programme Educational Objective:

1. Graduates will demonstrate their ability to advance their careers in the computing profession, and will be engaged in learning, understanding, and applying new ideas and technologies along with the evolution of the field of Multimedia Computing. (Professionalism).

2. Graduates will have continuously advanced their knowledge, and improved competency in computer science and Multimedia Computing to meet current and future needs (Continuous Personal Development).

3. Graduates will contribute to sustainable development and the well-being of society through the practices of computer science and Multimedia Computing (Societal Engagement)

PROGRAMME GOALS & LEARNING OUTCOMES

Learning Outcomes

At the end of the Bachelor of Computer Science (Multimedia Computing) programme, graduates can:

PO1   Acquire a wider breadth of knowledge in computer science areas and a deeper understanding of Multimedia Computing techniques.

PO2   Apply an understanding of Computer Science domain to solve problems by exploring innovative practices for acquiring and analyzing information.

PO3   Engage in practical solutions, which involves requirements gathering, designing, and developing algorithms and intelligence-based systems.

PO4   Apply basic Mathematics and computer science theories specifically techniques in modelling and designing computer-based systems..

PO5   Communicate effectively and engage in a teamwork to solve issues related to intelligence-based computer science.

PO6   Works effectively as individuals, and as a member of various technical teams.

PO7   Initiate technical and/or societal innovation through technologies or entrepreneurship.

PO8   Practice professionalism and ethics in executing tasks related to computing

CURRICULUM STRUCTURE
BACHELOR OF COMPUTER SCIENCE (MULTIMEDIA COMPUTING)
ACADEMIC SESSION 2024/2025

COURSE CODE	COURSE COMPONENT UNIVERSITY COURSES	CREDITS	SEMESTER
GIG1012	Philosophy and Current Issues *(for local student only)*	2	2
GLT1049	Basic Malay Language *(for international student)*		
GIG1013	Appreciation of Ethics and Civilizations	2	1
GIG1003	Basic Entrepreneurship Culture	2	1
GLTXXXX	English for Communication (1)	2	1
GLTXXXX	English for Communication (2)	2	2
	Co-Curriculum (1)	2	2
	Co-Curriculum (2)	2	1
	Total	**14**	

COURSE CODE	FACULTY CORE COURSES	CREDITS	SEMESTER
WIX1001	Computing Mathematics I	3	1
WIX1002	Fundamentals of Programming	5	1
WIX1003	Computer Systems and Organization	3	1
WIX2001	Thinking and Communication Skills	3	1
WIX2002	Project Management	3	1
	Total	**17**	

COURSE CODE	EXTERNAL UNIVERSITY ELECTIVE COURSES STUDENT HOLISTIC EMPOWERMENT (SHE)	CREDITS	SEMESTER
	University Elective (*Cluster 1*) - *Thinking Matters: Mind & Intellect*	2	2
	University Elective (*Cluster 2*) - *Technology/Artificial Intelligence and Data Analytics: i-Techie*	2	2
	University Elective (*Cluster 3 - Global Issues and Community Sustainability: Making the World a Better Place*	2	1
	KIAR: Integrity and Anti-Corruption course	2	2
	Total	**8**	

COURSE CODE	PROGRAMME CORE COURSES	CREDITS	SEMESTER
WIA1002	Data Structure (#WIX1002)	5	2
WIA1003	Computer System Architecture (#WIX1003)	3	2
WIA1005	Network Technology Foundation	4	2
WIA1006	Machine Learning	3	2
WIA1008	Fundamental of Multimedia	3	1
WIA2001	Database	3	1
WIA2003	Probability and Statistics	3	1
WIA2004	Operating Systems	4	2
WIA2005	Algorithm Design and Analysis (#WIA1002)	4	2
WIA2006	System Analysis and Design	3	1
WIA2007	Mobile Application Development	4	1
WIA3001	Industrial Training *	12	1
WIA3002	Academic Project I **	3	2
WIA3003	Academic Project II (#WIA3002)	5	1
	Total	**59**	

COURSE CODE	SPECIALIZATION ELECTIVE COURSES *(Choose only 10 courses)*	CREDITS	SEMESTER
WIG2001	Digital Image Processing	3	1 atau 2
WIG2002	Computer Graphics	3	1 atau 2
WIG2004	Audio Synthesis	3	1 atau 2
WIG2005	Interactive Design	3	1 atau 2
WIG3001	Mathematics for Multimedia	3	1 atau 2
WIG3002	Rendering and Animation	3	1 atau 2
WIG3003	Multimedia Programming	3	1 atau 2
WIG3004	Virtual Reality	3	1 atau 2
WIG3005	Game Development	3	1 atau 2
WIG3006	Digital Video Processing	3	1 atau 2
WIG3007	Special Topics in Multimedia	3	1 atau 2
WIG3008	Multimedia Forensic and Security	3	1 atau 2
WIE3010	Data Visualization	3	1 atau 2
WIF2003	Web Programming	3	1 atau 2
	Total	**30**	
	TOTAL CREDITS FOR GRADUATION	**128**	

\#   Pre-requisite.
*   Taken all Faculty and Programme Core Courses except Academic Project I and Academic Project II.
**   Pass all Faculty and Programme Core Courses except for Industrial Training and Academic Project II.

COURSE PLANNING FOR BACHELOR OF COMPUTER SCIENCE (MULTIMEDIA COMPUTING)
ACADEMIC SESSION 2024/2025

Level	Course Code	Semester 1	Credits	Course Code	Semester 2	Credits
1	GIG1003	Basic Entrepreneurship Culture	2	GIG1012 / GLT1049	Philosophy and Current Issues *(for local student only)* / Basic Malay Language *(for international student)*	2
	GLTXXXX	English for Communication (1)	2	GLTXXXX	English for Communication (2)	2
	WIX1001	Computing Mathematics I	3	WIA1002	Data Structure (#WIX1002)	5
	WIX1002	Fundamentals of Programming	5	WIA1003	Computer System Architecture (#WIX1003)	3
	WIX1003	Computer Systems and Organization	3	WIA1005	Network Technology Foundation	4
	WIA1008	Fundamental of Multimedia	3	WIA1006	Machine Learning	3
		Total	**18**		**Total**	**19**

Level	Course Code	Semester 1	Credits	Course Code	Semester 2	Credits
2	GIG1013	Appreciation of Ethics and Civilizations	2		Co-Curriculum (1)	2
	WIX2001	Thinking and Communication Skills	3	WIA2004	Operating Systems	4
	WIX2002	Project Management	3	WIA2005	Algorithm Design and Analysis (#WIA1002)	4
	WIA2001	Database	3		Specialization Elective (1) ⊗	3
	WIA2003	Probability and Statistics	3		Specialization Elective (2) ⊗	3
	WIA2006	System Analysis and Design	3		Specialization Elective (3) ⊗	3
	WIA2007	Mobile Application Development	4		*KIAR: Integrity and Anti-Corruption course*	2
		Total	**21**		**Total**	**21**

Level	Course Code	Semester 1	Credits	Course Code	Semester 2	Credits
3	WIB3001	Industrial Training *	12	WIA3002	Academic Project I **	3
					Specialization Elective (4) ⊗	3
					Specialization Elective (5) ⊗	3
					Specialization Elective (6) ⊗	3
					Specialization Elective (7) ⊗	3
					University Elective (Cluster 1): Thinking Matters: Mind & Intellect	2
					University Elective (Cluster 2): Technology/Artificial Intelligence and Data Analytics: i-Techie	2
		Total	**12**		**Total**	**19**

Level	Course Code	Semester 1	Credits		Credit Distribution	
4		Co-Curriculum (2)	2		**Course Component**	**Credits**
	WIA3003	Academic Project II (#WIA3002)	5		University Courses	14
		Specialization Elective (8) ⊗	3		Faculty Core Courses	17
		Specialization Elective (9) ⊗	3		University Elective Courses	8
		Specialization Elective (10) ⊗	3		Programme Core Courses	59
		University Elective (Cluster 3): Global Issues and Community Sustainability: Making the World a Better Place	2		Specialization Elective Courses	30
		Total	**18**		**TOTAL CREDITS FOR GRADUATION**	**128**

\#   Pre-requisite.
*   Taken all Faculty and Programme Core Courses except Academic Project I and Academic Project II.
**   Pass all Faculty and Programme Core Courses except for Industrial Training and Academic Project II.
⊗   Each Specialization Elective Course is only offered ONCE every academic session, either on Semester 1 OR Semester 2.

BACHELOR OF COMPUTER SCIENCE

DATA SCIENCE

Programme Goals

To produce excellent graduates who can apply the knowledge gained in the field of Data Science and apply scientific techniques to solve computer-based problems as well as having entrepreneurship mindset.

Programme Educational Objective:

Graduates can conduct data-driven investigations by accessing, evaluating, and analyzing data sets to obtain useful information; competent in the use of appropriate tools and technologies in building data models capable of making predictions and solving problems involving different set of data from any domain and developing data products.

PROGRAMME GOALS & LEARNING OUTCOMES

Learning Outcomes

At the end of the Bachelor of Computer Science (Data Science) programme, graduates can:

PO1	Gain strong knowledge in Data Science and across Computer Science field.
PO2	Engage in practical training that involves collecting, cleaning, and exploring data to extract information and gain insights from the data.
PO3	Demonstrate social skills and responsibility to the community using the knowledge and skills acquired throughout the Data Science pipeline.
PO4	Apply high ethical values in professional practice especially in dealing with data, organizations, and society.
PO5	Communicate effectively and demonstrate specific skills involved in communicating data, whether verbal or visual.
PO6	Apply data science concepts and methods to solve problems in a real-world context with effective data-driven solutions.
PO7	Use lifelong information management and learning skills to acquire knowledge and skills in Data Science.
PO8	Identify and analyze business opportunities and can develop a new Data Science related business plan.

CURRICULUM STRUCTURE
BACHELOR OF COMPUTER SCIENCE (DATA SCIENCE)
ACADEMIC SESSION 2024/2025

COURSE CODE	COURSE COMPONENT	CREDITS	SEMESTER
	UNIVERSITY COURSES		
GIG1012 / GLT1049	Philosophy and Current Issues *(for local student only)* / Basic Malay Language *(for international student)*	2	2
GIG1013	Appreciation of Ethics and Civilizations	2	1
GIG1003	Basic Entrepreneurship	2	1
GIG1004	Information Literacy	2	2
GIG1005	Social Engagement	2	2
GLTXXXX	English for Communication (1)	3	1
GLTXXXX	English for Communication (2)	3	2
	Co-Curriuculum	2	1
	External Faculty Elective	2	1
	Total	**20**	

COURSE CODE	FACULTY CORE COURSES	CREDITS	SEMESTER
WIX1001	Computing Mathematics I	3	1
WIX1002	Fundamentals of Programming	5	1
WIX1003	Computer System and Organization	3	1
WIX2001	Thinking and Communication Skills	3	1
WIX2002	Project Management	3	1
	Total	**17**	

COURSE CODE	PROGRAMME CORE COURSES	CREDITS	SEMESTER
WIE2003	Introduction to Data Science	3	2
WIA1001	Information Systems	3	1
WIA1002	Data Structure	5	2
WIA1003	Computer System Architecture	3	2
WIA1005	Network Technology Foundation	4	2
WIA2001	Database	3	1
WIA2002	Software Modelling	3	1
WIA2003	Probability and Statistics	3	1
WIA2004	Operating Systems	4	2
WID3006	Machine Learning	3	2
WIH3005	Professional Development*	2	1
WIH3006	Data Science and Application*	5	1
WIH3007	Industrial Solution Development*	5	1
WIH3001	Data Science Project**	3	1
WIH3002	Data Science Industrial Training*	14	2
	Total	**63**	

COURSE CODE	FACULTY ELECTIVE COURSES (*Choose only 2 courses*)	CREDITS	SEMESTER
WIX3001	Soft Computing	3	1 atau 2
WIX3002	Social Informatics	3	1 atau 2
WIX3003	Information Security Management and Ethics	3	1 atau 2
WIC2004	Internet Technology	3	1 atau 2
	Total	**6**	

COURSE CODE	SPECIALIZATION ELECTIVE COURSES (*Choose only 6 courses*)	CREDITS	SEMESTER
WIH2001	Data Analytics	3	1 atau 2
WID2001	Knowledge Representation and Reasoning	3	1 atau 2
WID2002	Computing Mathematics II	3	1 atau 2
WID3001	Functional and Logic Programming	3	1 atau 2
WID3002	Natural Language Processing	3	1 atau 2
WIE3007	Data Mining and Warehousing	3	1 atau 2
WIE3010	Data Visualization	3	1 atau 2
WIE3012	Business Analytics and Intelligence	3	1 atau 2
WIH3003	Big Data Applications and Analytics	3	1 atau 2
WIH3004	Trends in Data Science	3	1 atau 2
	Total	**18**	
	TOTAL CREDITS FOR GRADUATION	**124**	

\#   Pre-requisite.
*   Taken all Faculty and Programme Core Courses.
**   Pass all Faculty and Programme Core Courses except for Industrial Training.
⊗   Each Specialization Elective Course is only offered ONCE every academic session, either on Semester 1 OR Semester 2.

COURSE PLANNING FOR BACHELOR OF COMPUTER SCIENCE (DATA SCIENCE)
ACADEMIC SESSION 2024/2025

Level	Course Code	Semester 1	Credits	Course Code	Semester 2	Credits
1	GIG1003	Basic Entrepreneurship Culture	2	GIG1012/ GLT1049	Philosophy and Current Issues *(for local student only)* / Basic Malay Language *(for international student)*	2
	WIX1001	Computing Mathematics I	3	GIG1004	Information Literacy	2
	WIX1002	Fundamentals of Programming	5	GIG1005	Social Engagement	2
	WIX1003	Computer System and Organization	3	WIA1002	Data Structure (#WIX1002)	5
	WIA1001	Information Systems	3	WIA1003	Computer System Architecture (#WIX1003)	3
				WID3006	Machine Learning	3
				WIE2003	Introduction to Data Science	3
		Total	**16**		**Total**	**20**

Level	Course Code	Semester 1	Credits	Course Code	Semester 2	Credits
2		English for Communication (1)	3		Co-Curriculum	2
	GIG1013	Appreciation of Ethics and Civilizations	2		English for Communication (2)	3
	WIX2001	Communication Thinking and Skills	3	WIA2004	Operating Systems	4
	WIX2002	Project Management	3	WIA1005	Network Technology Foundation	4
	WIA2001	Database	3		Specialization Elective (1) ⊗	3
	WIA2002	Software Modelling	3		Specialization Elective (2) ⊗	3
	WIA2003	Probability and Statistics	3		Faculty Elective (1)	3
		Total	**20**		**Total**	**22**

Level	Course Code	Semester 1	Credits	Course Code	Semester 2 (Industry)	Credits
3	WIH3001	Data Science Project	3	WIH3002	Data Science Industrial Training	14
		Specialization Elective (3) ⊗	3			
		Specialization Elective (4) ⊗	3			
		Specialization Elective (5) ⊗	3			
		Specialization Elective (6) ⊗	3			
		Faculty Elective (2)	3			
		External Faculty Elective	2			
		Total	**20**		**Total**	**14**

Level	Course Code	Semester 1 (Industry)	Credits			
4					Credit Distribution	
					Course Component	Credits
	WIH3005	Professional Development*	2		University Courses	20
	WIH3006	Data Science and Application*	5		Faculty Core Courses	17
	WIH3007	Industrial Solution Development*	5		Faculty Elective Courses	6
					Programme Core Courses	63
					Specialization Elective Courses	18
		Total	**12**		**TOTAL CREDITS FOR GRADUATION**	**124**
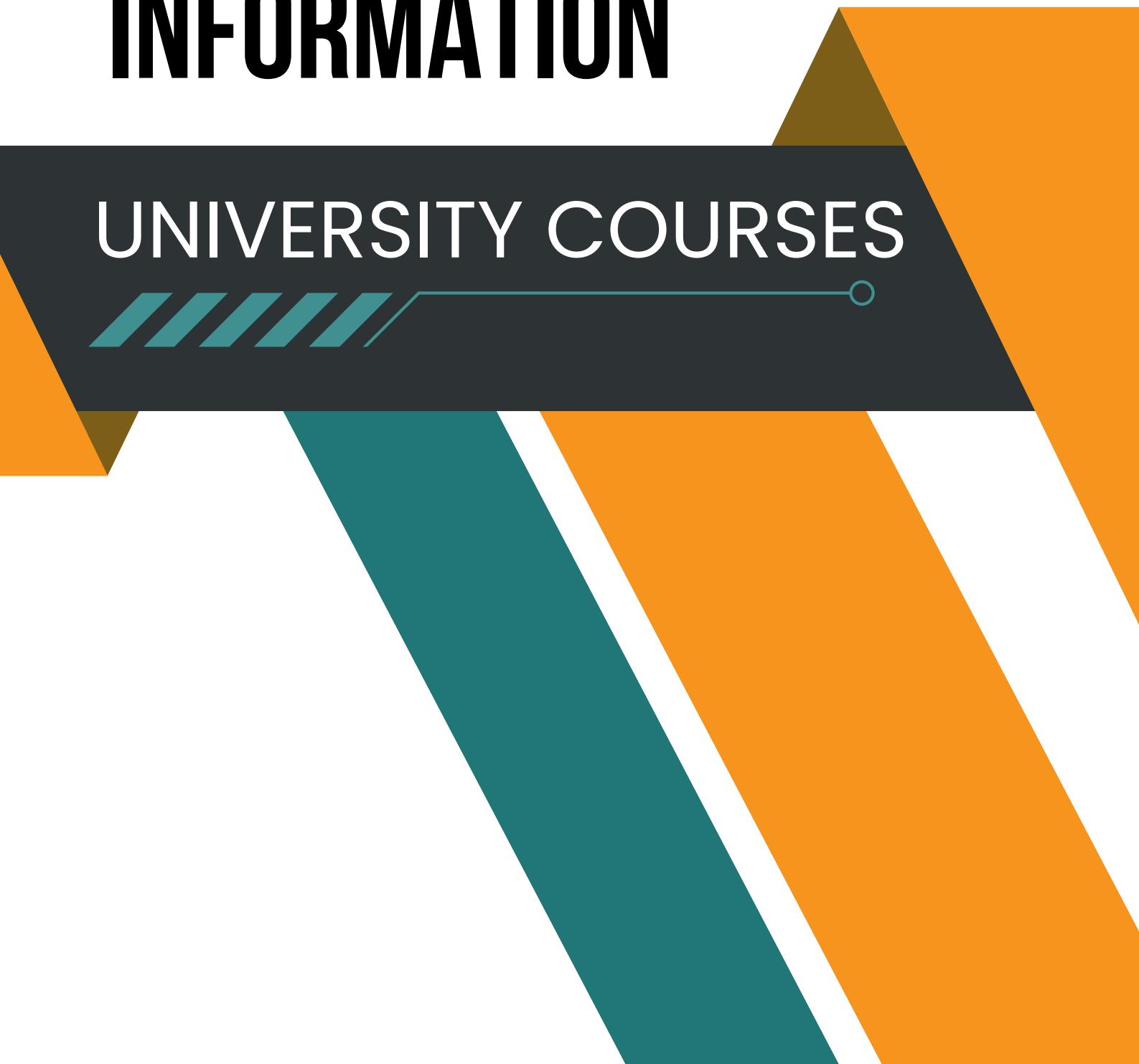
\#   Pre-requisite.
*   Taken all Faculty and Programme Core Courses
**   Pass all Faculty and Programme Core Courses except for Industrial Training
⊗   Each Specialization Elective Course is only offered ONCE every academic session, either on Semester 1 OR Semester 2.

COURSE INFORMATION

UNIVERSITY COURSES

GIG1003
BASIC ENTREPRENEURSHIP ENCULTURATION

Credit: 2

Course Pre-requisite(s): None

Medium of Instruction: English

Learning Outcomes
1. Explain the basic concepts of entrepreneurship.
2. Producing creative and innovative entrepreneurial ideas.
3. Develop a business plan framework.

Synopsis of Course Content
The course will attempt to inculcate the basic elements of entrepreneurship in the students. Initiatives are taken to open their minds and motivate the entrepreneurial spirit in this potential target group. The course encompasses theory and development of entrepreneurship, factors affecting entrepreneurship, entrepreneurship development in Malaysia, ethics of entrepreneurship, creativity and innovation in entrepreneurship and developing business plans. This course also incorporates a direct exposure to entrepreneurial mindset, skills and competencies.

Assessment Methods
Continuous Assessment: 100%

GIG1012
PHILOSOPHY AND CURRENT ISSUES

Credit: 2

Course Pre-requisite(s): None

Medium of Instruction: English

Learning Outcomes
1. Explain current issues based on philosophy, the Philosophy of National Education and the Rukun Negara.
2. Explain current issues based on the main thoughts from the various streams of philosophy.
3. Explain current issues through a comparative perspective of philosophy as a basis for establishing inter-cultural dialogue.

Synopsis of Course Content
This course covers philosophical relations with the Philosophy of National Education and Rukun Negara. The use of philosophy as a tool to purify the culture of thought in life through the arts and methods of thinking and human concepts. The main topics in philosophy are epistemology, metaphysics and ethics discussed in the context of current issues. Emphasis is given to philosophy as a basis for fostering inter-cultural dialogue and fostering one's values. At the end of this course students will be able to see the disciplines of science as one comprehensive body of knowledge and related to each other.

Assessment Methods
Continuous Assessment: 70%
Final Examination: 30%

GIG1013
APPRECIATION OF ETHICS AND CIVILISATIONS

Credit: 2

Course Pre-requisite(s): None

Medium of Instruction: English

Learning Outcomes
1. Explain the ethical concepts of different civilizations.
2. Compare systems, levels of development, social progress and culture across nationalities.
3. Discuss contemporary issues related to economics, politics, the social, the environment and culture from the perspective of ethics and civilization.

Synopsis of Course Content
This course discusses ethical concepts from different civilization perspectives. It aims to identify the systems, developmental stages, progress and culture of a nation in strengthening social cohesion. In addition, discussions on contemporary issues in the economic, political, social, cultural and environmental aspects from an ethical and civil perspective can produce students who are morally and professionally sound. The application of appropriate High Impact Education Practices (HIEPs) is used in the delivery of this course. At the end of this course students will be able to relate ethics and civic-minded citizenship.

Assessment Methods
Continuous Assessment: 70%
Final Examination: 30%

GIG1017
BASIC MALAY LANGUAGE

Credit: 2

Course Pre-requisite(s): None

Medium of Instruction: English

Learning Outcomes
1. Read syllables, words, phrases or expressions in Malay correctly.
2. Demonstrate spoken and written skills using simple Malay.
3. Write short paragraphs on selected topics using simple language styles.

Synopsis of Course Content

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This course emphasises mastering basic skills in Malay for international students enrolled in the undergraduate study programmes. The course includes four skills, which are pronunciation and speaking; listening, reading and writing in Malay for basic communication. Emphasis is given to oral and written exercises.

Assessment Methods
Continuous Assessment: 60%
Final Examination: 40%

COURSE INFORMATION

FACULTY CORE COURSES

WIX1001
COMPUTING MATHEMATICS I

Credit: 3

Course Pre-requisite(s): None

Medium of Instruction: English

Learning Outcomes
1. Identify fundamental concepts and terminology in computing mathematics.
2. Solve mathematical proofs using the fundamental mathematics concepts.
3. Apply various computing mathematics techniques to solve problems.

Synopsis of Course Content
This course covers mathematics and its applications in computer science. Topics include number theory, sets, relations and functions, logic, graphs and trees, matrices, vector and combinatorics. It also covers mathematical applications in computer science (such as applications of sets and functions in program semantics, logic in program specification, equivalence and order relations in program complexity, graphs and trees in game theory, matrices in graphics, number theory in secure communication).

Assessment Methods
Continuous Assessment: 50%
Final Examination: 50%

WIX1002
FUNDAMENTALS OF PROGRAMMING

Credit: 5

Course Pre-requisite(s): None

Medium of Instruction: English

Learning Outcomes
1. Define the steps of problem solving in programming.
2. Rewrite programs that contain errors.
3. Develop programs based on principles of object-oriented.

Synopsis of Course Content
This course covers problem solving and the fundamental of programming. These include problem solving techniques, the basic structure of computer program, the fundamental concepts of object-oriented programming, data types and operations, selection control structures i.e. if and switch, repetition control structures i.e. for, while, do-while, function, array, string, text file, and programming practice.

Assessment Methods
Continuous Assessment: 50%

Final Examination: 50%

WIX1003
COMPUTER SYSTEMS AND ORGANIZATION

Credit: 3

Course Pre-requisite(s): None

Medium of Instruction: English

Learning Outcomes
1. Describe the basic computer organization and logic design.
2. Explain the basic computer systems design, combinational circuit and sequential logic.
3. Interpret the basic concepts of computer systems operation.

Synopsis of Course Content
This course covers the introduction to computer systems and organization which includes number system, Boolean Algebra, basic logic gates, function simplification, combinational circuit, latches and flip-flop, sequential circuit and addressing mode. This course also gives an introduction to processor system.

Assessment Methods
Continuous Assessment: 50%
Final Examination: 50%

WIX2001
THINKING AND COMMUNICATION SKILLS

Credit: 3

Course Pre-requisite(s): None

Medium of Instruction: English

Learning Outcomes
1. Apply communication and thinking skills in various environments.
2. Plan and implement an entrepreneur activity.
3. Demonstrate an active, committed and ethical role in course and group activities.

Synopsis of Course Content
This course will cover topics to develop effective communication and critical thinking. Topics for communication skill include verbal and non-verbal communication skills, listening skills, presentation skills and barriers to communication. Topics taught for the latter include techniques to clarify, analyze and evaluate arguments, logical fallacies, problem solving and decision making. Additionally, methods to find, evaluate and use information sources correctly will be explained. The teaching and learning methods for the course able develop individual, leadership and teamwork skills.

Assessment Methods
Continuous Assessment: 70%
Final Examination: 30%

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                              WIX2002
                      PROJECT MANAGEMENT
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Credit: 3

Course Pre-requisite(s): None

Medium of Instruction: English

Learning Outcomes
1. Elaborate the purpose and importance of project management from the perspectives of planning, tracking and completion of project.
2. Identify appropriate techniques to estimate project time and costs.
3. Perform a project to track project schedule, expenses, and resources with the use of suitable project management tools.

Synopsis of Course Content
This course introduces the fundamental of management concepts, explains topics on organizational structures, project planning, techniques for project time and costs estimation, risk management, the various issues involved in the management of project personnel, measurement and evaluation of project progress and performance, and project control. This course also covers project audit and closure.

Assessment Methods
Continuous Assessment: 70%
Final Examination: 30%

COURSE INFORMATION

PROGRAMME CORE COURSES

Bachelor of Computer Science (Computer System and Network)
Bachelor of Computer Science (Artificial Intelligence)
Bachelor of Computer Science (Information Systems)
Bachelor of Computer Science (Software Engineering)
Bachelor of Computer Science (Multimedia Computing)
Bachelor of Computer Science (Data Science)

WIA1001
INFORMATION SYSTEMS

Credit: 3

Course Pre-requisite(s): None

Medium of Instruction: English

Learning Outcomes
1. Explain basic information systems concepts and principles.
2. Describe the ecosystem in which information systems are employed.
3. Determine societal and ethical impacts of information systems.

Synopsis of Course Content
This course covers the following topics: Overview of Information System (IS) (Introduction to IS, IS in organisation); Information Technology Concepts in IS; Managing Data and Information; Type of Business Information Systems; Knowledge Management and Specialized Information Systems; IS Stakeholders; Planning, Developing, Managing and Evaluating IS; Securing Information Systems; IS in Society, Business and Industry (Security Issue and Privacy, Ethics and IS); and Case study on IS in organization.

Assessment Methods
Continuous Assessment: 50%
Final Examination: 50%

WIA1002
DATA STRUCTURE

Credit: 5

Course Pre-requisite(s): WIX1002

Medium of Instruction: English

Learning Outcomes
1. Define the data structure ADT operations.
2. Implement the data structure internal operations.
3. Develop general-purpose, reusable data structures that implement one or more abstractions.

Synopsis of Course Content
For any type of query possible on digital data, there is a corresponding data structure supporting it. A data structure can be linear such as array, stack, queue, linked list etc., and non-linear such as graph, trees etc. A central goal in this course is to emphasize object-oriented view of data structures including encapsulation and abstract data types (ADTs), and, to learn how these data structures work internally by manipulating arrays, lists and pointers to perform searching, insertion, deletion, traversing and other operations.

Assessment Methods
Continuous Assessment: 50%
Final Examination: 50%

WIA1003
COMPUTER SYSTEM ARCHITECTURE

Credit: 3

Course Pre-requisite(s): WIX1003

Medium of Instruction: English

Learning Outcomes
1. Identify the concept of top-down approach to show the computer system architecture.
2. Use basic operation and instruction set architecture.
3. Explain the difference between computer organization and computer architecture.

Synopsis of Course Content
This course covers the introduction to computer architecture which includes global system structure, instruction sets, addressing mod, fundamental processor execution technique, pipelining, RISC and CISC design, memory hierarchy, cache memory, bus interconnection, I/O system, multiprocessing system and current topic in computer architecture.

Assessment Methods
Continuous Assessment: 50%
Final Examination: 50%

WIA1005
NETWORK TECHNOLOGY FOUNDATION

Credit: 4

Course Pre-requisite(s): None

Medium of Instruction: English

Learning Outcomes
1. Describe the protocols, architecture, components, addressing and operations in a network.
2. Explain basic routing and switching concepts.
3. Solve switching and routing problems in a network.

Synopsis of Course Content
This course is designed to provide students with the fundamental concepts of computer networking which include TCP/IP model, IPv4 and IPv6 addressing, routing and switching. This course will examine several aspects of networking such as VLAN, ACL, DHCP and NAT. This course also emphasis on practical exercises in routing and switching.

Assessment Methods
Continuous Assessment: 50%
Final Examination: 50%

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WIA1006
MACHINE LEARNING

Credit: 3

Course Pre-requisite(s): None

Medium of Instruction: English

Learning Outcomes
1. Describe the fundamental issues and challenges of machine learning.
2. Understand the underlying mathematical relationships within and cross machine learning algorithms and the paradigms of supervised and unsupervised learning.
3. Design various machine learning algorithms in a range of real-world applications.

Synopsis of Course Content
This course will introduce the field of Machine Learning, focusing on the core concepts of supervised and unsupervised learning. In supervised learning we will discuss algorithms which are trained on input data labelled with a desired output, for instance an image of a face and the name of the person whose face it is and learn a function mapping from the input to the output. Unsupervised learning aims to discover latent structure in an input signal where no output labels are available, an example of which is grouping webpages based on the topics they discuss. Students will learn the algorithms which underpin many popular Machine Learning techniques, as well as developing an understanding of the theoretical relationships between these algorithms. The practical will concern the application of machine learning to a range of real-world problems.

Assessment Methods
Continuous Assessment: 50%
Final Examination: 50%

WIA1007
INTRODUCTION TO DATA SCIENCE

Credit: 3

Course Pre-requisite(s): None

Medium of Instruction: English

Learning Outcomes
1. Explain the key concepts relevant to data science, including all processes in the data science life cycle and data science applications in real-world.
2. Determine suitable tools, technologies and the core algorithms underlying an end-to-end data science workflow, including the experimental design, data collection, mining, analysis, and presentation of information derived from datasets.

3. Interpret the ethical implications on the use of data and technologies in data science process.

Synopsis of Course Content
The course is designed to help the student learn fundamental concepts of data science. It covers what, when, who, where why and how (5W 1H) of data science in the era of big data. Also encompass, the life cycle of data science from data preparation, data processing, data cleansing and integration, to data analysis and visualization of data in data-driven decision making. The role of data scientist, the knowledge and skills required are also presented. Machine learning algorithms and statistical models are included. Diverse technologies, programming languages as well as tools in data science are discussed.

Assessment Methods
Continuous Assessment: 60%
Final Examination: 40%

WIA1008
FUNDAMENTAL OF MULTIMEDIA

Credit: 3

Course Pre-requisite(s): None

Medium of Instruction: English

Learning Outcomes
1. Describe the principles of each element of a multimedia system.
2. Evaluate the design of a multimedia application and provide recommendations for improvement.
3. Develop a multimedia application development through multiple elements creation and manipulation using appropriate multimedia editing and authoring tools.

Synopsis of Course Content
During the course, students will be introduced to the main elements of the multimedia system including texts, images and graphics, audio, video and animation. Students will be taught the process of editing multimedia elements using editing tools such as Adobe Photoshop, Illustrator, Animate, Rush, and Audacity. Students will also be exposed to issues related to data compression, security, and current multimedia technology.

Assessment Methods
Continuous Assessment: 50%
Final Examination: 50%

WIA2001
DATABASE

Credit: 3

Course Pre-requisite(s): None

Medium of Instruction: English

Learning Outcomes
1. Describe the basic concepts in database.
2. Design a database system for an application or small business.
3. Implement the database design using a Database Management System (DBMS).

Synopsis of Course Content
This course introduces the concepts of file-based systems vs DBMS. It provides students with the knowledge of database architecture, models, and processes necessary for using, designing, and implementing database systems and applications. Students will have hands on sessions to use DBMS and write SQL commands. Database applications will be developed based on case studies. Transaction management topics and other issues related to database management system are also discussed.

Assessment Methods
Continuous Assessment: 50%
Final Examination: 50%

WIA2002
SOFTWARE MODELLING

Credit: 3

Course Pre-requisite(s): None

Medium of Instruction: English

Learning Outcomes
1. Explain the concepts of software modelling.
2. Construct software model using the UML notation.
3. Use a UML CASE tool to produce and manage software models.

Synopsis of Course Contents
This course covers object-oriented modelling concepts in system design using Unified Modelling Language (UML). Topics include basic concepts of modelling in system design, key differences between the structured and object-oriented paradigm, design of a software system using structural and behavioral diagrams, use of an object-oriented case tool to construct various UML diagrams and generate source codes, consistency checking of UML model.

Assessment Methods
Continuous Assessment: 50%
Final Examination: 50%

WIA2003
PROBABILITY AND STATISTICS

Credit: 3

Course Pre-requisite(s): None

Medium of Instruction: English

Learning Outcomes
1. Explain probabilistic and statistical concepts.
2. Use basic probabilistic and statistical concepts.
3. Employ the appropriate statistical tests to analyze data.

Synopsis of Course Content
This course provides an introduction to probability and statistics concepts which includes Introductory Notions, Conditional Probability, Bayes Theorem, Binomial and Poisson Distributions, among others. As for statistics, the course aims to develop students' ability to describe, explore and analyze data (both descriptive and inferential statistics) using a statistical package (e.g., SAS/SPSS).

Assessment Methods
Continuous Assessment: 50%
Final Examination: 50%

WIA2004
OPERATING SYSTEMS

Credit: 4

Course Pre-requisite(s): None

Medium of Instruction: English

Learning Outcomes
1. List the basic concept of operating systems.
2. Elaborate the criteria on memory, device and file management for early systems and current systems.
3. Explain the criteria on processor and process management and know how to handle it.

Synopsis of Course Content
This course covers basic concepts of operating systems which includes memory management in early and recent systems, processor and process managements, concurrent process, deadlock, and starvation. This course also provides insights into device, file and system management, as well as examples of operating systems.

Assessment Methods
Continuous Assessment: 50%
Final Examination: 50%

WIA2005
ALGORITHM DESIGN AND ANALYSIS

Credit: 4

Course Pre-requisite(s):
WIA1002 – Data Structure

Medium of Instruction: English

Learning Outcomes
1. Describes major algorithms related to advanced data structures and time complexity.
2. Implement important algorithm design paradigms.
3. Assess the performance of algorithms.

Synopsis of Course Content
This course introduces students to the analysis and design of computer algorithms. Students will learn basics design techniques, important classical algorithms and advanced data structures, and their implementation in the modern programming environment. Students are exposed to a few algorithms design paradigm.

Assessment Method
Continuous Assessment: 70%
Final Examination: 30%

WIA2006
SYSTEM ANALYSIS AND DESIGN

Credit: 3

Course Pre-requisite(s): None

Medium of Instruction: English

Learning Outcomes
1. Identify various concepts, principles, and stages of computer-based information systems analysis, modelling, and design.
2. Review of the groups of people involved in systems development and the different methods, tools, and techniques used in systems analysis, modelling and design.
3. Apply concepts and skills to develop an information system.

Synopsis of Course Content
This course deals with process of collecting and interpreting facts, identifying the problems, and decomposition of a system into its components and planning the development of information systems through understanding and specifying in detail what a system should do and how the components of the system should be implemented and work together. In addition, this course also deals with the concepts, skills, methodologies, techniques, tools, and perspectives essential for systems analysts. System analysts solve business problems through analyzing the requirements of information systems and designing such systems by applying analysis,

modelling, and design techniques. The practical component of this course is object-oriented design and use-case driven, requiring students to go through the steps of system analysis, modelling, and design to solve a real-life business problem.

Assessment Methods
Continuous Assessment: 50%
Final Examination: 50%

WIA2007
MOBILE APPLICATION DEVELOPMENT

Credit: 4

Course Pre-requisite(s): None

Medium of Instruction: English

Learning Outcomes
1. Explain various categories of mobile applications, its framework, lifecycle and its relevant user interface components, services, and libraries.
2. Analyze the appropriate functionalities and sketches for mobile application based on its intended purposes and users.
3. Develop the mobile applications using suitable components, services, or libraries, with database utilization.

Synopsis of Course Content
This course provides an understanding on the categories, development framework and lifecycle of typical mobile applications. Besides, relevant GUI components and its event handling, services and libraries are introduced, including location-aware service, audio, etc. This course also gives practical hands-on on mobile application development with database connection, by considering users. hardware and software requirements as a whole.

Assessment Methods
Continuous Assessment: 50%
Final Examination: 50%

WIA2008
ADVANCED NETWORK TECHNOLOGY

Credit: 4

Course Pre-requisite(s): WIA1005

Medium of Instruction: English

Learning Outcomes
1. Identify the architecture, components, and operations of routers and switches in complex networks.
2. Explain the issues, philosophies and protocols involved in managing a local and wide area network infrastructure.
3. Solve the common problems of routers and switches in IPv4 and IPv6 networks.

Synopsis of Course Content

This course is designed to provide students with the overall concept and needs of network technologies in advance level. This course will examine several aspects of networking such as OSPF, EIGRP, STP, PPP and VPN in IPv4 and IPv6 networks. This course also emphasis on practical exercises by introducing a range of network technologies and protocols used in a network.

Assessment Methods

Continuous Assessment: 50%
Final Examination: 50%

WIA2009
DIGITAL DESIGN AND HARDWARE DESCRIPTION LANGUAGE

Credit: 3

Course Pre-requisite(s): WIA1003 & WIX1003

Medium of Instruction: English

Learning Outcomes

1. Explain the basic components of computer digital development and how those components functioning.
2. Discuss digital design issues.
3. Develop digital circuit using systematic design methods using HDL or any Electronic Design Automation (EDA) and Electronic Computer-Aided Design (ECAD) equipment.

Synopsis of Course Content

This course consists of basic introduction to digital design, combinational logic design principle and practice, sequential logic design principle and practice, memory, CPLD and FPGA, design method using HDL and case studies.

Assessment Methods

Continuous Assessment: 50%
Final Examination: 50%

WIA2010
HUMAN COMPUTER INTERACTION

Credit: 3

Course Pre-requisite(s): None

Medium of Instruction: English

Learning Outcomes

1. Explain the ways human factors and cognitive models influence aspects of interface design.
2. Apply design principles, guidelines, patterns and visual design elements to the interface design and selected interface construction tools for the implementation of interactive systems.

3. Evaluate interactive systems (websites, travel, or game apps), with a strong adoption of user-centric design.

Synopsis of Course Content

This course covers both human factors and the technical methods for the design and evaluation of interactive systems, where it is structured within four main topics: overview of HCI, essential interaction design principles, user interface development process and interface design and programming. Overview of HCI introduces human, computer and interactions; user interfaces; usability, user experience (UX) and design thinking. Interfaces development process includes topics on iterative design, user-centered design, design discovery, design exploration and evaluation of user interfaces. Interface design and programming include topics on visual information design, forms design, interface design patterns, prototyping and construction tools, and responsiveness issue. Three types of applications are covered: Graphical User Interfaces, Web and Mobile Devices.

Assessment Methods

Continuous Assessment: 50%
Final Examination: 50%

WIA3001
INDUSTRIAL TRAINING

Credit: 12

Course Pre-requisite(s):
Taken all Faculty and Programme Core Courses (except Academic Project I and Academic Project II).

Medium of Instruction: English

Learning Outcomes

1. Apply operation, management, and development processes at workplace.
2. Identify the problems faced and lessons learnt at the workplace.
3. Use appropriate systems and technologies in the tasks at workplace.
4. Demonstrate professional ethics at workplace according to knowledge and skills acquired at workplace.

Synopsis of Course Content

This course requires a student to undergo industrial training at an organization offering internship related to the student's field of study. The student records his/her daily activities at the workplace in a logbook. The student also prepares a final report about his/her industrial training.

Assessment Methods

Continuous Assessment: 100%

WIA3002
ACADEMIC PROJECT I

Credit: 3

Course Pre-requisite(s):
Pass all Faculty and Programme Core courses except for Industrial Training.

Medium of Instruction: English

Learning Outcomes
1. Identify solution approach that is suitable for the stated problem.
2. Conduct suitable requirement gathering, system analysis and design techniques.
3. Present project proposal paper.

Synopsis of Course Content
This course covers the activities including problem identification, literature review, data collection, writing and presenting project proposals.

Assessment Methods
Continuous Assessment: 100%

WIA3003
ACADEMIC PROJECT II

Credit: 5

Course Pre-requisite(s):
Pass all Faculty and Programme Core courses except for Industrial Training.

Medium of Instruction: English

Learning Outcomes
1. Develop a system based on the solution approach and method identified.
2. Present the implemented project.
3. Implement a system with ethics and professionalism.

Synopsis of Course Content
This course covers research activities including system analysis and design, system implementation, testing and evaluating the developed system, project presentation and writing an academic report.

Assessment Method
Continuous Assessment: 100%

WIE2003
INTRODUCTION TO DATA SCIENCE

Credit: 3

Course Pre-requisite(s): None

Medium of Instruction: English

Learning Outcomes
1. Explain the key concepts relevant to data science, including all processes in the data science life cycle and data science applications in real-world.
2. Determine suitable tools, technologies and the core algorithms underlying an end-to-end data science workflow, including the experimental design, data collection, mining, analysis, and presentation of information derived from datasets.
3. Interpret the ethical implications on the use of data and technologies in data science process.

Synopsis of Course Content
The course is designed to help the student learn fundamental concepts of data science. It covers what, when, who, where, why and how (5W 1H) of data science in the era of big data. Also encompass, the life cycle of data science from data preparation, data processing, data cleansing and integration, to data analysis and visualization of data in data-driven decision making. The role of data scientist, the knowledge and skills required are also presented. Machine learning algorithms and statistical models are included. Diverse technologies, programming languages as well as tools in data science are discussed.

Assessment Method
Continuous Assessment: 60%
Final Examination: 40%

WID3006
MACHINE LEARNING

Credit: 3

Course Pre-requisite(s): None

Medium of Instruction: English

Learning Outcomes
1. Explain the concepts and techniques for supervised learning, semi-supervised learning and unsupervised learning.
2. Use the appropriate machine learning techniques for given sample datasets.
3. Apply practical solutions to solve common problems in machine learning.

Synopsis of Course Content
This course covers a broad understanding of the field of machine learning and statistical pattern recognition. Topics include classification and linear

regression, Bayesian network, decision trees, SVMs, statistical learning method, unsupervised learning and reinforcement learning.

Assessment Methods
Continuous Assessment: 50%
Final Examination: 50%

WIH3001
DATA SCIENCE PROJECT

Credit: 3

Course Pre-requisite(s): None

Medium of Instruction: English

Learning Outcomes
1. Define the problem background.
2. Determine the objectives of project.
3. Identify suitable solution approaches for the stated problem.
4. Review literature relevant to the stated problem.
5. Conduct data gathering using suitable techniques.
6. Develop a prototype of the proposed solution.
7. Write a project report.

Synopsis of Course Content
This course covers the following research activities including problem and objectives identification; literature review; data collection, prototype development, report writing and project presentation.

Assessment Method
Continuous Assessment: 100%

WIH3002
DATA SCIENCE INDUSTRIAL TRAINING

Credit: 14

Course Pre-requisite(s):
Taken all Faculty and Programme Core Courses.

Medium of Instruction: English

Learning Outcomes
1. Understanding real-world case studies/problems that require data science solutions in industry.
2. Use appropriate data science technologies in tasks at workplace.
3. Apply data science industrial experience in one or more industry-based projects.

Synopsis of Course Content
This course requires a student to acquire data science industrial experience at an organisation offering internship related to data science field of study. The student records his/her daily experiences at the workplace in a logbook. The student also prepares a final report about his/her data science industrial experiences.

Assessment Method
Continuous Assessment: 100%

COURSE INFORMATION

SPECIALIZATION ELECTIVE COURSES

Bachelor of Computer Science (Computer System and Network)

WIC2002
NETWORK SECURITY

Credit: 3

Course Pre-requisite(s): None

Medium of Instruction: English

Learning Outcomes
1. Identify the importance of network security and the security applications and techniques used in a network.
2. Design a secure network topology based on the security elements.
3. Apply the applications and techniques to solve a range of security problems in a network.

Synopsis of Course Content
This course is designed to provide student knowledge of network security, types of attack towards network, security services, and security mechanism. This course also will examine the security criteria by identity the best practices for the network security. The criteria will be looking into encryption techniques, remote access, intrusion detection and prevention, Virtual Private Network, firewall, honey pots, AAA, Infrastructure security, and physical security. Finally, the course will evaluate a plan and best proposal to design a secure network topology based on security policy and legal issues. This course also emphasis on practical exercises by introducing a range of security applications used in a network.

Assessment Methods
Continuous Assessment: 50%
Final Examination: 50%

WIC2004
INTERNET TECHNOLOGY

Credit: 3

Course Pre-requisite(s): None

Medium of Instruction: English

Learning Outcomes
1. Describe the Internet and its evolution to the current technology.
2. Identify the steps to evaluate and implement the technology, the model it was based on and the architecture.
3. Analyze the strength and weaknesses of each Internet technology implementation being discussed.
4. Discuss security concern that must be considered when implementing the selected Internet technology.

Synopsis of Course Content
This course contains the introduction towards Internet and its evolution in introducing new technologies such as Internet of Everything, Cloud Computing and Software Defined Network. It explained the concept and steps of implementation of the technology discussed and how to implement it. It also discussed the strength and weaknesses of each Internet technology and the security issues related.

Assessment Methods
Continuous Assessment: 50%
Final Examination: 50%

WIC2005
PROGRAMMABLE NETWORK

Credit: 3

Course Pre-requisite(s): WIA2008

Medium of Instruction: English

Learning Outcomes
1. Describe the basic concept of network programming and Software Defined Networking (SDN) programming.
2. Design and program client/server communication.
3. Describe the deployment models of SDN and Network Functions Virtualization (NFV) using OpenFlow protocol.

Synopsis of Course Content
This course introduces network programming and SDN programming. The contents include the introduction to the concept and programming of client/server communication; the fundamentals of SDN and its potential applications related to network function virtualization (NFV); Explores emerging applications of SDN; hands-on exercises of SDN programming environment with OpenFlow protocol and controller.

Assessment Methods
Continuous Assessment: 50%
Final Examination: 50%

WIC2006
DIGITAL FORENSIC

Credit: 3

Course Pre-requisite(s): None

Medium of Instruction: English

Learning Outcomes
1. Identify forensics and information security issues in digital domain.
2. Differentiate various forensic techniques for digital media.
3. Apply appropriate digital forensic techniques for different digital media.

Synopsis of Course Content
This course is designed to provide students with knowledge on various security issues and cybercrime. This course will also expose students to different stages in the digital forensic process. Students will also apply

various digital forensic techniques in accordance with the identified media and applicable cybercrime laws.

Assessment Methods
Continuous Assessment: 50%
Final Examination: 50%

WIC2007
CYBER SECURITY

Credit: 3

Course Pre-requisite(s): None

Medium of Instruction: English

Learning Outcomes
1. Explain the concept of cyberspace and cybersecurity including critical security controls for effective cyber defense.
2. Determine suitable security controls for the defined security requirements.
3. Investigate techniques used for auditing and monitoring the performance of cybersecurity controls.

Synopsis of Course Content
This course consists of the introduction on terms cyberspace, cybersecurity, related standards for best practices in cybersecurity, essential security requirements and security controls/functions for cyber defense, and security assessment techniques in cyber environment.

Assessment Methods
Continuous Assessment: 50%
Final Examination: 50%

WIC2008
INTERNET OF THINGS

Credit: 3

Course Pre-requisite(s): WIA1005

Medium of Instruction: English

Learning Outcomes
1. Describe the basic concept of Internet-of-Things.
2. Design IoT application using existing technology.
3. Apply IoT knowledge of practical problem solving.

Synopsis of Course Content
The course provides an overview of Internet-of-Things technology concept and practical. It develops foundational skills using hands-on lab activities that stimulate the students in applying creative problem-solving and rapid prototyping in the interdisciplinary domain of electronics, networking, security, data analytics, and business. The student-centric approach translates into the student being able to produce ideas, design, prototype and present an IoT solution for an identified business or society need.

Continuous Assessment: 50%
Final Examination: 50%

WIC3001
MATHEMATICS IN NETWORKING

Credit: 3

Course Pre-requisite(s): None

Medium of Instruction: English

Learning Outcomes
1. Identify the basic principles of probability and statistics behind computer networking.
2. Discussing the techniques and applications of graph theory to solve computer networking problems.
3. Evaluating the problems in queueing theory and network calculus related to computer networks.

Synopsis of Course Content
This course is designed to provide a practical aspect of basic statistics and mathematics on computer networking. It also an emphasis on problem-solving and analysis using the mathematical and statistical techniques in computer networking.

Assessment Methods
Continuous Assessment: 50%
Final Examination: 50%

WIC3002
CRYPTOGRAPHY

Credit: 3

Course Pre-requisite(s): None

Medium of Instruction: English

Learning Outcomes
1. Explain the concept of cryptography and techniques used clearly.
2. Distinguish different cryptography systems.
3. Determine suitable technique or algorithm for implementation in a system accordingly.
4. Investigate cryptographic algorithms in regards to their design and security analysis.

Synopsis of Course Content
This course consists of the introduction of cryptography, cryptographic techniques, computer-based Symmetric Key
Cryptographic Algorithms, computer-based Asymmetric Key Cryptographic Algorithms, Public Key Infrastructure (PKI), Internet Security Protocols (Implementation of Cryptography), user authentication mechanisms, practical implementations of cryptography and case studies.

Assessment Methods
Continuous Assessment: 50%
Final Examination: 50%

WIC3003
EMBEDDED SYSTEM PROGRAMMING

Credit: 3

Course Pre-requisite(s): None

Medium of Instruction: English

Learning Outcomes
1. Explain the concept and architecture of an embedded system.
2. Program an embedded system application.
3. Apply interfaces technique between embedded applications system.

Synopsis of Course Content
This course covers the embedded system overview, embedded system memory management, embedded system interfaces and embedded system controller.

Assessment Methods
Continuous Assessment: 50%
Final Examination: 50%

WIC3004
COMPUTER PENETRATION

Credit: 3

Course Pre-requisite(s): None

Medium of Instruction: English

Learning Outcomes
1. Explain the concepts of computer penetration.
2. Identify suitable techniques in computer penetration activity.
3. Apply suitable computer penetration techniques in specific security scenario.

Synopsis of Course Content

This course introduces the concepts and techniques used to penetrate computers with a focus on ethical hacking. The contents of this course cover the basic steps of penetration testing such as reconnaissance, network scanning, exploitation of vulnerabilities, and maintaining access to penetrated systems.

Assessment Methods
Continuous Assessment: 50%
Final Examination: 50%

WIC3005
ENTERPRISE NETWORK DESIGN AND MANAGEMENT

Credit: 3

Course Pre-requisite(s): WIA1005

Medium of Instruction: English

Learning Outcomes
1. Explain and design network using top-down approach.
2. Solve network management problem.
3. Solve problems related to systematic network documentation, design and configuration.

Synopsis of Course Content
This course consists of top-down network design model for large scale network which includes the requirements and constraints, large scale network topology design, models for addressing and naming for network devices. This course also covers switching and routing protocols, network security strategies, optimal network design, network management planning and strategy, ISO network management model, network management protocols: SNMP, RMON, NTP, network performance issues, troubleshooting mechanisms and network documentation and base lining.

Assessment Methods
Continuous Assessment: 50%
Final Examination: 50%

WIC3006
MOBILE COMPUTING

Credit: 3

Course Pre-requisite(s): None

Medium of Instruction: English

Learning Outcomes
1. Explain the various wireless technologies and services.
2. Discuss important issues and challenges in mobile computing.
3. Build a mobile computing application that is according to the user requirements and operating environments.

Synopsis of Course Content
This course covers the introduction to wireless networks and mobile computing, which includes looking at examples of mobile computing applications, issues that distinguishes wireless networks from fixed networks and examples of how the issues are addressed to support mobile computing.

Assessment Methods
Continuous Assessment: 50%
Final Examination: 50%

WIC3007
PRINCIPLES OF DISTRIBUTED COMPUTING

Credit: 3

Course Pre-requisite(s):
WIA1005 - Network Technology Foundation

Medium of Instruction: English

Learning Outcomes
1. Determine the fundamental of distributed computing.
2. Identify the issues, problems and the solutions in distributed computing.
3. Implement distributed system.

Synopsis of Course Content
This course consists of top-down network design model for large scale network which includes the requirements and constraints, large scale network topology design, models for addressing and naming for network devices. This course also covers switching and routing protocols, network security strategies, optimal network design, network management planning and strategy, ISO network management model, network management protocols: SNMP, RMON, NTP, network performance issues, troubleshooting mechanisms and network documentation and base lining.

Assessment Methods
Continuous Assessment: 50%
Final Examination: 50%

WIC3008
MICROPROCESSOR

Credit: 3

Course Pre-requisite(s): None

Medium of Instruction: English

Learning Outcomes
1. Explain the basic concept and microprocessor architecture.
2. Explain the processor interface and software design techniques.
3. Executes the basic concept of microprocessor operation.

Synopsis of Course Content
This course covers the introduction to microprocessor which includes Arithmetic processor, microprocessor development, instruction in microprocessor, microprocessor connection, microcontroller, advanced microprocessor, Input / Output in microprocessor and microprocessor development based on product.

Assessment Methods
Continuous Assessment: 50%
Final Examination: 50%

WIC3009
PARALLEL PROGRAMMING

Credit: 3

Course Pre-requisite(s): None

Medium of Instruction: English

Learning Outcomes
1. Explain the fundamental of parallel computing.
2. Apply fundamental concepts of parallel programming.
3. Use GPU programming model and architecture, key algorithms, parallel programming *patterns* and optimization techniques.

Synopsis of Course Content
This course introduces the parallel programming model and hardware The course also includes how to optimize GPU programs and the future of GPU computing.

Assessment Methods
Continuous Assessment: 50%
Final Examination: 50%

COURSE INFORMATION

SPECIALIZATION ELECTIVE COURSES

Bachelor of Computer Science (Artificial Intelligence)

WIC2008
INTERNET OF THINGS

Credit: 3

Course Pre-requisite(s): WIA1005

Medium of Instruction: English

Learning Outcomes
1. Describe the basic concept of Internet-of-Things.
2. Design IoT application using existing technology.
3. Apply IoT knowledge of practical problem solving.

Synopsis of Course Content
The course provides an overview of Internet-of-Things technology concept and practical. It develops foundational skills using hands-on lab activities that stimulate the students in applying creative problem-solving and rapid prototyping in the interdisciplinary domain of electronics, networking, security, data analytics, and business. The student-centric approach translates into the student being able to produce ideas, design, prototype and present an IoT solution for an identified business or society need.

Assessment Methods
Continuous Assessment: 50%
Final Examination: 50%

WID2001
KNOWLEDGE REPRESENTATION AND REASONING

Credit: 3

Course Pre-requisite(s): None

Medium of Instruction: English

Learning Outcomes
1. Describe types of knowledge and their engineering processes.
2. Differentiate the various knowledge representation and knowledge reasoning methods.
3. Use the various knowledge representation and knowledge reasoning methods to solve problems.

Synopsis of Course Content
This course describes types of knowledge and their engineering processes as used in expert system development. It differentiates the various knowledge representations methods such as logic, rule-based, frame-based, semantic network, script, conceptual dependency, and ontology. It also explains the various knowledge reasoning methods such as the deductive, inductive, monotonic, and non-monotonic reasoning. Students will use the various knowledge representation and knowledge reasoning methods to solve problems.

Assessment Methods
Continuous Assessment: 50%
Final Examination: 50%

WID2002
COMPUTING MATHEMATICS II

Credit: 3

Course Pre-requisite(s): None

Medium of Instruction: English

Learning Outcomes
1. Apply various formulae for operations on differentiation and integration as well as mathematical transformation (Calculus).
2. Apply the principles of algebraic matrix in problem solving (Linear Algebra).
3. Apply statistical methods in problem solving (Statistics).

Synopsis of Course Content
This course covers important mathematics topics which can be applied to the artificial intelligence field. The topics include calculus (differentiation and integration), functions and graphs, matrix algebra (Eigen value, Eigen vector, dependency, singularity), statistical methods (sampling, principal component analysis) and transformations (Fourier, Laplace etc.).

Assessment Methods
Continuous Assessment: 50%
Final Examination: 50%

WID2003
COGNITIVE SCIENCE

Credit: 3

Course Pre-requisite(s): None

Medium of Instruction: English

Learning Outcomes
1. Identify various cognitive concepts and processes.
2. Describe memory functions related to learning activities.
3. Apply cognitive theories in everyday problem solving.

Synopsis of Course Content
This course covers the fundamentals on cognitive science. It covers topics on mind and machine, perception (object recognition), attention & consciousness, memory (short term memory, working memory and long term memory), forgetting,

mental representation and visual perception, category, language, intelligence and creativity, emotion and expression, problem solving, reasoning and decision making.

Assessment Methods
Continuous Assessment: 50%
Final Examination: 50%

WID3001
FUNCTIONAL AND LOGIC PROGRAMMING

Credit: 3

Course Pre-requisite(s): None

Medium of Instruction: English

Learning Outcomes
1. Describe basic principles and features of functional and logic programming.
2. Explain concepts and methods of functional and logic programming.
3. Apply functional and logic programming knowledge.

Synopsis of Course Content
This course introduces Artificial Intelligence (AI) programming languages, which covers functional and logic styles of programming. It describes the functional programming that uses functions as its basis and includes topics such as types and classes, lists, recursions, and higher-order functions. The logic programming is based on formal logic and includes topics such as clauses and predicates, unification, operators and arithmetic, cuts and negation.

Assessment Methods
Continuous Assessment: 50%
Final Examination: 50%

WID3002
NATURAL LANGUAGE PROCESSING

Credit: 3

Course Pre-requisite(s): None

Medium of Instruction: English

Learning Outcomes
1. Identify the various levels of natural language processing.
2. Explain the approaches and applications of natural language processing.
3. Apply natural language processing techniques to solve problems.

Synopsis of Course Content
The course introduces the theory and methods of Natural Language Processing (NLP). It covers a broad range of topics in NLP including basic text

processing, minimum edit distance, syntactic analysis, and semantic analysis. In addition, it also discusses some NLP applications such as machine translation and sentiment analysis.

Assessment Methods
Continuous Assessment: 50%
Final Examination: 50%

WID3007
FUZZY LOGIC

Credit: 3

Course Pre-requisite(s): WIX1001

Medium of Instruction: English

Learning Outcomes
1. Understand the concept and techniques of fuzzy set theory and fuzzy logic.
2. Distinguish fuzzy rules and fuzzy relations from their crisp counterparts.
3. Implement fuzzy inference systems and fuzzy clustering techniques in problem solving.

Synopsis of Course Content
This course begins with definition, concept, and examples of fuzzy logic. It covers fuzzy sets, rules, operations, relations, and membership functions. It also discuss fuzzy logics, fuzzification, defuzzification, fuzzy systems, and future applications.

Assessment Methods
Continuous Assessment: 50%
Final Examination: 50%

WID3010
AUTONOMOUS ROBOTS

Credit: 3

Course Pre-requisite(s): None

Medium of Instruction: English

Learning Outcomes
1. Describe various robot components such as sensors, actuators and computational nodes.
2. Discuss conceptual and technical challenges in autonomous robots.
3. Apply methods for decision making in autonomous robots.

Synopsis of Course Contents
This course introduces the basic concept of autonomous system by making robots that can observe, reason and act. The syllabus includes learning how robots interpret noisy sensor inputs, control its actions, recover from failures, react versus reason about a situation, solve sub-problems, solve long-term goals and coexist in the world. In this course, students will study

methodologies to achieve autonomous robot system through practical and ground up approach of programming your own.

Assessment Methods
Continuous Assessment: 70%
Final Examination: 30%

WID3011
DEEP LEARNING

Credit: 3

Course Pre-requisite(s): None

Medium of Instruction: English

Learning Outcomes
1. Describe components of architecture of artificial neural network and convolutional neural network.
2. Compare categories of supervised and unsupervised deep network.
3. Apply suitable learning rule for a problem.

Synopsis of Course Content
The purpose of this course is to give the students a clear introduction, an intuitive understanding and a smooth Python implementation of the most successful deep learning techniques. The teaching approach provides a good balance of theory and practice. Theory of deep neural networks relies on simple linear operations and basic gradient descent optimization. Practical exercises of deep learning applications will focus on PyTorch. Each lecture presents the fundamental concepts and translates them into PyTorch implementations.

Assessment Methods
Continuous Assessment: 50%
Final Examination: 50%

WID3012
EVOLUTIONARY COMPUTATION

Credit: 3

Course Pre-requisite(s): None

Medium of Instruction: English

Learning Outcomes
1. Explain evolutionary computation techniques and methodologies set in the context of modern heuristic methods.
2. Apply various evolutionary computation methods and algorithms for particular classes of problems.
3. Develop evolutionary algorithms for real-world applications.

Synopsis of Course Content

The course aims to introduce students to a wide range of Evolutionary Computation terminology, techniques, and processes. The concepts taught in these lectures will be practiced and reinforced by participation in projects.

Assessment Methods
Continuous Assessment: 50%
Final Examination: 50%

WID3013
COMPUTER VISION AND PATTERN RECOGNITION

Credit: 3

Course Pre-requisite(s): None

Medium of Instruction: English

Learning Outcomes
1. Explain basic concepts, terminology, theories, models and methods in the field of computer vision and pattern recognition.
2. Describe known principles of human visual system.
3. Suggest a design of a computer vision or pattern recognition system for a specific problem.

Synopsis of Course Content
Ever wonder how robots can navigate space and perform duties, how search engines can index billions of images and videos, how algorithms can diagnose medical images for diseases, how self-driving cars can see and drive safely or how Instagram creates filters or snapchat creates masks? In this course, we will explore all of these technologies and learn to prototype them. Lying in the heart of these modern AI applications are computer vision and pattern recognition technologies that can perceive, understand and reconstruct the complex visual world. Computer Vision and Pattern Recognition is one of the fastest growing and most exciting AI disciplines in today's academia and industry. This course is designed to open the doors for students who are interested in learning about the fundamental principles and important applications of computer vision and pattern recognition. We will expose students to a number of real-world applications that are important to our daily lives. More importantly, we will guide students through a series of well designed projects such that they will get to implement a few interesting and cutting-edge computer vision and pattern recognition algorithms.

Assessment Method
Continuous Assessment: 50%
Final Examination: 50%

WID3014
PRATICAL ARTIFICIAL INTELLIGENCE

Credit: 3

Course Pre-requisite(s): None

Medium of Instruction: English

Learning Outcomes
1. Identify solution approach that is suitable for the stated problem.
2. Conduct suitable requirement gathering, system analysis and design techniques.
3. Present the project solution.

Synopsis of Course Content
This course covers the practical activities including system analysis and design, system implementation, testing and evaluating the developed system and project presentation.

Assessment Methods
Continuous Assessment: 100%

WID3015
NUMERICAL ANALYSIS

Credit: 3

Course Pre-requisite(s): None

Medium of Instruction: English

Learning Outcomes
1. Solve equations using numerical methods.
2. Apply numerical methods in order to solve differentiation/integration problems.

Synopsis of Course Content
This course covers numerical analysis and the computer implementation of numerical problems. Topics include, interpolation & function approximation, system of linear equations solving algebraic equations, numerical differentiation and integration and numerical solution of ordinary differential equations.

Assessment Methods
Continuous Assessment: 50%
Final Examination: 50%

WIG3004
VIRTUAL REALITY

Credit: 3

Course Pre-requisite(s): Tiada

Medium of Instruction: English

Learning Outcomes
1. Explain the technology that support virtual reality applications and human perceptions involved in designing virtual reality environment.
2. Discuss other technologies including visualization and augmented reality
3. Develop a virtual reality environment using suitable tools and programming language.

Synopsis of Course Content
This course begins with some introduction to virtual reality technology and its applications, followed by detail explanation regarding input and output devices that are being used in virtual reality application. Students will also learn about human sensory systems (visual, audio and tactile) and their relations to the development of virtual reality devices, as well as the possible effects these devices have on human health. Then students will be taught about how to model a virtual reality world and manipulate its objects using virtual reality development tools and programming languages. The course ends by providing students with fundamental knowledge regarding data visualisation and augmented reality, a research area that is closely related to virtual reality.

Assessment Methods
Continuous Assessment: 50%
Final Examination: 50%

COURSE INFORMATION

SPECIALIZATION ELECTIVE COURSES

Bachelor of Computer Science (Information Systems)

WIC2008
INTERNET OF THINGS

Credit: 3

Course Pre-requisite(s): WIA1005

Medium of Instruction: English

Learning Outcomes
1. Describe the basic concept of Internet-of-Things.
2. Design IoT application using existing technology.
3. Apply IoT knowledge of practical problem solving.

Synopsis of Course Content
The course provides an overview of Internet-of-Things technology concept and practical. It develops foundational skills using hands-on lab activities that stimulate the students in applying creative problem-solving and rapid prototyping in the interdisciplinary domain of electronics, networking, security, data analytics, and business. The student-centric approach translates into the student being able to produce ideas, design, prototype and present an IoT solution for an identified business or society need.

Assessment Methods
Continuous Assessment: 50%
Final Examination: 50%

WIE2001
TRENDS IN INFORMATION SYSTEMS

Credit: 3

Course Pre-requisite(s): None

Medium of Instruction: English

Learning Outcomes
1. Describe emerging computer technologies, industry-specific information systems, and current trends in information systems.
2. Discuss critical issues related to managing and administering the discussed information systems or technologies.
3. Apply tools or model to relevant cases or data.

Synopsis of Course Content
This course explores selected topics of specialized content (not usually covered by the other courses) as determined by the department and the lecturer with emphasis on current Information System trends.

Topics under this course heading vary from year to year according to the developments in computer technology and information systems.

Assessment Methods
Continuous Assessment: 50%
Final Examination: 50%

WIE2002
OPEN-SOURCE PROGRAMMING: APPLICATION AND TECHNOLOGY

Credit: 3

Course Pre-requisite(s): None

Medium of Instruction: English

Learning Outcomes
1. Explain basic characteristics and concepts of open source applications and technology.
2. Use open source programming language to populate, update and retrieve database/ dataset.
3. Develop open source solution to resolve a business problem.

Synopsis of Course Content
This course will enable students to learn the basic characteristics and concepts of open source applications and technology. Student will be able to write applications using open source programming in order to populate, retrieve and update database. They will also develop an open source solution to resolve a business problem.

Assessment Methods
Continuous Assessment: 50%
Final Examination: 50%

WIE2003
INTRODUCTION TO DATA SCIENCE

Credit: 3

Course Pre-requisite(s): None

Medium of Instruction: English

Learning Outcomes
1. Explain the key concepts relevant to data science, including all processes in the data science life cycle and data science applications in real-world.
2. Determine suitable tools, technologies and the core algorithms underlying an end-to-end data science workflow, including the experimental design, data collection, mining, analysis, and presentation of information derived from datasets.
3. Interpret the ethical implications on the use of data and technologies in data science process.

Synopsis of Course Content
The course is designed to help the student learn fundamental concepts of data science. It covers the what, when, who, where, why and how (5W 1H) of data science in the era of big data. Also encompass the life cycle of data science from data preparation, data processing, data cleansing and integration, to data analysis and visualization of data in data-driven decision making. The role of data scientist, the knowledge and skills required is also presented. Machine learning algorithms and statistical models are included. Diverse technologies, programming languages as well as tools in data science are discussed.

Assessment Methods
Continuous Assessment: 60%
Final Examination: 40%

WIE2005
INFORMATION RETRIEVAL AND WEB SEARCH

Credit: 3

Course Pre-requisite(s): None

Medium of Instruction: English

Learning Outcomes
1. Define how the Web is organized and its fundamental properties.
2. Explain how search engines collect Web content, index it, and present the most relevant results for a given query.
3. Solve problems related to effective information retrieval or evaluation of search engine performances.

Synopsis of Course Content
The objective of this course is to examine the main computer science principles that lie behind search engines. For this purpose, focus will be given to the Information Retrieval (IR), which is described as "the science of searching for information in documents, searching for documents themselves, searching for metadata which describe documents, or searching within databases, whether relational stand-alone or hypertextually-networked such as the World Wide Web"

Assessment Methods
Continuous Assessment: 50%
Final Examination: 50%

WIE3001
ADVANCED DATABASE

Credit: 3

Course Pre-requisite(s): None

Medium of Instruction: English

Learning Outcomes
1. Administer the database.
2. Employ basic monitoring procedures.
3. Apply distributed database and big data.

Synopsis of Course Content
Enable students to play the role of a database administrator and perform tasks such as creating database instances, managing storage structures, schema objects, data concurrency, undo data, administrating users security and configuring database. This course will enable students to understand how distributed database and big data management are implemented.

Assessment Methods
Continuous Assessment: 50%

Final Examination: 50%

WIE3002
ELECTRONIC COMMERCE

Credit: 3

Course Pre-requisite(s): None

Medium of Instruction: English

Learning Outcomes
1. Explain technologies, standards and business processes involved in implementing electronic commerce.
2. Apply advance modes on usage of information technology in business activities to boost new opportunities developed from the usage of Internet among its users.
3. Build simple e-commerce applications for specific areas of business that have potential commercialization values.

Synopsis of Course Content
This course consists of the following components:
(a) Introduction of E-Commerce (b) E-Commerce Infrastructure: The Internet, Web and Mobile Platform; (c) Building an E-commerce Presence: Web Sites, Mobile Sites and Apps; (d) E-Commerce Security and Payment Systems; (e) E-Commerce Business Models and Concepts; (f) E-Commerce Marketing and Advertising; (g) Social, Mobile and Local Marketing; (h) Ethics, Law and E-Commerce; (i) Online Content and Media (j) Social Networks, Auctions and Portals, and (k) E-Commerce Retailing and Services.

Assessment Methods
Continuous Assessment: 50%
Final Examination: 50%

WIE3003
INFORMATION SYSTEM CONTROL AND SECURITY

Credit: 3

Course Pre-requisite(s): None

Medium of Instruction: English

Learning Outcomes
1. Identify control and security involve in an information systems from the physical/environmental perspective, application perspective and operational perspective.
2. Describe types of current security control for the information system organisation, including the methodology, procedure and implementation design.
3. Solve security problems in information system using workflow, procedure and control being studied.

Synopsis of Course Contents
There are ten elements of the syllabus of the course are;
(a) Information Security and Risk Management; (b) Threats and attacks in information systems (c) Access Control System and Methodology; (d) Cryptography; (e) Physical/Environmental Security; (f) Enterprise security

system architecture and design; (g) Business Continuity and Disaster Recovery Planning; (h) Telecommunication, Networks and Internet Security; (i) Application Security; (j) Operation Security.

Assessment Methods
Continuous Assessment: 50%
Final Examination: 50%

WIE3005
KNOWLEDGE MANAGEMENT AND ENGINEERING

Credit: 3

Course Pre-requisite(s): None

Medium of Instruction: English

Learning Outcomes
1. Describe the concepts and technological approaches of Knowledge Management and Engineering (KME).
2. Use of various tools and methods for KME.
3. Use working knowledge and skills to plan, assess and develop knowledge management system.

Synopsis of Course Content
Modules for this course include (a) An introduction to the concepts Knowledge Management and Engineering; (b) Knowledge Characteristics: knowledge and its differences from data and information; (c) Techniques in KME: capturing, encoding and measuring of knowledge (d) Technological approach towards knowledge; (e) Concepts of Ontology, Taxonomy and related knowledge construction tools (f) Developing knowledge management system, evaluating the knowledge needs of an organisation; (g) Case study on KME in organization.

Assessment Methods
Continuous Assessment: 50%
Final Examination: 50%

WIE3006
INFORMATION SYSTEM AUDITING

Credit: 3

Course Pre-requisite(s): None

Medium of Instruction: English

Learning Outcomes
1. Understand the processes, principle and method of information system auditing.
2. Identify effective auditing processes and tools for information systems.
3. Use the works, procedures and control learned to solve current problems faced by organisations for effective auditing purpose.

Synopsis of Course Content
The topics that make up the course are: (a) Auditing process; (b) Managing planning and organization of information systems; (c) Technical infrastructure and

operational work procedure; (d) Control on information assets; (e) Disaster recovery and business sustainability; (f) System development of Business applications, findings, implementation and operations; (g) Evaluation of business process and risk management.

Assessment Method
Continuous Assessment: 50%
Final Examination: 50%

WIE3007
DATA MINING AND WAREHOUSING

Credit: 3

Course Pre-requisite(s): None

Medium of Instruction: English

Learning Outcomes
1. Define the term Data Mining and Data Warehouse.
2. Draw a schema diagram for the data warehouse using Star schema.
3. Create a decision tree (DT) model using the ID3 algorithm to find frequent itemsets using Apriori.

Synopsis of Course Content
The course consists of the following components: (a) Introduction to Data Warehouse and Data Mining; (b) Data Warehouses; (c) Pre-mining; (d) Classification; (e) Association Rules; (f) Clustering Algorithms.

Assessment Methods
Continuous Assessment: 50%
Final Examination: 50%

WIE3010
DATA VISUALIZATION

Credit: 3

Course Pre-requisite(s): None

Medium of Instruction: English

Learning Outcomes
1. Explain concepts and techniques relevant to data visualization, ie; data aspects, modeling concepts, and visualization techniques.
2. Apply suitable visualization techniques to appropriate datasets.
3. Use appropriate tools to analyze, and present/visualize data.

Synopsis of Course Content
This course begins by introducing the concepts of data visualization vs infographics. It provides students with the knowledge of where data can be found (data sources), how data can be acquired and how data can be analyzed and presented. It explains topics such as modeling concepts, data aspects, and visualization techniques. Techniques for visualizing multivariate,

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temporal, text-based, geospatial, and other types of data are taught. Students will be exposed to a few tools; to capture/import data, to analyze data and to visualize data.

Assessment Methods
Continuous Assessment: 50%
Final Examination: 50%

WIE3012
BUSINESS ANALYTICS AND INTELLIGENCE

Credit: 3

Course Pre-requisite(s): None

Medium of Instruction: English

Learning Outcomes
1. Explain the concept of BI and implementation of Data warehouse.
2. Integrate data from different sources.
3. Use suitable methods and techniques to analyse OLAP data to solve business problems.

Synopsis of Course Content
This course discusses Online analytical processing (OLAP), Data warehouses and data Dimensional modelling, Extract Transform Load (ETL) design, and statistical and mining approaches to improve business. It also covers report design, development and emerging trends in business intelligence.

Assessment Methods
Continuous Assessment: 70%
Final Examination: 30

WIF2003
WEB PROGRAMMING

Credit: 3

Course Pre-requisite(s): None

Medium of Instruction: English

Learning Outcomes
1. Use different programming languages, techniques, platforms and tools for web development.
2. Use frameworks and database to develop web applications.
3. Apply different techniques to improve the quality of web applications.

Synopsis of Course Content
This course covers the techniques, frameworks, platforms and tools for Web development. Theoretical aspects include the concepts of Web development, stack technologies, client-server architecture, and quality attributes of Web-based systems. Technical aspects include topics on design and development of web database applications using different protocols, programming languages, techniques, frameworks, platforms and tools, taking relevant quality issues into consideration.

Assessment Methods
Continuous Assessment: 50%
Final Examination: 50%

COURSE INFORMATION

SPECIALIZATION ELECTIVE COURSES

Bachelor of Computer Science
(Software Engineering)

WIF2002
SOFTWARE REQUIREMENTS ENGINEERING

Credit : 3

Course Prerequisite(s) : None

Medium of Instruction : English

Learning Outcomes
1. To describe issues in software requirements engineering.
2. To provide requirement artefacts based on established standards.
3. To apply appropriate techniques and methods to elicit and analyse software requirements.
4. To use proper models and tools for managing and verifying requirements.

Synopsis of Course Content
This course covers the fundamentals of requirements engineering; important requirements artefacts are covered and discussed. Core activities of requirement engineering which include elicitation, specification, documentation, negotiation, validation, and management are explained.

Assessment Methods
Continuous Assessment : 50%
Final Examination : 50%

WIF2003
WEB PROGRAMMING

Credit : 3

Course Prerequisite(s) : None

Medium of Instruction : English

Learning Outcomes
1. Use different programming languages, techniques, platforms, and tools for web development.
2. Use frameworks and database to develop web applications.
3. Apply different techniques to improve the quality of web applications.

Synopsis of Course Content
This course covers the techniques, frameworks, platforms, and tools for Web development. Theoretical aspects include the concepts of Web development, stack technologies, client-server architecture, and quality attributes of Web-based systems. Technical aspects include topics on design and development of web database applications using different protocols, programming languages, techniques, frameworks,

platforms, and tools, taking relevant quality issues into consideration.

Assessment Methods
Continuous Assessment : 50%
Final Examination : 50%

WIF3001
SOFTWARE TESTING

Credit : 3

Course Prerequisite(s) : None

Medium of Instruction : English

Learning Outcomes
1. Explain between various levels of testing, test types, and test approaches in test based software development.
2. Analyse the test design techniques of static approach in software development phases.
3. Apply the test design techniques of dynamic approach within test process.

Synopsis of Course Content
This course is designed to provide with in-depth knowledge on software testing and its test process. The course covers the basic principles of software testing and test activities that include the test plan, test design, monitoring, implementation, and test closure. The students will also learn various categories of test design techniques and methods used in both black box and white box testing of static and dynamic approaches. At the end of this course, students should be able to recognize various types and levels of testing as well as categorizing and applying software testing process and techniques.

Assessment Methods
Continuous Assessment : 50%
Final Examination : 50%

WIF3002
SOFTWARE PROCESS AND QUALITY

Credit : 3

Course Prerequisite(s) : None

Medium of Instruction : English

Learning Outcomes
1. Describe the fundamental concepts of software quality, software process, measurement program, and software process improvement.
2. Apply the principles of measurement and

improvement program as part of software quality assurance activity to produce high quality artifacts in software development process.

3. Evaluate various software process improvement models and quality management standard.

Synopsis of Course Content

This course covers software quality, software process, and software process improvement. It introduces the software quality assurance and the importance of process quality. Various existing software development methodologies are also being studied. It is followed by measurement program as part of software quality assurance activity to produce quality artifacts. The later part discusses software process improvement. Various models that support software process improvement are presented, and these include the CMMI, ISO 9000, SPICE, PSP and TSP.

Assessment Methods

Continuous Assessment : 50%
Final Examination : 50%

WIF3004
SOFTWARE ARCHITECTURE AND DESIGN PARADIGMS

Credit : 3

Course Prerequisite(s) : WIA2002

Medium of Instruction : English

Learning Outcomes

1. Differentiate between function-oriented, object-oriented, and data-structure centered design methods.
2. Apply the design principles in producing software architecture design.
3. Analyze software architecture.

Synopsis of Course Contents

This course covers software design issues and design principles; the different types of design methods such as function-oriented design, object-oriented design (emphasizing on deployment diagram), data-structure centered design; architecture design; architectural structures and views; quality attributes; tactics to achieve quality attributes; architectural styles/patterns (such as client-server, peer-to-peer, layered, and so on); introduction to design patterns; domain specific architectures; and tools.

Assessment Methods

Continuous Assessment : 50%
Final Examination : 50%

WIF3005
SOFTWARE MAINTENANCE AND EVOLUTION

Credit : 3

Course Prerequisite(s) : None

Medium of Instruction : English

Learning Outcomes

1. The fundamentals of software maintenance, maintenance processes, and activities.
2. Apply suitable techniques and tools for performing software maintenance activities.
3. Assess various strategies for evolving a legacy software system.

Synopsis of Course Content

This course mainly covers software maintenance fundamentals, key issues in maintenance, maintenance process, techniques for maintenance, and evolution in maintenance activities. Topics include definitions, terminology and categories of maintenance (Corrective Maintenance, Perfective Maintenance, Adaptive Maintenance, Preventive Maintenance); evolution of software; technical and management issues in maintenance (such as technical issues related to testing, impact analysis, and maintainability; management issues such as staffing, process, organizational aspects, and outsourcing and offshoring); maintenance cost estimation and measurement; maintenance processes and activities (such as maintenance planning activities, software configuration management (configuration item, processes, and activities in configuration management, patches), activities for software quality); techniques for maintenance such as program comprehension, reengineering, reverse engineering, migration, and retirement; evolution of legacy systems; usage of tools related to maintenance (such as for program comprehension, reverse engineering, configuration management).

Assessment Methods

Continuous Assessment : 50%
Final Examination : 50%

WIF3006
COMPONENT-BASED SOFTWARE ENGINEERING

Credit : 3

Course Prerequisite(s) : WIA2002

Medium of Instruction : English

Learning Outcomes

1. Explain fundamental concepts, principles, and techniques in software reuse specifically on development for reuse, development by reuse,

and component-level design.
2. Analyze changes to the existing application using component-based approach.
3. Develop component-based application using various component frameworks and programming APIs.

Synopsis of Course Content
This course covers the fundamental concepts and principles of software reuse, component-level development, development/design for reuse, development/design by reuse, and design patterns. It includes the definition and explanation of the nature of components, components interfaces, Interfaces as contracts, benefits of components, component design, and assembly. It introduces the architecture of component-based systems, component-based software engineering frameworks such as SCA, Spring, OSGi, EJB, and also covers component-based computing, API programming, class browsers, and related tools, as well as debugging in the API environment.

Assessment Methods
Continuous Assessment : 50%
Final Examination : 50%

WIF3008
REAL TIME SYSTEMS

Credit : 3

Course Prerequisite(s) : None

Medium of Instruction : English

Learning Outcomes
1. Define the principles of real time systems and compare real time system architectures.
2. Implement algorithms and protocols for scheduling, analysis, and verification for real-time systems.
3. Solve problems related to real-time issues in communication networks, specifically, features and capabilities required to support real-time applications.

Synopsis of Course Content
This course introduces real time systems. The differences between soft and hard real time systems are explained. Issues related to system decomposition and scheduling techniques are discussed. These include Timed Petri Net, clock-driven scheduling, as well as priority-driven scheduling of periodic, aperiodic, and sporadic tasks. Apart from that, the course also covers issues such as multiprocessor scheduling and resource access control, fault tolerance, and real time communication.

Assessment Methods
Continuous Assessment : 50%
Final Examination : 50%

WIF3009
PYTHON FOR SCIENTIFIC COMPUTING

Credit : 3

Course Prerequisite(s) : None

Medium of Instruction : English

Learning Outcomes
1. Explain scientific computation using Python in problem solving.
2. Use Python to create a variety of scripts and applications for the Web and systems development.
3. Apply key packages of Python to solve complex and nontrivial problems in a software project.

Synopsis of Course Content
This course introduces the landscape of scientific computing and core Python language using simple examples drawn from mathematics and physics. It discusses some of the ecosystem of scientific libraries, in particular, the SciPy ecosystem which includes general and specialised tools for data management and computation, productive experimentation and high-performance computing. These tools include Pandas, SymPy, IPython, IPyParallel, and Matplotlib. These state-of-the-art tools and key packages allow students to solve complex and nontrivial problems rapidly, efficiently and correctly using numerical, symbolical, and scientific computing approach.

Assessment Methods
Continuous Assessment : 60%
Final Examination : 40%

WIF3010
PROGRAMMING LANGUAGE PARADIGM

Credit : 3

Course Prerequisite(s) : None

Medium of Instruction : English

Learning Outcomes
1. To describe characteristics and privilege of various programming language paradigms.
2. To use formal notation and suitable tools for defining programming language syntax.
3. To evaluate programming language design issues.

Synopsis of Course Content
This course covers the fundamentals concepts and paradigm of programming languages, discusses the various programming language constructs and their unique characteristics as well as their implementation techniques. It also analyzes the

formal methods of describing the syntax and semantics of programming languages.

Assessment Methods
Continuous Assessment : 50%
Final Examination : 50%

WIF3011
CONCURRENT AND PARALLEL PROGRAMMING

Credit : 3

Course Prerequisite(s) : WIX1002 & WIA2004

Medium of Instruction : English

Learning Outcomes
1. Explain the concepts and issues of concurrent and parallel processing.
2. Optimize execution of sequential code with concurrent and parallel processing.
3. Build algorithms to solve concurrent and parallel processing problems.

Synopsis of Course Content
Concurrent and parallel programming plays a vital role in processing a complex problem in a concurrent or parallel approach to improve overall performance of problem solving. This course explains the reasons and challenges in designing and implementing a concurrent or parallel program. Students will learn different models and programming constructs for concurrency and parallelism. This course also discusses evaluation of worthiness to make a sequential program concurrent or parallel.

Assessment Methods
Continuous Assessment : 50%
Final Examination : 50%

WIC2008
INTERNET OF THINGS

Credit : 3

Course Prerequisite(s) : WIA1005

Medium of Instruction : English

Learning Outcomes
1. Describe the basic concept of Internet-of-Things.
2. Design IoT application using existing technology.
3. Apply IoT knowledge of practical problem solving.

Synopsis of Course Content
The course provides an overview of Internet-of-Things technology concept and practical. It develops foundational skills using hands-on lab activities that stimulate the students in applying creative problem-solving and rapid prototyping in the interdisciplinary domain of electronics, networking, security, data analytics, and business. The student-centric approach translates into the student being able to produce ideas, design, prototype, and present an IoT solution for an identified business or society need.

Assessment Methods
Continuous Assessment : 50%
Final Examination : 50%

WIG3005
GAME DEVELOPMENT

Credit : 3

Course Prerequisite(s) : None

Medium of Instruction : English

Learning Outcomes
1. Explain the basic principles of computer games, game genre, game development life cycle, and design consideration.
2. Develop a computer game taking into consideration selected game genre.
3. Explain the collision detection in game programming.

Synopsis of Course Content
This course will give an introduction to computer game development starting from concept development to implementation of a playable game prototype. Both the aesthetic and technical aspects of game development will be covered. The aesthetic component of the course will focus on story and character development, game mechanics, game play, and interface design and content creation for games. The technical component of the course will focus on programming tools and concepts for games, including data structures and algorithms, computer graphics, human-computer interaction, collision detection, and AI. Common topics include project management, prototype development, and play testing. Students will work in groups and go through the complete pipeline starting from a basic game idea all the way through developing a playable prototype.

Assessment Methods
Continuous Assessment : 50%
Final Examination : 50%

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COURSE INFORMATION

SPECIALIZATION ELECTIVE COURSES

Bachelor of Computer Science (Multimedia Computing)

WIG2001
DIGITAL IMAGE PROCESSING

Credit: 3

Course Pre-requisite(s): None

Medium of Instruction: English

Learning Outcomes
1. Identify techniques of digital image processing specifically.
2. Explain and differentiate the usage of different techniques in digital image processing.
3. Apply several digital image processing techniques.

Synopsis of Course Content
This course covers topics in digital image processing including image representation, image enhancement, image restoration, line and edge detection, image segmentation and image representation and description.

Assessment Methods
Continuous Assessment: 50%
Final Examination: 50%

WIG2002
COMPUTER GRAPHICS

Credit: 3

Course Pre-requisite(s): None

Medium of Instruction: English

Learning Outcomes
1. Understand the basic principles of implementing 2D and 3D computer graphics primitives.
2. Explain the key algorithms for modelling and rendering graphical objects.
3. Create interactive graphics program using a computer graphics API.

Synopsis of Course Content
The course will cover the main topics in computer graphics such as: graphics system, camera model, graphics primitives, graphics coordinate system, 2D and 3D transformations, 2D and 3D viewing transformations, lighting, shadowing and texture mapping. Students will be using an open-source graphics API to create both 2D and 3D graphic objects.

Assessment Methods
Continuous Assessment: 50%
Final Examination: 50%

WIG2004
AUDIO SYNTHESIS

Credit: 3

Course Pre-requisite(s): None

Medium of Instruction: English

Learning Outcomes
1. Explain audio synthesis techniques and audio control.
2. Synthesize a digital audio file in .aiff, .wav and midi format.
3. Discuss about the characteristics of a speech synthesis and speech recognition systems.

Synopsis of Course Content
This course starts with an introduction to the characteristics of sound in terms of physical and acoustical sounds, followed by the subsequent topics: properties of a sound wave, its relations to human perception of sound, sounds sampling and sound processing tools. Next, students will be taught about CSound programming emphasizing on the syntax of both the orchestra and score files, and how to program these files according to certain synthesis techniques in order to produce an audio file. For this purpose, students will be taught common synthesis techniques such as additive, subtractive, FM (Frequency Modulation) and AM (Amplitude Modulation). The course ends with an overview and hands on session of Audacity so students are able to relate what they have learned and how it is being used in developing software to manipulate or edit audio.

Assessment Methods
Continuous Assessment: 50%
Final Examination: 50%

WIG2005
INTERACTIVE DESIGN

Credit: 3

Course Pre-requisite(s): None

Medium of Instruction: English

Learning Outcomes
1. Identify task analysis for interactive design.
2. Explain the design of interactive computer-based applications.
3. Develop an interactive computer-based application.
4. Evaluate an interactive computer-based application.

Synopsis of Course Content

This course covers the main topics in interactive design such as the following: interaction concept and design; user roles in interactive design; design for combining information and communication; effective aspects of interface and interactivity; data collecting, analyzing, and presentation; interactive design process; and interactive design evaluation process.

Assessment Methods
Continuous Assessment: 50%
Final Examination: 50%

WIG3001
MATHEMATICS FOR MULTIMEDIA

Credit: 3

Course Pre-requisite(s): None

Medium of Instruction: English

Learning Outcomes
1. Identify mathematical theories involved in multimedia signal processing.
2. Elaborate mathematical techniques used in multimedia application.
3. Apply mathematics theories in processing multimedia objects.

Synopsis of Course Content
This course covers topics such as numbers and arithmetic; space and linearity; time and frequency;sampling and estimation; scaling and resolution; redundancy and information;error detection and correction.

Assessment Methods
Continuous Assessment: 50%
Final Examination: 50%

WIG3002
RENDERING AND ANIMATION

Credit: 3

Course Pre-requisite(s): None

Medium of Instruction: English

Learning Outcomes
1. Explain the techniques used in modeling, texturing, animating and rendering process.
2. Differentiate algorithms involved in generating 3D objects.
3. Discuss the importance of 3D computer animation and relate it to their daily life.

Synopsis of Course Content
At the beginning of this course, students will be exposed to the development, technology and computer animation applications. Next, students will be taught about the main phases in the development of computer animation which include aspects such as modeling, animation, texturing, lighting, knowledge pertaining to the job opportunities and future of computer animation and rendering.

Assessment Methods
Continuous Assessment: 50%
Final Examination: 50%

WIG3003
MULTIMEDIA PROGRAMMING

Credit: 3

Course Pre-requisite(s): None

Medium of Instruction: English

Learning Outcomes
1. Explain the concept and syntax of Java programming used to develop a multimedia application.
2. Apply the multimedia elements in programming various mobile applications (Android & iOS).
3. Develop multimedia application using Java programming language.

Synopsis of Course Contents
This course covers the following topics: object-oriented programming concept; the structure and concept in Java object-oriented programming concept; graphics and animation generations using AWT, JavaFX, Swing and Java2D; applets; sounds generations using Java Sound API; programming using Java Media Framework (JMF), Android Development ToolKit (ADT).

Assessment Methods
Continuous Assessment: 50%
Final Examination: 50%

WIG3004
VIRTUAL REALITY

Credit: 3

Course Pre-requisite(s): None

Medium of Instruction: English

Learning Outcomes
1. Explain the technology that support virtual reality applications and human perceptions involved in designing virtual reality environment.
2. Discuss other technologies including visualization and augmented reality
3. Develop a virtual reality environment using suitable tools and programming language

Synopsis of Course Content
This course begins with some introduction to virtual reality technology and its applications, followed by

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detail explanation regarding input and output devices that are being used in virtual reality application. Students will also learn about human sensory systems (visual, audio and tactile) and their relations to the development of virtual reality devices, as well as the possible effects these devices have on human health. Then students will be taught about how to model a virtual reality world and manipulate its objects using virtual reality development tools and programming languages. The course ends by providing students with fundamental knowledge regarding data visualisation and augmented reality, a research area that is closely related to virtual reality, systems (visual, audio and tactile) and their relations to the development of virtual reality.

Assessment Methods
Continuous Assessment: 50%
Final Examination: 50%

WIG3005
GAME DEVELOPMENT

Credit: 3

Course Pre-requisite(s): None

Medium of Instruction: English

Learning Outcomes
1. Explain the basic principles of computer games, game genre, game development life cycle and design consideration.
2. Develop a computer game taking into consideration selected game genre.
3. Explain collision detection in game programming.

Synopsis of Course Content
This course will give an introduction to computer game development starting from concept development to implementation of a playable game prototype. Both the aesthetic and technical aspects of game development will be covered. The aesthetic component of the course will focus on story and character development, game mechanics, game play and interface design and content creation for games. The technical component of the course will focus on programming tools and concepts for games, including data structures & algorithms, computer graphics, human-computer interaction, shader programming and AI. Common topics include project management, prototype development and play testing. Students will work in groups and go through the complete pipeline starting from a basic game idea all the way through developing a playable prototype.

Assessment Methods
Continuous Assessment: 50%
Final Examination: 50%

WIG3006
DIGITAL VIDEO PROCESSING

Credit: 3

Course Pre-requisite(s): None

Medium of Instruction: English

Learning Outcomes
1. Explain about the digital video processing techniques in specific.
2. Differentiate the use of digital video processing techniques in several multimedia applications.
3. Apply the appropriate digital video processing techniques.

Synopsis of Course Content
This course covers topics in digital video processing as follows: representation of digital video; spatial and temporal sampling; two and three dimensional motion estimation techniques; video coding techniques; stereo and multiview video processing; video compression methods and standards; and error control in video communications.

Assessment Method
Continuous Assessment: 50%
Final Examination: 50%

WIG3007
SPECIAL TOPICS IN MULTIMEDIA

Credit: 3

Course Pre-requisite(s): None

Medium of Instruction: English

Learning Outcomes
1. Identify the current and specific topics in multimedia science.
2. Describe the technologies related to multimedia science.
3. Apply the related new technologies to the design of multimedia applications.

Synopsis of Course Content
This course serves as a platform to deliver specialized topics in multimedia offered by interested lecturers and professionals. This course may run in any semester depending on the availability of the interested instructor and the demand from the students

Assessment Methods
Continuous Assessment: 50%

Final Examination: 50%

WIG3008
MULTIMEDIA FORENSIC AND SECURITY

Credit: 3

Course Pre-requisite(s): None .

Medium of Instruction: English

Learning Outcomes
1. Identify forensic and security issues related to multimedia.
2. Differentiate various elementary forensic techniques for multimedia content.
3. Apply appropriate security techniques in multimedia content.

Synopsis of Course Content
This course is designed to provide students with knowledge on various digital media protection technology. Students will also be exposed to the different issues on cybercrime related to digital media. In addition, this course will discuss the different stages in the digital forensic process and various digital forensic techniques in accordance with the identified media and applicable cyber crime laws.

Assessment Methods
Continuous Assessment: 50%
Final Examination: 50%

WIE3010
DATA VISUALIZATION

Credit: 3

Course Pre-requisite(s): None .

Medium of Instruction: English

Learning Outcomes
1. Explain concepts and techniques relevant to data.
2. Visualization, ie; data aspects, modeling concepts, and visualization techniques.
3. Apply suitable visualization techniques to appropriate datasets.
4. Use appropriate tools to analyze, and present/ visualize data.

Synopsis of Course Content
This course begins by introducing the concepts of data visualization vs infographics. It provides students with the knowledge of where data can be found (data sources), how data can be acquired and how data can be analyzed and presented. It explains topics such as modeling concepts, data

aspects, and visualization techniques. Techniques for visualizing multivariate, temporal, text-based, geospatial, and other types of data are taught. Students will be exposed to a few tools; to capture/import data, to analyze data and to visualize data.

Assessment Method
Continuous Assessment: 50%
Final Examination: 50%

WIF2003
WEB PROGRAMMING

Credit: 3

Course Pre-requisite(s): None .

Medium of Instruction: English

Learning Outcomes
1. Use different programming languages, techniques, platforms and tools for web development.
2. Use frameworks and database to develop web applications.
3. Apply different techniques to improve the quality of web applications.

Synopsis of Course Content
This course covers the techniques, frameworks, platforms and tools for Web development. Theoretical aspects include the concepts of Web development, stack technologies, client-server architecture, and quality attributes of Web-based systems. Technical aspects include topics on design and development of web database applications using different protocols, programming languages, techniques, frameworks, platforms and tools, taking relevant quality issues into consideration.

Assessment Method
Continuous Assessment: 50%
Final Examination: 50

COURSE INFORMATION

SPECIALIZATION ELECTIVE COURSES

Bachelor of Computer Science (Data Science)

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-------------------------------------------------------------------
                            WIG2001
                 DIGITAL IMAGE PROCESSING
-------------------------------------------------------------------
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Credit: 3

Course Pre-requisite(s): None

Medium of Instruction: English

Learning Outcomes
1. Identify techniques of digital image processing specifically.
2. Explain and differentiate the usage of different techniques in digital image processing.
3. Apply several digital image processing techniques.

Synopsis of Course Content
This course covers topics in digital image processing including image representation, image enhancement, image restoration, line and edge detection, image segmentation and image representation and description.

Assessment Methods
Continuous Assessment: 50%
Final Examination: 50%

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-------------------------------------------------------------------
                            WIG2002
                    COMPUTER GRAPHICS
-------------------------------------------------------------------
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Credit: 3

Course Pre-requisite(s): None

Medium of Instruction: English

Learning Outcomes
1. Understand the basic principles of implementing 2D and 3D computer graphics primitives.
2. Explain the key algorithms for modelling and rendering graphical objects.
3. Create interactive graphics program using a computer graphics API.

Synopsis of Course Content
The course will cover the main topics in computer graphics such as: graphics system, camera model, graphics primitives, graphics coordinate system, 2D and 3D transformations, 2D and 3D viewing transformations, lighting, shadowing and texture mapping. Students will be using an open-source graphics API to create both 2D and 3D graphic objects.

Assessment Methods
Continuous Assessment: 50%
Final Examination: 50%

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-------------------------------------------------------------------
                            WIG2004
                     AUDIO SYNTHESIS
-------------------------------------------------------------------
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Credit: 3

Course Pre-requisite(s): None

Medium of Instruction: English

Learning Outcomes
1. Explain audio synthesis techniques and audio control.
2. Synthesize a digital audio file in .aiff, .wav and midi format.
3. Discuss about the characteristics of a speech synthesis and speech recognition systems.

Synopsis of Course Content
This course starts with an introduction to the characteristics of sound in terms of physical and acoustical sounds, followed by the subsequent topics: properties of a sound wave, its relations to human perception of sound, sounds sampling and sound processing tools. Next, students will be taught about CSound programming emphasizing on the syntax of both the orchestra and score files, and how to program these files according to certain synthesis techniques in order to produce an audio file. For this purpose, students will be taught common synthesis techniques such as additive, subtractive, FM (Frequency Modulation) and AM (Amplitude Modulation). The course ends with an overview and hands on session of Audacity so students are able to relate what they have learned and how it is being used in developing software to manipulate or edit audio.

Assessment Methods
Continuous Assessment: 50%
Final Examination: 50%

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-------------------------------------------------------------------
                            WIG2005
                    INTERACTIVE DESIGN
-------------------------------------------------------------------
```

Credit: 3

Course Pre-requisite(s): None

Medium of Instruction: English

Learning Outcomes
1. Identify task analysis for interactive design.
2. Explain the design of interactive computer-based applications.
3. Develop an interactive computer-based application.
4. Evaluate an interactive computer-based application.

Synopsis of Course Content

This course covers the main topics in interactive design such as the following: interaction concept and design; user roles in interactive design; design for combining information and communication; effective aspects of interface and interactivity; data collecting, analyzing, and presentation; interactive design process; and interactive design evaluation process.

Assessment Methods
Continuous Assessment: 50%
Final Examination: 50%

WIG3001
MATHEMATICS FOR MULTIMEDIA

Credit: 3

Course Pre-requisite(s): None

Medium of Instruction: English

Learning Outcomes
1. Identify mathematical theories involved in multimedia signal processing.
2. Elaborate mathematical techniques used in multimedia application.
3. Apply mathematics theories in processing multimedia objects.

Synopsis of Course Content
This course covers topics such as numbers and arithmetic; space and linearity; time and frequency;sampling and estimation; scaling and resolution; redundancy and information;error detection and correction.

Assessment Methods
Continuous Assessment: 50%
Final Examination: 50%

WIG3002
RENDERING AND ANIMATION

Credit: 3

Course Pre-requisite(s): None

Medium of Instruction: English

Learning Outcomes
1. Explain the techniques used in modeling, texturing, animating and rendering process.
2. Differentiate algorithms involved in generating 3D objects.
3. Discuss the importance of 3D computer animation and relate it to their daily life.

Synopsis of Course Content
At the beginning of this course, students will be exposed to the development, technology and computer animation applications. Next, students will be taught about the main phases in the development of computer animation which include aspects such as modeling, animation, texturing, lighting, knowledge pertaining to the job opportunities and future of computer animation and rendering.

Assessment Methods
Continuous Assessment: 50%
Final Examination: 50%

WIG3003
MULTIMEDIA PROGRAMMING

Credit: 3

Course Pre-requisite(s): None

Medium of Instruction: English

Learning Outcomes
1. Explain the concept and syntax of Java programming used to develop a multimedia application.
2. Apply the multimedia elements in programming various mobile applications (Android & iOS).
3. Develop multimedia application using Java programming language.

Synopsis of Course Contents
This course covers the following topics: object-oriented programming concept; the structure and concept in Java object-oriented programming concept; graphics and animation generations using AWT, JavaFX, Swing and Java2D; applets; sounds generations using Java Sound API; programming using Java Media Framework (JMF), Android Development ToolKit (ADT).

Assessment Methods
Continuous Assessment: 50%
Final Examination: 50%

WIG3004
VIRTUAL REALITY

Credit: 3

Course Pre-requisite(s): None

Medium of Instruction: English

Learning Outcomes
1. Explain the technology that support virtual reality applications and human perceptions involved in designing virtual reality environment.
2. Discuss other technologies including visualization and augmented reality
3. Develop a virtual reality environment using suitable tools and programming language

Synopsis of Course Content
This course begins with some introduction to virtual reality technology and its applications, followed by

detail explanation regarding input and output devices that are being used in virtual reality application. Students will also learn about human sensory systems (visual, audio and tactile) and their relations to the development of virtual reality devices, as well as the possible effects these devices have on human health. Then students will be taught about how to model a virtual reality world and manipulate its objects using virtual reality development tools and programming languages. The course ends by providing students with fundamental knowledge regarding data visualisation and augmented reality, a research area that is closely related to virtual reality, systems (visual, audio and tactile) and their relations to the development of virtual reality.

Assessment Methods
Continuous Assessment: 50%
Final Examination: 50%

WIG3005
GAME DEVELOPMENT

Credit: 3

Course Pre-requisite(s): None

Medium of Instruction: English

Learning Outcomes
1. Explain the basic principles of computer games, game genre, game development life cycle and design consideration.
2. Develop a computer game taking into consideration selected game genre.
3. Explain collision detection in game programming.

Synopsis of Course Content
This course will give an introduction to computer game development starting from concept development to implementation of a playable game prototype. Both the aesthetic and technical aspects of game development will be covered. The aesthetic component of the course will focus on story and character development, game mechanics, game play and interface design and content creation for games. The technical component of the course will focus on programming tools and concepts for games, including data structures & algorithms, computer graphics, human-computer interaction, shader programming and AI. Common topics include project management, prototype development and play testing. Students will work in groups and go through the complete pipeline starting from a basic game idea all the way through developing a playable prototype.

Assessment Methods
Continuous Assessment: 50%
Final Examination: 50%

WIG3006
DIGITAL VIDEO PROCESSING

Credit: 3

Course Pre-requisite(s): None

Medium of Instruction: English

Learning Outcomes
1. Explain about the digital video processing techniques in specific.
2. Differentiate the use of digital video processing techniques in several multimedia applications.
3. Apply the appropriate digital video processing techniques.

Synopsis of Course Content
This course covers topics in digital video processing as follows: representation of digital video; spatial and temporal sampling; two and three dimensional motion estimation techniques; video coding techniques; stereo and multiview video processing; video compression methods and standards; and error control in video communications.

Assessment Method
Continuous Assessment: 50%
Final Examination: 50%

WIG3007
SPECIAL TOPICS IN MULTIMEDIA

Credit: 3

Course Pre-requisite(s): None

Medium of Instruction: English

Learning Outcomes
1. Identify the current and specific topics in multimedia science.
2. Describe the technologies related to multimedia science.
3. Apply the related new technologies to the design of multimedia applications.

Synopsis of Course Content
This course serves as a platform to deliver specialized topics in multimedia offered by interested lecturers and professionals. This course may run in any semester depending on the availability of the interested instructor and the demand from the students

Assessment Methods
Continuous Assessment: 50%

Final Examination: 50%

WIG3008
MULTIMEDIA FORENSIC AND SECURITY

Credit: 3

Course Pre-requisite(s): None .

Medium of Instruction: English

Learning Outcomes
1. Identify forensic and security issues related to multimedia.
2. Differentiate various elementary forensic techniques for multimedia content.
3. Apply appropriate security techniques in multimedia content.

Synopsis of Course Content
This course is designed to provide students with knowledge on various digital media protection technology. Students will also be exposed to the different issues on cybercrime related to digital media. In addition, this course will discuss the different stages in the digital forensic process and various digital forensic techniques in accordance with the identified media and applicable cyber crime laws.

Assessment Methods
Continuous Assessment: 50%
Final Examination: 50%

WIE3010
DATA VISUALIZATION

Credit: 3

Course Pre-requisite(s): None .

Medium of Instruction: English

Learning Outcomes
1. Explain concepts and techniques relevant to data.
2. Visualization, ie; data aspects, modeling concepts, and visualization techniques.
3. Apply suitable visualization techniques to appropriate datasets.
4. Use appropriate tools to analyze, and present/visualize data.

Synopsis of Course Content
This course begins by introducing the concepts of data visualization vs infographics. It provides students with the knowledge of where data can be found (data sources), how data can be acquired and how data can be analyzed and presented. It explains topics such as modeling concepts, data

aspects, and visualization techniques. Techniques for visualizing multivariate, temporal, text-based, geospatial, and other types of data are taught. Students will be exposed to a few tools; to capture/import data, to analyze data and to visualize data.

Assessment Method
Continuous Assessment: 50%
Final Examination: 50%

WIF2003
WEB PROGRAMMING

Credit: 3

Course Pre-requisite(s): None .

Medium of Instruction: English

Learning Outcomes
1. Use different programming languages, techniques, platforms and tools for web development.
2. Use frameworks and database to develop web applications.
3. Apply different techniques to improve the quality of web applications.

Synopsis of Course Content
This course covers the techniques, frameworks, platforms and tools for Web development. Theoretical aspects include the concepts of Web development, stack technologies, client-server architecture, and quality attributes of Web-based systems. Technical aspects include topics on design and development of web database applications using different protocols, programming languages, techniques, frameworks, platforms and tools, taking relevant quality issues into consideration.

Assessment Method
Continuous Assessment: 50%
Final Examination: 50

FACULTY OF
COMPUTER SCIENCE &
INFORMATION TECHNOLOGY

INDUSTRIAL
TRAINING

https://careerportal.fsktm.um.edu.my

INDUSTRIAL TRAINING
FACULTY OF COMPUTER SCIENCE AND INFORMATION TECHNOLOGY
UNIVERSITI MALAYA

1. INTRODUCTION

Industrial Training is a training program that is compulsory for students of Bachelor of Computer Science from the Faculty of Computer Science and Information Technology (FCSIT), Universiti Malaya. The purpose of this training is to give exposure to students on the operations and real activities in the workplace.

Through Industrial Training, students will be able to see how the concepts of Computer Science and Information Technology learnt in university can be practiced in development processes and daily management of an organization. It will also increase and improve skills that are needed by students with the guidance of professionals from industry and University. In relation to that, Industrial Training plays the role as the preparation point that allows a student to get involved in a profession related to his or her field of study.

This guideline can be used as a reference by Industrial Training Committee, organizations/companies, Company Supervisors, Faculty Supervisors and students. It provides guidelines related to the functions or roles that all parties involved in the Industrial Training should play; the training scope required as well as the ways evaluations are carried out.

2. DEFINITION OF INDUSTRIAL TRAINING

Industrial Training is the training undergone by students in any organization/company which provides tasks related to the field of Computer Science for a determined period to obtain working experience by practicing what was learnt in university.

3. AIM OF INDUSTRIAL TRAINING

The aim of Industrial Training is to enable students to get experience in related organizations/companies in parallel with the faculty's intention to produce graduates with skills and specializations to fulfil the country's current needs.

4. OBJECTIVES OF INDUSTRIAL TRAINING

a) To produce excellent graduates who are always open-minded, innovative, smart in communicating and competitive.
b) To expose students to the real situation of operation, development and management processes in the workplace.
c) To provide opportunities to students to participate as members in completing a task or development project.
d) To provide experience to students in learning techniques to solve problems faced during work and to contribute innovative ideas to the organizations.
e) To allow students and University to get exposure to the latest systems and technologies used by the external organizations.

f) To provide opportunities for organizations and industry to train and identify the potential of future graduates of university.

g) To get feedback to continuously improve the quality of the courses offered by the faculty.

h) To motivate students to improve their academic achievements after undergoing Industrial Training.

5. IMPLEMENTATION

5.1 Industrial Training Committee

The Industrial Training Committee of FCSIT is appointed by the Dean for a given timeframe. It consists of Industrial Training Coordinator from each department or unit in the faculty. A Department Industrial Training Coordinator is in-charge of the Industrial Training of the students of its department. The committee is led by the Head of Coordinator and is assisted by a support staff for clerical matters.

The tasks of the Industrial Training Committee are:

a) Plan, implement and coordinate Industrial Training programme.
b) Prepare guidelines and related information.
c) Coordinate Industrial Training programme at the Faculty with Centre for Integral Learning (CITrA), Universiti Malaya.
d) Determine the scope of Industrial Training as a guideline for students and employers.
e) Identify forthcoming students for Industrial Training and ensure that they are registered.
f) Ensure the Industrial Training regulations in the curriculum are conformed.
g) Give briefing to the forthcoming Industrial Training students.
h) Identify organizations that are suitable for students' placement.
i) Ensure that students get the insurance application form, Industrial Training confirmation form, and other relevant documents from CITrA.
j) Advertise, promote and encourage students to attend preparatory workshop conducted by CITrA Send and monitor students at the organizations/companies during the Industrial Training.
k) Appoint lecturers from FCSIT as Faculty Supervisors to supervise each student undergoing Industrial Training.
l) Monitor the students' welfare during Industrial Training.
m) Develop and update the evaluation method.
n) Collect, check, coordinate and present the students' Industrial Training results to the Deputy Dean (Undergraduate).

5.2 Industrial Training Time and Duration

The eligible students must undergo their Industrial Training in Semester 1 of Year 3, for a duration of 24 weeks.

In certain cases, the Faculty can approve students to undergo Industrial Training at another Semester instead of Semester 1 of Year 3.

5.3 Student Requirements

Industrial Training is **COMPULSORY** for all Bachelor of Computer Science students who are listed as eligible. Eligible students:

a) Must have taken all Faculty and Programme Core Courses (except Academic Project I and Academic Project II).
b) Must not register Industrial Training together with any other courses in one semester.

5.4 Requirements of Organisations/Companies

As the measure to ensure that organisations/companies offering Industrial Training provide suitable training in the field of Computer Science, the Faculty has set some criteria that must be fulfilled by any of the interested organizations/companies, namely:

a) The organizations/companies **MUST** offer job specifications within the scope stated in Section 5.5. Jobs and tasks that focus only on sales, teaching, administration and the like, are NOT allowed.
b) The organizations/companies **MUST** offer formal working hours and office environment only. Teleworking, virtual office and so on, are **NOT** allowed unless being specifically specified in the offer letter (for example remote internship). Students are allowed to work on night shift if it is the instruction from the companies and it follows the companies' safety guidelines for workers.
c) It is **NOT** compulsory for the organizations/companies to provide allowances or honorarium to the students but are highly encouraged to do so to help students in coping with living expenses.

5.5 Training Scope

Organizations/companies offering Industrial Training to the students MUST be able to train them in the practical aspects of Computer Science. The suggested job scopes include, but not limited to:

a) Become a member of a system development project: conduct feasibility study, analysis, design, implementation, maintenance and evaluation.
b) Formulate problem solution and programming in information management system development, web access, computer network control, and research and development.
c) Hands-on experience in developing, testing, and deploying AI models, understanding ethical AI practices
d) Practical experience in data analysis, visualization, and interpretation, proficiency in using data science tools and programming languages.
e) Hands-on experience in system design, implementation, and troubleshooting, familiarity with hardware and software integration, exposure to network management, cybersecurity practices.
f) Practical experience in digital content creation, graphic design, video production, and interactive media development.

Other than that, organizations/companies have the responsibility to provide students with the opportunity to enhance their soft skills.

5.6 Students' Responsibilities
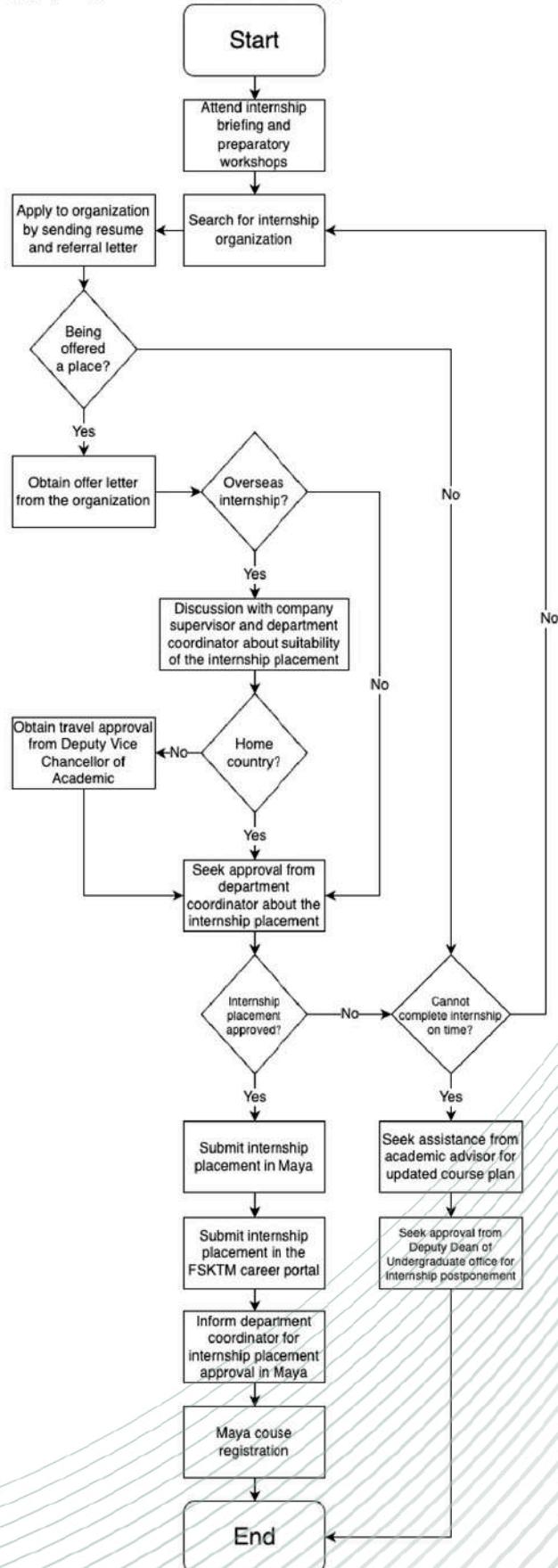
a) Identify and apply directly to suitable organizations/companies for Industrial Training placement one semester before the Industrial Training Programme for local placement, and at least two semesters before the Industrial Training Programme for abroad placement. Refer to Section 5.7.

b) Should not undergo Industrial Training in an organization/company where there might be conflict of interests, such as, in an organization/company owned by one's own family or relative, organization/company where the student has worked before or is currently working, and so on.

c) FCSIT students are not allowed to undergo Industrial Training in Universiti Malaya including spin-off companies, except for certain cases which are approved.

d) Get the advice from the Industrial Training Coordinator if unsure of the suitability of an organization/company.

e) Inform the Industrial Training Coordinator if unable to get a placement for Industrial Training and ready to accept a training place decided by the Industrial Training Coordinator.

f) Attend a briefing related to Industrial Training.

g) Required to attend a total of 4 hours preparatory workshops organized by CITrA and/or the faculty, before Industrial Training.

h) Choose only **ONE** place for Industrial Training.

i) Email offer letter to Industrial Training Department Coordinator to get approval for the placement before starting the training. The offer letter must state the start and end dates of the Industrial Training of the student, the tasks in general that will be assigned to the student during the training, and the department where the student will be placed. Without this information the placement will not be approved by the Industrial Training Department Coordinator.

j) The student is responsible to make sure that the duration of the student's Industrial Training is at least 24 weeks. If less than 24 weeks, the student does not fulfil the requirement of the Industrial Training programme and will fail his or her Industrial Training.

k) Register the internship placement in Maya and the career portal and submit all the required documents including the offer letter.

l) Get written permission from the Faculty to withdraw from the Industrial Training programme or to change the location of placement or to reject an offer accepted previously.

m) Follow the training requirements.

n) Carry out the tasks and the responsibilities assigned by the organization/company under the supervision of one or more Company Supervisors.

o) Adhere to all the rules and regulations of organization/company as long as not contradicting with the rules of the University.

p) Always be positive and give the best contribution in carrying out the tasks given.

q) Carry out Industrial Training in an ethical and professional manner and uphold the good name of the University at all times.

r) Contact and inform Industrial Training Coordinator/Faculty Supervisor immediately if facing any problem.

s) Record all activities that have been carried out in Logbooks and submit to the Faculty Supervisor via the career portal following the schedule in Section 5.8.

t) Write the Industrial Training Final Report and conduct other tasks assigned.

u) Contact the appointed Faculty Supervisor to arrange for the supervisor to visit the student at the organization/company where the student is undergoing his or her Industrial Training. A student who fails to do so before the end of his or her Industrial Training will fail Industrial Training.

v) Be present at the training place during the Faculty Supervisor's visit and conduct a presentation and demonstrate devices or systems that have been used or learnt.

w) Show the Logbook to be checked by the Faculty Supervisor during the supervisor's visit.

x) Adhere to the Industrial Training rules and regulations set by the Faculty, CITrA, and the University.

y) Leave taken during Industrial Training has to be replaced (even though it is the student's entitlement, and the organization/company has approved it) unless the student obtains a letter from the organization/company which states that it is unable

to let the student to replace the leave. Include this letter in the Final Logbook. Sick leave which has been approved by the organization/company does not need to be replaced.   Include the medical certificate and Company Supervisor's approval on the sick leave in the Logbook.

z) Always visit CITrA website and Industrial Training website of the Faculty to get the latest information.

aa) Perform the required actions following the schedule in Section 5.8.

5.7 Flow Chart for Applying Industrial Training Placement

5.8   Students' Schedule

5.8.1   During Industrial Training

Week	Tasks
1 - 2	Submit the Confirmation Form in the career portal.
6	1. Check the name of the Faculty Supervisor that has been assigned to the student at the Industrial Training website of FCSIT. 2. Remind the Company Supervisor to complete the Plan of Tasks and submit in the career portal.
1 - 8	Prepare First Logbook by filling in the daily log and weekly tasks summary. Logbook must be verified by the Company Supervisor on a weekly basis.
9	Submit completed First Logbook (comprising Week 1 to 8) in the career portal, latest by 5pm, Friday of Week 9.
9 - 16	Prepare Second Logbook by filling in the daily log and weekly tasks summary. Logbook has to be verified by the Company Supervisor on a weekly basis.
17	Submit completed second Logbook (comprising Week 9 to 16) in the career portal, latest by 5pm, Friday of Week 17.
21 - 24	1. Liaise with the Faculty Supervisor to arrange for his/her visit to the company. 2. Conduct presentation on industrial training undergone and show Logbook during the supervisor's visit. 3. Introduce Company Supervisor(s) to Faculty/department Supervisor.
24	1. Remind the Company Supervisor to complete company supervisor evaluation in the career portal. The marks given in the evaluation form are confidential and should not be released to the student. 2. Submit Final Report and Final Logbook which has been verified by the Company Supervisor in the career portal. 3. Submit a copy of the Final Report to the Company Supervisor. Complete Industrial Training Self-Evaluation Form.

Note: *The week in the tables above refers to the week of a student's Industrial Training and not the week of the semester.*

5.9 Faculty Supervisors' Responsibilities

a) Ensure that students undergo the Industrial Training in-line with the objectives established.
b) Assist in solving students' problems related to the field of work.
c) Arrange for at least one visit to the organisation/company within Week 21 to 24 of the student's training.
d) Visit the company to give advice to the student, meet the Company Supervisor, assess the suitability of the company for students, and evaluate the student.
e) Evaluate the student progressively following the schedule in Section 5.10.
f) Inform about the company supervisor evaluation to the Company Supervisor.
g) Coordinate the marking and submit the marks and all the evaluation forms to the Industrial Training support staff.
h) Provide suggestions to improve future Industrial Training program.
i) Perform the required things following the schedule in Section 5.10.

5.10 Faculty Supervisors' Schedule

Week	Tasks
6	1. Receive letter of appointment of supervision from TDID office. 2. Receive Plan of Tasks in the career portal.
9	Receive First Logbook (comprising Week 1 to 8) from the student in the career portal.
10 - 11	Assess the First Logbook using Evaluation Form 1A (10%) in the career portal.
17	Receive Second Logbook (comprising Week 9 to 16) from the student in the career portal.
18 - 19	Assess the Second Logbook using Evaluation Form 1A (10%) in the career portal.
21 - 24	Visit the student at the respective company and assess the student including the Logbook by using Evaluation Form 1B (20%) in the career portal. The marks given for Evaluation Form 1B can be finalized after returning from the visit and the marks should not be released to the student or organisation/company.
24	Receive Final Report and Final Logbook in the career portal.
Within two weeks after submission of Final Report.	Assess the Final Report and Final Logbook of each student assigned by using Evaluation Form 1C (20%) in the career portal.

Note:
1. *The week in the table above refers to the week of a student's Industrial Training and not the week of the semester.*
2. *All the evaluation forms are accessible in the career portal of FCSIT.*

5.11 Organisation/Company's Responsibilities

a) Identify the number of students needed, specialisation, and job specification.
b) State the following information in the offer letter for the student: the start and end dates of the Industrial Training of the student, the tasks in general that will be assigned to the student during the training, and the department the student will be placed. Without this information the placement will not be approved by the faculty.
c) The duration of Industrial Training for FCSIT students is 24 weeks. If less than 24 weeks, the student does not fulfil the requirement of the Industrial Training programme and will fail his or her Industrial Training.
Please take note that 24 weeks is not equivalent to 6 months.
d) Appoint one of its officers as Company Supervisor to the student throughout the student's Industrial Training.
e) Determine the student's training scope in accordance with the University's suggestion.
f) Provide appropriate exposure in order for the student to obtain useful practical experience.
g) Provide facilities relevant to the tasks given to the student.
h) Consider giving appropriate allowance or honorarium to students undergoing Industrial Training. The giving of allowance or honorarium is not mandatory but highly encouraged to help students in coping with living expenses.
i) Give feedback to the Industrial Training Coordinator/Faculty Supervisor regarding training given.

5.12 Organisation/Company Supervisors' Responsibilities

a) Supervise the student for the whole duration of the Industrial Training.
b) Perform the required things following the schedule in Section 5.13.
c) Inform the Industrial Training Coordinator/Faculty Supervisor of any problem or issue in relation to Industrial Training.

5.13 Organisation/Company Supervisors' Schedule

Week	Tasks
Before Industrial Training	1. If your organisation/company had been registered with a career portal, watch out for emails from the system on students' applications to undergo Industrial Training at your organisation and approve those applications that you want to accept. 2. Issue offer letters to students you want to accept. The offer letter must state the start and end dates of the Industrial Training of the student, the tasks in general that will be assigned to the student during the training, and the department the student will be placed. Without this information the placement will not be approved by the faculty.
1 - 2	Sign Confirmation Form passed to you by the student.
6	Refer to the career portal of FCSIT or the student, to get the template for the Plan of Tasks, the name and email of the supervisor from the faculty that has been assigned to the student, and the name and email of the Industrial Training support staff.

1 - 8	Verify the student's Logbook on a weekly basis. The student has to submit First Logbook (comprising Week 1 to 8) to the Faculty Supervisor in the career portal by Week 9.
9 - 16	Verify the student's Logbook on a weekly basis. The student has to email scanned Second Logbook (comprising Week 9 to 16) to the Faculty Supervisor in the career portal by Week 17.
17 - 24	Verify the student's Logbook on a weekly basis. The student has to submit the Final Logbook (comprising all the weeks) together with the Final Report in the career portal within one week after the training ended.
21 - 24	Allocate time to meet the Faculty Supervisor during his/her visit of the student at the company.
24	1. Complete Evaluation Form 2A (40%) to assess the student performance in the career portal. The marks given in the evaluation form are confidential and should not be released to the student. 2. Verify the Final Report and Final Logbook prepared by the student for submission to the Faculty. 3. Receive a copy of the Final Report from the student. 4. Complete the Industrial Training Survey online.

Note: The week in the table above refers to the week of the student's Industrial Training and not the week of the semester.

5.14 Student Placement Process

Refer to the latest guideline provided by CITrA and Section 5.7.

6. EVALUATION

6.1 Purpose of Evaluation

The purposes of evaluation are to:

a) Measure the student's job/training performance and the quality of the student's work.
b) Evaluate the development of the student's character.
c) Guide the student's training.

6.2 Student Evaluation Criteria

There are **TWO (2)** main aspects of evaluation:

a) Job performance evaluation; and
b) Student character evaluation.

6.3 Evaluation Method

Evaluation is done continuously and involves the Faculty Supervisor and Company Supervisor. The following table shows the details of the evaluation:

	Percentage	Evaluator
First Logbook	10	Faculty Supervisor
Second Logbook	10	Faculty Supervisor
Presentation during Faculty Supervisor's visit	20	Faculty Supervisor
End of Training Evaluation	40	Company Supervisor
Final Report and Final Logbook	20	Faculty Supervisor

7. LOGBOOKS PREPARATION AND SUBMISSION

a) Every student is required to prepare the following Logbooks to record all the daily activities in the organisation/company:

	Content	Submission Date
First Logbook	Week 1 to 8	5pm, Friday of Week 9
Second Logbook	Week 9 to 16	5pm, Friday of Week 17
Final Logbook	All the weeks	Within two weeks after training ended

Note: The week in the table above refers to the week of a student's Industrial Training and not the week of the semester.
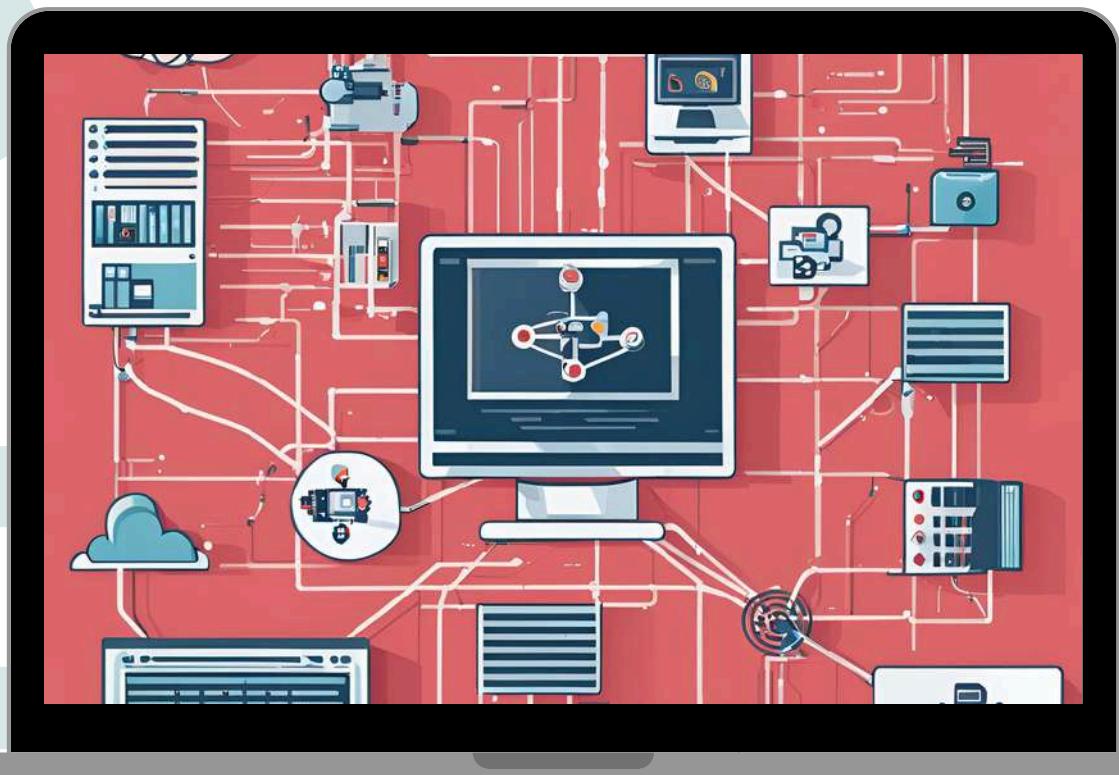
b) The Logbooks must be prepared following the template given at the Industrial Training Website of FCSIT.

8. FINAL REPORT PREPARATION

a) Final Report must be prepared according to the format given at the Industrial Training Website of FCSIT.
b) Refer to the guideline of writing the Final Report at the Industrial Training Website of FCSIT.
c) Final Report must be verified by the Company Supervisor to ensure the authenticity of the information before submission.
d) Final Report must be submitted to the Industrial Training support staff in the career portal and to the company within one (1) week after the Industrial Training ended.

9. CONCLUSION

Through the Industrial Training programme, the Faculty and University truly hope that students can make use of the provided opportunities to improve their knowledge and skills before embarking on their careers.

ACADEMIC
PROJECT

https://ilmiah.fsktm.um.edu.my

ACADEMIC PROJECT I AND II
FACULTY OF COMPUTER SCIENCE AND INFORMATION TECHNOLOGY
UNIVERSITY OF MALAYA

1. Introduction

An Academic Project (AP) is a project or academic task that must be accomplished individually by every undergraduate student to obtain the attributions. It is compulsory for students of Bachelor of Computer Science and Bachelor of Information Technology from the Faculty of Computer Science and Information Technology (FCSIT), Universiti Malaya.

FCSIT offers Academic Project I and Academic Project II to final year students in order to produce quality graduates who are excellent and academically competent in the field of Computer Science. The aim of these courses is to leverage students' technical and soft skills gained throughout their studies. Students should be able to demonstrate their technical knowledge, problem-solving, critical thinking, and good decision-making while researching, developing, and completing the project.

This guideline is produced with the purpose of becoming the reference and guide to the Academic Project Committee, supervisors, panels, and students. It provides guidelines related to the functions or roles that all parties involved in the Academic Project carry out.

The list of the courses of Academic Project is divided as follows:

No.	Course Title	Course Code	Programme	Credits	Semester
1	Academic Project I	WIA3002*	Bachelor of Computer Science	3	Semester II Year 3
		WIB3002*	Bachelor of Information Technology		
2	Academic Project II	WIA3003#	Bachelor of Computer Science	5	Semester I Year 4
		WIB3003#	Bachelor of Information Technology		
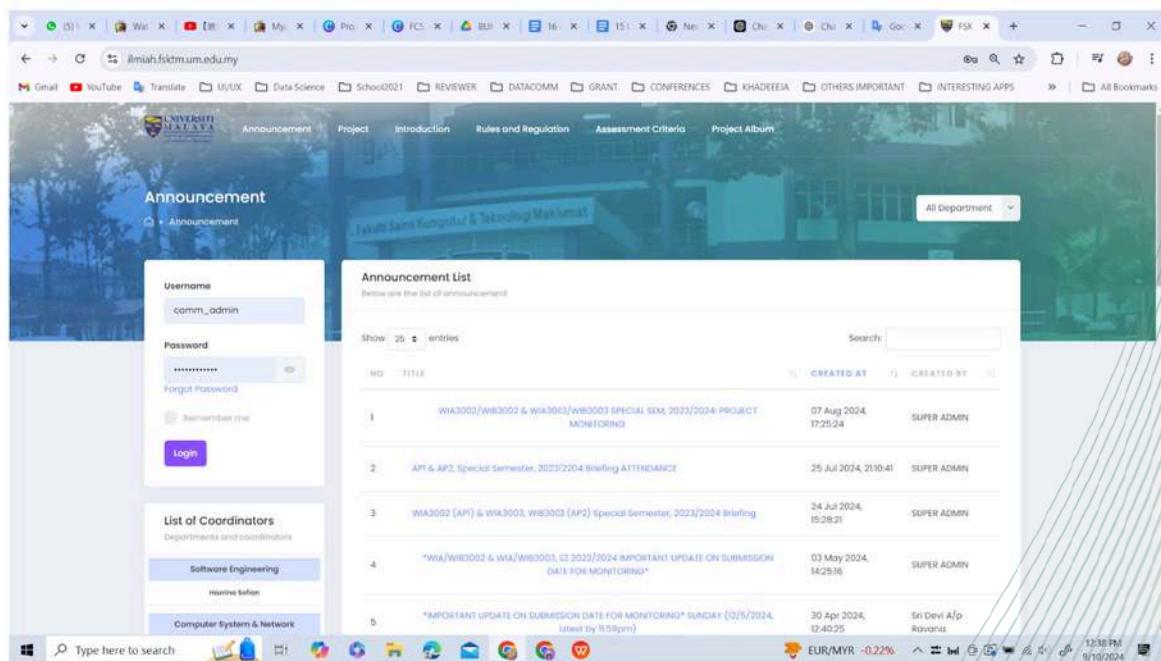
*   **Pass** all Faculty and Programme Core Courses except for Industrial Training and Academic Project II.
\#   Prerequisite: Bachelor of Computer Science - WIA3002
                            Bachelor of Information Technology - WIB3002

2. Course Outcome

No.	Course Title	Course Outcome
1.	Academic Project I	At the end of the course, students are able to: 1. Identify a solution approach that is suitable for the stated problem. 2. Conduct suitable requirement gathering, system analysis and design techniques. 3. Present project proposal paper.

2.	Academic Project II	At the end of the course, students are able to: 1. Develop a system based on the solution approach and method identified. 2. Present the implemented project. 3. Implement a system with ethics and professionalism.

3. **The Ilmiah System @ https://ilmiah.fsktm.um.edu.my**

The Ilmiah System, introduced in October 2021, was developed to manage all tasks related to the Academic Project, replacing the previous system. It is utilized by the Head Coordinator, department coordinators, supervisors, panels of lecturers, and final year undergraduate students. The system includes modules for Admin, Coordinator, Supervisor, Panel, and Student, each designed to handle tasks specific to its user role.

Through this system, all processes related to the Academic Project are managed, including title proposals, assigning titles and assessors to students, tracking student progress, conducting viva assessments, and submitting project reports and documents to assessors by the students.

Students can access the system using the following default information:

Username : matric number (e.g. 20001111)
Default Password : fsktmmatricnumber (e.g. fsktm20001111)

4. Roles and Responsibilities

Academic Project Committee

The Academic Project Committee of FCSIT is appointed by the Dean for a specific term. It is composed of Academic Project Coordinators from each department or unit within the faculty. Each Departmental Academic Project Coordinator oversees the academic project matters for their respective students. The committee is chaired by the Head Coordinator and supported by a support staff for clerical matters.

The Department's Academic Project Coordinator manages the process of Academic Project as follows:
- Approve project titles from the supervisor.
- Assign panels for monitoring and viva sessions.
- Arrange viva schedules and to inform panels, supervisors, and students.
- Compile and generate reports on students' viva marks.
- Submit final marks to Head Coordinator.
- Moderate marks for Academic Project.

Supervisor

- Propose and key in the project details into the system. Project proposed must map to at least **ONE** of the Sustainable Development Goals (SDGs).
- Assign students to projects in the system.
- Supervise and coach students on the projects.
- Have regular project meetings with supervised students.
- Verify supervised student's progress logbook.
- Evaluate the supervised student's report.
- Key in supervised student's marks into the system.

Panel

- Evaluate student's project progress for monitoring and to key comments and evaluation result into the system.
- Attend assigned student's viva session for Academic Project I and Academic Project II.
- Evaluate student's project planning and development, technical skills, system demonstration and soft skills during viva sessions and to key in marks into the system.

Students

- Register for the course.
- Attend a briefing on the Academic Project given by the Head Coordinator (Week 1/ Week 2 and students will be notified via Spectrum).
- Decide on a project to do and consult with lecturer proposing the project (Week 1 - Week 2)

- Attend Research Methodology Seminar for Academic Project I.
- Have regular meetings with the supervisor for project discussion.
- Compulsory to summarize the outcome of discussion/meetings with the supervisor in the progress logbook.
- Submit progress logbook to supervisor for verification prior to monitoring and viva submission.
- Submit presentation slides, presentation video and progress logbook for monitoring and viva in the system.
- Attend the viva session as scheduled.
- Submit the final report in the system.
- Submit the system exe/apk/url/link etc in the system.

\# The submission date for all materials prepared for the monitoring session, viva session and academic project report will be notified via the system by the Department Coordinator.

\# The viva schedule will be arranged and informed by the respective Coordinator.

5. Academic Project I Process Flow

Figure 1 represents Academic Project I process flow. The processes involve student, supervisor, panel and coordinators.

6. Academic Project II Process Flow

Figure 2 represents Academic Project II process flow. The processes involve the student, supervisor, panel and coordinators.

7. Academic Project I Report

Each student is required to prepare and submit a report for Academic Project I. The report must contain the following information:

Section	Details
Title Page	A title should reflect the project. The title must be concise and well-written to give a general overview of what the project is all about.
Abstract	An abstract of the whole report including objective, method, findings, and discussion. The abstract must not exceed 300 words.
Table of Contents	Lists all section headings, subsection headings, figures, and tables with page numbers.
Substantive body of the report	Chapter 1: • Introduction to relevant project/title: In the introduction, students must introduce the subject of the project. It should give some insight into the structure of the report. Some general remarks including problems and existing works must be included. • Problem statements • Project objectives (and module objectives if it is a group project) • Project timeline Chapter 2: Literature review Chapter 3: Research methodology Chapter 4: System analysis and design (Project requirements and initial design) # *student must refer to respective project supervisor for details in each chapter*
Conclusion	A conclusion is a summarization of the main points of the project and the gap(s) that is/are able to solve.
References	Details of published sources of material referred to or quoted in the text (including any lecture notes and URL addresses of any websites used). Provide up-to-date references (5 years back). Use **APA reference style**.
Appendices (if appropriate)	Any further material which is essential for full understanding of the report (e.g. large scale diagrams, survey questions, raw data, specifications).

8. Academic Project II Report

Each student is required to prepare and submit a report for Academic Project I. The report must contain the following information:

Section	Details
Title Page	A title should reflect the project. The title must be concise and well-written to give a general overview of what the project is all about.
Abstract	An abstract of the whole report including objective, problem statement, method, important features, results, and conclusions. The abstract must not exceed one (1) page.
Acknowledgment	List of individuals who are involved in the project either directly or indirectly.
Table of Contents	Lists all section headings, subsection headings, figures, and tables with page numbers.
Introduction	States the objectives, problem, methodology, implementation, results, and discussion.
Substantive body of the report	In the body of the report, a student must address the following information: The contents of Project Academic I report. Chapter 4: System analysis and design (details analysis and design) Chapter 5: System Development Chapter 6: Results and Discussion Chapter 7: Strengths, limitations and future works # *students must refer to their respective supervisor for other details to be included in the report.*
Conclusion	A summarization of the theme(s) developed in the main text.
References	Details of published sources of material referred to or quoted in the text (including any lecture notes and URL addresses of any websites used). Provide an up-to-date reference (5 years back). Use **APA reference style**.
Appendices (if appropriate)	Any further material which is essential for full understanding of the report (e.g. large scale diagrams, computer code, raw data, specifications).

9. Evaluation

- **Continuous Assessment: 100%**
- The assessment consists of three components: **monitoring, viva** and **report** evaluation.
- Both monitoring and viva are assessed by appointed panels from each department, while the report is evaluated by the project supervisor.
- A student's soft skills are assessed in both the viva and report components.

The assessment and the weightage assigned to each component are as follows:

No.	Course Title	Assessment Component	Weightage	Assessor
1.	Academic Project I	Monitoring	Satisfactory/ Unsatisfactory	Panels
		Viva	60%	Panels
		Report	40%	Supervisor
		Total	**100%**	
2.	Academic Project II	Monitoring	Satisfactory/ Unsatisfactory	Panels
		Viva	60%	Panels
		Report	40%	Supervisor
		Total	**100%**	

 # Important: A student will FAIL the Academic Project if
- *the average mark from the panels during the viva is less than 30. In such a case, the student's report will not be evaluated for grading.*
- *he/she failed to attend the scheduled viva session.*
- *he/she fails to present his/her project during the viva session.*

- Grade: Refer to the University's Grading Scheme

10. Plagiarism

As an enrolled student at the University of Malaya, he/she is expected to produce original work. Any student who is found to have plagiarized his/her report that is part of the assessment in the academic project may be subjected to disciplinary action under the University of Malaya (Discipline of Students) Rules 1999.

11. Excellence Academic Project Award (APAC)

The Excellence Academic Project Award (APAC) was initiated in 2012 to motivate students to produce excellent projects. It is an annual event to select the best academic project of each department and unit. The event will be conducted during Week 15 of Semester I in every session. The objectives of APAC are to:

- steer the competition spirits amongst students to produce good/quality systems.
- acknowledge the effort of the students in designing and developing good systems.
- identify good projects for other students' references and exhibitions.
- promote good projects for competitions, exhibitions, and intellectual property (IP).
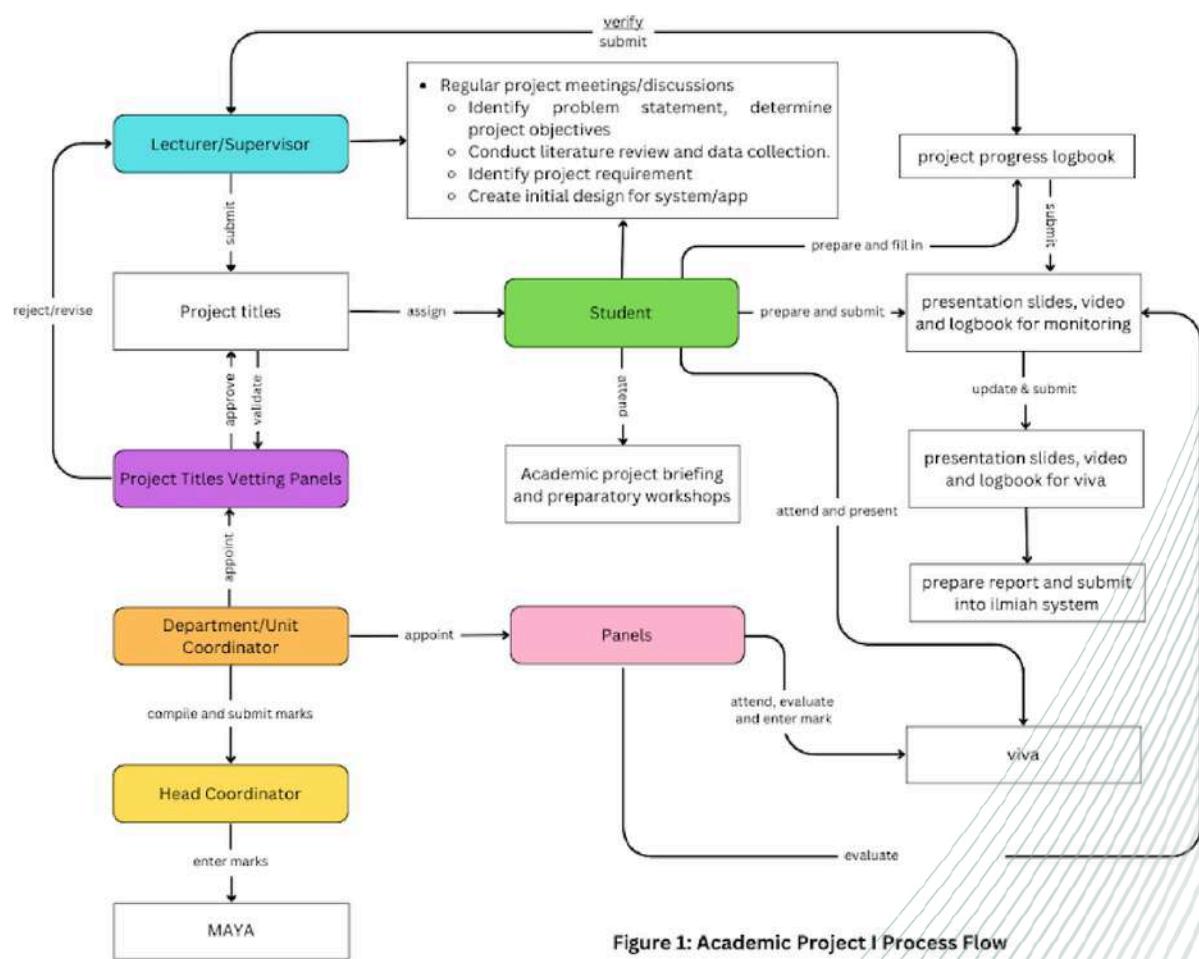
Figure 1: Academic Project I Process Flow
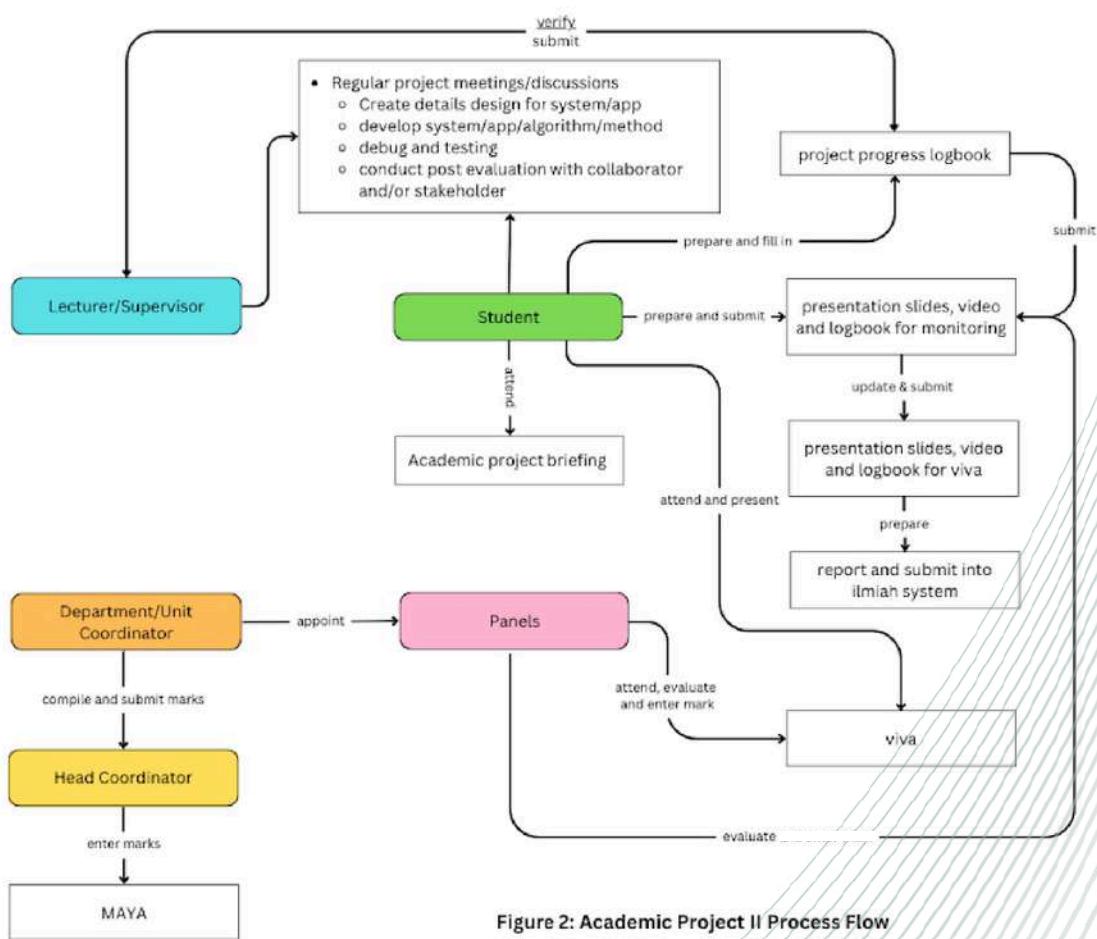
Figure 2: Academic Project II Process Flow

ENGLISH

COMMUNICATION PROGRAMME

2024/2025

ENGLISH COMMUNICATION PROGRAMME (UNIVERSITY COURSE)
FACULTY OF LANGUAGES AND LINGUISTICS
LIST OF COURSES TO BE COMPLETED BY ALL STUDENTS (EXCEPT DATA SCIENCE PROGRAMME)
2024/2025 ACADEMIC SESSION
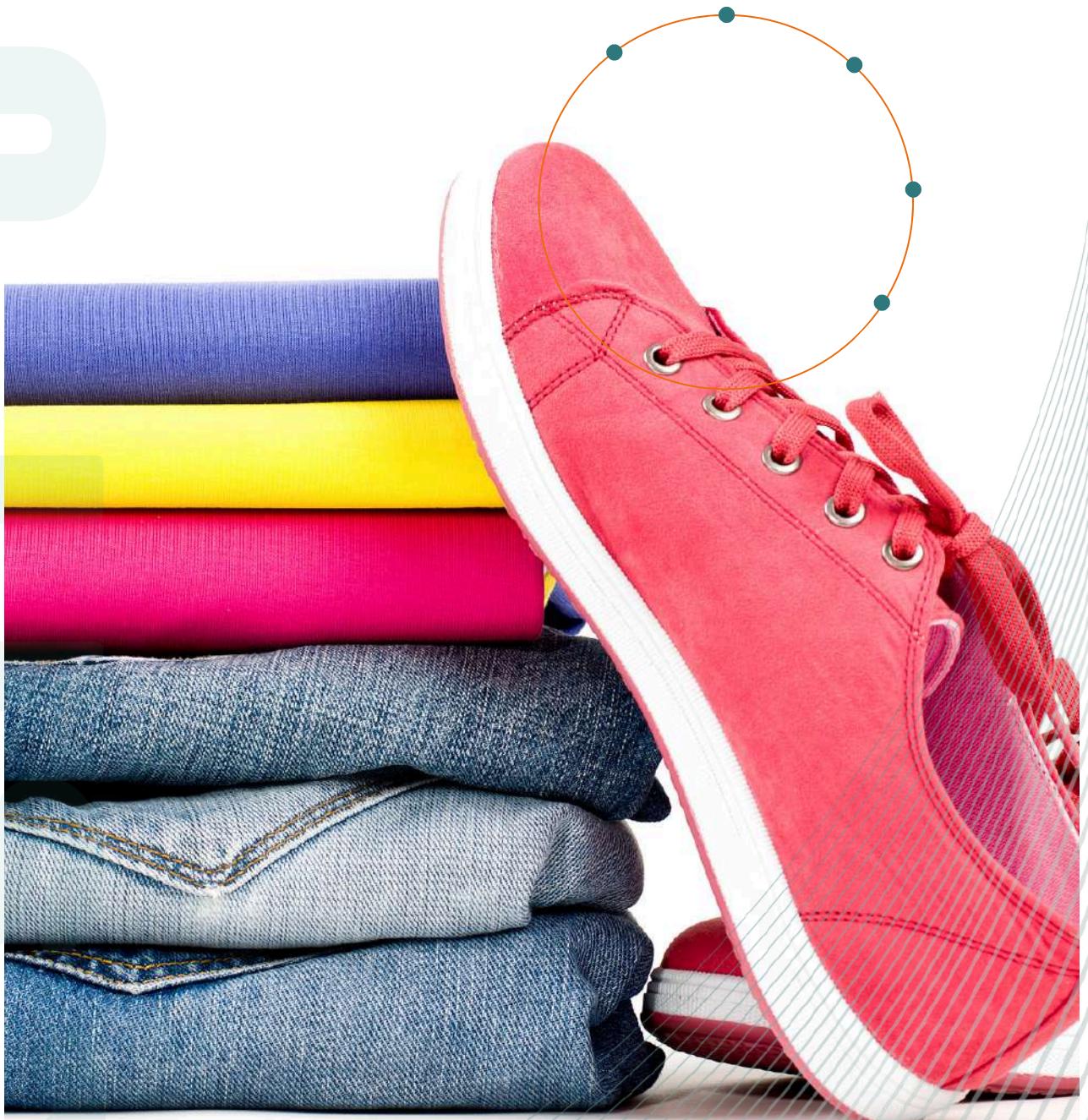
PATH 1	PATH 2	PATH 3	PATH 4
• MUET BAND 2 • IELTS Band 4.0 • TOEFL Paper – Based Test (437 – 473) • TOEFL Computer – Based Test (123 – 150) • TOEFL Internet – Based Test (41– 52) • PTE (Academic) – (10 – 28)	• MUET BAND 3 • IELTS Band 4.5 – 5.0 • TOEFL Paper – Based Test (477 – 510) • TOEFL Computer – Based Test (153 – 180) • TOEFL Internet – Based Test (53 – 64) • PTE (Academic) – (29 - 41)	• MUET BAND 4 • IELTS Band 5.5 – 6.0 • TOEFL Paper – Based Test (513 – 547) • TOEFL Computer – Based Test (183 – 210) • TOEFL Internet – Based Test (65-78) • PTE (Academic) – (42 – 57) • FCE (B & C) • GCE A Level (English) (Minimum C) • IGCSE/GCSE (English) (A, B & C)	• MUET BAND 5 & BAND 6 • IELTS Band 6.5 – 9.0 • TOEFL Paper – Based Test (550 – 677) • TOEFL Computer – Based Test (213 –300) • TOEFL Internet – Based Test (79 – 120) • PTE (Academic) (58 – 90) • FCE (A) • GCE A Level (English) (B & A)
Students need to complete 2 courses (2 courses x 2 credits each) from this PATH	Students need to complete 2 courses (2 courses x 2 credits each) from this PATH	Students need to complete 2 courses (2 courses x 2 credits each) from this PATH	Students need to complete 2 courses (2 courses x 2 credits each) from this PATH
COMPULSORY • GLT1018 – Proficiency in English I ** CHOOSE ONE: • GLT1019 – Let's Speak • GLT1020 – Fundamental Writing	COMPULSORY • GLT1021 – Proficiency in English II ** CHOOSE ONE: • GLT1022 – Speak Up • GLT1023 – Effective Workplace Writing	COMPULSORY • GLT1024 – Proficiency in English III ** CHOOSE ONE: • GLT1025 – Effective Oral Communication • GLT1026 – Writing at the Workplace	• GLT1027 – Advanced Oral Communication* • GLT1028 – Advanced Business Writing* • Optional - Foreign Language course *(Students can only register for one course per semester)

** These courses have prerequisites and students can only register for them after obtaining a PASS in the compulsory course as stipulated in the respective PATH.

UNIVERSITY ENGLISH LANGUAGE COURSES
FACULTY OF LANGUAGES AND LINGUISTICS
LIST OF COURSES TO BE COMPLETED BY STUDENTS FROM DATA SCIENCE PROGRAMME ONLY
2024/2025 ACADEMIC SESSION

PATH 1	PATH 2	PATH 3	PATH 4
• MUET BAND 2 # IELTS Band 4 # TOEFL Paper – Based Test (437 – 473) / Computer – Based Test (123 – 150) /Internet – Based Test (41 – 52)	• MUET BAND 3 # IELTS Band 4.5 – 5 # TOEFL Paper – Based Test (477 – 510) / Computer – Based Test (153 – 180) / Internet – Based Test (53 – 64)	• MUET BAND 4 # IELTS Band 5.5 – 6 ## # TOEFL Paper – Based Test (513 – 547) / Computer – Based Test (183 – 210) / Internet – Based Test (65-78) # A' Levels English (University of Cambridge, London) – Minimum C	• MUET BAND 5 & BAND 6 # IELTS Band 6.5 – 9.0 # TOEFL Paper – Based Test (550 – 677) / Computer – Based Test (213 – 300) / Internet – Based Test (79 – 120) # A'Levels English (University of Cambridge, London) – Minimum B or A
COMPULSORY - (3 Courses x 2 Credit Hours) • GLT1002 - Mastering English I • GLT1003 - Mastering English II • GLT1004 - Mastering English III	COMPULSORY - (2 Courses x 3 Credit Hours) • GLT1005 - Mastering English IV [Pre-requisite] ** PILIH SATU: • GLT1006 - Mastering English V • GLT1007 - Essential Writing Skills • GLT1008 - Effective Communication	COMPULSORY - (2 Courses x 3 Credit Hours) • GLT1009 - Mastering English VI [Pre-requisite] ** PILIH SATU: • GLT1010 - Mastering English VII • GLT1011 - Technical Writing Skills in English • GLT1012 - Presentation Skills in English • GLT1013 - Reading Critically	COMPULSORY - (2 Courses x 3 Credit Hours) • GLT1014 – Advanced Communication Skills • GLT1015 – Advanced Professional Writing

** These courses have pre-requisites and students can ONLY register for them after they have PASSED the COMPULSORY course as determined by the respective Paths

DRESS CODE
for Students of UM

TATACARA BERPAKAIAN DAN PENAMPILAN PELAJAR UNIVERSITI MALAYA

DRESS CODE AND APPEARANCE GUIDES FOR UNIVERSITI MALAYA STUDENTS

UNIVERSITI MALAYA

Semua pelajar dikehendaki mematuhi Arahan Pentadbiran Universiti Malaya (Etika Berpakaian dan Penampilan Pelajar) 2024 sewaktu berada di kawasan kampus. *UM Students must adhere to the Universiti Malaya Administrative Directions (Student Dress Code and Appearance) 2024 while on campus.*

Majlis Rasmi
Official Events

Kuliah, Urusan Pejabat, Peperiksaan dan Perpustakaan
Lectures, Office Matters, Examination and Library

Sukan dan Rekreasi
Sports and Recreational

Semua staf universiti termasuk staf akademik, pentadbiran, perpustakaan, dan keselamatan adalah diberi kuasa memberi teguran sama ada secara lisan atau bertulis kepada mana-mana pelajar yang didapati melanggar mana-mana peruntukan di dalam Arahan Pentadbiran ini. Mana-mana pelajar yang tidak mematuhi peruntukan Arahan Pentadbiran ini boleh dihalang daripada memasuki atau berurusan di kawasan yang dikuatkuasakan peruntukan Arahan Pentadbiran ini atau apa-apa tindakan pentadbiran lain yang ditetapkan dari semasa ke semasa.

All university staff members including academic, administrative, library and security are authorised to reprimand either verbally or in writing to any student who is found to be in violation of any of the provisions in these Administrative Directions. Any student who does not comply with the provisions of these Administrative Directions may be prevented from entering or dealing in the area where the provisions of these Administrative Directions are enforced or any other administrative actions determined from time to time.

SCAN ME

UNDERGRADUATE RULES AND REGULATIONS

- **UNIVERSITY OF MALAYA (BACHELOR'S DEGREE) RULES & REGULATIONS 2019**

  https://fsktm.um.edu.my/undergraduate-rules-amp-regulation

- **STUDENT MISCONDUCT IN EXAMINATION**

  https://aasd.um.edu.my/student-misconduct-in-examination

- **ACADEMIC DISHONESTY - UNIVERSITI MALAYA ACADEMIC PROGRAMME MANAGEMENT POLICY**

  https://aasd.um.edu.my/academic-dishonesty

- **UNIVERSITI MALAYA (STUDENTS DISCIPLINE) RULES 1999**

  https://hep.um.edu.my/disciplinary

- **ZERO TOLERANCE CODE OF EXPLOITATION, ABUSE AND SEXUAL HARASSMENT IN UNIVERSITY MALAYA (UM)**

  https://umintegrity.um.edu.my/news/are-you-harassed-exploited-or-sexually-abused

- **TRANSFER CREDIT**

  https://fsktm.um.edu.my/fsktm/doc/undergraduate/TK-2UNIVERSITI%20MALAYA%20GUIDELINES%20ON%20THE%20MANAGEMENT%20OF%20APPLICATION%20FOR%20TRANSFER%20OF%20CREDIT%20AND%20COURSE%20EXEMPTION.pdf

EXAMINATION
GRADING
SCHEME

EXAMINATION GRADING SCHEME

The official University grades including the marks and their meaning are as follows:

Marks	Grade	Grade Point	Interpretation
90.00 – 100.00	A+	4.00	Distinction
80.00 – 89.99	A	4.00	Distinction
75.00 – 79.99	A-	3.70	Distinction
70.00 – 74.99	B+	3.30	Good
65.00 – 69.99	B	3.00	Good
60.00 – 64.99	B-	2.70	Good
55.00 – 59.99	C+	2.30	Pass
50.00 – 54.99	C	2.00	Pass
45.00 – 49.99	C-	1.70	Fail
40.00 – 44.99	D+	1.30	Fail
35.00 – 39.99	D	1.00	Fail
00.00 – 34.99	F	0.00	Fail

FACILITIES
@ FCSIT
2024/2025

TEACHING AND LEARNING FACILITIES

FACULTY OF COMPUTER SCIENCE AND INFORMATION TECHNOLOGY

(A) TEACHING LABS

The Faculty of Computer Science and Information Technology provide 9 laboratories for teaching and learning purposes. The laboratories are as follows:

BLOCK A

Micro Lab 1 (MM1)
This lab has 50 units of computer that are connected to Windows Active Directory servers and the Internet. The operating system for these PCs is Windows 10. This lab is opened to all FSKTM undergraduate students.

Micro Lab 2 (MM2)
This lab has 12 units of computer that are connected to Windows Active Directory servers and the Internet. The operating system for these PCs is Windows 10. This lab is opened to all FSKTM undergraduate students.

Postgraduate Lab (ML)
This lab has 33 units of computer. All the computers are connected to Windows Active Directory servers and the Internet. The operating system for these PCs is Windows 10. This lab is opened to all FSKTM postgraduate students.

CCNA LAB (CCNA)
This lab has 41 units of computer. The operating system for these workstations is Windows 10. There are also 25 units of Cisco 1700 Series Router, 4 units Cisco 1760 Series Router and 12 units switch Cisco 2950 CATALYST Series. This lab is opened to all FSKTM students.

Robotic Teaching Lab
The Robotic Teaching Lab @ FCSIT is part of the Department of Artificial Intelligence effort to provide conducive intelligent learning environment to students taking the 'Intelligent Robotics' course. Equipped with six mobile robots, the lab allows space for hands-on and robotic experiments designed to help students understand the concept of robotic intelligence and acquire the needful skills for the course.

BLOCK B

Micro Lab 3 (MM3)
This lab has 60 units of computer that are connected to Windows Active Directory servers and the Internet. This lab is opened to undergraduate and postgraduate students.

Micro Lab 4 (MM4)
This lab has 60 units of computer that are connected to Windows Active Directory servers and the Internet. This lab is opened to undergraduate and postgraduate students.

Micro Lab 6 (MM6)
This lab has 45 units of computer that are connected to Windows Active Directory servers and the Internet. This lab is opened to all FSKTM students but priority is given to multimedia courses. Operating system – Windows 10.

Stroustrup Lab 1
This lab has 42 units of computer that are connected to the Internet. This lab is opened to undergraduate students. Operating system – Windows 10.

(B) RESEARCH LABS

29 research labs to support postgraduate students research activities, managed by various departments in the faculty:

BLOCK A

Computer Technology Lab
This lab is opened to post-graduate student, priority given to students who are taking courses related to the field Computer Technology.

BLOCK B

Artificial Intelligence Research Lab
Qualitative reasoning, qualitative modeling, Intelligent Tutoring System, Case-based System, Intelligent Interactive Multimedia System.

VLSI Research Lab
The study of the performance and the implementation of fast pipelined floating-point arithmetic circuits and arithmetic algorithm, as well as on designing VLSI. Focus is given to the aspect of VLSI circuits test.

Computer Systems and Network Research Lab
Focus on data security research through networking, ability of protocols and ATM studies.

Multimedia Research Lab
Research and development comprise:
- Corporate training
- Smart school education software
- Distributed multimedia systems
- Web-based multimedia systems
- Multimedia Storage & retrieval technology
- Multimedia input & output technology

Human Computer Interaction (HCI) Research Lab
This lab used is for conducting research on usability area, computer support cooperative work (CSCW) and task analysis. It involves task analysis hierarchy chart for user understandability test in implementing any task.

Information System Research Lab
This lab is used for conducting research on dissimilar information systems integration in heterogeneous environment including operating system, hardware, language and the use of the latest software industrial standard to integrate information systems.
Research and development on:
- Business Oriented Systems/ Electronic Government Systems
- Geographic Information Systems
- Inter-organizational Information Systems
- Web-based Information Systems
- Smart Card Application

Stroustrup Lab 2
This lab has 18 units of computer that are connected to the Internet. This lab is opened to undergraduate students taking courses related to electronic circuit.

C. PROJECT BASED LAB

Artificial Intelligence 4 U (AI4U)

AI-based Machine Vision essentials. Key objective is to transfer 'AI-based machine

vision' knowledge to university lecturers and students.

Wisma R&D (15th floor):

Web Based Information System Lab & Knowledge Engineering Lab (Open-Space Concept)

Both the Knowledge Engineering Lab and the Web-Based Information System Lab are open-space concept labs accessible to all postgraduate students, regardless of their field. Students can use the space and facilities provided in these labs, with permission for access. These labs are located on the 15th floor of Wisma R&D

Robotedge AI Robotic Lab
This lab is previously known as Natural Language Processing Lab. This lab is equipped with equipment for AI robotics research and development focusing on environmental, home services, and search and rescue research areas.

OTHER FACILITIES
FACULTY OF COMPUTER SCIENCE AND INFORMATION TECHNOLOGY

1. **Prayer Room (surau)**
   Air-conditioned prayer rooms (surau) (one for Men, and the other for Women) are provided in Block A for Muslims to pray. The surau for Men is located at the second floor and surau for women is located at the first floor in the building. Users are not allowed to sleep and eat in the surau. Users are also responsible for the cleanliness of the surau.

2. **Vending Machine (Drinks)**
   There are 4 units of vending machine for cold drinks located at Block A and Block B.

3. **Cafeteria**
   Cafeteria is located at the back of Block A.

4. **Postgraduate Lounge & Student Centre**
   Space provided for student to relaxing their mind, having informal discussion and make a small gathering. A few facilities such as sofas, computers, discussion rooms and pantry are ready to use.

5. **Parking Lot**
   The Faculty also provides parking lots for students to park their car or motorbike. Students can park their car or motorbike at the back of Block A. There are 150 parking lots for the motorbike and 45 for the car. Students are not allowed to park their car in front of both buildings because the parking lots are reserved for the faculty staff and visitors.

6. **Water Purifiers**
   Water purifiers are provided in both buildings and placed at every floor.

7. **Internet Access at the building of FCSIT**
   There are WIFI Internet Access provided to students at every floor in each building. Students must obey the rules and regulations during the usage of these facilities.

8. **SPeCTRUM (Student Powered e-Collaboration Transforming UM)**
   This facility is for easy accessibility for student to upload their notes and information regarding their courses.

   All faculties (excluding Faculty of Medicine & Faculty of Dentistry) and PASUM can browse the SPECTRUM website at https://spectrum.um.edu.my

   For Faculty of Medicine and Faculty of Dentistry, SPECTRUM website can be browsed a https://spectrumx.um.edu.my

   All queries and suggestions can be directed to https://helpdesk.um.edu.my

9. **Door Access**
   Students must register for door access for using research labs, Student Center and Postgraduate Lounge.