



**UNIVERSITI
MALAYA**

*Faculty of Computer Science
and Information Technology*

UNDERGRADUATE DEGREE
**PROGRAMME
HANDBOOK**

SESSION 2021/2022

Faculty of Computer Science & Information Technology
Universiti Malaya



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VISION, MISSION AND OBJECTIVES

Vision

A globally-influential faculty, enriching lives, shaping the future through computing technology.

Mission

To enrich lives and shape the future for the nation and humanity through education, research and technopreneurship.

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 University of 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.

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 - current	Professor Datin Dr. Sameem Abdul Kareem

STAFF

DEAN'S OFFICE

Dean	: Professor Datin Dr. Sameem Abdul Kareem Dip.Ed. (Mal), B.Sc.Eng. (Hons) (Temple), MLIS (Mal), PhD (Mal)
Deputy Dean (Undergraduate)	: Assoc. Prof. Dr. Maizatul Akmar Ismail BIT (Hons) (UM), M.Sc. (UPM), PhD (UM)
Deputy Dean (Postgraduate)	: Prof. Ts. Dr. Miss Laiha Mat Kiah B.Comp.Sc. (Hons) (Mal), M.Comp.Sc. (Mal), PhD (Glasgow)
Deputy Dean (Research)	: Assoc. Prof. Dr. Mohd Yamani Idna Idris B.Eng. (Hons) (Mal), M.Comp.Sc. (Mal), PhD (Mal)

Head of Department

Artificial Intelligence	: Assoc. Prof. Dr. Norisma Idris B.Comp.Sc. (Hons) (UM), M.Comp.Sc. (UM), PhD (UM)
Software Engineering	: Assoc. Prof. Dr. Mumtaz Begum Peer Mustafa B.Comp.Sc. (UPM), MSE (UM), PhD (UM)
Information Systems	: Dr. Norjihan Abdul Ghani BIT (UUM), MIT (Sc.) (UKM), PhD (UTM)
Computer System and Technology	: Dr. Mohamad Nizam Ayub B.Comp.Sc. (Hons) (Mal), M.Sc. (Edinburgh), PhD (UK)

Head of Unit

Multimedia	: Dr. Nurul Fazmidar Mohd Noor B.Comp.Sc. (Hons) (Mal), M.Sc. (Liverpool), PhD (UK)
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Administration and Support Staff

Principal Assistant Registrar (N48)	:	Rafiza Hashim
Assistant Registrar (N41)	:	Muhamad Idris Rosnawan Nur Hafiezah Mohd Nor Peah Nurul Farhana Mohd Nasir
Accountant Assistant (W29)	:	Nurul Aqillah Omar
Senior Administrative Assistant (Clerical/Operational) (N22)	:	Mohd Afiffudin Mohd Ali Norhayati Mohd Supi
Senior Administrative Assistant (Clerical/Operational) (N22_KUP)	:	Faridah Mat Yaacob Norhazariah Husin
Assistant Office Secretary (N19)	:	Noorhafiza Kamaruddin Nurfatehah M. Zahir Nur Hidayah Mohd Sarbini Siti Amiza Hashim Ibrahim Hussin Norazarina Bohari Norhafidzan Ahmad
Administrative Assistant (Clerical/Operational) (N19)	:	Nur Nadia Azizan Rohayu Mohd Nor Shahidah Mohd Ainun Shamsuddin Zaleha Sumairi Farah Nadhirah Mohd Aznam
Administrative Assistant (Finance) (W19)	:	Haida Izwani Che Mahmood
Operational Assistant (N11)	:	Shaiful Izwan Awang Zarudin Zainal
Driver (H11)	:	Mohd Haffes Rahim

Technical Staff

Senior Information Technology Officer (F44)	:	Noorsyahidah Abd Wahab
Assistant Information Technology Officer (FA32)	:	Azzyaty Razali Haryati Masilan Wan Mohd Hasanul Isyraf Wan Yusoff Aini Munira Ahmad Huswadi Hussain
Assistant Information Technology Officer (FA29)	:	Jamal Amran Noor Shyahira Adnan Nor Syazwani Nuru Mohamad
Assistant Engineer (JA29)	:	Mohd Azren Misnan Mohd Nizam Ismail Muhd Amin Syaqqib Arslan Mustafa

DEPARTMENT OF SOFTWARE ENGINEERING

Head of Department:

Mumtaz Begum Peer Mustafa, B.Comp.Sc. (UPM), MSE (UM), PhD (UM)

Associate Professor:

Chiew Thiam Kian, B.Comp.Sc. (Hons) (Mal), M.Comp.Sc. (Mal), PhD (Glasgow)

Mumtaz Begum Peer Mustafa, B.Comp.Sc. (UPM), MSE (UM), PhD (UM)

Rodina Ahmad, B.Sc. (Hons) (Hartford), M.Sc. (Comp.Sc.) (Hartford), PhD (Mal)

Siti Hafizah Ab Hamid, B.Comp.Sc. (Hons) (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.) (Mal), PhD (Australia)

Hasan Kahtan, B.Comp.Sc. (Iraq), M. Comp. Sc. (UiTM), PhD (UiTM)

Hazrina Sofian, B.Comp.Sc. (Hons) (UM), MSE (UM), Phd (Mal)

Hema Subramaniam, BSc (IT) (Mal), M. Comp. Sc. (Mal), PhD (UPM)

Mohd. Hairul Nizam Md. Nasir, B.Comp.Sc. (Hons) (UM), M.Comp.Sc. (UM), PhD (UTM)

Nazean Jomhari, B.Sc. (Hons) (UKM), M.Sc. (Essex), PhD (Manchester)

Ong Sim Ying, B.Comp.Sc. (UM), PhD (UM)

Raja Jamilah Raja Yusof, B.Eng. (Hons) (London), M.Comp.Sc. (Mal), PhD (Mal)

Su Moon Ting, B.Comp.Sc. (Hons) (UPM), M.Comp.Sc. (UPM), PhD (Auckland)

Fellow SLAB/SLAI:

Mohamad Hazim Md Hanif

Nur Nasuha Daud

DEPARTMENT OF ARTIFICIAL INTELLIGENCE

Head of Department:

Norisma Idris, B.Comp.Sc. (Hons) (UM), M.Comp.Sc. (UM), PhD (UM)

Professor:

Loo Chu Kiong, B.Mech.Eng. (Hons) (UM), PhD (USM)

Sameem Abdul Kareem (Datin), B.Sc. (Hons) (UM), M.Sc. (Cardiff), PhD (UM)

Associate Professor:

Chan Chee Seng, B.Eng. (MMU), M.Sc. (Portsmouth), PhD (Portsmouth)

Norisma Idris, B.Comp.Sc. (Hons) (UM), M.Comp.Sc. (UM), PhD (UM)

Senior Lecturer:

Aznul Qalid Md Sabri, B.Comp.Sc. (Hons) (UM), M. (Vision & Robotics) (Heriot-Watt),

M. (Robotic) (Uni. De Bourgogne), PhD (France)

Erma Rahayu Mohd Faizal, B.Comp.Sc. (Hons) (UM), M.Elect.Eng. (OITA), PhD (UiTM)

Lim Chee Kau, B.Sc. (Hons) (USM), M.Comp.Sc. (UM), PhD (UM)

Rohana Mahmud, B.Sc. (Hons) (Waikato), M.Sc. (AI) (USM), PhD (Manchester)

Muhammad Shahreeza Safiruz Kassim, BEng (Electrical, Electronics and Information Engineering) (Japan) M.Sc (Artificial Intelligence) (UK), PhD (Southampton)

Saw Shier Nee, B.Bio.Eng. (Hons) (UM), PhD (NUS)

Siti Soraya Abdul Rahman, B.Sc. (Hons) Information Technology (UK), M.Comp.Sc. (UM), PhD (UK)

Unaizah Hanum Obaidellah, B.Comp.Sc. (Hons) (UM), M.Comp.Sc. (UM), PhD (UK)

Woo Chaw Seng, B.Comp.Sc. (Hons) (UM), M.Comp.Sc. (UM), PhD (Australia)

Zati Hakim Azizul Hasan, B.Comp.Sc. (Hons) (UM), M.Comp.Sc. (UM), PhD (New Zealand)

Lecturer:

Md. Nor Ridzuan Daud, B.Comp.Sc. (Hons) (UTM), M.Phil Comp. Sc. (Cardiff)

DEPARTMENT OF COMPUTER SYSTEM AND TECHNOLOGY

Head of Department:

Mohamad Nizam Ayub, B.Comp.Sc. (Hons) (Mal), M.Sc. (Edinburgh), PhD (UK)

Professor:

Miss Laiha Mat Kiah, B.Comp. Sc. (Hons) (Mal), M.Sc. (London), PhD (London)

Associate Professor:

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

Ang Tang Fong, BIT (Hons) (Mal), M.Comp.Sc. (Mal), PhD (UM)

Hamid Abdulla Jalilb Al-Tulea, B.Sc. (Electronic Eng.) (Baghdad), M.Sc. (Comp. Eng.)(Ukraine), PhD (Ukraine)

Ling Teck Chaw, B.Sc. (Hons) (Mal), M.Comp.Sc. (Mal), PhD (Mal)

Mohd. Yamani Idna Idris, B.Eng. (Hons) (Mal), M.Comp.Sc. (Mal), PhD (Mal)

Nor Aniza Abdullah, B.Comp.Sc. (Hons) (Mal), M.Sc. (London), PhD (Southampton)

Nor Badrul Anuar Juma'at, B.Comp.Sc. (Hons) (Mal), M.Comp.Sc. (Mal), PhD (UK)

Por Lip Yee @ Por Khoon Sun, B.Comp.Sc. (Hons) (Mal), M.Comp.Sc. (Mal), PhD (UM) Rafidah

Md Noor, BIT (Hons) (UUM), M.Sc. (UTM), PhD (Lancaster)

Rosli Salleh, B.Comp.Sc. (Hons) (Mal), M.Sc. (Salford), PhD (Salford)

Shivakumara Palaiahnakote, B.Sc. (India), M.Sc. (India), M.Sc. Tech. (India), PhD (India)

Senior Lecturer:

Amirrudin Kamsin, BIT (Hons) (Mal), M.Sc. (Bournemouth), PhD (London)

Ismail Ahmedy, Dip.Comp.Sc. (UTM), B.Sc. (Computer) (Hons) (UTM), M.Sc. (Computer Science) (Queensland), PhD (UTM)

Liew Chee Sun, B.Comp.Sc. (Hons) (USM), M.Comp.Sc. (USM), PhD (UK)

Mohamad Nizam Ayub, B.Comp.Sc. (Hons) (Mal), M.Sc. (Edinburgh), PhD (UK)

Muhammad Reza Z'aba, B.Sc. (Comp.) (UTM), PhD (Queensland)

Nurul Fazmidar Mohd Noor, B.Comp.Sc. (Hons) (Mal), M.Sc. (Liverpool), PhD (UK)

Roziana Ramli, B.Eng. (Electrical) (UM), M.Eng.Sc (UM), PhD (UM)

Saaidal Razalli Azzuhri, B.Eng. (Hons) (UM), M.Sc. (IT) (MUST), PhD (Queensland)

Tey Kok Soon, B.Eng. (Electrical) (UM), PhD (UM)

Lecturer:

Emran Mohd Tamil, B.Eng. (UTM), M.Sc. (UiTM)

Fazidah Othman, B.Comp.Sc. (Hons) (UTM), M.Sc. (UTM)

Hannyyzura Pal @ Affal, B.Comp.Sc. (Hons) (Mal), M.Sc. (London)

Mas Idayu Md. Sabri, B.Comp.Sc. (Hons) (Mal), M.Sc. (Bath)

Noorzaily Mohamed Noor, B.Sc. (Hons) (Mal), M.Comp.Sc. (Mal)

Nornazlita Hussin, B.Comp.Sc. (Hons) (Mal), M.Sc. (Bath)

Fellow SLAB/SLAI:

Muhammad Faiz Mohd Zaki

Muhammad Nur Firdaus Sahran

DEPARTMENT OF INFORMATION SYSTEMS

Head of Department:

Norjihan Abdul Ghani, BIT (UUM), MIT (Sc.) (UKM), PhD (UTM)

Professor:

Teh Ying Wah, B.Sc. (Hons) (Oklahoma), M.Sc. (Oklahoma), PhD (Mal)

Associate Professor:

Fariza Hanum Md. Nasaruddin, B.Sc. (Hons) (Illinois), M.Sc. (Illinois), PhD (UM)Maizatul

Akmar Ismail, BIT (Hons) (UM), M.Sc. (UPM), PhD (UM)

Nor Liyana Mohd Shuib, B.Comp.Sc. (Hons) (UTM), M.IT (UKM), PhD (UM)

Salimah Mokhtar, BSc. (Hons) (Stockton), M.Sc. (Washington), PhD (UM) Sri

Devi A/P Ravana, BIT (Hons) (UKM), MSE (Mal), PhD (Melbourne) Suraya

Hamid, BIT (Hons) (UKM), MIT (UKM), PhD (Melbourne)

Vimala A/P Balakrishnan, B.Comp.Sc. (Hons) (USM), M.Sc. (Comp.Sc.) (USM), PhD (MMU)

Senior Lecturer:

Azah Anir Norman, BIT (UKM), M.Sc. (London), PhD (UM)

Hoo Wai Lam, B.Comp.Sc (UM), PhD (UM)

Kasturi Dewi A/P Varathan, B.IT (Hons) (Uniten), M.Comp.Sc (MIS) (UM), PhD (UKM)

Mohd. Khalit Othman, B.Sc. (Mal), MIT (UKM), PhD (UM)

Norizan Mohd. Yasin, BBA (Hons) (Miami), MBA (Miami), M.Sc. (CIS) (Miami), PhD (Manchester)

Norjihan Abdul Ghani, BIT (UUM), MIT (Sc.) (UKM), PhD (UTM)

**ACADEMIC CALENDAR
SESSION 2021/2022**

ACADEMIC CALENDAR FOR 2021/2022 ACADEMIC SESSION (BACHELOR DEGREE LEVEL) <i>(amended June 2021)</i>			
SEMESTER I			
Course Registration (Module) <i>(Refer Registration Schedule at https://umsitsguide.um.edu.my/)</i>	2 weeks	24.09.2021	- 08.10.2021
Orientation (Week of Welcome) - WOW	1 week	10.10.2021	- 17.10.2021
Lectures	7 weeks*	18.10.2021	- 05.12.2021
Mid-Semester I Break	1 week	06.12.2021	- 12.12.2021
Lectures	7 weeks*	13.12.2021	- 30.01.2022
Revision Week	1 week*	31.01.2022	- 06.02.2022
Semester I Final Examination	2 weeks	07.02.2022	- 20.02.2022
Semester Break	3 weeks	21.02.2022	- 13.03.2022
	<u>24 weeks</u>		
SEMESTER II			
Course Registration (Module) <i>(Refer Registration Schedule at https://umsitsguide.um.edu.my/)</i>	2 weeks	18.02.2022	- 04.03.2022
Lectures	7 weeks*	14.03.2022	- 01.05.2022
Mid-Semester II Break	1 week*	02.05.2022	- 08.05.2022
Lectures	7 weeks*	09.05.2022	- 26.06.2022
Revision Week	1 week	27.06.2022	- 03.07.2022
Semester II Final Examination	2 weeks*	04.07.2022	- 17.07.2022
	<u>20 weeks</u>		
SEMESTER BREAK			
Break	9 weeks*	18.07.2022	- 18.09.2022
SPECIAL SEMESTER			
Course Registration (Module)	1 week	01.07.2022	- 08.07.2022
Lectures	7 weeks*	18.07.2022	- 04.09.2022
Special Semester Final Examination	1 week	05.09.2022	- 11.09.2022
Break	1 week*	12.09.2022	- 18.09.2022
	<u>10 weeks</u>		

- The Academic Calendar has taken into account public and festive holidays

National Day (31 August 2021)
Malaysia Day (16 September 2021)
Maulidur Rasul (19 October 2021)
Deepavali (4 November 2021)
Christmas Day (25 December 2021)
New Year (1 January 2022)
Thaipusam (18 January 2022)
Federal Territory Day (1 February 2022)

Chinese New Year (1 & 2 February 2022)
Nuzul Al-Quran (19 April 2022)
Labour Day (1 May 2022)
Eidul Fitri (2 & 3 May 2022)
Wesak Day (15 May 2022)
His Majesty's King's Birthday (6 June 2022)
Awal Muharam (30 July 2022)
National Day (31 August 2022)

BACHELOR PROGRAMMES OFFERED

1) COMPUTER SCIENCE

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 (Data Science)
- (5) Bachelor of Computer Science (Software Engineering)
- (6) Bachelor of Computer Science (Multimedia Computing)

Programme Goals:

To produce excellent graduates who are able to apply the knowledge gained in the field of computer science with high competitiveness, effective communication, emotionally intelligent, confident, socially responsible, and are able to think critically and apply scientific techniques to solve computer-based problems, as well as having entrepreneurship mindset.

Programme Educational Objective:

Equipped with the basic knowledge, principles and skills in the field of computer science; having the analytical and critical thinking skills to solve problems; understand the relationships between theoretical and practical of computer science; and applying the basic mathematical knowledge, theory and scientific techniques in analyzing, modeling, designing, developing, and evaluating computer solutions.

**SPECIFIC REQUIREMENTS OF THE PROGRAMME FOR LOCAL STUDENTS
SESSION 2021/2022**

PROGRAM	QUALIFICATIONS			
	STPM	MATRICULATION / FOUNDATION	DIPLOMA / EQUIVALENT	OTHERS
Bachelor of Computer Science (Software Engineering) Bachelor of Computer Science (Information Systems) Bachelor of Computer Science (Computer System and Network) Bachelor of Computer Science (Artificial Intelligence) Bachelor of Computer Science (Multimedia Computing)	Pass STPM with a minimum CGPA of 3.00 ; and Obtained of at least Grade B in STPM for the following subjects: <ul style="list-style-type: none"> • Mathematics (T); • Physics; and • Chemistry/ Biology/ Information and Communications Technology (ICT) and Obtained of at least Grade B in SPM for the following subjects: <ul style="list-style-type: none"> • Additional Mathematics; and • Mathematics/ Physics and Obtained of at least Band 2 for MUET .	Pass Matriculation/ Foundation with a minimum CGPA of 3.00 ; and Obtained of at least Grade B in Matriculation / Foundation for the following subjects: <ul style="list-style-type: none"> • Mathematics; • Physics/ • Engineering Physics; and <ul style="list-style-type: none"> • Chemistry/ Engineering Chemistry/ Biology/ Computer Science/ Computing and Obtained of at least Grade B in SPM for the following subjects: <ul style="list-style-type: none"> • Additional Mathematics; and • Mathematics/ Physics and <ul style="list-style-type: none"> • Additional Mathematics; and • Mathematics/ Physics and	Possessed a Diploma in Computer Science or Diploma in Information Technology from public universities or other institutions with related field recognized by Malaysian Government and approved by the University Senate with a minimum CGPA of 3.00 ; and Obtained of at least Grade B at Diploma level in Mathematics subjects; and Obtained of at least Grade B in SPM for the following subjects: <ul style="list-style-type: none"> • Additional Mathematics; and • Mathematics / Physics and Obtained of at least Band 2 for MUET OR	Possessed a GCE A-Level qualification with at least Grade A in Mathematics; and Obtained of at least Grade B in any one (1) of the following subjects: <ul style="list-style-type: none"> • Computing; • Physics; • Further Mathematics; • Chemistry; • Biology; and Obtained of at least Grade B in SPM for the following subjects: <ul style="list-style-type: none"> • Additional Mathematics; and • Mathematics / Physics and Obtained of at least Band 2 for MUET .

		<p>Obtained of at least Band 2 for MUET.</p>	<p>Pass STPM not within the current year with a minimum CGPA of 3.00;</p> <p>and</p> <p>Obtained of at least Grade B in STPM for the following subjects:</p> <ul style="list-style-type: none"> • Mathematics (T) • Physics; and • Chemistry/ Biology/ Information and Communications Technology (ICT) <p>and</p> <p>Obtained of at least Grade B in SPM for the following subjects:</p> <ul style="list-style-type: none"> • Additional Mathematics; and • Mathematics / Physics <p>and</p> <p>Obtained of at least Band 2 for MUET</p> <p>OR</p> <p>Pass Matriculation/ Foundation not within the current year with a minimum CGPA of 3.00;</p> <p>and</p>	<p>OR</p> <p>Possessed an International Baccalaureate (IB) Diploma with a minimum score of 30 points and grade 5 (Higher Level) in Mathematics;</p> <p>and</p> <p>Any one (1) of the following subjects:</p> <ul style="list-style-type: none"> • Chemistry; • Physics; • Computer Science; • Biology; <p>and</p> <p>Obtained of at least Grade B in SPM for the following subjects:</p> <ul style="list-style-type: none"> • Additional Mathematics; and • Mathematics / Physics <p>and</p> <p>Obtained of at least Band 2 for MUET.</p> <p>OR</p> <p>Possessed an Australian Matriculation (AUSMAT) qualification with at least</p>
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			<p>Obtained of at least Grade B in Matriculation/ Foundation for the following subjects:</p> <ul style="list-style-type: none"> • Mathematics (T) • Physics; and • Chemistry/ Biology/ Information and Communications Technology (ICT) <p style="text-align: center;">and</p> <p>Obtained of at least Grade B in SPM for the following subjects:</p> <ul style="list-style-type: none"> • Additional Mathematics; and • Mathematics / Physics <p style="text-align: center;">and</p> <p>Obtained of at least Band 2 for MUET</p>	<p>an Australian Tertiary Admission Rank (ATAR) of 80 percent and 16 points (High Achievement) in Mathematics;</p> <p style="text-align: center;">and</p> <p>Obtained 16 points (High Achievement) in one (1) of the following subjects:</p> <p>Physics Chemistry Mathematics Specialist</p> <p style="text-align: center;">and</p> <p>Obtained of at least Grade B in SPM for the following subjects:</p> <ul style="list-style-type: none"> • Additional Mathematics; and • Mathematics / Physics <p style="text-align: center;">and</p> <p>Obtained of at least Band 2 for MUET.</p> <p>However, applicants who do not possess a MUET but possessed the following results may be considered for a conditional offer with the fulfilment of the MUET requirements within the</p>
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				<p>duration of one (1) academic session:</p> <ul style="list-style-type: none"> • Obtained of at least Band 4 (Academic) (Academic) in IELTS; or • Obtained of at least 437 points (PBT)/ 123 points (CBT)/ 41 points (IBT) in TOEFL
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PROGRAM	STPM	MATRICULATION / FOUNDATION	DIPLOMA / EQUIVALENT
Bachelor of Computer Science (Data Science)	<p>Pass STPM with a minimum CGPA of 3.00; and Obtained of at least Grade B in STPM for the following subjects:</p> <ul style="list-style-type: none"> • Mathematics (T); • Physics; and • Chemistry/ Information Technology (ICT) Biology/ and <p>and</p> <p>Obtained of at least Grade B in SPM for the following subjects:</p> <ul style="list-style-type: none"> • Additional Mathematics; and • Mathematics/ Physics <p>and</p>	<p>Pass Matriculation/ Foundation with a minimum CGPA of 3.00; and Obtained of at least Grade B in Matriculation / Foundation for the following subjects:</p> <ul style="list-style-type: none"> • Mathematics; • Physics/ • Engineering Physics; <p>and</p> <ul style="list-style-type: none"> • Chemistry/ Biology/ Computing Engineering Computer Chemistry/ Science/ <p>and</p>	<p>Possessed a Diploma in Computer Science or Diploma in Information Technology from public universities or other institutions with related field recognized by Malaysian Government and approved by the University Senate with a minimum CGPA of 3.00; and Obtained of at least Grade B at Diploma level in Mathematics subjects; and Obtained of at least Grade B in SPM for the following subjects:</p> <ul style="list-style-type: none"> • Additional Mathematics; and

	<p>Obtained of at least Band 2 for MUET.</p>	<p>Obtained of at least Grade B in SPM for the following subjects:</p> <ul style="list-style-type: none"> • Additional Mathematics; and • Mathematics/ Physics <p style="text-align: center;">and</p> <p>Obtained of at least Band 2 for MUET.</p>	<ul style="list-style-type: none"> • Mathematics / Physics and <p>Obtained of at least Band 2 for MUET</p>
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**SPECIFIC REQUIREMENTS OF THE PROGRAMME FOR INTERNATIONAL STUDENTS
SESSION 2021/2022**

PROGRAM	KELAYAKAN
Bachelor of Computer Science (Software Engineering)	Obtained a National Higher School Certificate (or an Advanced Level equivalent) with the grade 90% and above
	OR
Bachelor of Computer Science (Information Systems)	A Diploma from recognized Institutions with the least a CGPA of 3.00
	and
Bachelor of Computer Science (Computer System and Network)	Obtained ONE of the English Language Proficiency qualifications as below:
Bachelor of Computer Science (Artificial Intelligence)	i) A band of 6.0 and above in IELTS (Academic); or
Bachelor of Computer Science (Multimedia Computing)	ii) A score of 550 (PBT), 213 (CBT) or 80 (IBT) and above in TOEFL
	and
	PASS the interview

PROGRAMME GOALS AND LEARNING OUTCOMES **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 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 the society through computer science practices (Societal Engagement).

PROGRAMME 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 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

PROGRAMME GOALS AND LEARNING OUTCOMES 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 the society through computer science and Artificial Intelligence (Societal Engagement).

PROGRAMME LEARNING OUTCOMES

At the end of the Bachelor of Computer Science (Artificial Intelligence) 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 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

PROGRAMME GOALS AND LEARNING OUTCOMES BACHELOR OF COMPUTER SCIENCE (INFORMATION SYSTEMS)

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 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 the society through computer science and Information Systems practices (Societal Engagement).

PROGRAMME 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 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

PROGRAMME GOALS AND LEARNING OUTCOMES BACHELOR OF COMPUTER SCIENCE (DATA SCIENCE)

PROGRAMME GOALS

To produce excellent graduates who are able to 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 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 analyse business opportunities and is able to develop a new Data Science related business plan.

PROGRAMME GOALS AND LEARNING OUTCOMES 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 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 the society through professional practices (Societal Engagement).

PROGRAMME 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 a 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.

PROGRAMME GOALS AND LEARNING OUTCOMES BACHELOR OF COMPUTER SCIENCE (MULTIMEDIA COMPUTING)

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 the society through the practices of computer science and Multimedia Computing (Societal Engagement).

PROGRAMME 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 (COMPUTER SYSTEM AND NETWORK)
ACADEMIC SESSION 2021/2022**

COURSE CODE	COURSE COMPONENT	CREDITS	SEMESTER
	UNIVERSITY COURSES		
GIG1012	Philosophy and Current Issues <i>(for local student only)</i>	2	1
GLT1017	Basic Malay Language <i>(for international student)</i>		
GIG1013	Appreciation of Ethics and Civilizations	2	2
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
	Elektif Universiti <i>(Cluster 1)</i>	2	2
	Elektif Universiti <i>(Cluster 2)</i>	2	2
	Elektif Universiti <i>(Cluster 3)</i>	2	2
	Elektif Universiti <i>(Cluster 4)</i>	2	1
	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 <i>(Choose only 10 courses)</i>	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.

**COURSE PLANNING FOR BACHELOR OF COMPUTER SCIENCE (COMPUTER SYSTEM AND NETWORK)
ACADEMIC SESSION 2021/2022**

Level	Course Code	Semester 1	Credits	Course Code	Semester 2	Credits
1	GIG1012 / GLT1017	Philosophy and Current Issues <i>(for local student only)</i> / Basic Malay Language <i>(for international student)</i>	2	GIG1013	Appreciation of Ethics and Civilizations	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
Course Code	Semester 1	Credits	Course Code	Semester 2	Credits	
2	GIG1003	Basic Entrepreneurship Culture	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		University Elective (Cluster 1)	2
		Total	21		Total	21
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
	Total	12		Total	19	
Course Code	Semester 1	Credits	Credit Distribution			
4		Co-Curriculum (2)	Course Component		Credits	
	WIA3003	Academic Project II (#WIA3002)	University Courses	14		
		Specialization Elective (8)	Faculty Core Courses	17		
		Specialization Elective (9)	University Elective Courses	8		
		Specialization Elective (10)	Programme Core Courses	59		
		University Elective (Cluster 4)	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.

**CURRICULUM STRUCTURE
BACHELOR OF COMPUTER SCIENCE (ARTIFICIAL INTELLIGENCE)
ACADEMIC SESSION 2021/2022**

COURSE CODE	COURSE COMPONENT	CREDITS	SEMESTER
	UNIVERSITY COURSES		
GIG1012	Philosophy and Current Issues <i>(for local student only)</i>	2	1
GLT1017	Basic Malay Language <i>(for international student)</i>		
GIG1013	Appreciation of Ethics and Civilizations	2	2
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	UNIVERSITY ELECTIVE COURSES STUDENT HOLISTIC EMPOWERMENT (SHE)	CREDITS	SEMESTER
	University Elective <i>(Cluster 1)</i>	2	2
	University Elective <i>(Cluster 2)</i>	2	2
	University Elective <i>(Cluster 3)</i>	2	2
	University Elective <i>(Cluster 4)</i>	2	1
	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	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 <i>(Choose only 10 courses)</i>	CREDITS	SEMESTER
WIC2008	Internet of Things (#WIA1005)	3	1 or 2
WID2001	Knowledge Representation and Reasoning	3	1 or 2
WID2002	Computing Mathematics II	3	1 or 2
WID2003	Cognitive Science	3	1 or 2
WID3001	Functional and Logic Programming	3	1 or 2
WID3002	Natural Language Processing	3	1 or 2
WID3007	Fuzzy Logic (#WIX1001)	3	1 or 2
WID3010	Autonomous Robots	3	1 or 2
WID3011	Deep Learning	3	1 or 2
WID3012	Evolutionary Computation	3	1 or 2
WID3013	Computer Vision and Pattern Recognition	3	1 or 2
WID3014	Practical Artificial Intelligence	3	1 or 2
WID3015	Numerical Analysis	3	1 or 2
WIG3004	Virtual Reality	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.

**COURSE PLANNING FOR BACHELOR OF COMPUTER SCIENCE (ARTIFICIAL INTELLIGENCE)
ACADEMIC SESSION 2021/2022**

Level	Course Code	Semester 1	Credits	Course Code	Semester 2	Credits
1	GIG1012 / GLT1017	Philosophy and Current Issues (for local student only) / Basic Malay Language (for international student)	2	GIG1013	Appreciation of Ethics and Civilizations	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
Course Code	Semester 1	Credits	Course Code	Semester 2	Credits	
2	GIG1003	Basic Entrepreneurship Culture	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
	Total	21		Total	21	
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
	Total	12		Total	19	
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 4)	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.

**CURRICULUM STRUCTURE
BACHELOR OF COMPUTER SCIENCE (INFORMATION SYSTEMS)
ACADEMIC SESSION 2021/2022**

COURSE CODE	COURSE COMPONENT	CREDITS	SEMESTER
	UNIVERSITY COURSES		
GIG1012	Philosophy and Current Issues (<i>for local student only</i>)	2	1
GLT1017	Basic Malay Language (<i>for international student</i>)		
GIG1013	Appreciation of Ethics and Civilizations	2	2
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	
	FACULTY CORE COURSES		
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	
	EXTERNAL UNIVERSITY ELECTIVE COURSES		
	STUDENT HOLISTIC EMPOWERMENT (SHE)		
	University Elective (<i>Cluster 1</i>)	2	2
	University Elective (<i>Cluster 2</i>)	2	2
	University Elective (<i>Cluster 3</i>)	2	2
	University Elective (<i>Cluster 4</i>)	2	1
	Total	8	
	PROGRAMME CORE COURSES		
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	
	SPECIALIZATION ELECTIVE COURSES (Choose only 10 courses)		
WIC2008	Internet of Things (#WIA1005)	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
WIE3012	Business Analytics and Intelligence	3	1 or 2
WIE3010	Data Visualization	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.

**COURSE PLANNING FOR BACHELOR OF COMPUTER SCIENCE (INFORMATION SYSTEMS)
ACADEMIC SESSION 2021/2022**

Level	Course Code	Semester 1	Credits	Course Code	Semester 2	Credits
1	GIG1012 / GLT1017	Philosophy and Current Issues <i>(for local student only)</i> / Basic Malay Language <i>(for international student)</i>	2	GIG1013	Appreciation of Ethics and Civilizations	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
	Course Code	Semester 1	Credits	Course Code	Semester 2	Credits
2	GIG1003	Basic Entrepreneurship Culture	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
	Total	21		Total	21	
	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
	Total	12		Total	19	
	Course Code	Semester 1	Credits	Credit Distribution		
4		Co-Curriculum (2)	2	Course Component		
	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 4)	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.

**CURRICULUM STRUCTURE
BACHELOR OF COMPUTER SCIENCE (DATA SCIENCE)
ACADEMIC SESSION 2021/2022**

COURSE CODE	COURSE COMPONENT	CREDITS	SEMESTER
	UNIVERSITY COURSES		
GIG1012 / GLT1017	Philosophy and Current Issues <i>(for local student only)</i> / Basic Malay Language <i>(for international student)</i>	2	1
GIG1013	Appreciation of Ethics and Civilizations	2	2
GIG1003	Basic Entrepreneurship	2	2
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-Curriculum	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
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
WIE2003	Introduction to Data Science	3	2
WIA3001	Industrial Training*	12	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	KURSUS ELEKTIF PENGKHUSUSAN (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
WIE3008	Business Analytics and Intelligence	3	1 atau 2
WIE3010	Data Visualization	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.

**COURSE PLANNING FOR BACHELOR OF COMPUTER SCIENCE (DATA SCIENCE)
ACADEMIC SESSION 2021/2022**

Level	Course Code	Semester 1	Credits	Course Code	Semester 2	Credits
1	GIG1012 / GLT1017	Philosophy and Current Issues (for local student only) / Basic Malay Language (for international student)	2	GIG1013	Appreciation of Ethics and Civilizations	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
Course Code	Semester 1	Credits	Course Code	Semester 2	Credits	
	English for Communication (1)	3		Co-Curriculum	2	
GIG1003	Basic Entrepreneurship Skills	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
Course Code	Semester 1	Credits	Course Code	Semester 2 (Industry)	Credits	
	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
Course Code	Semester 1 (Industry)	Credits	Credit Distribution			
	WIA3001	Industrial Training		Course Component	Credits	
				University Courses	20	
				Faculty Core Courses	17	
				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 except Academic Project I and Academic Project II.
** Pass all Faculty and Programme Core Courses except for Industrial Training and Academic Project II.

**CURRICULUM STRUCTURE
BACHELOR OF COMPUTER SCIENCE (SOFTWARE ENGINEERING)
ACADEMIC SESSION 2021/2022**

COURSE CODE	COURSE COMPONENT	CREDITS	SEMESTER
	UNIVERSITY COURSES		
GIG1012	Philosophy and Current Issues (<i>for local student only</i>)	2	1
GLT1017	Basic Malay Language (<i>for international student</i>)		
GIG1013	Appreciation of Ethics and Civilizations	2	2
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 (<i>Cluster 1</i>)	2	2
	University Elective (<i>Cluster 2</i>)	2	2
	University Elective (<i>Cluster 3</i>)	2	2
	University Elective (<i>Cluster 4</i>)	2	1
	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 Modelling	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 (<i>Choose only 10 courses</i>)	CREDITS	SEMESTER
WIF-2002	Software Requirements Engineering	3	1 atau 2
WIF-2003	Web Programming	3	1 atau 2
WIF-3001	Software Testing	3	1 atau 2
WIF-3002	Software Process and Quality	3	1 atau 2
WIF-3004	Software Architecture and Design Paradigms (#WIA2002)	3	1 atau 2
WIF-3005	Software Maintenance and Evolution	3	1 atau 2
WIF-3006	Component Based Software Engineering (#WIA2002)	3	1 atau 2
WIF-3008	Real Time Systems	3	1 atau 2
WIF-3009	Python for Scientific Computing	3	1 atau 2
WIF-3010	Programming Language Paradigm	3	1 atau 2
WIF-3011	Concurrent and Parallel Programming (#WIX1002) (#WIA2004)	3	1 atau 2
WIG3005	Game Development	3	1 atau 2
WIC2008	Internet of Things (#WIA1005)	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 (SOFTWARE ENGINEERING)
ACADEMIC SESSION 2021/2022**

Level	Course Code	Semester 1	Credits	Course Code	Semester 2	Credits
1	GIG1012 / GLT1017	Philosophy and Current Issues <i>(for local student only) / Basic Malay Language (for international student)</i>	2	GIG1013	Appreciation of Ethics and Civilizations	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
	Course Code	Semester 1	Credits	Course Code	Semester 2	Credits
2	GIG1003	Basic Entrepreneurship Culture	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 Modelling	3		Specialization Elective (2)	3
	WIA2003	Probability and Statistics	3		Specialization Elective (3)	3
	WIA2007	Mobile Application Development	4		<i>University Elective (Cluster 1)</i>	2
	Total		21		Total	21
	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
					<i>University Elective (Cluster 2)</i>	2
					<i>University Elective (Cluster 3)</i>	2
	Total		12		Total	19
	Course Code	Semester 1	Credits	Credit Distribution		
4		Co-Curriculum (2)	2	Course Component		
	WIA3003	Academic Project II (#WIA3002)	5	University Courses		
		Specialization Elective (8)	3	Faculty Core Courses		
		Specialization Elective (9)	3	University Elective Courses		
		Specialization Elective (10)	3	Programme Core Courses		
		<i>University Elective (Cluster 4)</i>	2	Specialization Elective Courses		
	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.

**CURRICULUM STRUCTURE
BACHELOR OF COMPUTER SCIENCE (MULTIMEDIA COMPUTING)
ACADEMIC SESSION 2021/2022**

COURSE CODE	COURSE COMPONENT	CREDITS	SEMESTER
	UNIVERSITY COURSES		
GIG1012	Philosophy and Current Issues (<i>for local student only</i>)	2	1
GLT1017	Basic Malay Language (<i>for international student</i>)		
GIG1013	Appreciation of Ethics and Civilizations	2	2
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 (<i>Cluster 1</i>)	2	2
	University Elective (<i>Cluster 2</i>)	2	2
	University Elective (<i>Cluster 3</i>)	2	2
	University Elective (<i>Cluster 4</i>)	2	1
	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 (<i>Choose only 10 courses</i>)	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 2021/2022**

Level	Course Code	Semester 1	Credits	Course Code	Semester 2	Credits
1	GIG1012 / GLT1017	Philosophy and Current Issues <i>(for local student only)</i> / Basic Malay Language <i>(for international student)</i>	2	GIG1013	Appreciation of Ethics and Civilizations	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
Course Code	Semester 1	Credits	Course Code	Semester 2	Credits	
2	GIG1003	Basic Entrepreneurship Culture	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		<i>University Elective (Cluster 1)</i>	2
	Total	21		Total	21	
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
					<i>University Elective (Cluster 2)</i>	2
					<i>University Elective (Cluster 3)</i>	2
	Total	12		Total	19	
Course Code	Semester 1	Credits	Credit Distribution			
4		Co-Curriculum (2)			Credits	
	WIA3003	Academic Project II (#WIA3002)			University Courses	14
		Specialization Elective (8)			Faculty Core Courses	17
		Specialization Elective (9)			University Elective Courses	8
		Specialization Elective (10)			Programme Core Courses	59
		<i>University Elective (Cluster 4)</i>			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.

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 of 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%

GLT1017
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

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%

WIX2002 PROJECT MANAGEMENT

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 (Data Science)

Bachelor of Computer Science (Software Engineering)

Bachelor of Computer Science (Multimedia Computing)

**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 and etc., and non-linear such as graph, trees and 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 others 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 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%

**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, in particular 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 web-pages 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 practicals 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 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%

**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 use presentation tools such as MS Powerpoint to make a presentation for their mini multimedia projects. 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 on database architecture, models, and processes necessary for using, designing, and implementing database systems and applications. Students will have hands on session to use DBMS and write SQL commands. Database applications will be developed based on case studies. Transaction management topics and other issues related database management system is 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 model.

Synopsis of Course Contents

This course covers the 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 behavioural 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 concept 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 to device, file and system management, as well as example 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 algorithm 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 about 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 analysing 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
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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 network.
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 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 component 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-centred 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 workplace.
3. Use appropriate systems and technologies in the tasks at workplace.
4. Demonstrate professional ethics at workplace accordingly 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 log book. 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 proposal.

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 system with ethics and professionalism.

Synopsis of Course Content

This course covers the 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 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 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 approach for the stated problem.
4. Review literatures 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/problem that require data science solutions in industry.
2. Use appropriate data science technologies in the 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 log book. 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 identify 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 provides an introduction to 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 cyber crime. 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 cyber crime 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.

Assessment Methods

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 an 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 artificial intelligence field. The topics include calculus (differentiation and integration), functions and graphs, matrix algebra (Eigen value, Eigen vector, dependency, singularity), statistical methods (sampling, principle 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
PRACTICAL 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
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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
KNOWLEDGEMANGEMENT 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%

**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

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, 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%

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 (Data Science)

**WIH2001
DATA ANALYTICS**

Credit: 3

Course Pre-requisite(s): None

Medium of Instruction: English

Learning Outcomes

1. Explain the basic concepts of data analytics.
2. Differentiate the various data analytics techniques.
3. Apply the appropriate data analytics techniques.

Synopsis of Course Content

This course aims to develop students' ability to describe, explore and analyze data using suitable data analytics techniques.

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 different kinds of knowledge and their related engineering processes.
2. Explain 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 the different kinds of knowledge and their related engineering processes. It explains the various knowledge representations methods such as rule-based, frame-based, case-based reasoning, semantic network, script, conceptual graph 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 various matrix algebra.
2. Solve problems involving various types of mathematical transformations.
3. Apply statistical methods and sampling in problem solving.

Synopsis of Course Content

This course covers important mathematics topics which can be applied to artificial intelligence field. The topics include calculus (differentiation and integration), functions and graphs, matrix algebra (Eigen value, Eigen vector, dependency, singularity), statistical methods (sampling, principle component analysis) and transformations (Fourier, Laplace, Hough, geometric and wavelet).

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 levels of natural language processing.
2. Describe the natural language processing techniques.
3. Apply basic algorithms of natural language processing.

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 automatic summarization.

Assessment Methods

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. Explain the concept of Data Mining and Data Warehouse.
2. Create a schema diagram for the data warehouse using Star schema.
3. Develop model using various data mining techniques.

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%

**WIE3008
BUSINESS ANALYTICS AND INTELLIGENCE**

Credit: 3

Course Pre-requisite(s): WIA2001 Database

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%

**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, i.e.; 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, 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%

WIH3003
BIG DATA APPLICATIONS AND ANALYTICS

Credit: 3

Course Pre-requisite(s) : None

Medium of Instruction: English

Learning Outcomes

1. List the concepts of Big Data Applications and Analytics.
2. Explain suitable methods and techniques to collect and analyse big data
3. Use big data in real world problem solutions.

Synopsis of Course Content

The course will cover a) Big data applications and analytics, b) Data Collection, Sampling and Preprocessing, c) Predictive Analysis, d) Descriptive analysis, e) Survival analysis, f) Social networks analysis, g) Case study of Big Data Applications.

Assessment Methods

Continuous Assessment: 70%
Final Examination: 30%

WIH3004
TRENDS IN DATA SCIENCE

Credit: 3

Course Pre-requisite(s) : None

Medium of Instruction: English

Learning Outcomes

1. Describe emerging computer technologies, data science technique, industry applications, and current trends in data science.
2. Discuss critical issues related to managing data and 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 data science 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%

COURSE INFORMATION: SPECIALIZATION ELECTIVE COURSES

Bachelor of Computer Science (Software Engineering)

WIF2002
SOFTWARE REQUIREMENTS ENGINEERING

Credit: 3

Course Pre-requisite(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 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%

WIF3001

SOFTWARE TESTING

Credit: 3

Course Pre-requisite(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 approach. 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 Pre-requisite(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 be 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 Pre-requisite(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 (emphasising 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 Pre-requisite(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 Pre-requisite(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
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Credit: 3

Course Pre-requisite(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
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Credit: 3

Course Pre-requisite(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
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Credit: 3

Course Pre-requisite(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
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Credit: 3

Course Pre-requisite(s): WIX1002 & WIA2004

Medium of Instruction: English

Learning Outcomes

1. Explain the concepts and issues of concurrent and parallel processing.
2. Optimise 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 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%

**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 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 & 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%

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 characteristic 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 object.
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 application.
3. Apply the appropriate digital video processing

techniques.

Synopsis of Course Content

This course covers topics in digital video processing as follow: 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 the design of multimedia applications.

Synopsis of Course Content

This course serves as a platform for to deliver specialized topics in multimedia offered by interested lecturer and professional. 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. Student will also be exposed on the different issue 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 to 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

MAPPING COURSES TO PROGRAMME OUTCOMES

PROGRAMME: BACHELOR OF COMPUTER SCIENCE (COMPUTER SYSTEM AND NETWORK)

COURSE CODE	COURSE TITLE	CREDITS	PROGRAMME OUTCOMES (PO)							
			PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
FACULTY CORE COURSES										
WIX1001	Computing Mathematics I	3	☐	☐		☐				
WIX1002	Fundamentals of Programming	5	☐	☐	☐					
WIX1003	Computer Systems and Organization	3	☐	☐		☐				
WIX2001	Thinking and Communication Skills	3					☐		☐	☐
WIX2002	Project Management	3		☐			☐	☐		
UNIVERSITY COURSES										
GIG1003	Basic Entrepreneurship Enculturation	2							☐	☐
GIG1012	Philosophy and Current Issues	2				☐			☐	
GIG1013	Appreciation of Ethics and Civilisations	2								☐
GLT1017	Basic Malay Language	2	☐	☐			☐			
PROGRAMME CORE COURSES										
WIA1002	Data Structure (#WIX1002)	5	☐	☐	☐					
WIA1003	Computer System Architecture (#WIX1003)	3	☐	☐	☐					
WIA1005	Network Technology Foundation	4	☐	☐	☐					

COURSE CODE	COURSE TITLE	CREDITS	PROGRAMME OUTCOMES (PO)							
			PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
WIA1006	Machine Learning	3	☐	☐					☐	
WIA2001	Database	3	☐		☐				☐	
WIA2003	Probability and Statistics	3	☐	☐	☐					
WIA2004	Operating Systems	4	☐	☐				☐		
WIA2005	Algorithm Design and Analysis (#WIA1002)	4	☐	☐		☐				
WIA2006	System Analysis and Design	3	☐	☐						☐
WIA2008	Advanced Network Technology (#WIA1005)	4	☐	☐	☐					
WIA2009	Digital Design and Hardware Description Language (#WIA1003 & #WIX1003)	3	☐	☐	☐					
WIA3001	Industrial Training *	12				☐			☐	☐
WIA3002	Academic Project I **	3		☐	☐			☐		
WIA3003	Academic Project II (#WIA3002)	5						☐	☐	☐
SPECIALIZATION ELECTIVE COURSES										
WIC2002	Network Security	3	☐	☐	☐					
WIC2004	Internet Technology	3	☐	☐				☐		
WIC2005	Programmable Network (#WIA2008)	3	☐	☐	☐					
WIC2006	Digital Forensic	3		☐	☐				☐	
WIC2007	Cyber Security	3	☐	☐				☐		

COURSE CODE	COURSE TITLE	CREDITS	PROGRAMME OUTCOMES (PO)							
			PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
WIC2008	Internet of Things (#WIA1005)	3		☐	☐				☐	
WIC3001	Mathematics in Networking	3	☐	☐	☐					
WIC3002	Cryptography	3	☐	☐				☐		
WIC3003	Embedded System Programming	3	☐	☐	☐					
WIC3004	Computer Penetration	3	☐	☐				☐		
WIC3005	Enterprise Network Design and Management (#WIA1005)	3	☐	☐	☐					
WIC3006	Mobile Computing	3	☐	☐	☐					
WIC3007	Distributed Computing (#WIA1005)	3	☐	☐	☐					
WIC3008	Microprocessor	3	☐	☐	☐					
WIC3009	Parallel Programming	3	☐	☐	☐					

MAPPING COURSES TO PROGRAMME OUTCOMES

PROGRAMME: BACHELOR OF COMPUTER SCIENCE (ARTIFICIAL INTELLIGENCE)

COURSE CODE	COURSE TITLE	CREDITS	PROGRAMME OUTCOMES (PO)							
			PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
FACULTY CORE COURSES										
WIX1001	Computing Mathematics I	3	✓	✓		✓				
WIX1002	Fundamentals of Programming	5	✓	✓	✓					
WIX1003	Computer Systems and Organization	3	✓	✓		✓				
WIX2001	Thinking and Communication Skills	3					✓		✓	✓
WIX2002	Project Management	3		✓			✓	✓		
UNIVERSITY COURSES										
GIG1003	Basic Entrepreneurship Enculturation	2							✓	✓
GIG1012	Philosophy and Current Issues	2				✓			✓	
GIG1013	Appreciation of Ethics and Civilisations	2								✓
GLT1017	Basic Malay Language	2	✓	✓			✓			
PROGRAMME CORE COURSES										
WIA1002	Data Structure (#WIX1002)	5	✓	✓	✓					
WIA1003	Computer System Architecture (#WIX1003)	3	✓	✓	✓					
WIA1005	Network Technology Foundation	4	✓	✓	✓					

COURSE CODE	COURSE TITLE	CREDITS	PROGRAMME OUTCOMES (PO)							
			PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
WIA1006	Machine Learning	3	✓	✓					✓	
WIA1007	Introduction to Data Science	3	✓		✓				✓	
WIA2001	Database	3	✓		✓			✓		
WIA2003	Probability and Statistics	3	✓	✓	✓					
WIA2004	Operating Systems	4	✓	✓			✓			
WIA2005	Algorithm Design and Analysis (#WIA1002)	4	✓	✓		✓				
WIA2006	System Analysis and Design	3	✓	✓						✓
WIA2007	Mobile Application Development	4	✓	✓	✓					
WIA3001	Industrial Training *	12				✓			✓	✓
WIA3002	Academic Project I **	3		✓	✓		✓			
WIA3003	Academic Project II (#WIA3002)	5					✓		✓	✓
SPECIALIZATION ELECTIVE COURSES										
WIC2008	Internet of Things (#WIA1005)	3		✓	✓			✓		
WID2001	Knowledge Representation and Reasoning	3	✓	✓			✓			
WID2002	Computing Mathematics II	3	✓	✓		✓				
WID2003	Cognitive Science	3	✓	✓		✓				
WID3001	Functional and Logic Programming	3		✓	✓	✓				
WID3002	Natural Language Processing	3	✓	✓	✓					

COURSE CODE	COURSE TITLE	CREDITS	PROGRAMME OUTCOMES (PO)								
			PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	
WID3007	Fuzzy Logic	3	✓	✓						✓	
WID3010	Autonomous Robots	3	✓	✓	✓						
WID3011	Deep Learning	3	✓	✓	✓						
WID3012	Evolutionary Computation	3	✓			✓				✓	
WID3013	Computer Vision and Pattern Recognition	3	✓	✓						✓	
WID3014	Practical Artificial Intelligence	3		✓	✓			✓			
WID3015	Numerical Analysis	3			✓	✓					
WIG3004	Virtual Reality	3	✓	✓							✓

MAPPING COURSES TO PROGRAMME OUTCOMES

PROGRAMME: BACHELOR OF COMPUTER SCIENCE (INFORMATION SYSTEMS)

COURSE CODE	COURSE TITLE	CREDITS	PROGRAMME OUTCOMES (PO)							
			PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
FACULTY CORE COURSES										
WIX1001	Computing Mathematics I	3	☐	☐		☐				
WIX1002	Fundamentals of Programming	5	☐	☐	☐					
WIX1003	Computer Systems and Organization	3	☐	☐		☐				
WIX2001	Thinking and Communication Skills	3					☐		☐	☐
WIX2002	Project Management	3		☐			☐	☐		
UNIVERSITY COURSES										
GIG1003	Basic Entrepreneurship Enculturation	2							☐	☐
GIG1012	Philosophy and Current Issues	2				☐			☐	
GIG1013	Appreciation of Ethics and Civilisations	2								☐
GLT1017	Basic Malay Language	2	☐	☐			☐			
PROGRAMME CORE COURSES										
WIA1001	Information Systems	3	✓	✓					✓	
WIA1002	Data Structure (#WIX1002)	5	✓	✓	✓					

COURSE CODE	COURSE TITLE	CREDITS	PROGRAMME OUTCOMES (PO)							
			PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
WIA1003	Computer System Architecture (#WIX1003)	3	☐	☐	☐					
WIA1005	Network Technology Foundation	4	☐	☐	☐					
WIA1006	Machine Learning	3	☐	☐					☐	
WIA2001	Database	3	☐		☐			☐		
WIA2003	Probability and Statistics	3	☐	☐	☐					
WIA2004	Operating Systems	4	☐	☐			☐			
WIA2005	Algorithm Design and Analysis (#WIA1002)	4	☐	☐		☐				
WIA2006	System Analysis and Design	3	☐	☐						☐
WIA2007	Mobile Application Development	4	☐	☐	☐					
WIA3001	Industrial Training *	12				☐			☐	☐
WIA3002	Academic Project I **	3		☐	☐		☐			
WIA3003	Academic Project II (#WIA3002)	5					☐		☐	☐
SPECIALIZATION ELECTIVE COURSES										
WIC2008	Internet of Things	3		✓	✓			✓		
WIE2001	Trends in Information Systems	3	✓	✓		✓				
WIE2002	Open Source Programming: Application and Technology	3	✓	✓	✓					
WIE2003	Introduction to Data Science	3	✓	✓					✓	
WIE2005	Information Retrieval and Web Search	3	✓	✓		✓				

WIE3001	Advanced Database	3	✓		✓		✓			
WIE3002	Electronic Commerce	3	✓	✓	✓					
WIE3003	Information System Control and Security	3	✓	✓	✓					
WIE3005	Knowledge Management and Engineering	3	✓		✓		✓			
WIE3006	Information System Auditing (#WIE3003)	3	✓	✓						✓
WIE3007	Data Mining and Warehousing	3	✓	✓					✓	
WIE3008	Business Analytics and Intelligence (#WIA2001)	3		✓	✓				✓	
WIE3010	Data Visualisation	3	✓	✓	✓					
WIF2003	Web Programming	3		✓	✓	✓				

MAPPING COURSES TO PROGRAMME OUTCOMES

PROGRAMME: BACHELOR OF COMPUTER SCIENCE (DATA SCIENCE)

COURSE CODE	COURSE TITLE	CREDITS	PROGRAMME OUTCOMES (PO)							
			PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
FACULTY CORE COURSES										
WIX1001	Computing Mathematics I	3	✓	✓				✓		
WIX1002	Fundamentals of Programming	5	✓	✓				✓		
WIX1003	Computer Systems and Organization	3	✓	✓	✓					
WIX2001	Thinking and Communication Skills	3					✓		✓	✓
WIX2002	Project Management	3				✓	✓		✓	
FACULTY ELECTIVE COURSES										
WIX3001	Soft Computing	3		✓		✓		✓		
WIX3002	Social Informatics	3			✓			✓	✓	
WIX3003	Information Security Management and Ethics	3			✓	✓			✓	
WIC2004	Internet Technology	3	✓	✓				✓		
PROGRAMME CORE COURSES										
WIA1001	Information System	3	✓		✓	✓				
WIA1002	Data Structure	5	✓	✓				✓		

COURSE CODE	COURSE TITLE	CREDITS	PROGRAMME OUTCOMES (PO)							
			PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
WIA1003	Computer System & Architecture	3	✓	✓				✓		
WIA1005	Network Technology Foundation	4	✓	✓				✓		
WIA2001	Database	3	✓	✓				✓		
WIA2002	Software Modelling	3	✓	✓				✓		
WIA2003	Probability and Statistics	3	✓	✓				✓		
WIA2004	Operating System	4	✓	✓			✓			
WIA3001	Industrial Training	12				✓		✓	✓	
WID3006	Machine Learning	3	✓	✓				✓		
WIE2003	Introduction to Data Science	3	✓				✓	✓	✓	
WIH3001	Data Science Project	3						✓	✓	✓
WIH3002	Data Science Industrial Training	14				✓		✓	✓	
SPECIALIZATION ELECTIVE COURSES										
WIH2001	Data Analytics	3	✓	✓				✓		
WID2001	Knowledge Representation and Reasoning	3	✓				✓	✓		
WID2002	Computing Mathematics II	3	✓	✓				✓		
WID3001	Functional and Logic Programming	3		✓		✓		✓		
WID3002	Natural Language Processing	3	✓					✓	✓	
WIE3007	Data Mining and Warehousing	3	✓	✓				✓		
WIE3008	Business Analytics and Intelligence	3		✓			✓			✓

COURSE CODE	COURSE TITLE	CREDITS	PROGRAMME OUTCOMES (PO)							
			PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
WIE3010	Data Visualization	3	✓	✓				✓		
WIH3003	Big Data Applications and Analytics	3			✓			✓	✓	
WIH3004	Trends in Data Science	3	✓	✓	✓					

MAPPING COURSES TO PROGRAMME OUTCOMES PROGRAMME:
BACHELOR OF COMPUTER SCIENCE (SOFTWARE ENGINEERING)

COURSE CODE	COURSE TITLE	CREDITS	PROGRAMME OUTCOMES (PO)							
			PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
FACULTY CORE COURSES										
WIX1001	Computing Mathematics I	3	✓	✓		✓				
WIX1002	Fundamentals of Programming	5	✓	✓	✓					
WIX1003	Computer Systems and Organization	3	✓	✓		✓				
WIX2001	Thinking and Communication Skills	3					✓		✓	✓
WIX2002	Project Management	3		✓			✓	✓		
UNIVERSITY COURSES										
GIG1003	Basic Entrepreneurship Enculturation	2							✓	✓
GIG1012	Philosophy and Current Issues	2				✓			✓	
GIG1013	Appreciation of Ethics and Civilisations	2								✓
GLT1017	Basic Malay Language	2	✓	✓			✓			
PROGRAMME CORE COURSES										
WIA1002	Data Structure (#WIX1002)	5	✓	✓	✓					

COURSE CODE	COURSE TITLE	CREDITS	PROGRAMME OUTCOMES (PO)							
			PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
WIA1003	Computer System Architecture (#WIX1003)	3	✓	✓	✓					
WIA1005	Network Technology Foundation	4	✓	✓	✓					
WIA1006	Machine Learning	3	✓	✓					✓	
WIA2001	Database	3	✓		✓			✓		
WIA2002	Software Modelling	3	✓		✓	✓				
WIA2003	Probability and Statistics	3	✓	✓	✓					
WIA2004	Operating Systems	4	✓	✓			✓			
WIA2005	Algorithm Design and Analysis (#WIA1002)	4	✓	✓		✓				
WIA2007	Mobile Application Development	4	✓	✓	✓					
WIA2010	Human Computer Interaction	3	✓	✓					✓	
WIA3001	Industrial Training *	12				✓			✓	✓
WIA3002	Academic Project I **	3		✓	✓		✓			
WIA3003	Academic Project II (#WIA3002)	5					✓		✓	✓
SPECIALIZATION ELECTIVE COURSES										
WIF2002	Software Requirements Engineering	3	✓	✓			✓			
WIF2003	Web Programming	3		✓	✓	✓				
WIF3001	Software Testing	3	✓	✓	✓					
WIF3002	Software Process and Quality	3	✓	✓						✓

WIF3004	Software Architecture and Design Paradigms (#WIA2002)	3	✓	✓	✓					
WIF3005	Software Maintenance and Evolution	3	✓	✓		✓				
WIF3006	Component Based Software Engineering (#WIA2002)	3	✓		✓	✓				
WIF3008	Real Time Systems	3	✓	✓	✓					
WIF3009	Python for Scientific Computing	3		✓	✓		✓			
WIF3010	Programming Language Paradigm	3	✓	✓		✓				
WIF3011	Concurrent and Parallel Programming (#WIX1002) (#WIA2004)	3	✓	✓	✓					
WIG3005	Game Development	3	✓	✓	✓					
WIC2008	Internet of Things (#WIA1005)	3		✓	✓			✓		

MAPPING COURSES TO PROGRAMME OUTCOMES PROGRAMME:

BACHELOR OF COMPUTER SCIENCE (MULTIMEDIA COMPUTING)

COURSE CODE	COURSE TITLE	CREDITS	PROGRAMME OUTCOMES (PO)							
			PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
FACULTY CORE COURSES										
WIX1001	Computing Mathematics I	3	✓	✓		✓				
WIX1002	Fundamentals of Programming	5	✓	✓	✓					
WIX1003	Computer Systems and Organization	3	✓	✓		✓				
WIX2001	Thinking and Communication Skills	3					✓		✓	✓
WIX2002	Project Management	3		✓			✓	✓		
UNIVERSITY COURSES										
GIG1003	Basic Entrepreneurship Enculturation	2							✓	✓
GIG1012	Philosophy and Current Issues	2				✓			✓	
GIG1013	Appreciation of Ethics and Civilisations	2								✓
GLT1017	Basic Malay Language	2	✓	✓			✓			
PROGRAMME CORE COURSES										
WIA1002	Data Structure (#WIX1002)	5	✓	✓	✓					
WIA1003	Computer System Architecture (#WIX1003)	3	✓	✓	✓					
WIA1005	Network Technology Foundation	4	✓	✓	✓					
WIA1006	Machine Learning	3	✓	✓					✓	
WIA1008	Fundamental of Multimedia	3	✓	✓	✓					
WIA2001	Database	3	✓		✓			✓		

COURSE CODE	COURSE TITLE	CREDITS	PROGRAMME OUTCOMES (PO)							
			PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
WIA2003	Probability and Statistics	3	✓	✓	✓					
WIA2004	Operating Systems	4	✓	✓			✓			
WIA2005	Algorithm Design and Analysis (#WIA1002)	4	✓	✓		✓				
WIA2006	System Analysis and Design	3	✓	✓						✓
WIA2007	Mobile Application Development	4	✓	✓	✓					
WIB3001	Industrial Training *	12				✓			✓	✓
WIB3002	Academic Project I **	3		✓	✓		✓			
WIB3003	Academic Project II (#WIA3002)	5					✓		✓	✓
SPECIALIZATION ELECTIVE COURSES										
WIG2001	Digital Image Processing	3	✓	✓	✓					
WIG2002	Computer Graphics	3	✓	✓	✓					
WIG2004	Audio Synthesis	3	✓		✓		✓			
WIG2005	Interactive Design	3	✓	✓	✓		✓			
WIG3001	Mathematics for Multimedia	3	✓	✓		✓				
WIG3002	Rendering and Animation	3	✓	✓				✓		

COURSE CODE	COURSE TITLE	CREDITS	PROGRAMME OUTCOMES (PO)							
			PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
WIG3003	Multimedia Programming	3	✓	✓	✓					
WIG3004	Virtual Reality	3	✓	✓					✓	
WIG3005	Game Development	3	✓	✓	✓					
WIG3006	Digital Video Processing	3	✓	✓	✓					
WIG3007	Special Topics in Multimedia	3	✓	✓	✓					
WIG3008	Multimedia Forensic and Security	3		✓	✓				✓	
WIE3010	Data Visualization	3	✓	✓	✓					
WIF2003	Web Programming	3		✓	✓	✓				

MAPPING COURSES TO TEACHING AND LEARNING TAXONOMY

PROGRAMME: BACHELOR OF COMPUTER SCIENCE (COMPUTER SYSTEM AND NETWORK)

COURSE CODE	COURSE TITLE	CREDITS	COGNITIVE						PSYCHOMOTOR					AFFECTIVE				
			C1	C2	C3	C4	C5	C6	P1	P2	P3	P4	P5	A1	A2	A3	A4	A5
FACULTY CORE COURSES																		
WIX1001	Computing Mathematics I	3	✓	✓	✓						✓							
WIX1002	Fundamentals of Programming	5		✓	✓						✓						✓	
WIX1003	Computer Systems and Organization	3		✓	✓										✓	✓		
WIX2001	Thinking and Communication Skills	3			✓						✓				✓	✓		
WIX2002	Project Management	3		✓	✓					✓				✓	✓			
UNIVERSITY COURSES																		
GIG1003	Basic Entrepreneurship Enculturation	3		✓	✓					✓				✓				
GIG1012	Philosophy and Current Issues	3		✓		✓										✓		✓
GIG1013	Appreciation of Ethics and Civilisations	3		✓												✓	✓	
GLT1017	Basic Malay Language	3	✓							✓					✓			
PROGRAMME CORE COURSES																		
WIA1002	Data Structure (#WIX1002)	5		✓	✓						✓					✓		
WIA1003	Computer System Architecture (#WIX1003)	3		✓	✓										✓	✓		
WIA1005	Network Technology Foundation	4			✓						✓					✓		

COURSE CODE	COURSE TITLE	CREDITS	COGNITIVE						PSYCHOMOTOR					AFFECTIVE					
			C1	C2	C3	C4	C5	C6	P1	P2	P3	P4	P5	A1	A2	A3	A4	A5	
WIA1006	Machine Learning	3	✓	✓													✓		
WIA2001	Database	3			✓						✓						✓		
WIA2003	Probability and Statistics	3		✓	✓						✓						✓		
WIA2004	Operating Systems	4		✓	✓						✓			✓					
WIA2005	Algorithm Design and Analysis (#WIA1002)	4			✓						✓						✓		
WIA2006	System Analysis and Design	3	✓	✓	✓					✓	✓						✓		
WIA2008	Advanced Network Technology (#WIA1005)	4	✓	✓	✓				✓	✓	✓			✓	✓	✓			
WIA2009	Digital Design and Hardware Description Language (#WIA1003 & #WIX1003)	3	✓	✓	✓				✓	✓				✓	✓	✓			
WIA3001	Industrial Training *	12			✓	✓				✓							✓		
WIA3002	Academic Project I **	3		✓	✓						✓						✓		
WIA3003	Academic Project II (#WIA3002)	5					✓				✓						✓		
SPECIALIZATION ELECTIVE COURSES																			
WIC2002	Network Security	3	✓	✓	✓					✓									
WIC2004	Internet Technology	3	✓	✓	✓				✓	✓				✓	✓	✓			
WIC2005	Programmable Network (#WIA2008)	3		✓	✓					✓	✓				✓	✓			
WIC2006	Digital Forensic	3	✓	✓	✓				✓	✓				✓	✓	✓			
WIC2007	Cyber Security	3			✓	✓			✓	✓				✓	✓				

COURSE CODE	COURSE TITLE	CREDITS	COGNITIVE						PSYCHOMOTOR					AFFECTIVE				
			C1	C2	C3	C4	C5	C6	P1	P2	P3	P4	P5	A1	A2	A3	A4	A5
WIC2008	Internet of Things (#WIA1005)	3	✓	✓	✓					✓	✓				✓	✓		
WIC3001	Mathematics in Networking	3	✓	✓	✓				✓	✓								
WIC3002	Cryptography	3		✓		✓			✓		✓			✓				
WIC3003	Embedded System Programming	3			✓						✓							
WIC3004	Computer Penetration	3	✓		✓					✓						✓		
WIC3005	Enterprise Network Design and Management (#WIA1005)	3			✓						✓					✓		
WIC3006	Mobile Computing	3		✓					✓	✓				✓		✓		
WIC3007	Distributed Computing (#WIA1005)	3		✓	✓					✓	✓							
WIC3008	Microprocessor	3		✓	✓				✓		✓							
WIC3009	Parallel Programming	3		✓	✓				✓	✓	✓							

MAPPING COURSES TO TEACHING AND LEARNING TAXONOMY

PROGRAMME: BACHELOR OF COMPUTER SCIENCE (ARTIFICIAL INTELLIGENCE)

COURSE CODE	COURSE TITLE	CREDITS	COGNITIVE						PSYCHOMOTOR					AFFECTIVE				
			C1	C2	C3	C4	C5	C6	P1	P2	P3	P4	P5	A1	A2	A3	A4	A5
FACULTY CORE COURSES																		
WIX1001	Computing Mathematics I	3	✓	✓	✓						✓							
WIX1002	Fundamentals of Programming	5		✓	✓						✓						✓	
WIX1003	Computer Systems and Organization	3		✓	✓											✓	✓	
WIX2001	Thinking and Communication Skills	3			✓						✓					✓	✓	
WIX2002	Project Management	3		✓	✓					✓				✓	✓			
UNIVERSITY COURSES																		
GIG1003	Basic Entrepreneurship Enculturation	2		✓	✓					✓				✓				
GIG1012	Philosophy and Current Issues	2		✓		✓										✓		✓
GIG1013	Appreciation of Ethics and Civilisations	2		✓												✓	✓	
GLT1017	Basic Malay Language	2	✓							✓					✓			
PROGRAMME CORE COURSES																		
WIA1002	Data Structure (#WIX1002)	5		✓	✓						✓					✓		
WIA1003	Computer System Architecture (#WIX1003)	3		✓	✓										✓	✓		
WIA1005	Network Technology Foundation	4			✓						✓					✓		

COURSE CODE	COURSE TITLE	CREDITS	COGNITIVE						PSYCHOMOTOR					AFFECTIVE					
			C1	C2	C3	C4	C5	C6	P1	P2	P3	P4	P5	A1	A2	A3	A4	A5	
WIA1006	Machine Learning	3	✓	✓													✓		
WIA1007	Introduction to Data Science	3			✓						✓						✓		
WIA2001	Database	3			✓						✓						✓		
WIA2003	Probability and Statistics	3		✓	✓						✓						✓		
WIA2004	Operating Systems	4		✓	✓						✓			✓					
WIA2005	Algorithm Design and Analysis (#WIA1002)	4			✓						✓						✓		
WIA2006	System Analysis and Design	3	✓	✓	✓					✓	✓						✓		
WIA2007	Mobile Application Development	4																	
WIA3001	Industrial Training *	12			✓	✓				✓							✓		
WIA3002	Academic Project I **	3		✓	✓						✓						✓		
WIA3003	Academic Project II (#WIA3002)	5					✓				✓						✓		
SPECIALIZATION ELECTIVE COURSES																			
WIC2008	Internet of Things (#WIA1005)	3	✓							✓	✓						✓		
WID2001	Knowledge Representation and Reasoning	3		✓	✓				✓					✓					
WID2002	Computing Mathematics II	3			✓	✓				✓									
WID2003	Cognitive Science	3				✓				✓									
WID3001	Functional and Logic Programming	3		✓					✓		✓								

COURSE CODE	COURSE TITLE	CREDITS	COGNITIVE						PSYCHOMOTOR					AFFECTIVE				
			C1	C2	C3	C4	C5	C6	P1	P2	P3	P4	P5	A1	A2	A3	A4	A5
WID3002	Natural Language Processing	3		✓		✓					✓							
WID3007	Fuzzy Logic (#WIX1001)	3		✓		✓											✓	
WID3010	Autonomous Robots	3	✓	✓							✓							
WID3011	Deep Learning	3	✓		✓						✓							
WID3012	Evolutionary Computation	3		✓					✓								✓	
WID3013	Computer Vision and Pattern Recognition	3		✓											✓			
WID3014	Practical Artificial Intelligence	3		✓	✓						✓						✓	
WID3015	Numerical Analysis	3								✓	✓							
WIG3004	Virtual Reality	3	✓	✓							✓						✓	

MAPPING COURSES TO TEACHING AND LEARNING TAXONOMY

PROGRAMME: BACHELOR OF COMPUTER SCIENCE (INFORMATION SYSTEMS)

COURSE CODE	COURSE TITLE	CREDITS	COGNITIVE						PSYCHOMOTOR					AFFECTIVE				
			C1	C2	C3	C4	C5	C6	P1	P2	P3	P4	P5	A1	A2	A3	A4	A5
FACULTY CORE COURSES																		
WIX1001	Computing Mathematics I	3	✓	✓	✓						✓							
WIX1002	Fundamentals of Programming	5		✓	✓						✓					✓		
WIX1003	Computer Systems and Organization	3		✓	✓										✓	✓		
WIX2001	Thinking and Communication Skills	3			✓						✓				✓	✓		
WIX2002	Project Management	3		✓	✓					✓				✓	✓			
UNIVERSITY COURSES																		
GIG1003	Basic Entrepreneurship Enculturation	2		✓	✓					✓				✓				
GIG1012	Philosophy and Current Issues	2		✓		✓										✓	✓	
GIG1013	Appreciation of Ethics and Civilisations	2		✓												✓	✓	
GLT1017	Basic Malay Language	2	✓							✓					✓			
PROGRAMME CORE COURSES																		
WIA1001	Information Systems	3	✓	✓										✓				
WIA1002	Data Structure (#WIX1002)	5		✓	✓						✓					✓		

COURSE CODE	COURSE TITLE	CREDITS	COGNITIVE						PSYCHOMOTOR					AFFECTIVE					
			C1	C2	C3	C4	C5	C6	P1	P2	P3	P4	P5	A1	A2	A3	A4	A5	
WIA1003	Computer System Architecture (#WIX1003)	3		✓	✓											✓	✓		
WIA1005	Network Technology Foundation	4			✓							✓					✓		
WIA1006	Machine Learning	3	✓	✓													✓		
WIA2001	Database	3			✓							✓					✓		
WIA2003	Probability and Statistics	3		✓	✓							✓					✓		
WIA2004	Operating Systems	4		✓	✓							✓			✓				
WIA2005	Algorithm Design and Analysis (#WIA1002)	4			✓							✓					✓		
WIA2006	System Analysis and Design	3	✓	✓	✓						✓	✓					✓		
WIA2007	Mobile Application Development	4		✓	✓						✓	✓							
WIA3001	Industrial Training *	12			✓	✓					✓						✓		
WIA3002	Academic Project I **	3		✓	✓							✓					✓		
WIA3003	Academic Project II (#WIA3002)	5					✓					✓					✓		
SPECIALIZATION ELECTIVE COURSES																			
WIC2008	Internet-of Things	3	✓								✓	✓				✓	✓		
WIE2001	Trends in Information Systems	3	✓	✓					✓										
WIE2002	Open Source Programming: Application and Technology	3	✓	✓					✓										
WIE2003	Introduction to Data Science	3		✓								✓					✓		
WIE2005	Information Retrieval and Web Search	3	✓	✓							✓								

WIE3001	Advanced Database	3		✓						✓	✓							
WIE3002	Electronic Commerce	3	✓	✓							✓							
WIE3003	Information System Control and Security	3		✓	✓						✓							
WIE3005	Knowledge Management and Engineering	3			✓						✓					✓		
WIE3006	Information System Auditing (#WIE3003)	3	✓	✓												✓		
WIE3007	Data Mining and Warehousing	3		✓		□										✓		
WIE3008	Business Analytics and Intelligence (#WIA2001)	3			✓						✓			✓				
WIE3010	Data Visualisation	3	✓	✓							✓							
WIF2003	Web Programming	3			✓					✓								

MAPPING COURSES TO TEACHING AND LEARNING TAXONOMY

PROGRAMME: BACHELOR OF COMPUTER SCIENCE (DATA SCIENCE)

COURSE CODE	COURSE TITLE	CREDITS	COGNITIVE						PSYCHOMOTOR					AFFECTIVE				
			C1	C2	C3	C4	C5	C6	P1	P2	P3	P4	P5	A1	A2	A3	A4	A5
FACULTY CORE COURSES																		
WIX1001	Computing Mathematics I	3	✓	✓	✓				✓	✓	✓			✓	✓			
WIX1002	Fundamentals of Programming	5	✓	✓	✓				✓	✓	✓			✓	✓			
WIX1003	Computer Systems and Organization	3	✓	✓	✓				✓	✓	✓			✓	✓	✓		
WIX2001	Thinking and Communication Skills	3	✓	✓	✓				✓	✓	✓			✓	✓	✓		
WIX2002	Project Management	3	✓	✓	✓				✓	✓	✓			✓	✓	✓		
FACULTY ELECTIVE COURSES																		
WIX3001	Soft Computing	3	✓	✓	✓				✓	✓								
WIX3002	Social Informatics	3	✓	✓	✓									✓	✓	✓		
WIX3003	Information Security Management and Ethics	3	✓	✓	✓									✓	✓	✓		
WIC2004	Internet Technology	3	✓	✓	✓	✓			✓	✓	✓			✓	✓	✓		
PROGRAMME CORE COURSES																		
WIA1001	Information Systems	3	✓	✓	✓									✓	✓	✓		
WIA1002	Data Structure	5	✓	✓	✓				✓	✓	✓			✓	✓	✓		

COURSE CODE	COURSE TITLE	CREDITS	COGNITIVE						PSYCHOMOTOR					AFFECTIVE				
			C1	C2	C3	C4	C5	C6	P1	P2	P3	P4	P5	A1	A2	A3	A4	A5
WIA1003	Computer System Architecture	3	✓	✓	✓				✓	✓	✓			✓	✓	✓		
WIA1005	Network Technology Foundation	4	✓	✓	✓				✓	✓	✓			✓	✓	✓		
WIA2001	Database	3	✓	✓	✓				✓	✓	✓			✓	✓			
WIA2002	Software Modelling	3		✓	✓				✓	✓	✓			✓	✓	✓		
WIA2003	Operating Systems	3	✓	✓	✓				✓	✓	✓			✓	✓	✓		
WIA2004	Machine Learning	4	✓	✓	✓				✓	✓	✓			✓	✓	✓		
WIA3001	Industrial Training	12	✓	✓	✓	✓			✓	✓				✓	✓	✓		
WID3006	Probability and Statistics	3	✓	✓	✓	✓			✓	✓	✓			✓	✓			
WIE2003	Introduction to Data Science	3	✓	✓	✓	✓								✓	✓	✓		
WIH3001	Data Science Project	3	✓	✓	✓				✓	✓				✓	✓	✓		
WIH3002	Data Science Industrial Training	14	✓	✓	✓	✓			✓	✓	✓			✓	✓	✓		
SPECIALIZATION ELECTIVE COURSES																		
WIH2001	Data Analytics	3	✓	✓	✓	✓			✓	✓	✓			✓	✓			
WID2001	Knowledge Representation and Reasoning	3	✓	✓	✓	✓			✓	✓	✓			✓	✓			
WID2002	Computing Mathematics II	3	✓	✓	✓	✓								✓	✓	✓		
WID3001	Functional and Logic Programming	3	✓	✓	✓	✓			✓	✓	✓			✓	✓			
WID3002	Natural Language Processing	3	✓	✓	✓				✓	✓	✓			✓	✓	✓		
WIE3007	Data Mining and Warehousing	3	✓	✓	✓				✓	✓								
WIE3008	Business Analytics and Intelligence	3	✓	✓	✓				✓	✓	✓			✓	✓			

COURSE CODE	COURSE TITLE	CREDITS	COGNITIVE						PSYCHOMOTOR					AFFECTIVE				
			C1	C2	C3	C4	C5	C6	P1	P2	P3	P4	P5	A1	A2	A3	A4	A5
WIE3010	Data Visualization	3	✓	✓	✓				✓	✓	✓							
WIH3003	Big Data Applications and Analytics	3	✓	✓	✓				✓	✓	✓			✓	✓			
WIH3004	Trends in Data Science	3	✓	✓	✓	✓			✓	✓	✓							

MAPPING COURSES TO TEACHING AND LEARNING TAXONOMY

PROGRAMME: BACHELOR OF COMPUTER SCIENCE (SOFTWARE ENGINEERING)

COURSE CODE	COURSE TITLE	CREDITS	COGNITIVE						PSYCHOMOTOR					AFFECTIVE				
			C1	C2	C3	C4	C5	C6	P1	P2	P3	P4	P5	A1	A2	A3	A4	A5
FACULTY CORE COURSES																		
WIX1001	Computing Mathematics I	3	✓	✓	✓							✓						
WIX1002	Fundamentals of Programming	5		✓	✓							✓					✓	
WIX1003	Computer Systems and Organization	3		✓	✓											✓	✓	
WIX2001	Thinking and Communication Skills	3			✓							✓				✓	✓	
WIX2002	Project Management	3		✓	✓						✓				✓	✓		
UNIVERSITY COURSES																		
GIG1003	Basic Entrepreneurship Enculturation	2		✓	✓						✓				✓			
GIG1012	Philosophy and Current Issues	2		✓		✓											✓	✓
GIG1013	Appreciation of Ethics and Civilisations	2		✓													✓	✓
GLT1017	Basic Malay Language	2	✓								✓					✓		
PROGRAMME CORE COURSES																		
WIA1002	Data Structure (#WIX1002)	5		✓	✓							✓					✓	

COURSE CODE	COURSE TITLE	CREDITS	COGNITIVE						PSYCHOMOTOR					AFFECTIVE					
			C1	C2	C3	C4	C5	C6	P1	P2	P3	P4	P5	A1	A2	A3	A4	A5	
WIA1003	Computer System Architecture (#WIX1003)	3		✓	✓											✓	✓		
WIA1005	Network Technology Foundation	4			✓						✓						✓		
WIA1006	Machine Learning	3	✓	✓													✓		
WIA2001	Database	3			✓						✓						✓		
WIA2002	Software Modeling	3		✓	✓					✓				✓					
WIA2003	Probability and Statistics	3		✓	✓						✓						✓		
WIA2004	Operating Systems	4		✓	✓						✓			✓					
WIA2005	Algorithm Design and Analysis (#WIA1002)	4			✓						✓						✓		
WIA2007	Mobile Application Development	4		✓	✓					✓	✓								
WIA2010	Human Computer Interaction	3				✓		✓					✓				✓		
WIA3001	Industrial Training *	12			✓	✓				✓							✓		
WIA3002	Academic Project I **	3		✓	✓						✓						✓		
WIA3003	Academic Project II (#WIA3002)	5					✓				✓						✓		
SPECIALIZATION ELECTIVE COURSES																			
WIF2002	Software Requirements Engineering	3		✓	✓					✓				✓					
WIF2003	Web Programming	3			✓					✓									
WIF3001	Software Testing	3			✓	✓					✓								
WIF3002	Software Process and Quality	3	✓		✓	✓									✓				

COURSE CODE	COURSE TITLE	CREDITS	COGNITIVE						PSYCHOMOTOR					AFFECTIVE				
			C1	C2	C3	C4	C5	C6	P1	P2	P3	P4	P5	A1	A2	A3	A4	A5
WIF3004	Software Architecture and Design Paradigms (#WIA2002)	3			✓	✓					✓							
WIF3005	Software Maintenance and Evolution	3	✓		✓					✓								
WIF3006	Component-Based Software Engineering (#WIA2002)	3		✓	✓	✓					✓	✓						
WIF3008	Real Time Systems	3		✓		✓		✓			✓							
WIF3009	Python for Scientific Computing	3				✓					✓	✓					✓	
WIF3010	Programming Language Paradigm	3		✓	✓					✓								
WIF3011	Concurrent and Parallel Programming (#WIA1002) (#WIA2004)	3		✓		✓						✓						
WIC2008	Internet of Things (#WIA1005)	3	✓							✓	✓							✓
WIG3005	Game Development	3		✓	✓				✓	✓							✓	

MAPPING COURSES TO TEACHING AND LEARNING TAXONOMY

PROGRAMME: BACHELOR OF COMPUTER SCIENCE

(MULTIMEDIA COMPUTING)

COURSE CODE	COURSE TITLE	CREDITS	COGNITIVE						PSYCHOMOTOR					AFFECTIVE				
			C1	C2	C3	C4	C5	C6	P1	P2	P3	P4	P5	A1	A2	A3	A4	A5
FACULTY CORE COURSES																		
WIX1001	Computing Mathematics I	3	✓	✓	✓						✓							
WIX1002	Fundamentals of Programming	5		✓	✓						✓						✓	
WIX1003	Computer Systems and Organization	3		✓	✓											✓	✓	
WIX2001	Thinking and Communication Skills	3			✓						✓					✓	✓	
WIX2002	Project Management	3		✓	✓						✓				✓	✓		
UNIVERSITY COURSES																		
GIG1003	Basic Entrepreneurship Enculturation	2		✓	✓						✓				✓			
GIG1012	Philosophy and Current Issues	2		✓		✓											✓	✓
GIG1013	Appreciation of Ethics and Civilisations	2		✓													✓	✓
GLT1017	Basic Malay Language	2	✓								✓					✓		
PROGRAMME CORE COURSES																		
WIA1002	Data Structure (#WIX1002)	5		✓	✓						✓						✓	

COURSE CODE	COURSE TITLE	CREDITS	COGNITIVE						PSYCHOMOTOR					AFFECTIVE					
			C1	C2	C3	C4	C5	C6	P1	P2	P3	P4	P5	A1	A2	A3	A4	A5	
WIA1003	Computer System Architecture (#WIX1003)	3		✓	✓											✓	✓		
WIA1005	Network Technology Foundation	4			✓						✓						✓		
WIA1006	Machine Learning	3	✓	✓													✓		
WIA1008	Fundamental of Multimedia	3	✓	✓						✓							✓		
WIA2001	Database	3			✓						✓						✓		
WIA2003	Probability and Statistics	3		✓	✓						✓						✓		
WIA2004	Operating Systems	4		✓	✓						✓			✓					
WIA2005	Algorithm Design and Analysis (#WIA1002)	4			✓						✓						✓		
WIA2006	System Analysis and Design	3	✓	✓	✓					✓	✓						✓		
WIA2007	Mobile Application Development	4		✓	✓					✓	✓								
WIA3001	Industrial Training *	12			✓	✓				✓							✓		
WIA3002	Academic Project I **	3		✓	✓						✓						✓		
WIA3003	Academic Project II (#WIA3002)	5					✓				✓						✓		
SPECIALIZATION ELECTIVE COURSES																			
WIG2001	Digital Image Processing	3		✓							✓					✓			
WIG2002	Computer Graphics	3		✓							✓					✓			
WIG2004	Audio Synthesis	3	✓		✓					✓							✓		
WIG2005	Interactive Design	3	✓	✓	✓	✓							✓				✓		
WIG3001	Mathematics for Multimedia	3	✓	✓	✓														

COURSE CODE	COURSE TITLE	CREDITS	COGNITIVE						PSYCHOMOTOR					AFFECTIVE					
			C1	C2	C3	C4	C5	C6	P1	P2	P3	P4	P5	A1	A2	A3	A4	A5	
WIG3002	Rendering and Animation	3	✓	✓	✓												✓		
WIG3003	Multimedia Programming	3		✓	✓					✓	✓						✓		
WIG3004	Virtual Reality	3	✓	✓								✓					✓		
WIG3005	Game Development	3		✓	✓					✓	✓						✓		
WIG3006	Digital Video Processing	3	✓	✓						✓							✓		
WIG3007	Special Topics in Multimedia	3	✓	✓	✓														
WIG3008	Multimedia Forensic and Security	3	✓	✓	✓					✓	✓				✓				
WIE3010	Data Visualization	3	✓	✓						✓									
WIF2003	Web Programming	3			✓						✓								

GUIDELINES FOR TEACHING AND LEARNING TAXONOMY

COGNITIVE DOMAIN					
Level					
C1: Remembering	C2: Understanding	C3: Applying	C4: Analyzing	C5: Evaluating	C6: Creating
Retrieving, recognizing, and recalling relevant knowledge from long-term memory	Constructing meaning from oral, written, and graphic messages through interpreting, exemplifying, classifying, summarizing, inferring, comparing, and explaining	Carrying out or using a procedure through executing, or implementing	Breaking material into constituent parts, determining how the parts relate to one another and to an overall structure or purpose through differentiating, organizing and attributing	Making judgments based on criteria and standards through checking and critiquing	Putting elements together to form a coherent or functional whole: reorganizing elements into a new pattern or structure through generating, planning, or producing
Arrange, Underline, Label, Name, Enumerate, List, State, Indicate, Define, Reads, Describe, Record, Memorize, Recall, Repeat	Infer, Review, Explain, Report, Rewrite, Select, Estimate, Distinguish, Describe, Trace, Identify, Classify, Indicate, Discuss, Recognize, Translate, Give example, Defend, Summarize, Paraphrase, Locate	Change, Apply, Manipulate, Teach, Illustrate, Use, Report, Determine, Solve, Construct, Write, Interpret, Organize, Provide, Employ,	Discriminate, Distinguish, Differentiate, Analyze, Solve, Test, Debate, Compare, Contrast, Diagram, Determine, Criticize, Prioritize, Categorize, Experiment, Sub divide, Calculate, Questions, Illustrate, Appraise, Relate, Examiner	Select, Value, Enumerate, Interpret, Predict, Attach, Reframe, Choose, Evaluate, Estimate, Conclude, Revise, Judge, Support, Compare, Measure, Critique, Decide, Defend, Rate, Grade, Criticize, Appraise, Contrast, Justify, Assess, Score, Argue	Assemble, Formulate, Combine, Propose, Set up, Collect, Design, Rearrange, Modify, Anticipate, Compile, Devise, Compose, Adapt, Explain, Manage, Intervene, Arrange, Categorize, Reorganize, Structure, Validate, Substitute, Generate, Integrate, Express, Perform, Plan, Prepare, Negotiate, Model, Write, Develop, Construct, Create

PSYCHOMOTOR DOMAIN

Level

P1: Imitation	P2: Manipulation	P3: Precision	P4: Articulation	P5: Naturalization
Copy action of another; observe and replicate	Reproduce activity from instruction or memory	Execute skill reliably, independent of help	Adapt and integrate expertise to satisfy a non-standard objective	Automated, unconscious mastery of activity and related skills at strategic level
* Relate * Repeat * Choose * Copy * Follow * Show * Identity * Isolate *	* Copy * Response * Trace * Show * Start * Perform * Execute * Re-create *	* Assemble * Implement * Organize * Calibrate * Demonstrate * Build * Perfect * Control * Complete * Measure *	* Modify * Master * Develop * Adapt * Formulate * Coordinate * Solve * Integrate *	* Design * Rank * Manage * Compose * Develop * Specify * Construct * Invent *

AFFECTIVE DOMAIN

Level

A1: Receiving	A2: Responding	A3: Valuing	A4: Organizing	A5: Internalizing
<p>Willingness to participate in an activity to attend to a stimulus; getting and holding the attention of students</p>	<p>Actively participates; demonstrates interest in an object, activity or phenomena; seeks or pursues this object, activity or phenomena</p>	<p>Value or worth attached to an object, activity, or phenomena; varies from simple acceptance to commitment</p>	<p>Compare and contrast, and resolve conflict to build a consistent value system; emphasis on comparing and synthesizing values</p>	<p>Adopt a value system for length of time that contributes to a particular "lifestyle" (i.e. directs behavior)</p>
<p>* Locate * Give * Point to * Follow * Sit erect * Hold * Name * Reply * Identify * Choose *</p>	<p>* Label * Answer * Perform * Write * Conform * Assist * Recite * Report * Read * Greet * Help * Present * Compile *</p>	<p>* Work * Form * Follow * Join * Invite * Justify * Study * Explain * Share * Propose * Select * Complete * Describe * Read * Report * Differentiate * Initiate *</p>	<p>* Relate * Synthesize * Identify * Prepare * Defend * Generalize * Modify * Integrate * Order * Compare * Complete * Organize * Adhere * Arrange * Combine * Explain * Alter *</p>	<p>* Influence * Propose * Use * Quality * Revise * Serve * Solve * Modify * Practice * Listen * Question * Perform * Act * Discriminate * Verify *</p>

**INDUSTRIAL TRAINING
FACULTY OF COMPUTER SCIENCE AND INFORMATION TECHNOLOGY
UNIVERSITY OF MALAYA**

1. INTRODUCTION

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

Through Industrial Training, students will be able to see how the concepts of Computer Science and Information Technology learnt in University can be practised in development processes and daily management of an organisation. It will also increase and improve skills that are needed by students with the guidance of professionals from the 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 is produced with the purpose to become the reference and guide to Industrial Training Committee, organisations/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 an organisation/company related to the field of Computer Science and Information Technology for a determined period of time to obtain real experience by practising what was learnt in University.

3. AIM OF INDUSTRIAL TRAINING

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

4. OBJECTIVES OF INDUSTRIAL TRAINING

- a) To form students to become 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 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 good ideas to the organisations.
- e) To allow students and University to get exposure to the latest systems and technologies used by the external organisations.

- f) To provide opportunities to organisations 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 the Initiation of Talent and Industrial Training (CITra), University of 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 organisations 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 preparation programmes conducted by CITra.
- k) Send and monitor students at the organisations/companies during the Industrial Training.
- l) Appoint lecturers from FCSIT as Faculty Supervisors to supervise each student undergoing Industrial Training.
- m) Monitor the students' welfare during Industrial Training.
- n) Develop and update the evaluation method.
- o) 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 Level 3, for a duration of 24 weeks.

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

5.3 Student Requirements

Industrial Training is **COMPULSORY** for all Bachelor of Computer Science and Bachelor of Information Technology 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.
- c) Are not allowed to postpone their Industrial Training to the final semester of their studies if they have fulfilled the stipulated requirements.

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 and Information Technology, the Faculty has set some criteria that must be fulfilled by any of the interested organisations/companies, namely:

- a) The organisations/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 organisations/companies **MUST** offer formal working hour and office environment only. Teleworking, virtual office and so on, are **NOT** allowed. 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 organisations/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

Organisations/companies offering Industrial Training to the students **MUST** be able to train them in the practical aspects of Computer Science and Information Technology. 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.

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

5.6 Students' Responsibilities

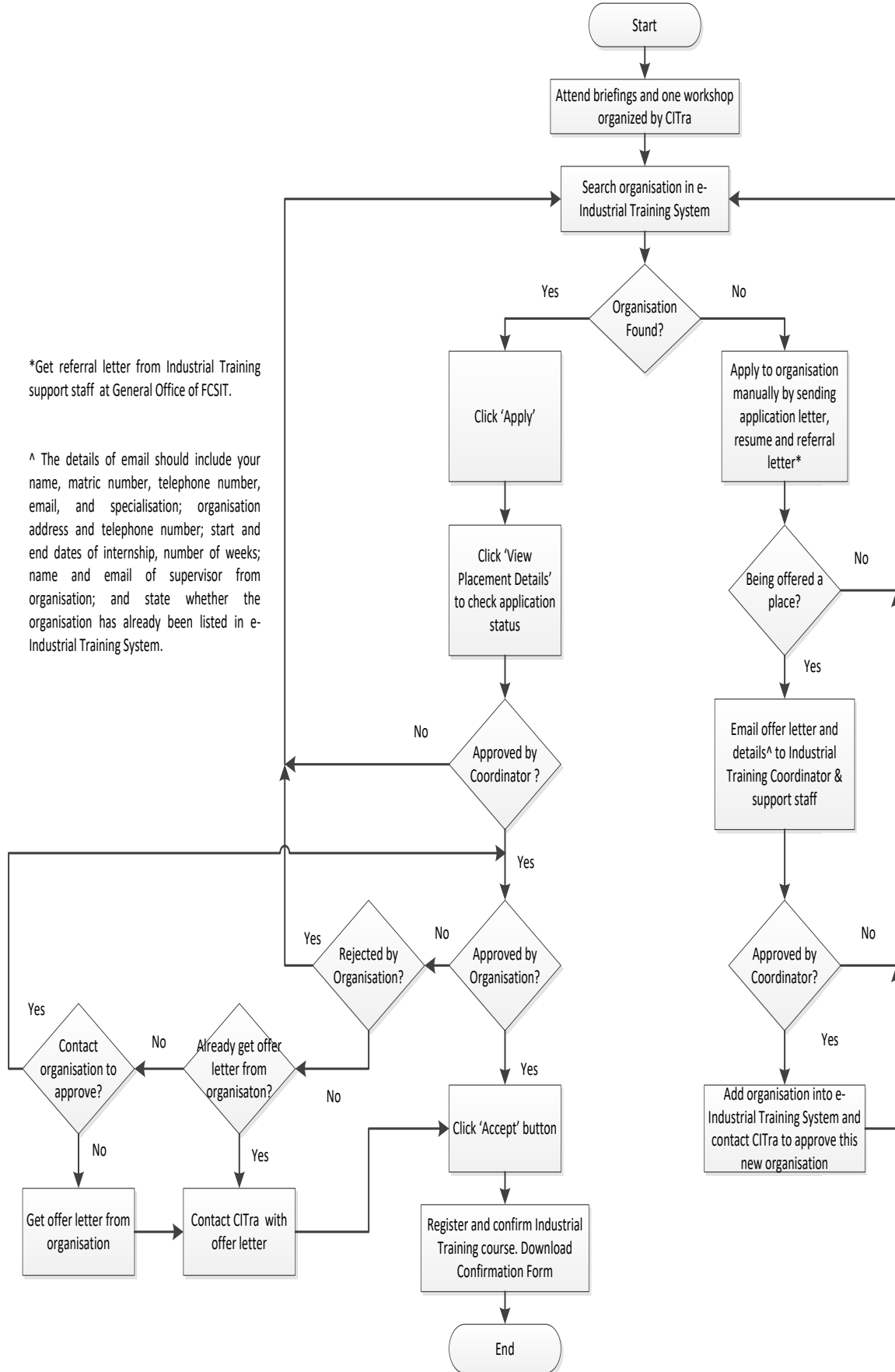
- a) Identify and apply directly to suitable organisations/companies for Industrial Training placement one semester before the Industrial Training Programme for local placement, and at least two semesters before the Industrial Training Programme for abroad placement. Refer to Section 5.7.
- b) Should not undergo Industrial Training in organisation/company where there might be conflict of interests, such as, in organisation/company owned by own family or

- relative, organisation/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 University of 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 organisation/company.
 - e) Inform the Industrial Training Coordinator if unable to get a placement for Industrial Training and ready to accept training place decided by the Industrial Training Coordinator.
 - f) Attend briefing related to Industrial Training.
 - g) Encouraged to attend one workshop and one corporate talk organised by CITra, before Industrial Training.
 - h) Choose only ONE place for Industrial Training.
 - i) Email offer letter to Industrial Training 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 Industrial Training Coordinator.
 - j) The student and not the Industrial Training Coordinator 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 online and submit all the needed documents to the Faculty and/or CITra.
 - 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 organisation/company under the supervision of one or more Company Supervisors.
 - o) Adhere to all the rules and regulations of organisation/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 time.
 - r) Contact and inform Industrial Training Coordinator/Faculty Supervisor immediately if facing any problem.
 - s) Record all activities that have been carried out in Log Books and email to the Faculty Supervisor 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 organisation/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 presentation and demonstrate devices or systems that have been used or learnt.
 - w) Show the Log Book 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 organisation/company has approved it) unless the student obtains a letter from the organisation/company which states that it is unable to let the student to replace the leave. Include this letter in Final Log Book. Sick leave which has been approved by the organisation/company does not need to be

replaced. Include the medical certificate and Company Supervisor's approval on the sick leave in Log Book.

- z) Always visit CITra website and Industrial Training website of the Faculty to get the latest information.
- aa) Perform the required things 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	Email Confirmation Form to Industrial Training Coordinator and cc to the Industrial Training support staff. Refer to the Industrial Training website of FCSIT to get the names and emails of the Industrial Training Coordinator and support staff.
6	<ol style="list-style-type: none"> 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 email Plan of Tasks to the Faculty Supervisor and cc to the support staff, latest by Week 6.
1 - 8	Prepare First Log Book by filling in the daily log and weekly tasks summary. Log Book has to be verified by the Company Supervisor on a weekly basis.
9	Email scanned First Log Book (comprising Week 1 to 8) to the Faculty Supervisor and cc to the support staff, latest by 5pm, Friday of Week 9.
10 - 11	Receive feedback from the Faculty Supervisor for the First Log Book.
9 - 16	Prepare Second Log Book by filling in the daily log and weekly tasks summary. Log Book has to be verified by the Company Supervisor on a weekly basis.
17	Email scanned Second Log Book (comprising Week 9 to 16) to the Faculty Supervisor and cc to the support staff, latest by 5pm, Friday of Week 17.
18 - 19	Receive feedback from the Faculty Supervisor for the Second Log Book.
21 - 24	<ol style="list-style-type: none"> 1. Liaise with the Faculty Supervisor to arrange for his/her visit to the company. 2. Conduct presentation on industrial training undergone and show Log Book during the supervisor's visit. 3. Introduce Company Supervisor(s) to Faculty Supervisor.
Last week of training	Remind the Company Supervisor to email a scanned Evaluation Form 2A which has been completed to the Faculty Supervisor and cc to the support staff. The marks given in the evaluation form are confidential and should not be released to the student.

5.8.2 After Industrial Training

Week	Tasks
Within two weeks after training ended.	<ol style="list-style-type: none"> 1. Submit printed Final Report and printed Final Log Book (comprising all the weeks) which has been verified by the Company Supervisor to the support staff at the General Office of FCSIT. 2. Submit a copy of the Final Report to the Company Supervisor. 3. Complete Industrial Training Self-Evaluation Form at myum.um.edu.my

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) Distribute and collect back Evaluation Form 2A from 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	<ol style="list-style-type: none"> 1. Receive letter of appointment of supervision from Industrial Training Coordinator. 2. Receive Plan Of Tasks from the Company Supervisor.
9	Receive scanned First Log Book (comprising Week 1 to 8) from the student.
10 - 11	Assess the First Log Book using Evaluation Form 1A (10%) and email feedback (and not Evaluation Form 1A) to the student.
17	Receive scanned Second Log Book (comprising Week 9 to 16) from the student.
18 - 19	Assess the Second Log Book using Evaluation Form 1A (10%) and email feedback (and not Evaluation Form 1A) to the student.
21 - 24	Visit the student at the respective company and assess the student including the Log Book by using Evaluation Form 1B (20%). The marks given for Evaluation Form 1B can be finalised after returning from the visit and the marks should not be released to the student or organisation/company.
Within two weeks after training ended.	<ol style="list-style-type: none"> 1. Receive scanned Evaluation Form 2A (40%) from the Company Supervisor. 2. Receive printed Final Report and printed Final Log Book (comprising all the weeks) from the Industrial Training support staff. Students will submit these two items to the support staff at the General Office of FCSIT.
Within two weeks after submission of Final Report.	<ol style="list-style-type: none"> 1. Assess the Final Report and Final Log Book of each student assigned by using Evaluation Form 1C (20%). 2. Submit the five evaluation forms to support staff but keep the Final Report and Final Log Book.

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. If Plan of Tasks, First Log Book, Second Log Book, Evaluation Form 2A are not being cc'ed to the support staff, please forward the respective emails to the support staff for the staff to record the submission of these items.
3. All the evaluation forms can be downloaded from the Industrial Training website 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	<ol style="list-style-type: none"> 1. If your organisation/company had been registered with Centre for the Initiation of Talent and Industrial Training (CItra), 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	Email to the student's supervisor from the Faculty and cc to the Industrial Training support staff, the Plan Of Tasks that will be

	assigned to the student for the whole duration of the internship. Refer to the Industrial Training website 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 Log Book on a weekly basis. The student has to email scanned First Log Book (comprising Week 1 to 8) to the Faculty Supervisor and cc to the support staff by Week 9.
9 - 16	Verify the student's Log Book on a weekly basis. The student has to email scanned Second Log Book (comprising Week 9 to 16) to the Faculty Supervisor and cc to the support staff by Week 17.
17 - 24	Verify the student's Log Book on a weekly basis. The student has to submit the printed Final Log Book (comprising all the weeks) together with the printed Final Report to the support staff at the General Office of FCSIT within two weeks after the training ended.
21 - 24	Allocate time to meet the Faculty Supervisor during his/her visit of the student at the company.
Within two weeks after training ended.	<ol style="list-style-type: none"> 1. Complete Evaluation Form 2A (40%) to assess the student performance and email the scanned form to the Faculty Supervisor and cc to the Industrial Training support staff. The marks given in the evaluation form are confidential and should not be released to the student. 2. Verify the Final Report and Final Log Book 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 Log Book	10	Faculty Supervisor
Second Log Book	10	Faculty Supervisor
Presentation and Log Book during Faculty Supervisor's visit	20	Faculty Supervisor
End of Training Evaluation	40	Company Supervisor
Final Report and Final Log Book	20	Faculty Supervisor

7. LOG BOOKS PREPARATION AND SUBMISSION

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

	Content	Submission Date
First Log Book	Week 1 to 8	5pm, Friday of Week 9
Second Log Book	Week 9 to 16	5pm, Friday of Week 17
Final Log Book	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 Log Books have to be prepared following the template given at the Industrial Training Website of FCSIT.

8. FINAL REPORT PREPARATION

- a) Final Report has to 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 has to be verified by the Company Supervisor to ensure the authenticity of the information before submission.
- d) Printed Final Report has to be submitted to the Industrial Training support staff at the General Office of FCSIT and to the company within two (2) weeks after the Industrial Training ended.

9. CONCLUSION

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

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

1. Introduction

To produce quality graduates who are excellent and academically competent in the field of Computer Science, Faculty of Computer Science and Information Technology (FCSIT) offers Academic Project I and Academic Project II to the final year students. The aim of these courses is to leverage students' technical and soft skills. Students should be able to demonstrate their technical knowledge, problem-solving, critical thinking, and good decision-making. The lists of the courses are 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.

Pre-requisite: 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. State the problem background. 2. Identify solution approach that is suitable for the stated problem. 3. Report literature review that is related with the stated problem. 4. Conduct suitable data gathering techniques. 5. Write project proposal.
2.	Academic Project II	At the end of the course, students are able to: 1. Discuss software development life cycle for the project implementation. 2. Develop a system based on the problems identified. 3. Write academic project report undertaken by the project. 4. Experiment the developed product.

3. Roles and Responsibilities

Students

- Register the course.
- Attend the briefing on Academic Project by the Coordinator (Week 1).
- Confirm the project titles via *e-ilmiah* system (Week 2).
- Regular meetings with supervisor for project discussion (attendance will be recorded).
- Attend the monitoring session (Within Week 8-9).
- Submit the draft report prior to the Viva session (Week 13).
- Submit the final report to the office (Week 14).

Supervisor

- Enter the project titles via *e-ilmiah* system.
- Assign students to the project via *e-ilmiah* system.
- Supervise and coach students to implement the project.
- Conduct regular meetings with students for project discussion (student's attendance must be recorded).
- Evaluate students' reports.
- Enter students' marks via *e-ilmiah* system.

Viva Panel

- Attend student's monitoring session for Academic Project I and Academic Project II.
- Attend students' Viva for Academic Project I and Academic Project II.
- Evaluate student's soft skills, technical skills and product demonstration.
- Enter students' marks via *e-ilmiah* system.

Department Coordinator

Manage the process of Academic Project I and Academic Project II as follows:

- Approve project titles from supervisor via *e-ilmiah* system.
- Assign panels via *e-ilmiah* system.
- Arrange Viva schedules.
- Inform panels, supervisors and students on the Viva schedules via *e-ilmiah* system.
- Generate report on students Viva marks via *e-ilmiah* system.
- Submit report on student marks for Academic Project I to Head Coordinator
- Enter marks for Academic Project II in Integrated Student Information System (ISIS) University of Malaya (UM).

4. Academic Project I Flow Chart

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

5. Academic Project II Flow Chart

Figure 2 represents Academic Project II processes. The processes involve student, supervisor and panel.

6. Report Preparation for Academic Project I

All students are required to prepare a report for Academic Project I. It should covers project introduction, objective, literature review, problem statements, research methodology, discussions, contributions and acknowledgement. Specifically, 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. Abstract must not exceed 300 words.
Introduction to relevant project/title.	In 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.
Substantive body of the report	In the body of the report, student must address the following information: i. Project objective ii. Literature review iii. Problem statements iv. Research methodology v. Findings and Discussions vi. Contributions vii. Acknowledgement
Conclusion	A conclusion is a summarization of the main points of the project and 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 an up-to-date references (5 years back). Use APA reference style.

7. Report Preparation for Academic Project II

Each student must prepare a report for Academic Project II which contains 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 important features, results and conclusions. Abstract must not exceed one (1) page.
Table of Contents	Numbers and lists all section and subsection headings with page numbers.
Introduction	States the objectives, problem, methodology, implementation, results and discussion.
Substantive body of the report	Divided into numbered and headed sections such as: 1. System Design 2. Implementation/Experimental Details 3. Results and Discussion 4. Strengths and Limitations
Conclusion	A short, logical summing up 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 references (5 years back). Use APA reference style.
Acknowledgement	List of individuals who are involve in the project either directly or indirectly.
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) but not required by a casual reader.

8. Evaluation

- Continuous Assessment: 100%

No.	Course Title	Assessment Component	Weightage	Assessor
1.	Academic Project I	Viva by Panels	60%	Appointed Panels
		Report	40%	Supervisor
		Total	100%	
2.	Academic Project II	Viva by Panels	60%	Appointed Panels
		Report	40%	Supervisor
		Total	100%	

Important:

- 1) ***Should the student fail to attend, or fail in presentation and viva session, or fail to submit the report, the student will be considered as FAIL in the Academic Project.***
- 2) ***Student MUST submit draft report prior to the Viva.***

- Grade

Refer to the University's Grading Scheme.

9. Plagiarism

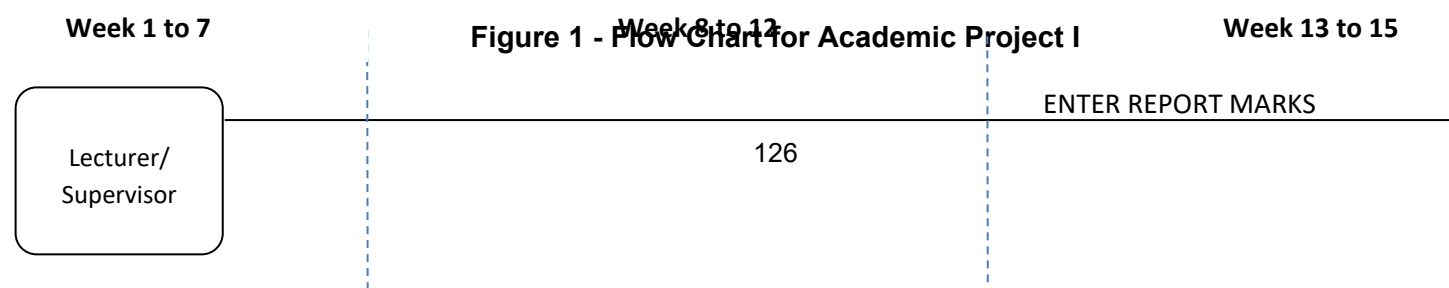
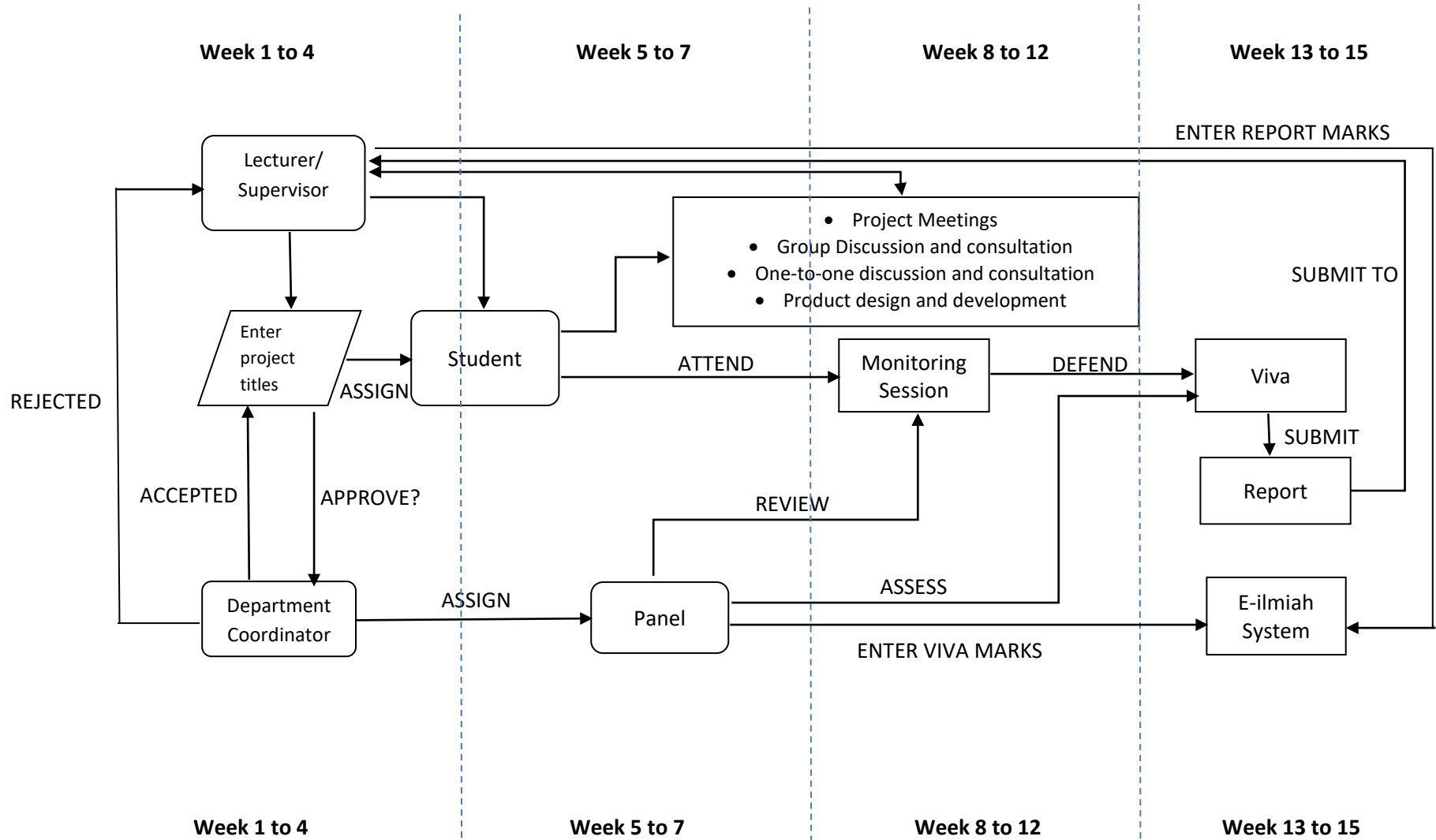
As an enrolled student of the University of Malaya, he/she is expected to produce original work. Any student who is found to have plagiarized his/her report that is part of the assessment in the academic project may be subjected to disciplinary action under the University of Malaya (Discipline of Students)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

10. Excellence Academic Project Award (APAC)

The Excellence Academic Project Award (APAC) was initiated in 2012 to motivate the student to produce excellent project. It is an annual event to select the best academic project of each department/major. The objectives of APAC are to:

- Steer the competition sprits 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 project for competitions, exhibitions and intellectual property (IP).

The event will be conducted during Week 14 of Semester I in every session.



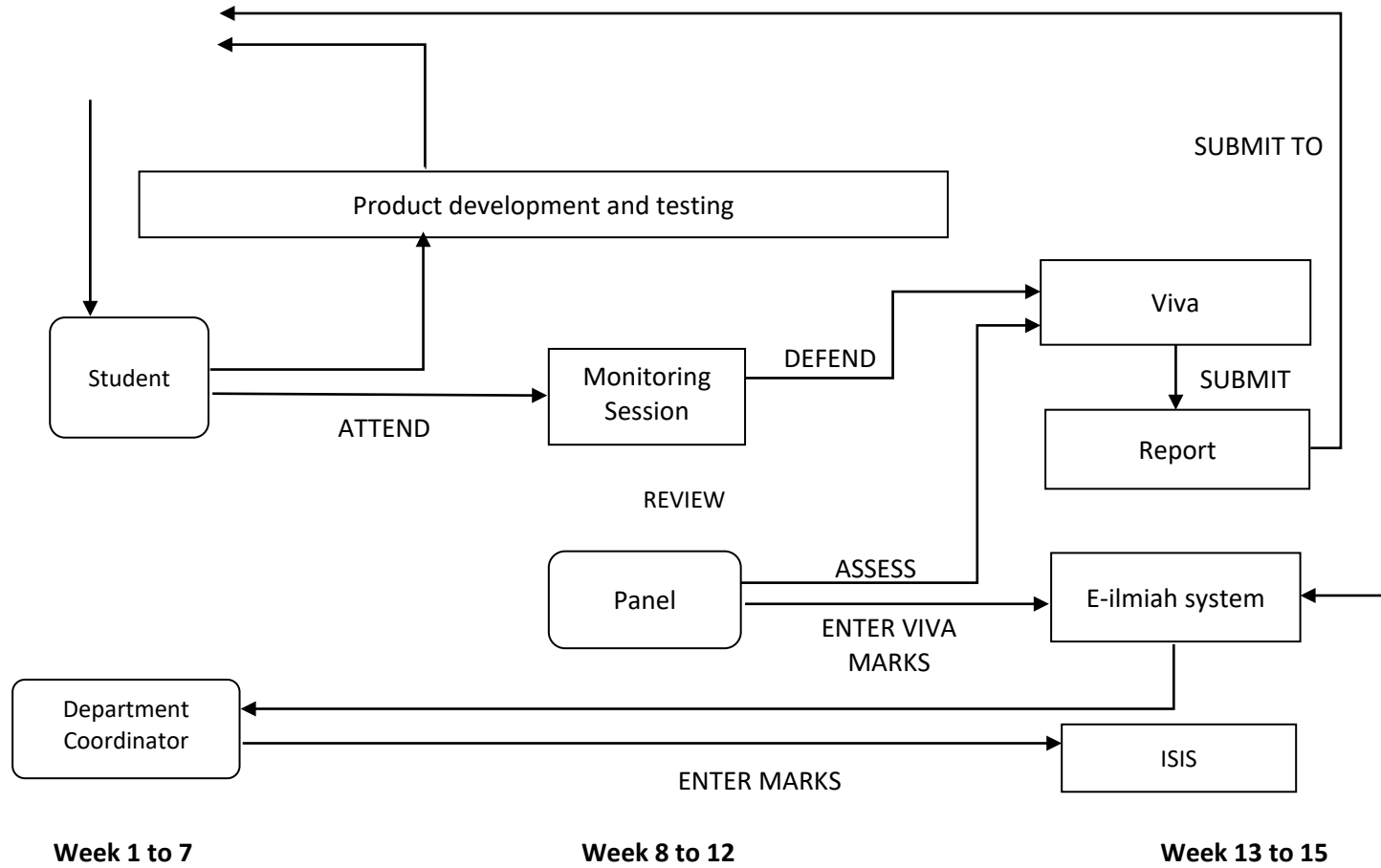


Figure 2 - Flow Chart for Academic Project II

**ENGLISH COMMUNICATION PROGRAMME (UNIVERSITY COURSE)
FACULTY OF LANGUAGES AND LINGUISTICS
LIST OF COURSES TO BE COMPLETED BY ALL STUDENTS (EXCEPT DATA SCIENCE PROGRAMME)
2021/2022 ACADEMIC SESSION**

PATH 1	PATH 2	PATH 3	PATH 4
<ul style="list-style-type: none"> ● 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) 	<ul style="list-style-type: none"> ● 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) 	<ul style="list-style-type: none"> ● 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) 	<ul style="list-style-type: none"> ● 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
<u>COMPULSORY</u>	<u>COMPULSORY</u>	<u>COMPULSORY</u>	
<ul style="list-style-type: none"> ● GLT1018 – Proficiency in English I 	<ul style="list-style-type: none"> ● GLT1021 – Proficiency in English II 	<ul style="list-style-type: none"> ● GLT1024 – Proficiency in English III 	<ul style="list-style-type: none"> ● GLT1027– Advanced Oral Communication* ● GLT1028 – Advanced Business Writing*
** CHOOSE ONE:	** CHOOSE ONE:	** CHOOSE ONE:	
<ul style="list-style-type: none"> ● GLT1019 – Let’s Speak ● GLT1020 – Fundamental Writing 	<ul style="list-style-type: none"> ● GLT1022 – Speak Up ● GLT1023 – Effective Workplace Writing 	<ul style="list-style-type: none"> ● GLT1025 – Effective Oral Communication ● GLT1026 – Writing at the Workplace 	<p>*(Students can only register for one course per semester)</p>

**** Kursus ini mempunyai Pra Syarat dan hanya boleh didaftar selepas pelajar LULUS kursus WAJIB mengikut Path yang ditetapkan.**

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.

DESCRIPTION OF UNIVERSITY ENGLISH LANGUAGE COURSES

NO.	CODE & TITLE (NO. OF CREDITS)	SYNOPSIS	LEVEL OF REQUIRED PROFICIENCY
1.	GLT1018 - Proficiency in English I <ul style="list-style-type: none"> • 2 Credits • Offered in Semesters 1 & 2 	This course is designed for students with basic proficiency in English. Focus is on building speaking and reading competence with an emphasis on accuracy in grammar and on vocabulary building. Students will develop structural accuracy, reasonable oral fluency and language appropriateness by practising the language in a variety of contexts.	CEFR A2+ <ul style="list-style-type: none"> • 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)
2.	GLT 1019 - Let's Speak <ul style="list-style-type: none"> • 2 Credits • Offered in Semesters 1 & 2 • Prerequisite: Students must pass GLT1018 (Proficiency in English I) with grade C 	This course focuses on preparing a speech in English accurately and coherently. It also develops students' speech planning skills in stages. Students will learn to speak accurately using the appropriate language strategies to a selected audience..	CEFR B1 Pass GLT1018 with grade C
3.	GLT 1020 - Fundamental Writing <ul style="list-style-type: none"> • 2 Credits • Offered in Semesters 1 & 2 • Prerequisite: Students must pass GLT1018 (Proficiency in English I) with grade C 	This course is designed for students with a pre-intermediate level of proficiency in English. It focuses on writing skills, with an emphasis on accuracy in grammar and vocabulary building. Students will be exposed to writing strategies that will enable them to write short texts effectively for different purposes.	CEFR B1 Pass GLT1018 with grade C
4.	GLT 1021- Proficiency in English II <ul style="list-style-type: none"> • 2 Credits • Offered in Semesters 1 & 2 	This course is designed to improve students' English Language proficiency in terms of accuracy and language use at the intermediate level. Students will be exposed to a variety of reading texts in order to improve their reading skills. They will also be given ample speaking practice to develop their confidence in communicating and interacting with others in a multitude of situations. The course improves students' skills in writing texts coherently on various topics.	CEFR B1 <ul style="list-style-type: none"> • 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)

NO.	CODE & TITLE (NO. OF CREDITS)	SYNOPSIS	LEVEL OF REQUIRED PROFICIENCY
5.	GLT1022 – Speak Up <ul style="list-style-type: none"> • 2 Credits • Offered in Semesters 1 & 2 • Prerequisite: Students must pass GLT1021 (Proficiency in English II) with grade C 	This course focuses on speaking English accurately and coherently at the intermediate level. It develops students' communication strategies that enable them to interact appropriately in a variety of informal situations.	CEFR B1+/ Low B2 <ul style="list-style-type: none"> • Pass GLT1021 with grade C
6.	GLT1023 - Effective Workplace Writing <ul style="list-style-type: none"> • 2 Credits • Offered in Semesters 1 & 2 Prerequisite: Students must pass GLT1021 (Proficiency in English II) with grade C	This course introduces writing strategies at the intermediate level. Students will be exposed to a range of workplace communication. They will learn how to produce effective written communication and improve their overall skills in writing.	CEFR B1+/ Low B2 Pass GLT1021 with grade C
7.	GLT1024 - Proficiency in English III Offered in Semesters 1 & 2	This course is designed to fortify students' English Language proficiency in terms of accuracy and effectiveness at a developing upper intermediate level. Students will be taught the four language skills with a focus on reading, writing and speaking. They will be exposed to a variety of texts to develop a higher level of proficiency that will allow them to apply the skills learnt.	CEFR B2 <ul style="list-style-type: none"> • 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)
8.	GLT1025 - Effective Oral Communication <ul style="list-style-type: none"> • 2 credits • Offered in Semesters 1 & 2 Prerequisite: Students must pass GLT1024 (Proficiency in English III) with grade C	The course encompasses different aspects of oral communication used in delivering speeches and presentations at the high intermediate level. Appropriate examples from a variety of situations are used as practice materials for students to analyse, discuss and apply the strategies taught.	CEFR B2+/ Low C1 Pass GLT1024 with grade C

NO.	CODE & TITLE (NO. OF CREDITS)	SYNOPSIS	LEVEL OF REQUIRED PROFICIENCY
9.	GLT1026 - Writing at the Workplace <ul style="list-style-type: none"> • 2 Credits • Offered in Semesters 1 & 2 Prerequisite: Students must pass GLT1024 (Proficiency in English III) with grade C	This course will introduce students to effective writing skills at the workplace. Using relevant materials, students will be taught in stages how to produce documents within a workplace context.	CEFR B2+/ Low C1 Pass GLT1024 with grade C
10.	GLT1027 Advanced Oral Communication <ul style="list-style-type: none"> • 2 Credits Offered in Semesters 1 & 2	The course encompasses different aspects of oral communication used in delivering speeches and presentations at the high intermediate level. Appropriate examples from a variety of situations are used as practice materials for students to analyse, discuss and apply the strategies taught.	CEFR C1 <ul style="list-style-type: none"> • 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)
11.	GLT1028 Advanced Business Writing <ul style="list-style-type: none"> • 2 Credits Offered in Semesters 1 & 2	This course is designed to equip students with the necessary writing skills to meet the needs of the workplace. Students will also be taught how to produce clear, accurate and well organised professional business documents. Students will be required to analyse and respond to a variety of situations and to write for identified audiences. The course also explores the ways in which technology helps shape business writing and communication	GCE A Level (English) (B & A)

**UNIVERSITY ENGLISH LANGUAGE COURSES
FACULTY OF LANGUAGES AND LINGUISTICS
LIST OF COURSES TO BE COMPLETED BY STUDENTS FROM DATA SCIENCE PROGRAMME ONLY
2021/2022 ACADEMIC SESSION**

PATH 1	PATH 2	PATH 3	PATH 4
<ul style="list-style-type: none"> ● MUET BAND 2 # IELTS Band 4 # TOEFL Paper – Based Test (437 – 473) / Computer – Based Test (123 – 150) / Internet – Based Test (41 – 52) 	<ul style="list-style-type: none"> ● MUET BAND 3 # IELTS Band 4.5 – 5 # TOEFL Paper – Based Test (477 – 510) / Computer – Based Test (153 – 180) / Internet – Based Test (53 – 64) 	<ul style="list-style-type: none"> ● 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 	<ul style="list-style-type: none"> ● 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
<p><u>COMPULSORY -</u> (3 Courses x 2 Credit Hours)</p> <ul style="list-style-type: none"> ● GLT1002 - Mastering English I ● GLT1003 - Mastering English II ● GLT1004 - Mastering English III 	<p><u>COMPULSORY -</u> (2 Courses x 3 Credit Hours)</p> <ul style="list-style-type: none"> ● GLT1005 - Mastering English IV [Pre-requisite] <p>** PILIH SATU :</p> <ul style="list-style-type: none"> ● GLT1006 - Mastering English V ● GLT1007 - Essential Writing Skills ● GLT1008 - Effective Communication 	<p><u>COMPULSORY -</u> (2 Courses x 3 Credit Hours)</p> <ul style="list-style-type: none"> ● GLT1009 - Mastering English VI [Pre-requisite] <p>** PILIH SATU :</p> <ul style="list-style-type: none"> ● GLT1010 - Mastering English VII ● GLT1011 - Technical Writing Skills in English ● GLT1012 - Presentation Skills in English ● GLT1013 - Reading Critically 	<p><u>COMPULSORY -</u> (2 Courses x 3 Credit Hours)</p> <ul style="list-style-type: none"> ● 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 .# Only for Malaysian students with conditional offers.*

**SYNOPSIS FOR UNIVERSITY ENGLISH LANGUAGE COURSES
LANGUAGE UNIT
FACULTY OF LANGUAGES AND LINGUISTICS**

NO.	CODE & TITLE (NO. OF CREDITS)	SYNOPSIS	LEVEL OF REQUIRED PROFICIENCY
1	<p>GLT1002 : Mastering English I 2 Credits</p> <ul style="list-style-type: none"> ● Offered in Semester 1 & 2 	<p>This course is designed for students with basic proficiency in English. It focuses on basic speaking and reading skills, with an emphasis on accuracy in grammar and on vocabulary building. Students will learn structural accuracy and language appropriateness by being exposed to the language in a variety of contexts.</p>	<p>CEFR A1+</p> <ul style="list-style-type: none"> ● MUET BAND 2 ● IELTS Band 4 ● TOEFL Paper – Based Test (437 – 473) ● TOEFL Computer – Based Test (123 – 150) ● TOEFL Internet – Based Test (41 – 52) ● Grade C / C+ (Special Intensive Courses offered by FLL)
2	<p>GLT1003: Mastering English II 2 Credits</p> <ul style="list-style-type: none"> ● Offered Only in Semester 2 ● Prerequisite: Students must pass GLT1002 (Mastering English I) with grade C 	<p>This course is designed for students with basic proficiency in English. Focus is on building speaking and reading competence with an emphasis on accuracy in grammar and on vocabulary building. Students will develop structural accuracy, reasonable oral fluency and language appropriateness by practising the language in a variety of contexts.</p>	<p>CEFR A2</p> <ul style="list-style-type: none"> ● Pass GLT1002 with grade C
3	<p>GLT1004: Mastering English III 2 Credits</p> <ul style="list-style-type: none"> ● Offered Only in Semester 1 ● Prerequisite: Students must pass GLT1003 (Mastering English II) with grade C 	<p>This course is designed for students with a developing pre-intermediate proficiency level in English. Together with the use of suitable vocabulary and accurate grammatical structures, the course focuses on further expanding students' comprehension of reading texts as well as their competency in writing and speaking skills.</p>	<p>CEFR Low B1</p> <ul style="list-style-type: none"> ● Pass GLT1003 with grade C

NO.	CODE & TITLE (NO. OF CREDITS)	SYNOPSIS	LEVEL OF REQUIRED PROFICIENCY
4.	GLT1005: Mastering English IV 3 Credits <ul style="list-style-type: none"> ● Offered in Semester 1 & 2 	<p>This course is designed to improve students' English Language proficiency in terms of grammatical accuracy and language skills at the pre-intermediate level. Students will be exposed to a variety of reading texts in order to improve their reading skills. Students will also be given ample speaking practice to develop their confidence in communicating and interacting with others in a multitude of situations. The course will also improve students' basic skills in writing sentences and paragraphs.</p>	CEFR B1 <ul style="list-style-type: none"> ● MUET BAND 3 ● IELTS Band 4.5 – 5 ● TOEFL Paper – Based Test (477 – 510) ● TOEFL Computer – Based Test (153 – 180) ● TOEFL Internet – Based Test (53 – 64) ● Grade B- / B / B+ (Special Intensive Courses offered by FLL)
5.	GLT1006: Mastering English V 3 Credits <ul style="list-style-type: none"> ● Offered Only in Semester 2 ● Prerequisite: Students must pass GLT1005 (Mastering English IV) with grade C 	<p>This course is designed to improve students' English Language proficiency in terms of grammatical accuracy and language skills at the intermediate level. Students will be exposed to a variety of reading texts in order to improve their reading skills. Students will also be given ample speaking practice to develop their confidence in communicating and interacting with others in a multitude of situations. The course improves students' skills in writing paragraphs and essays.</p>	CEFR B1+ / Low B2 <ul style="list-style-type: none"> ● Pass GLT1005 with grade C
6.	GLT1007: Essential Writing Skills 3 Credits <ul style="list-style-type: none"> ● Offered in Semester 1 & 2 ● Prerequisite: Students must pass GLT1005 (Mastering English IV) with grade C 	<p>This course introduces the process of paragraph development and the generation of ideas in order to write within a variety of rhetorical patterns. It focuses on accurate and organised structures in writing. The course helps students to understand the relationship between paragraphs in an essay.</p>	CEFR B1+ / Low B2 <ul style="list-style-type: none"> ● Pass GLT1005 with grade C

NO.	CODE & TITLE (NO. OF CREDITS)	SYNOPSIS	LEVEL OF REQUIRED PROFICIENCY
7.	<p>GLT1008: Effective Communication 3 Credits</p> <ul style="list-style-type: none"> • Offered Only in Semester 1 & 2 • Prerequisite: Students must pass GLT1005 (Mastering English IV) with grade C 	<p>This course focuses on speaking English accurately and coherently. It also develops students' communication skills and strategies that enable them to interact appropriately and accurately. Students will learn to speak accurately using the appropriate language strategies in a variety of informal situations.</p>	<p>CEFR B1+/ Low B2</p> <ul style="list-style-type: none"> • Pass GLT1005 with grade C
8.	<p>GLT1009: Mastering English VI 3 Credits</p> <ul style="list-style-type: none"> • Offered in Semester 1 & 2 	<p>This course is designed to fortify students' English Language proficiency in terms of accuracy and effectiveness at a developing upper intermediate level. Students will be taught the four language skills with a focus on accurate language use in reading, writing and speaking. The students will be exposed to a variety of texts to develop a higher level of proficiency that will allow them to apply the skills learnt.</p>	<p>CEFR B2</p> <ul style="list-style-type: none"> • MUET BAND 4 • IELTS Band 5.5 – 6 • TOEFL Paper – Based Test (513 – 547) • TOEFL Computer – Based Test (183 – 210) • TOEFL Internet – Based Test (65-78) • A' Levels (University of Cambridge, London) Minimum C • LULUS Advanced English (Level 6) (English Language Proficiency Programme offered by UMCCed)
9.	<p>GLT1010: Mastering English VII 3 Credits</p> <ul style="list-style-type: none"> • Offered Only in Semester 2 • Prerequisite: Students must pass GLT1009 (Mastering English VI) with grade C 	<p>This course is designed to raise students' English Language proficiency in terms of accuracy and effectiveness to an upper intermediate level. Students will be taught the four language skills with a focus on accurate language use in reading, writing and speaking. The students will be exposed to a variety of higher level texts to develop a higher level of proficiency that will allow them to apply the skills learnt.</p>	<p>CEFR B2+/ Low C1</p> <ul style="list-style-type: none"> • Pass GLT1009 with grade C

NO.	CODE & TITLE (NO. OF CREDITS)	SYNOPSIS	LEVEL OF REQUIRED PROFICIENCY
10.	<p>GLT1011: Technical Writing Skills in English 3 Credits</p> <ul style="list-style-type: none"> Offered Only in Semester 2 Prerequisite: Students must pass GLT1009 (Mastering English VI) with grade C 	<p>This course will introduce students to effective technical writing skills. Using materials related to the workplace, students will be taught in stages to write a variety of technical documents.</p>	<p>CEFR B2+/ Low C1</p> <ul style="list-style-type: none"> Pass GLT1009 with grade C
11.	<p>GLT1012: Presentations Skills in English 3 Credits</p> <ul style="list-style-type: none"> Offered Only in Semester 1 & 2 Prerequisite: Students must pass GLT1009 (Mastering English VI) with grade C 	<p>The course encompasses different aspects of communication used in delivering effective oral presentations. Appropriate examples from a variety of situations are used as practice materials for students to analyse, discuss and apply the communication strategies taught.</p>	<p>CEFR B2+/ Low C1</p> <ul style="list-style-type: none"> Pass GLT1009 with grade C
12.	<p>GLT1013: Reading Critically 3 Credits</p> <ul style="list-style-type: none"> Offered Only in Semester 1 & 2 Prerequisite: Students must pass GLT1009 (Mastering English VI) with grade C 	<p>This course aims at developing students' critical reading skills. Students will acquire the ability to analyse a piece of writing in fine detail and the author's argumentative strategy and style. Students will also learn to evaluate information in an unbiased way, and be able to differentiate between sound and unsound evidence. To this end, students will be exposed to strategies for reading critically and will engage with a variety of reading selections which will develop and enhance their thinking skills via active discussions and presentations.</p>	<p>CEFR B2+/ Low C1</p> <ul style="list-style-type: none"> Pass GLT1009 with grade C

NO.	CODE & TITLE (NO. OF CREDITS)	SYNOPSIS	LEVEL OF REQUIRED PROFICIENCY
13.	<p>GLT1014 : Advanced Communication Skills 3 Credits</p> <ul style="list-style-type: none"> Offered Only in Semester 1 	<p>This course aims to develop advanced communication skills among students when delivering presentations and interacting in group discussions in diverse settings. Students will prepare and deliver organized, impactful presentations on a variety of topics using appropriate language, style and structure to engage the audience. Students will also be exposed to different communication strategies to enable them to interact effectively and communicate with clarity in collaborative discussions.</p>	<p>CEFR C1</p> <ul style="list-style-type: none"> 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) A' Levels (University of Cambridge, London) Minimum B & A
14.	<p>GLT1015: Advanced Professional Writing 3 Credits</p> <ul style="list-style-type: none"> Offered Only in Semester 2 	<p>This course is designed to equip students with the necessary writing skills to meet the needs of the workplace. Students will also be taught to produce clear, accurate and well organised professional business documents. Students will be required to analyse and respond to a variety of situations and to write for identified audiences. The course also explores the ways in which technology helps shape business writing and communication.</p>	

RULES AND REGULATIONS ON PLAGIARISM AND EXAMINATION

(A) GUIDELINES FOR HANDLING PLAGIARISM UNIVERSITI MALAYA

1. Definition of Plagiarism in the Code of Ethics University of Malaya

**Penjiplakan* (plagiarism) is an academic fraud arising from the attitude of lying, insincere, untrustworthy, dishonest and disrespectful to fellow colleagues. Plagiarism happens when someone else's idea is taken without mentioning the source, and thus gives the impression that the idea is his own. This situation may occur when:

- (1) one's idea, taken word for word from an article or book that has been published.
- (2) The idea of a person from an article or book is taken using his own words.
- (3) A person's idea is taken from discussions whether in conferences, seminars, forums, talks or informal discussions between two parties.
- (4) Data, diagrams, tables, photographs or any other illustrative material derived from others is taken as if it were his own.

2. Acts of Plagiarism

- (1) Plagiarism refers to the act of a person using someone else's ideas without citing the source. Plagiarism acts include but are not limited to those listed below:
 - (a) Presenting the work or research data of others as the result of one's own work.
 - (b)² Using the concept of research work of others, the results of experiments, analysis of findings, conclusion or inferences of argument / statement without appropriate reference or acknowledgement to the creator of the idea.
 - (c)² Copying part or whole without acknowledging the source(s):
 - written text;
 - structures within texts;
 - diagrams;
 - formulae;
 - sound files;
 - still photographs;
 - audio-visual materials (sound and image files);
 - graphics / animations / multimedia objects;
 - software and code, including mashed-up products or code;
 - other computer based material;
 - mathematical evidences;
 - art objects;
 - practical artifacts (i.e. apprenticeship pieces);
 - other work as relevant.
- (2) Any other act which in the opinion of the University Authority is associated with the conduct of plagiarism and fraud.

3. Plagiarist

Any individual (student / candidate or University staff) who is and / or has produced academic and research related work that has elements of plagiarism.

4. Similarity Index

The RC may conduct an investigation on any individual who is found to have the result of a similarity index between 10% to 30% in an academic work and / or publication. Academic work includes thesis / dissertation upon submission. In certain circumstances, the RC can set the similarity index percentage for each discipline provided that it does not exceed the percentage as specified above.

In setting the similarity index percentage for the respective fields of study, the RC should consider and determine the percentage limit for each of the following criteria:

- (1) include / exclude quotes;
- (2) include / exclude bibliography, and
- (3) include / exclude small sources (can be either by word count or percentage).

5. Complaint

Any party may lodge a report against any academic work and / or publication that is suspected to have elements of plagiarism. Complaints must be made by filling in the **Plagiarism Complaint Form** or any other appropriate mechanism and submitted to the Head of RC.

6. Appearance for examinations

- (1) Where a student's course of study entails his appearance for an examination and he is not otherwise debarred from such examination, he shall not fail to appear for the examination without the prior permission of the Dean of the Faculty, or the School, Centre, Academy or Institute, as the case may be.
- (2) Where the circumstances do not permit such prior permission to be obtained, the student shall, as soon as possible thereafter, satisfy the Dean or the Head, as the case may be, with regard to his absence and obtain approval in respect thereof.

7. Conduct during examination

- (1) No student shall:-
 - (a) take any book, paper, document, picture or other things, except those authorized by the examiner, into or out of an examination room, or receive any book, paper, document, picture or other things from any person while in the examination room, except that a student may, while he is in the examination room, receive from the invigilator such books, papers, documents, pictures or other things which have been recommended by the examiner or Board of Examiners, and authorized by the Vice-Chancellor;
 - (b) write, or have it written by another person, any information or diagram which may be relevant to the examination he is sitting for, on his hand or on any other part of his anatomy, or on his apparel or clothing;

- (c) communicate with any other student during an examination by whatever means; or
- (d) cheat or attempt to cheat or conduct himself in a manner which can be construed as cheating or attempting to cheat in, an examination, while the examination is being conducted.

8. Disciplinary punishment

A student who commits a disciplinary offence under these Rules and is found guilty of the offence shall be liable to any one or any appropriate combination of two or more of the following punishments:

- (a) a warning;
- (b) a fine not exceeding two hundred ringgit;
- (c) exclusion from any specific part of parts of the University for a specified period;
- (d) suspension from being a student of the University for a specified period;
- (e) expulsion from the University.

GRADING SCHEME

The official grading scheme of the University 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

**TEACHING AND LEARNING FACILITIES
FACULTY OF COMPUTER SCIENCE AND INFORMATION TECHNOLOGY**

(A) TEACHING LABS

The Faculty of Computer Science and Information Technology provide 10 laboratories for teaching and learning purposes. The laboratories are as follows:

BLOCK A

Micro Lab 1 (MM1)

This lab has 47 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 37 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 61 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 61 units of computer that are connected to Windows Active Directory servers and the Internet. This lab is opened to undergraduate and postgraduate students.

iOS Application Development Lab

This lab has 15 units of Apple iMac 21.5" Intel Core i5 (2.96GHz) Processor, 1TB HDD and 8GB RAM and 5 units of Dell OptiPlex 3050. This computer is connected to

Windows Active Directory servers and the Internet. The operating system is Mac OS and Windows. This lab is opened only for Multimedia 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

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

BLOCK A

Software Engineering Research Lab

All the machines in the lab are connected to the Internet. This lab is opened to students who are taking courses related to the field of software engineering.

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.

Information Science Research Lab

This lab is used to develop application software related to the field of Information Science.

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.

Silicon Valley

Silicon Valley Lab is involved in Research and Development projects with the international industry primarily based in Silicon Valley, California, USA. The Lab works on the latest real-world research problems using state of the art equipment and software provided by the companies in the Valley. The lab trains FSKTM, UM students and staff to be able to contribute in high profile R&D projects and be part of the Silicon Valley Ecosystem.

Wisma R&D (10th and 15th floor):

- Empirical Software Engineering Lab
- Network Analytics Lab
- Mobile Ad Hoc Technology Lab
- Mobile Cloud Computing Lab
- Multimedia Lab
- Software Requirement, Architecture and Reuse Engineering Lab
- Cognitive Science Lab
- Advanced Robotic Lab
- I-Interact
- Software Engineering Process Lab
- Multimedia Signal Processing Lab
- Informetric Lab
- Data Science
- Multimodal Interaction Lab
- Security Lab
- Knowledge Engineering Lab
- AIED/ ES/ NLP/ Intelligent System Lab
- Web Based Information System Lab
- Hypermedia

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 2 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 are placed at Student Lounge & Postgraduate Lounge.

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 <http://spectrum.um.edu.my/>

For Faculty of Medicine and Faculty of Dentistry, SPECTRUM website can be browsed at <http://spectrumx.um.edu.my/>

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

9. Software Loan

The Faculty provides some software that can be borrowed by FSKTM students and staff for ease of project implementation and so on.

LABORATORY REGULATIONS

1. Only registered users are allowed to use the facilities in the lab.
2. Effective from 1st April 2006, it is compulsory for users to wear the matric card in the lab at all times. Users who do not wear the matric cards are not allowed to enter the lab. Lab staff has the right to ask the user to leave upon refusing to wear or show his/her name tag.
3. Ensure use of good quality diskettes, CD or thumb drives and virus-free data. The faculty reserves the right to examine the diskettes, CDs or thumb drives before use.
4. Users are strictly prohibited from making copies of software without the knowledge of the staff on duty.
5. Users are prohibited from installing any software onto the hard disk without the knowledge of the staff on duty (eg; KAZAA, BitTorrent, P2P software). The faculty reserves the right to remove such installations without any prior notice.
6. Any hardware problems must be reported to the staff on duty. The faculty will not be responsible for any accidents or damage because of negligence and misuse of the equipment by users.
7. Users are prohibited from playing games, chat or browse the web for pornography materials.
8. Users are prohibited from bringing in friends or students from other faculties/universities into the lab.
9. Users are prohibited from making noise and disturbing others. Any discussions should be conducted outside the lab.
10. Smoking, bringing-in bags and foodstuffs is strictly prohibited in the lab.
11. Users are responsible for the safekeeping of the hardware and cleanliness of other equipment in the lab including tables and chairs.
12. Users must be properly attired inside the lab. Slippers, shorts and indecently dressed users are strictly prohibited.
13. Users are prohibited to change administrator password as security reason and maintenance work.

Disciplinary action will be taken by the Faculty against those who breached the rules and regulations mentioned above.

ENQUIRIES ON TECHNICAL PROBLEMS

Users who face problems using equipment and software may contact the technical staff on duty at the various laboratories as indicated below:

LAB	STAFF ON DUTY	TEL. NO.	EMAIL
Micro Lab 1 (MM1)	Haryati Masilan	03-79676364	haryatim@um.edu.my
Micro Lab 2 (MM2)	Jamal Amran	03-79676364	jamalamr@um.edu.my
Postgraduate Lab (ML)	Azzyaty Razali	03-79676364	azzyaty@um.edu.my
CCNA Lab (MC)	Wan Mohd Hasanul Isyraf	03-79676317	isyraf@um.edu.my
Micro Lab 3 (MM3)	Huswadi Hussain	03-79676317	huswadi@um.edu.my
Micro Lab 4 (MM4)	Huswadi Hussain	03-79676317	huswadi@um.edu.my
iOS Application Development Lab	Aini Munira Ahmad	03-79676364	aini_munira@um.edu.my
Micro Lab 6 (MM6)	Aini Munira Ahmad	03-79676394	aini_munira@um.edu.my
Stroustrup Lab 1 (MS1)	Wan Mohd Hasanul Isyraf	03-79676407	isyraf@um.edu.my
Robotic Teaching Lab	Jamal Amran	03-79676407	jamalamr@um.edu.my

Operation Hours:

DAY	TIME
Monday - Thursday	8.00 a.m. – 5.30 p.m. (extended upon request according to class timetable)
Friday	8.00 a.m. – 12.15 p.m. 2.45 p.m. – 5.30 p.m. (extended upon request according to class timetable)

**** Computer Laboratories will be closed during maintenance work, and public holidays.**

GENERAL ENQUIRIES

For any enquiries, please contact us as follows:

General Enquiries (Undergraduate)

Mrs. Nur Hafiezah Mohd Nor Peah

Telephone : 03-7967 6428
Facsimile : 03-7957 9249
Email : hafiezah@um.edu.my

General Enquiries (Postgraduate)

Mrs. Nurul Farhana Mohd Nasir

Telephone : 03-7967 6307
Facsimile : 03-7957 9249
Email : n.farhana@um.edu.my

Enquiries on Programme:

- **Bachelor of Computer Science (Computer System and Network)**

Dr. Mohamad Nizam Ayub

Telephone : 03-7967 6304
Facsimile : 03-7957 9249
Email : ketua_fsktmstk@um.edu.my
PA : Mrs. Faridah Mat Yaacob (03-7967 6313)

- **Bachelor of Computer Science (Artificial Intelligence)**

Associate Professor Dr. Norisma Idris

Telephone : 03-7967 6310
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Counter Service Operating Hours

Day	Time
Monday - Thursday	8.30 a.m. - 5.30 p.m.
Friday	8.30 a.m. - 12.15 noon 2.45 p.m. - 5.30 p.m.

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Website: <http://fsktm.um.edu.my>