

UNDERGRADUATE DEGREE
**PROGRAMME
HANDBOOK**
2020/2021



FACULTY OF COMPUTER SCIENCE & INFORMATION TECHNOLOGY
UNIVERSITY OF 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. Chan Chee Seng**
B.Eng. (MMU), M.Sc. (Portsmouth), PhD (Portsmouth)

Head of Department

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

Head of Unit

- Multimedia : **Assoc. Prof. Dr. Ainuddin Wahid Abdul Wahab**
B.Comp.Sc. (UM), M.Comp.Sc. (UM), PhD (UK)

Administration and Support Staff

Principal Assistant Registrar (N48)	:	Rafiza Hashim
Assistant Registrar (N41)	:	Nur Hafiezah Mohd Nor Peah
Accountant Assistant (W29)	:	Adibah Sulaiman
Office Secretary (N22)		Noordalilia Ilyana Kiwam
Senior Administrative Assistant (Clerical/Operational) (N22_KUP)	:	Faridah Mat Yaacob Norhazariah Husin
Assistant Office Secretary (N19)	:	Noorhafiza Kamaruddin Siti Amiza Hashim
Administrative Assistant (Clerical/Operational) (N19)	:	Farah Nadhirah Mohd Aznam Norazarina Bohari Norazirah Mohd Supi Norhafidzan Ahmad Nur Nadia Azizan Rohayu Mohd Nor Shahidah Mohd Ainun Shamsuddin
Administrative Assistant (Finance) (W19)	:	Haida Izwani Che Mahmood
Operational Assistant (N11)	:	Shaiful Izwan Awang Zarudin Zainal
Driver (H11)	:	Sabasri Udin

Technical Staff

Senior Information Technology Officer (F44)	:	Noorsyahidah Abd Wahab
Senior Assistant Information Technology Officer (F32)	:	Rita Afriani Mohamd Yusu
Senior Assistant Information Technology Officer (F32_KUP)	:	Hamisah Redzwan
Assistant Information Technology Officer (FA29)	:	Aini Munira Ahmad Huswadi Hussain Jamal Amran Mohd Jalaluddin Ahmad Noor Shyahira Adnan Nor Shuhadah Yahiya 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)
Ow Siew Hock, Dip.Comp.Sc. (Mal), B.A. (Hons) (Mal), M.Comp.Sc. (Mal), PhD (Mal)
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)
Zarinah Mohd. Kasirun, B.Comp.Sc. (UKM), M.Comp.Sc. (UKM), PhD (Mal)

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)
Mohd. Hairul Nizam Md. Nasir, B.Comp.Sc. (Hons) (UM), M.Comp.Sc. (UM), PhD (UTM)
Mumtaz Begum Peer Mustafa, B.Comp.Sc. (UPM), MSE (UM), PhD (UM)
Naze

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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:

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Professor:

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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.Sc.Comp (UM), M. (Vision & Robotics) (Heriot-Watt Uni.),

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

Erma Rahayu Mohd Faizal, B.Sc. (Hons) (Mal), 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)

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

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

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

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

Lecturer:

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

Fellow SLAB/SLAI:

Muhammad Shahreeza Safiruz Kassim

DEPARTMENT OF LIBRARY AND INFORMATION SCIENCE

Head of Department:

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Associate Professor:

Kiran Kaur Gurmit Singh, B.Sc.Ed. (Hons) (UKM), MLIS (UM), PhD (UM)
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Samsul Farid Samsuddin, BSc. Info Studies (Hons) (Lib & Info Mgt) (UiTM), MLIS (UM), PhD (Mal)
Yanti Idaya Aspura Mohd Khalid, B. Human Sciences (Political Science) (IIUM), MLIS (IIUM), PhD (Mal)

Lecturer:

Ali Fauzi Ahmad Khan, B.Sc.Mgmt (Hons) (Oregon), M.Sc. (UiTM)

Fellow SLAB/SLAI:

Amirah Ayoib

DEPARTMENT OF COMPUTER SYSTEM AND TECHNOLOGY

Head of Department:

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Professor:

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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 Jallb 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)

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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)

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

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Lecturer:

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

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Muhammad Nr Firdaus Sahran

DEPARTMENT OF INFORMATION SYSTEMS

Head of Department:

Norjihhan 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)

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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)

Muneer Ahmad, B.Sc. (Pak), M.Comp.Sc. (Pakistan), MS/MPhil.Comp.Sc. (Pakistan), PhD (Mal)

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

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

ACADEMIC CALENDAR SESSION 2020/2021

SEMESTER I

Orientation	1 week *	04.10.2020	-	11.10.2020
Lectures	5 weeks *	12.10.2020	-	15.11.2020
Mid Semester I Break	1 week *	16.11.2020	-	22.11.2020
Lectures	9 weeks	23.11.2020	-	24.01.2020
Final Examination Semester I	3 weeks *	25.01.2021	-	14.02.2021
Semester Break	3 weeks *	15.02.2021	-	07.03.2021

22 weeks

SEMESTER II

Lectures	10 weeks	08.03.2021	-	16.05.2021
Mid Semester II Break	1 week	17.05.2021	-	23.05.2021
Lectures	4 weeks *	24.05.2021	-	20.06.2021
Revision Week	1 week	21.06.2021	-	27.06.2021
Final Examination Semester II	3 weeks *	28.06.2021	-	18.07.2021

19 weeks

HOLIDAY

Holiday	11 weeks	19.07.2021	-	03.10.2021
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SPECIAL SEMESTER

Lectures	7 weeks*	26.07.2021	-	12.09.2021
Final Examination	1 week	13.09.2021	-	19.09.2021
Holiday	2 weeks*	20.09.2021	-	03.10.2021

- * Awal Muharam (20 August 2020)
 National Day (31 August 2020)
 Malaysia Day (16 September 2020)
 Prophet Muhammad's Birthday (Maulidur Rasul) (29 October 2020)
 Deepavali (14 November 2020)
 Christmas Day (25 December 2020)
 New Year (1 January 2021)
 Thaipusam (28 January 2021)
 Federal Territory Day (1 February 2021)
 Chinese New Year (12 & 13 February 2021)
 Nuzul Al-Qur'an (29 April 2021)
 Labour Day (1 May 2021)
 Hari Raya Aidilfitri (13 & 14 May 2021)
 Wesak Day (26 May 2021)
 The Yang di-Pertuan Agong's Birthday (7 June 2021)
 Hari Raya Aidiladha (20 July 2021)
 Awal Muharam (10 August 2021)
 National Day (31 August 2021)

BACHELOR PROGRAMMES OFFERED

1) COMPUTER SCIENCE

There are four (4) 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)

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.

2) INFORMATION TECHNOLOGY

There is a programme offered under the Information Technology as follows:

- (1) Bachelor of Information Technology (Multimedia)

Programme Goals:

To produce high spirited excellent graduates who are able to apply knowledge gained in the computer science field, communicate efficiently, emotionally bright, confident, embrace social responsibility, and have the ability to use critical thinking skills and scientific techniques to solve problem based on information technology; and have the entrepreneurial mindset.

Programme Educational Objective:

Possess basic knowledge, principles and skills in the field of information technology; have strong analytical and critical thinking skills to solve problem using knowledge, principles and skills in information technology field; have the ability to design, execute and manage solution and information technology source, and certify the effect of technology to individual, organization and community, and poses skills to integrate various technology solution.

SPECIAL REQUIREMENTS OF THE PROGRAMME FOR SESSION 2020/2021

PROGRAM	QUALIFICATIONS			
	STPM	MATRICULATION / FOUNDATION	DIPLOMA / EQUIVALENT	OTHERS
MC04 Bachelor of Computer Science (Software Engineering)	Passed the STPM with at least CGPA 3.00 ; and	Passed the Matriculation/ Foundation with at least CGPA 3.00 ; and	Possess a Diploma in Computer Science or Diploma in Information Technology or a Diploma in related fields from Public or Higher Education Institutions recognized by the Government of Malaysia and the University Senate with a CGPA of at least 3.00 ; and	Have a GCE A Level qualification with at least Grade A in Mathematics subject; and
MC06 Bachelor of Computer Science (Information Systems)	Obtained at least Grade B at the STPM level in any two (2) of the following subjects:	Obtained at least Grade B at the Matriculation/Foundation level in any two (2) of the following subjects:	Obtained at least Grade B at the Diploma level in one of the Mathematics subject; or	Obtained at least Grade B in one of the following subjects:
MC12 Bachelor of Computer Science (Computer System and Network)	<ul style="list-style-type: none"> • Mathematics T / Physics; and • Mathematics T / Physics / Chemistry / Biology / Information and Communications Technology (ICT); 	<ul style="list-style-type: none"> • Mathematics / Physics / Engineering Physics; and • Mathematics / Physics / Engineering Physics / Chemistry / Engineering Chemistry / Biology / Computer Science / Computing; 	and	<ul style="list-style-type: none"> • Computing • Physics • Further Mathematics • Chemistry • Biology
MC21 Bachelor of Computer Science (Artificial Intelligence)	and	and	or	or
MC02 Bachelor of Information Technology (Multimedia)	Obtained at least Band 2 in MUET.	Obtained at least Band 2 in MUET.	Passed the STPM not in the current year with at least CGPA 3.00 ; and	Have an International Baccalaureate (IB) Diploma qualification with at least 30 points scored and Grade 5 (Higher Level) in Mathematics subject; and
			Obtained at least Grade B at the STPM level in any two (2) of the following subjects:	in one of the following (1) subjects:
			<ul style="list-style-type: none"> • Mathematics T / Physics; and • Mathematics T / Physics / Chemistry / Biology / Information and Communications Technology (ICT); 	<ul style="list-style-type: none"> • Chemistry • Physics • Computer Science • Biology
			or	or
				Have Australian Matriculation Programme (AUSMAT) with at

			<p>Passed the Matriculation/ Foundation not in the current year with at least CGPA 3.00;</p> <p>and</p> <p>Obtained at least Grade B at the Matriculation/Foundation level in any two (2) of the following subjects:</p> <ul style="list-style-type: none"> • Mathematics / Physics / Engineering Physics; and • Mathematics / Physics / Engineering Physics / Chemistry / Engineering Chemistry / Biology / Computer Science / Computing; <p>and</p> <p>Obtained at least Band 2 in MUET.</p>	<p>least 80% in Australian Tertiary Admission Rank (ATAR) and achieve 16 points (High Achievement) in Mathematics</p> <p>and</p> <p>achieve 16 points (High Achievement) in one of the subjects:</p> <ul style="list-style-type: none"> • Physics • Chemistry • Mathematics Specialist <p>and</p> <p>Obtained at least Band 2 in MUET.</p> <p>Note: Students who are accepted with IELTS / TOEFL qualification must meet the requirements of MUET within one (1) academic session after the student is enrolled into the program of study.</p>
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**PROGRAMME GOALS AND LEARNING OUTCOMES
BACHELOR OF COMPUTER SCIENCE (COMPUTER SYSTEM AND NETWORK)**

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.

PROGRAMME LEARNING OUTCOMES

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

- PO1** Master the concepts, principles and basic processes that support the design, development and management of computer system and network technology within an organization or an application environment.
- PO2** Analyze, design, develop, model and maintain computer system and network technology using appropriate methodologies and tools, and develop applications in organizations matters.
- PO3** Demonstrate social skills and responsibility to the community using knowledge and skills in computer system and network technology.
- PO4** Demonstrate attitude and character which in line with professional codes and ethics in the discipline of computer system and network technology.
- PO5** Communicate effectively, orally and in writing, using the standards adopted in his career, working in teams to achieve project goals and demonstrate positive leadership qualities.
- PO6** Apply quantitative and qualitative data analysis techniques, as well as systematic and analytical skills and use appropriate tools in the context of organizational problem-solving.
- PO7** Use skills in computer system and network technology for lifelong learning in line with development needs and professional growth.
- PO8** Use managerial and entrepreneurial skills to identify business opportunities related to computer system and network technology.

**PROGRAMME GOALS AND LEARNING OUTCOMES
BACHELOR OF COMPUTER SCIENCE (ARTIFICIAL INTELLIGENCE)**

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.

PROGRAMME LEARNING OUTCOMES

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

- PO1** Acquire adequate knowledge in Computer Science with a specialization in Artificial Intelligence.
- PO2** Use computer tools and technologies in designing and developing intelligent systems with attributes of human intelligence.
- PO3** Show social skills and responsibility by producing intelligent systems that benefit society.
- PO4** Show ethical and professional attitude in programming and developing intelligent system projects according to current best practices in Computer Science.
- PO5** Communicate effectively and work in groups as well as display leadership skills to achieve intelligent systems project goals.
- PO6** Apply the concepts of Computer Science and Artificial Intelligence techniques in problem solving.
- PO7** Apply information management and lifelong learning skills for the acquisition of Computer Science and Artificial Intelligence knowledge and skills.
- PO8** Apply management and entrepreneurship skills to identify business opportunities involving intelligent systems.

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

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.

PROGRAMME LEARNING OUTCOMES

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

- PO1** Master the basic concepts, principles, and processes in the field of computer science beside proficient with the knowledge of system and information management.
- PO2** Apply the techniques and skills as well as using software to solve and develop computer systems.
- PO3** Using the knowledge and skills of systems development and communication for the benefits of the society.
- PO4** Practice high ethical concerns in the profession, particularly from the context of computerisation and social interaction in developing and advancing the organisation and the society.
- PO5** Communicate effectively either in verbal or written communications, using the acceptable standards in the career, working in a team to achieve the project objectives and demonstrate positive leadership quality.
- PO6** Apply the quantitative and qualitative data analysis techniques, and systemic and analytical skills, and using appropriate tools in information systems development in the context of organisational problem solving.
- PO7** Be a self-learner and aware of the needs of life-long learning to advance themselves as to be current in the field of systems and information management.
- PO8** Identify and analyse business opportunities and is able to develop a new business plan.

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 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.

PROGRAMME LEARNING OUTCOMES

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

- PO1** Master the theoretical and practical knowledge in computer science and software engineering discipline.
- PO2** Analyze, design, develop and maintain software solution by applying principle, methodology, standard, technique and tool to ensure software quality.
- PO3** Use the knowledge and skills in computer science and software engineering to benefit the society and environment.
- PO4** Exhibit attitude and character in accordance to the professional and ethical code in computer science and software engineering discipline.
- PO5** Communicate effectively and practice a team work culture and exhibit leadership skills in computer science and software engineering project.
- PO6** Apply logical and analytical thinking skill and scientific approach in software development to solve real world problems.
- PO7** Apply information management skills and capable for lifelong learning in accordance to professional development needs.
- PO8** Identify and analyse business opportunities which relevant to software engineering project.

PROGRAMME GOALS AND LEARNING OUTCOMES BACHELOR OF INFORMATION TECHNOLOGY (MULTIMEDIA)

PROGRAMME GOALS

To produce high spirited excellent graduates who are able to apply knowledge gained in the computer science field, communicate efficiently, emotionally bright, confident, embrace social responsibility, and have the ability to use critical thinking skills and scientific techniques to solve problem based on information technology; and have the entrepreneurial mindset.

Programme Educational Objective:

Possess basic knowledge, principles and skills in the field of information technology; have strong analytical and critical thinking skills to solve problem using knowledge, principles and skills in information technology field; have the ability to design, execute and manage solution and information technology source, and certify the effect of technology to individual, organization and community, and poses skills to integrate various technology solution.

PROGRAMME LEARNING OUTCOMES

At the end of the Bachelor of Information Technology (Multimedia) programme, graduates can:

- PO1** Master the concepts, principles and basic processes in information technology as well as multimedia knowledge.
- PO2** Apply techniques and skills and use tools and software to solve problem and development of information technology application.
- PO3** Use knowledge, application development and communication skills to benefit the community.
- PO4** Perform high ethical values in professional practices in the context of information technology and social interaction to maintain organization and community development/progress.
- PO5** Communicate effectively, orally and in writing, using the standards adopted in his career, working in teams to achieve project goals and demonstrate positive leadership qualities.
- PO6** Apply quantitative and qualitative data analysis techniques, as well as systematic and analytical skills and use appropriate tools in the context of organizational problem-solving.
- PO7** Work and continue to study to gain knowledge and aware the importance of lifelong learning and skills in information technology.
- PO8** Use managerial and entrepreneurial skills to identify and analyse business opportunities in the field of multimedia technology.

**CURRICULUM STRUCTURE
BACHELOR OF COMPUTER SCIENCE (COMPUTER SYSTEM AND NETWORK)
ACADEMIC SESSION 2020/2021**

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
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 Systems and Organization	3	1
WIX2001	Thinking and Communication Skills	3	1
WIX2002	Project Management	3	1
	Total	17	
COURSE CODE	FACULTY ELECTIVE COURSES <i>(Choose only 2 courses)</i>	CREDITS	SEMESTER
WIX3001	Soft Computing	3	1 or 2
WIX3002	Social Informatics	3	1 or 2
WIX3003	Information Security Management and Ethics	3	1 or 2
WIX3004	Mobile Application Development	3	1 or 2
WIX3005	Digital Cinematography	3	1 or 2
	Total	6	
COURSE CODE	PROGRAMME CORE COURSES	CREDITS	SEMESTER
WIA1001	Information Systems	3	1
WIA1002	Data Structure (#WIX1002)	5	2
WIA1003	Computer System Architecture (#WIX1003)	3	2
WIA1004	Fundamentals of Artificial Intelligence	3	2
WIA1005	Network Technology Foundation	4	2
WIA2001	Database	3	1
WIA2002	Software Modeling	3	1
WIA2003	Probability and Statistics	3	1
WIA2004	Operating Systems	4	2
WIA2005	Algorithm Design and Analysis (#WIA1002)	4	2
WIA3001	Industrial Training *	12	1
WIA3002	Academic Project I **	3	2
WIA3003	Academic Project II (#WIA3002)	5	1
	Total	55	
COURSE CODE	SPECIALIZATION ELECTIVE COURSES <i>(Choose only 10 courses)</i>	CREDITS	SEMESTER
WIC2001	Advanced Network Technology	3	1 or 2
WIC2002	Network Security	3	1 or 2
WIC2003	Digital Design and Hardware Description Language	3	1 or 2
WIC2004	Internet Technology	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	3	1 or 2
WIC3006	Mobile Computing	3	1 or 2
WIC3007	Principles of Distributed Systems	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 2020/2021**

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	
	WIX1001	Computing Mathematics I	3	GIG1005	Social Engagement	2	
	WIX1002	Fundamentals of Programming	5	WIA1002	Data Structure (#WIX1002)	5	
	WIX1003	Computer Systems and Organization	3	WIA1003	Computer System Architecture (#WIX1003)	3	
	WIA1001	Information Systems	3	WIA1004	Fundamentals of Artificial Intelligence	3	
				WIA1005	Network Technology Foundation	4	
			Total	16			Total
	Course Code	Semester 1	Credits	Course Code	Semester 2	Credits	
2		Co-Curriculum	2	GLTXXXX	English for Communication (2)	3	
	GLTXXXX	English for Communication (1)	3	GIG1004	Information Literacy	2	
	GIG1003	Basic Entrepreneurship Culture	2	WIA2004	Operating Systems	4	
	WIX2001	Thinking and Communication Skills	3	WIA2005	Algorithm Design and Analysis (#WIA1002)	4	
	WIX2002	Project Management	3		Specialization Elective (1)	3	
	WIA2001	Database	3		Specialization Elective (2)	3	
	WIA2002	Software Modeling	3		Specialization Elective (3)	3	
	WIA2003	Probability and Statistics	3				
		Total	22			Total	22
	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	
					Faculty Elective (1)	3	
			Total	12			Total
	Course Code	Semester 1	Credits	Credit Distribution			
4	WIA3003	Academic Project II (#WIA3002)	5	Course Component		Credits	
		Specialization Elective (8)	3	University Courses		20	
		Specialization Elective (9)	3	Faculty Core Courses		17	
		Specialization Elective (10)	3	Faculty Elective Courses		6	
		Faculty Elective (2)	3	Programme Core Courses		55	
		External Faculty Elective	2	Specialization Elective Courses		30	
		Total	19	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 2020/2021**

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
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 Systems and Organization	3	1
WIX2001	Thinking and Communication Skills	3	1
WIX2002	Project Management	3	1
	Total	17	
COURSE CODE	FACULTY ELECTIVE COURSES <i>(Choose only 2 courses)</i>	CREDITS	SEMESTER
WIX3001	Soft Computing	3	1 or 2
WIX3002	Social Informatics	3	1 or 2
WIX3003	Information Security Management and Ethics	3	1 or 2
WIX3004	Mobile Application Development	3	1 or 2
WIX3005	Digital Cinematography	3	1 or 2
	Total	6	
COURSE CODE	PROGRAMME CORE COURSES	CREDITS	SEMESTER
WIA1001	Information Systems	3	1
WIA1002	Data Structure (#WIX1002)	5	2
WIA1003	Computer System Architecture (#WIX1003)	3	2
WIA1004	Fundamentals of Artificial Intelligence	3	2
WIA1005	Network Technology Foundation	4	2
WIA2001	Database	3	1
WIA2002	Software Modeling	3	1
WIA2003	Probability and Statistics	3	1
WIA2004	Operating Systems	4	2
WIA2005	Algorithm Design and Analysis (#WIA1002)	4	2
WIA3001	Industrial Training *	12	1
WIA3002	Academic Project I **	3	2
WIA3003	Academic Project II (#WIA3002)	5	1
	Total	55	
COURSE CODE	SPECIALIZATION ELECTIVE COURSES <i>(Choose only 10 courses)</i>	CREDITS	SEMESTER
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
WID3003	Neural Computing	3	1 or 2
WID3004	Numerical Methods	3	1 or 2
WID3005	Intelligent Robotics	3	1 or 2
WID3006	Machine Learning	3	1 or 2
WID3007	Fuzzy Logic	3	1 or 2
WID3008	Image Processing	3	1 or 2
WID3009	Artificial Intelligence Game Programming (#WID3004)	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 2020/2021**

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
	WIX1001	Computing Mathematics I	3	GIG1005	Social Engagement	2
	WIX1002	Fundamentals of Programming	5	WIA1002	Data Structure (#WIX1002)	5
	WIX1003	Computer Systems and Organization	3	WIA1003	Computer System Architecture (#WIX1003)	3
	WIA1001	Information Systems	3	WIA1004	Fundamentals of Artificial Intelligence	3
				WIA1005	Network Technology Foundation	4
		Total	16		Total	19
Course Code	Semester 1	Credits	Course Code	Semester 2	Credits	
	Co-Curriculum	2	GLTXXXX	English for Communication (2)	3	
	GLTXXXX	English for Communication (1)	3	GIG1004	Information Literacy	2
	GIG1003	Basic Entrepreneurship Culture	2	WIA2004	Operating Systems	4
	WIX2001	Thinking and Communication Skills	3	WIA2005	Algorithm Design and Analysis (#WIA1002)	4
	WIX2002	Project Management	3		Specialization Elective (1)	3
	WIA2001	Database	3		Specialization Elective (2)	3
	WIA2002	Software Modeling	3		Specialization Elective (3)	3
	WIA2003	Probability and Statistics	3			
		Total	22		Total	22
Course Code	Semester 1	Credits	Course Code	Semester 2	Credits	
	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
					Faculty Elective (1)	3
		Total	12		Total	18
Course Code	Semester 1	Credits	Credit Distribution			
	WIA3003	Academic Project II (#WIA3002)		Course Component	Credits	
		Specialization Elective (8)		University Courses	20	
		Specialization Elective (9)		Faculty Core Courses	17	
		Specialization Elective (10)		Faculty Elective Courses	6	
		Faculty Elective (2)		Programme Core Courses	55	
		External Faculty Elective		Specialization Elective Courses	30	
		Total		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 2020/2021**

COURSE CODE	COURSE COMPONENT UNIVERSITY COURSES	CREDITS	SEMESTER
GIG1012	Philosophy and Current Issues <i>(for local student only)</i>	2	1
GLT1017	Basic Malay Language <i>(for international student)</i>	2	2
GIG1013	Appreciation of Ethics and Civilizations	2	1
GIG1003	Basic Entrepreneurship Culture	2	2
GIG1004	Information Literacy	2	2
GIG1005	Social Engagement	3	1
GLTXXXX	English for Communication (1)	3	2
GLTXXXX	English for Communication (2)	2	1
	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 Systems and Organization	3	1
WIX2001	Thinking and Communication Skills	3	1
WIX2002	Project Management	3	1
	Total	17	
COURSE CODE	FACULTY ELECTIVE COURSES <i>(Choose only 2 courses)</i>	CREDITS	SEMESTER
WIX3001	Soft Computing	3	1 or 2
WIX3002	Social Informatics	3	1 or 2
WIX3003	Information Security Management and Ethics	3	1 or 2
WIX3004	Mobile Application Development	3	1 or 2
WIX3005	Digital Cinematography	3	1 or 2
	Total	6	
COURSE CODE	PROGRAMME CORE COURSES	CREDITS	SEMESTER
WIA1001	Information Systems	3	1
WIA1002	Data Structure (#WIX1002)	5	2
WIA1003	Computer System Architecture (#WIX1003)	3	2
WIA1004	Fundamentals of Artificial Intelligence	3	2
WIA1005	Network Technology Foundation	4	2
WIA2001	Database	3	1
WIA2002	Software Modeling	3	1
WIA2003	Probability and Statistics	3	1
WIA2004	Operating Systems	4	2
WIA2005	Algorithm Design and Analysis (#WIA1002)	4	2
WIA3001	Industrial Training *	12	1
WIA3002	Academic Project I **	3	2
WIA3003	Academic Project II (#WIA3002)	5	1
	Total	55	
COURSE CODE	SPECIALIZATION ELECTIVE COURSES <i>(Choose only 10 courses)</i>	CREDITS	SEMESTER
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
WIE2004	Information Service Oriented Architecture	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
WIE3004	Information Retrieval	3	1 or 2
WIE3005	Knowledge Management and Engineering	3	1 or 2
WIE3006	Information System Auditing (#WIE3003)	3	1 or 2
WIE3007	Data Mining and Warehousing	3	1 or 2
WIE3008	Business Analytics and Intelligence (#WIA2001)	3	1 or 2
WIE3009	Enterprise System Design and Implementation	3	1 or 2
WIE3010	Data Visualisation	3	1 or 2
WIE3011	Strategic Information Systems and Management	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 2020/2021**

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
	WIX1001	Computing Mathematics I	3	GIG1005	Social Engagement	2
	WIX1002	Fundamentals of Programming	5	WIA1002	Data Structure (#WIX1002)	5
	WIX1003	Computer Systems and Organization	3	WIA1003	Computer System Architecture (#WIX1003)	3
	WIA1001	Information Systems	3	WIA1004	Fundamentals of Artificial Intelligence	3
				WIA1005	Network Technology Foundation	4
		Total	16		Total	19
Course Code	Semester 1	Credits	Course Code	Semester 2	Credits	
	Co-Curriculum	2	GLTXXXX	English for Communication (2)	3	
	GLTXXXX	English for Communication (1)	3	GIG1004	Information Literacy	2
	GIG1003	Basic Entrepreneurship Culture	2	WIA2004	Operating Systems	4
	WIX2001	Thinking and Communication Skills	3	WIA2005	Algorithm Design and Analysis (#WIA1002)	4
	WIX2002	Project Management	3		Specialization Elective (1)	3
	WIA2001	Database	3		Specialization Elective (2)	3
	WIA2002	Software Modeling	3		Specialization Elective (3)	3
	WIA2003	Probability and Statistics	3			
		Total	22		Total	22
Course Code	Semester 1	Credits	Course Code	Semester 2	Credits	
	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
					Faculty Elective (1)	3
		Total	12		Total	18
Course Code	Semester 1	Credits	Credit Distribution			
	WIA3003	Academic Project II (#WIA3002)		Course Component	Credits	
		Specialization Elective (8)		University Courses	20	
		Specialization Elective (9)		Faculty Core Courses	17	
		Specialization Elective (10)		Faculty Elective Courses	6	
		Faculty Elective (2)		Programme Core Courses	55	
		External Faculty Elective		Specialization Elective Courses	30	
		Total		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 2020/2021**

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
WIE2003	Introduction to Data Science	3	2
WIA1001	Information Systems	3	1
WIA1002	Data Structure	5	2
WIA1003	Computer System Architecture	3	2
WIA1005	Network Technology Foundation	4	2
WIA2001	Database	3	1
WIA2002	Software Modelling	3	1
WIA2003	Probability and Statistics	3	1
WIA2004	Operating Systems	4	2
WID3006	Machine Learning	3	2
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 (<i>Choose only 2 courses</i>)	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 (<i>Choose only 6 courses</i>)	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 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 (DATA SCIENCE)
ACADEMIC SESSION 2020/2021**

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
2		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		Specialization Elective (3)	3	
		Total	20		Total	22
	Course Code	Semester 1	Credits	Course Code	Semester 2 (Industry)	Credits
3	WIH3001	Data Science Project	3	WIH3002	Data Science Industrial Training	14
		Specialization Elective (4)	3			
		Specialization Elective (5)	3			
		Specialization Elective (6)	3			
		Faculty Elective (2)	3			
		Faculty Elective (1)	3			
	External Faculty Elective	2				
		Total	20		Total	14
	Course Code	Semester 1 (Industry)	Credits	Credit Distribution		
4	WIA3001	Industrial Training	12		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 2020/2021**

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
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 Systems and Organization	3	1
WIX2001	Thinking and Communication Skills	3	1
WIX2002	Project Management	3	1
	Total	17	
COURSE CODE	FACULTY ELECTIVE COURSES (<i>Choose only 2 courses</i>)	CREDITS	SEMESTER
WIX3001	Soft Computing	3	1 or 2
WIX3002	Social Informatics	3	1 or 2
WIX3003	Information Security Management and Ethics	3	1 or 2
WIX3004	Mobile Application Development	3	1 or 2
WIX3005	Digital Cinematography	3	1 or 2
	Total	6	
COURSE CODE	PROGRAMME CORE COURSES	CREDITS	SEMESTER
WIA1001	Information Systems	3	1
WIA1002	Data Structure (#WIX1002)	5	2
WIA1003	Computer System Architecture (#WIX1003)	3	2
WIA1004	Fundamentals of Artificial Intelligence	3	2
WIA1005	Network Technology Foundation	4	2
WIA2001	Database	3	1
WIA2002	Software Modeling	3	1
WIA2003	Probability and Statistics	3	1
WIA2004	Operating Systems	4	2
WIA2005	Algorithm Design and Analysis (#WIA1002)	4	2
WIA3001	Industrial Training *	12	1
WIA3002	Academic Project I **	3	2
WIA3003	Academic Project II (#WIA3002)	5	1
	Total	55	
COURSE CODE	SPECIALIZATION ELECTIVE COURSES (<i>Choose only 10 courses</i>)	CREDITS	SEMESTER
WIF2001	Human Computer Interaction	3	1 or 2
WIF2002	Software Requirements Engineering	3	1 or 2
WIF2003	Web Programming	3	1 or 2
WIF3001	Software Testing	3	1 or 2
WIF3002	Software Process and Quality	3	1 or 2
WIF3003	Concurrent Programming (#WIX1002; WIA2004)	3	1 or 2
WIF3004	Software Architecture and Design Paradigms (#WIA2002)	3	1 or 2
WIF3005	Software Maintenance and Evolution	3	1 or 2
WIF3006	Component-Based Software Engineering (#WIA2002)	3	1 or 2
WIF3007	Design Patterns	3	1 or 2
WIF3008	Real Time Systems	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 (SOFTWARE ENGINEERING)
ACADEMIC SESSION 2020/2021**

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
	WIX1001	Computing Mathematics I	3	GIG1004	Information Literacy	2
	WIX1002	Fundamentals of Programming	5	GIG1005	Social Engagement	2
	WIX1003	Computer Systems and Organization	3	WIA1002	Data Structure (#WIX1002)	5
	WIA1001	Information Systems	3	WIA1003	Computer System Architecture (#WIX1003)	3
	WIA1005	Network Technology Foundation	4	WIA1004	Fundamentals of Artificial Intelligence	3
		Total	20		Total	17
Course Code	Semester 1	Credits	Course Code	Semester 2	Credits	
2	GLTXXXX	English for Communication (1)	3		Co-Curriculum	2
	GIG1003	Basic Entrepreneurship Culture	2	GLTXXXX	English for Communication (2)	3
	WIX2001	Thinking and Communication Skills	3	WIA2004	Operating Systems	4
	WIX2002	Project Management	3	WIA2005	Algorithm Design and Analysis (#WIA1002)	4
	WIA2001	Database	3		Specialization Elective (1)	3
	WIA2002	Software Modeling	3		Specialization Elective (2)	3
	WIA2003	Probability and Statistics	3		Specialization Elective (3)	3
	Total	20		Total	22	
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
					Faculty Elective (1)	3
		Total	12		Total	18
Course Code	Semester 1	Credits	Credit Distribution			
4	WIA3003	Academic Project II (#WIA3002)	5	Course Component	Credits	
		Specialization Elective (8)	3	University Courses	20	
		Specialization Elective (9)	3	Faculty Core Courses	17	
		Specialization Elective (10)	3	Faculty Elective Courses	6	
		Faculty Elective (2)	3	Programme Core Courses	55	
		External Faculty Elective	2	Specialization Elective Courses	30	
		Total	19	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 INFORMATION TECHNOLOGY (MULTIMEDIA)
ACADEMIC SESSION 2020/2021**

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
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	2
	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 Systems and Organization	3	1
WIX2001	Thinking and Communication Skills	3	1
WIX2002	Project Management	3	1
	Total	17	
COURSE CODE	FACULTY ELECTIVE COURSES <i>(Choose only 2 courses)</i>	CREDITS	SEMESTER
WIX3001	Soft Computing	3	1 or 2
WIX3002	Social Informatics	3	1 or 2
WIX3003	Information Security Management and Ethics	3	1 or 2
WIX3004	Mobile Application Development	3	1 or 2
WIX3005	Digital Cinematography	3	1 or 2
	Total	6	
COURSE CODE	PROGRAMME CORE COURSES	CREDITS	SEMESTER
WIB1001	Fundamental of Multimedia	3	2
WIB1002	Data Structure (#WIX1002)	5	2
WIB1003	Data Communication and Networking	3	2
WIB2001	Database	3	1
WIB2002	Interactive Design	3	1
WIB2003	Probability and Statistics	3	1
WIB2004	Operating Systems	4	1
WIB2005	Open Source Programming: Application and Technology	3	2
WIB2006	System Analysis, Modelling and Design	3	2
WIB2007	Information System Control and Security	3	2
WIB3001	Industrial Training *	12	1
WIB3002	Academic Project I **	3	2
WIB3003	Academic Project II (#WIB3002)	5	1
	Total	53	
COURSE CODE	SPECIALIZATION ELECTIVE COURSES <i>(Choose only 10 courses)</i>	CREDITS	SEMESTER
WIG2001	Digital Image Processing	3	1 or 2
WIG2002	Computer Graphics	3	1 or 2
WIG2003	Multimedia Visual Arts	3	1 or 2
WIG2004	Audio Synthesis	3	1 or 2
WIG3001	Mathematics for Multimedia	3	1 or 2
WIG3002	Rendering and Animation	3	1 or 2
WIG3003	Multimedia Programming	3	1 or 2
WIG3004	Virtual Reality	3	1 or 2
WIG3005	Game Development	3	1 or 2
WIG3006	Digital Video Processing	3	1 or 2
WIG3007	Special Topics in Multimedia	3	1 or 2
WIG3008	Multimedia Forensic and Security	3	1 or 2
WIG3009	Multimedia Retrieval	3	1 or 2
	Total	30	
TOTAL CREDITS FOR GRADUATION		126	

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 INFORMATION TECHNOLOGY (MULTIMEDIA)
ACADEMIC SESSION 2020/2021**

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)	3	GIG1004	Information Literacy	2
	WIX1001	Computing Mathematics I	3	GIG1005	Social Engagement	2
	WIX1002	Fundamentals of Programming	5	GLTXXXX	English for Communication (2)	3
	WIX1003	Computer Systems and Organization	3	WIB1001	Fundamental of Multimedia	3
				WIB1002	Data Structure (#WIX1002)	5
				WIB1003	Data Communication and Networking	3
		Total	16		Total	20
Course Code	Semester 1	Credits	Course Code	Semester 2	Credits	
2	GIG1003	Basic Entrepreneurship Culture	2		Co-Curriculum	2
	WIX2001	Thinking and Communication Skills	3	WIB2005	Open Source Programming: Application and Technology	3
	WIX2002	Project Management	3	WIB2006	System Analysis, Modelling and Design	3
	WIB2001	Database	3	WIB2007	Information System Control and Security	3
	WIB2002	Interactive Design	3		Specialization Elective (1)	3
	WIB2003	Probability and Statistics	3		Specialization Elective (2)	3
	WIB2004	Operating Systems	4		Specialization Elective (3)	3
		Total	21		Total	20
Course Code	Semester 1	Credits	Course Code	Semester 2	Credits	
3	WIB3001	Industrial Training *	12	WIB3002	Academic Project I **	3
					Specialization Elective (4)	3
					Specialization Elective (5)	3
					Specialization Elective (6)	3
					Specialization Elective (7)	3
					Faculty Elective (1)	3
		Total	12		Total	18
Course Code	Semester 1	Credits	Credit Distribution			
4	WIB3003	Academic Project II (#WIB3002)	5	Course Component	Credits	
		Specialization Elective (8)	3	University Courses	20	
		Specialization Elective (9)	3	Faculty Core Courses	17	
		Specialization Elective (10)	3	Faculty Elective Courses	6	
		Faculty Elective (2)	3	Programme Core Courses	53	
		External Faculty Elective	2	Specialization Elective Courses	30	
		Total	19	TOTAL CREDITS FOR GRADUATION		126

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:

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 discrete mathematics. (C2)
2. Indicate mathematical proofs using the fundamental concepts. (C1)
3. Apply various discrete structure techniques to solve problems. (C3)

Synopsis of Course Content

This course covers discrete 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. (C1)
2. Rewrite programs that contain errors. (C2)
3. Develop programs based on principles of object-oriented. (C3)

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 architecture and logic design. (C1)
2. Explain the basic computer systems architecture, combinational circuit and sequential logic. (C2)
3. Translate the basic concepts of computer systems operation. (C3)

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 introduction to Pentium Processor Architecture and Assembly language.

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. Repeat on certain topics. (C1)
2. Review resources of information. (C2)
3. Apply the skills to communicate effectively in different environments and constraints. (C3)
4. Provide plan for business opportunities. (C3)
5. Manage team members in group activities. (C3)

Synopsis of Course Content

This course is based on the conviction that thinking is an ability that can be developed and improved through guidance and practice. It is designed to help develop fundamental thinking abilities such as clarifying, analysing and evaluating arguments; and developing attitudes of open-mindedness and curiosity. These are needed for success in academic courses, in solving problems and making informed decisions in life. The course integrates the development of both critical (evaluation) and creative (synthesis) thinking abilities within communication situations such as emphasizing empathy speaker and the audience, interpersonal communication, the use of language and nonverbal messages. This learning environment will develop

leadership skills, group skills and other necessary skills due to its dynamic nature.

Assessment Methods

Continuous Assessment: 70%

Final Examination: 30%

<p style="text-align: center;">WIX2002 PROJECT MANAGEMENT</p>

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. (C1)
2. Identify appropriate techniques to estimate project time and costs. (C2)
3. Perform a project to track project schedule, expenses and resources with the use of suitable project management tools. (C3)

Synopsis of Course Content

This course introduces the fundamental of management concepts, explains topics on organisational 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 software configuration management.

Assessment Methods

Continuous Assessment: 70%

Final Examination: 30%

COURSE INFORMATION:

FACULTY ELECTIVE COURSES

**WIX3001
SOFT COMPUTING**

Credit: 3

Course Pre-requisite(s): None

Medium of Instruction: English

Learning Outcomes

1. Describe soft computing techniques and their roles in building intelligent machines.
2. Use soft computing tools to solve a particular problem.
3. Apply soft computing techniques to solve real problems.

Synopsis of Course Content

This course introduces data structures in the context of object orientation. Concepts of object-oriented programming covered include class, object, encapsulation, inheritance, and polymorphism. Java interface and generics are taught before different data structures like linked list, stack, queue, and binary tree are explained in details. Searching and sorting algorithms are also covered by this course.

Assessment Methods

Continuous Assessment: 50%
Final Examination: 50%

**WIX3002
SOCIAL INFORMATICS**

Credit: 3

Course Pre-requisite(s): None

Medium of Instruction: English

Learning Outcomes

1. Describe the connection between information technology and social relations.
2. Discuss the impacts of information technologies on people, organizations and society.
3. Use social network analysis tool.

Synopsis of Course Content

This course describes the connection between the use of information technology and social relations. It describes how social issues such as privacy and freedom of speech related to the use of information technology. It also describes the use of the social network analysis tool.

Assessment Methods

Continuous Assessment: 50%
Final Examination: 50%

**WIX3003
INFORMATION SECURITY MANAGEMENT
AND ETHICS**

Credit: 3

Course Pre-requisite(s): None

Medium of Instruction: English

Learning Outcomes

1. Identify the basic concept of ethics and definition of security.
2. Discusses the legal aspect of computer security and effective security management.
3. Demonstrate computer safety preventive methods.

Synopsis of Course Content

This course covers the topics in advance principles of information security and its management, security audit, human factor in information security, security management in the industry.

Assessment Methods

Continuous Assessment: 50%
Final Examination: 50%

**WIX3004
MOBILE APPLICATION DEVELOPMENT**

Credit: 3

Course Pre-requisite(s): None

Medium of Instruction: English

Learning Outcomes

1. Identify the differences between application development for a personal computer and mobile environments.
2. Review the use of a mobile device API.
3. Apply the functionality of features available on mobile devices.
4. Develop mobile applications in a client-server environment.

Synopsis of Course Content

This course is an overview of developing mobile apps using a relevant software development kit (SDK) and other development tools. Unique considerations, requirements and methodologies necessary for developing mobile apps as compared to developing PC-based applications will be introduced. In particular, requirements in relation to memory, communication, and power on mobile devices will be addressed. Hardware capabilities such as location-aware services and voice communications will be explored.

Assessment Methods

Continuous Assessment: 50%
Final Examination: 50%

WIX3005
DIGITAL CINEMATOGRAPHY

Credit: 3

Course Pre-requisite(s): None

Medium of Instruction: English

Learning Outcomes

1. Describe principles of digital cinematography.
2. Explain tools and techniques used in visual story telling process.
3. Apply the importance of visual story telling and relate it to their daily life.

Synopsis of Course Content

This course focuses on storytelling, and explores advanced digital video cinematography tools and techniques for both studio and field. Students will operate HD video cameras, use light meters, determine set and lighting needs, block scenes, mount and use a matte box, and become familiar with topics including film space, continuity, lenses, color, filters, and camera control. Over the course of the semester, students will work together to produce a number of short stories in both field and studio environments.

Assessment Methods

Continuous Assessment: 60%
Final Examination: 40%

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%

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 technology such as Internet of Everything (IoE), Cloud Computing and Software Defined Network (SDN).
2. Identify the steps to evaluate and implement an IoE Solution, Cloud Deployment Model and SDN.
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

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)

**WIA1001
INFORMATION SYSTEMS**

Credit: 3

Course Pre-requisite(s): None

Medium of Instruction: English

Learning Outcomes

1. List basic Information Systems concepts and principles.
2. Identify the role of stakeholders in developing, using and managing the Information Systems.
3. Interpret current Information Systems practices.

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 – Fundamentals of Programming

Medium of Instruction: English

Learning Outcomes

1. Explain the concepts of data abstraction.
2. Recognize the fundamental data structures.
3. Use appropriate data structures in application design and development.

Synopsis of Course Content

This course introduces the concept of abstraction in problem solving. Basic data structures, like linked list, stack, queue, and binary tree, are explained in details. This course emphasizes on the implementation of data structures in programming environment to solve real-world problems.

Assessment Methods

Continuous Assessment: 50%
Final Examination: 50%

**WIA1003
COMPUTER SYSTEM ARCHITECTURE**

Credit: 3

Course Pre-requisite(s):
WIX1003– Computer Systems and Organization

Medium of Instruction: English

Learning Outcomes

1. Enumerate the concept of top down approach to show the computer system architecture.
2. Use basic operation and instruction set architecture for assembly language programming execution.
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, bus Interconnection, system I/O, multiprocessing system and advanced topic in computer architecture.

Assessment Methods

Continuous Assessment: 50%
Final Examination: 50%

**WIA1004
FUNDAMENTALS OF ARTIFICIAL INTELLIGENCE**

Credit: 3

Course Pre-requisite(s): None

Medium of Instruction: English

Learning Outcomes

1. Describe Artificial Intelligence concepts and its applications.
2. Distinguish between conventional systems and intelligent systems.
3. Apply Artificial Intelligence techniques in solving problems.

Synopsis of Course Content

This is an introductory course to the Principle of Artificial Intelligence (AI). It covers the history, the basic concepts and techniques of AI such as knowledge representation, problem solving, searching, reasoning and machine learning. It also differentiates between conventional systems and intelligent systems and introduces the various applications of AI.

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 includes TCP/IP model, IPv4 and IPv6 addressing, routing and switching. This course will examine several aspects of networking such as VLAN, RIP, OSPF, ACL, DHCP and NAT. This course also emphasis on practical exercises in routing and switching.

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. Identify a database management system (DBMS).
3. Develop a database system for an application or small business.
4. 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. Apply object-oriented modelling techniques to analyse software systems.
3. Construct various models using the appropriate UML notations.
4. Use a suitable CASE tool for the construction of UML models.

Synopsis of Course Contents

This course covers the object-oriented modelling concepts in system analysis and design using Unified Modelling Language (UML). Topics include: basic concepts of modelling in system analysis and design, key differences between the structured and object-oriented analysis and design, analysis and design of a software system using structural (Use Case and Class Diagrams) and behavioral diagrams (Activity, Interaction and State Machine Diagrams), use of an object-oriented case tool to construct various UML diagrams and generate source codes, consistency checking of UML models and software testing.

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. Describe probabilistic and statistical concepts.
2. Discuss 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 (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 management for early systems and current systems.
3. Explain the criteria on processor and process management.
4. Describe the file and device management.
5. Operate a selected operating system.

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
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Credit: 3

Course Pre-requisite(s):

WIA1003 – Data Structure

Medium of Instruction: English

Learning Outcomes

1. Indicate major algorithms and data structures.
2. Describe the importance of algorithmic-design paradigms.
3. Report 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 modern programming environment.

Assessment Method

Continuous Assessment: 70%
Final Examination: 30%

WIA3001 INDUSTRIAL TRAINING
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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 organisation 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 and Academic Project II.

Medium of Instruction: English

Learning Outcomes

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.

Synopsis of Course Content

This course covers the following research activities including problem identification; literature review; data collection, writing research proposal and project presentation.

Assessment Methods

Continuous Assessment: 100%

**WIA3003
ACADEMIC PROJECT II**

Credit: 5

Course Pre-requisite(s):

WIA3002 - Academic Project I

Medium of Instruction: English

Learning Outcomes

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.

Synopsis of Course Content

This course covers the research activities including system analysis and design, system implementation, testing and evaluating the developed system/application, 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 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 large datasets.
3. Identify suitable tools and technologies used in data science.

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): Pass all Faculty and Programme Core courses except for Industrial Training.

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: PROGRAMME CORE COURSES

Bachelor of Information Technology (Multimedia)

**WIB1001
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. (C1)
2. Develop a multimedia application development via multiple elements creation and manipulation using appropriate multimedia editing and authoring tools. (C3)
3. Explain several compression techniques, security and current multimedia technology issues. (C2)

Synopsis of Course Content

In this course, students will be introduced to the main elements of a multimedia system including text, image and graphics, audio, video and animation. Students will be taught the editing process for each multimedia element using appropriate editing tools such as Adobe Photoshop, Adobe Illustrator, Audacity and SketchUp. Students also will be using a presentation tool such as MS Powerpoint and Prezi to create multimedia presentation for a mini project. Students also will be exposed to issues related to data compression, security and current multimedia technologies.

Assessment Methods

Continuous Assessment: 50%
Final Examination: 50%

**WIB1002
DATA STRUCTURE**

Credit: 5

Course Pre-requisite(s):

WIX1002 – Fundamentals of Programming

Medium of Instruction: English

Learning Outcomes

1. Explain the concepts of data abstraction. (C2)
2. Recognize the fundamental data structures.(C2)
3. Use appropriate data structures in application design and development.(C3)

Synopsis of Course Content

This course introduces the concept of abstraction in problem solving. Basic data structures, like linked list, stack, queue, and binary tree, are explained in details. This course emphasizes on the implementation of data structures in programming environment to solve real-world problems.

Assessment Methods

Continuous Assessment: 50%
Final Examination: 50%

**WIB1003
DATA COMMUNICATION AND NETWORKING**

Credit: 3

Course Pre-requisite(s): None

Medium of Instruction: English

Learning Outcomes

1. Identify the main components in a multimedia communication system. (C2)
2. Discuss on the use of high speed network in multimedia files transfer, and real-time traffic. (C2)
3. Determine on the type of good quality networks that are suitable for certain multimedia applications. (C3)

Synopsis of Course Content

This course covers the following topics: Multimedia communications system; Representation of multimedia signals; Video; Sound; Coding theory; Multimedia Networking; Multimedia security.

Assessment Methods

Continuous Assessment: 50%
Final Examination: 50%

**WIB2001
DATABASE**

Credit: 3

Course Pre-requisite(s): None

Medium of Instruction: English

Learning Outcomes

1. Describe the basic concepts in database. (C1)
2. Identify a database management system (DBMS). (C2)
3. Develop a database system for an application or small business. (C3)
4. 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%

WIB2002 INTERACTIVE DESIGN

Credit: 3

Course Pre-requisite(s): None

Medium of Instruction: English

Learning Outcomes

1. Identify task analysis for interactive design. (C2)
2. Explain an interactive computer-based application. (C2)
3. Develop an interactive computer-based application. (C3)
4. Construct an interactive computer-based application. (C3)

Synopsis of Course Contents

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%

WIB2003 PROBABILITY AND STATISTICS

Credit: 3

Course Pre-requisite(s): None

Medium of Instruction: English

Learning Outcomes

1. Describe probabilistic and statistical concepts. (C1)
2. Discuss basic probabilistic and statistical concepts. (C2)
3. Employ the appropriate statistical tests to analyze data. (C3)

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 (SAS/SPSS).

Assessment Methods

Continuous Assessment: 50%
Final Examination: 50%

WIB2004 OPERATING SYSTEMS

Credit: 4

Course Pre-requisite(s): None

Medium of Instruction: English

Learning Outcomes

1. List the basic concept of operating systems. (C1)
2. Elaborate the criteria on memory management for early systems and current systems. (C2)
3. Explain the criteria on processor and process management. (C2)
4. Describe the file and device management. (C2)
5. Operate a selected operating system. (C3)

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%

WIB2005 OPEN SOURCE PROGRAMMING: APPLICATION AND TECHNOLOGY
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Credit: 3

Course Pre-requisite(s): None

Medium of Instruction: English

Learning Outcomes

1. Describe basic characteristics and concepts of open source applications and technology. (C2)
2. Use open source programming language to populate, retrieve and update database. (C3)
3. Develop open source solution to resolve a business problem. (C3)

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 Method

Continuous Assessment: 50%
Final Examination: 50%

**WIB2006
SYSTEM ANALYSIS, MODELLING 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 and design. (C2)
2. Review about the groups of people involved in systems development and the different methods, tools, and techniques used in systems analysis and design. (C2)
3. Apply concepts and skills needed to develop an information system. (C3)

Synopsis of Course Content

Topics that covered in this course are: (a) Systems Development Roles; (b) Systems Development Building Blocks; (c) Systems Development Processes; (d) Systems Development Project Management; (e) Systems Analysis; (f) Fact-Finding Techniques for Requirements Discovery; (g) Modeling System Requirements with Use Cases; (h) Data Modeling and Analysis; (i) Process Modeling; (j) Feasibility Analysis and the System Proposal; (k) Object-Oriented Analysis and Modeling Using the UML; (l) Systems Design; (m) Application Architecture and Modeling; (n) Database Design; (o) Output Design and Prototyping; (p) Input Design and Prototyping; (q) User Interface Design; (r) Object-Oriented Design and Modeling Using the UML; (s) Systems Construction and Implementation; (t) Systems Operations and Support.

Assessment Method

Continuous Assessment: 50%
Final Examination: 50%

**WIB2007
INFORMATION SYSTEM CONTROL AND SECURITY**

Credit: 3

Course Pre-requisite(s): None

Medium of Instruction: English

Learning Outcomes

1. Identify control and security involves in information systems from the physical/environmental perspective, application perspective and operational perspective.
2. Explain types of current security control and effective usage for the information system

organization, including the methodology, procedure and implementation design.

3. Solve security problems in information system using workflow, procedure and control being studied.
4. Apply ethical value in each of the security development of information system complying to the law and policy for better control.

Synopsis of Course Content

There are ten elements of the syllabus of the course are; (a) Information Security and Risk Management; (b) Access Control System and Methodology; (c) Cryptography; (d) Physical/Environmental Security; (e) Enterprise security system architecture and design; (f) Business Continuity and Disaster Recovery Planning; (g) Telecommunication, Networks and Internet Security; (h) Application Security; (i) Operation Security; (j) Law, Investigation, Compliance and Ethics.

Assessment Method

Continuous Assessment: 50%
Final Examination: 50%

**WIB3001
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. (C3)
2. Identify the problems faced and lessons learnt at workplace. (C2)
3. Use appropriate systems and technologies in the tasks at workplace. (C3)
4. Demonstrate professional ethics at workplace accordingly knowledge and skills acquired at workplace. (C3)

Synopsis of Course Content

This course requires a student to undergo industrial training at an organisation 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%

**WIB3002
ACADEMIC PROJECT I**

Credit: 3

Course Pre-requisite(s):

Pass all Faculty and Programme Core Courses except for Industrial Training and Academic Project II.

Medium of Instruction: English

Learning Outcomes

1. State the problem background. (C1)
2. Identify solution approach that is suitable for the stated problem. (C2)
3. Report literature review that is related with the stated problem. (C3)
4. Conduct suitable data gathering techniques. (C3)
5. Write project proposal. (C3)

Synopsis of Course Content

This course covers the following research activities including problem identification; literature review; data collection, writing research proposal and project presentation.

Assessment Methods

Continuous Assessment: 100%

**WIB3003
ACADEMIC PROJECT II**

Credit: 5

Course Pre-requisite(s):

WIB3002 - Academic Project I

Medium of Instruction: English

Learning Outcomes

1. Discuss software development life cycle for the project implementation. (C2)
2. Develop a system based on the problems identified. (C3)
3. Write academic project report undertaken by the project. (C3)
4. Experiment the developed product. (C3)

Synopsis of Course Content

This course covers the research activities including system analysis and design, system implementation, testing and evaluating the developed system/application, project presentation and writing an academic report.

Assessment Method

Continuous Assessment: 100%

COURSE INFORMATION: SPECIALIZATION ELECTIVE COURSES

Bachelor of Computer Science (Computer System and Network)

**WIC2001
ADVANCED NETWORK TECHNOLOGY**

Credit: 3

Course Pre-requisite(s): None

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%

**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%

**WIC2003
DIGITAL DESIGN AND HARDWARE
DESCRIPTION LANGUAGE**

Credit: 3

Course Pre-requisite(s): None

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 such as optimization, high-speed circuit design, high volume and low power consumption for microprocessor, digital signal and multimedia, memory and etc.
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%

**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 technology such as Internet of Everything (IoE), Cloud Computing and Software Defined Network (SDN).
2. Identify the steps to evaluate and implement an IoE Solution, Cloud Deployment Model and SDN.
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%

WIC3001 MATHEMATICS IN NETWORKING

Credit: 3

Course Pre-requisite(s): None

Medium of Instruction: English

Learning Outcomes

1. Explain mathematics theorems related to networking
2. Solve networking problems with mathematics
3. Solve problems related to network performance with mathematics

Synopsis of Course Content

This course covers probability theory, stochastic processes, queuing theory, graph theory and their applications to networking. Topics include random variables, conditional probability, discrete and continuous distribution, Little's theorem, Markov processes, Markov chains, birth-death processes, M/M/1 queue, multiserver queue, graph theory etc.

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 technique used clearly.
2. Analyze the technique used in an algorithm for the strength and weaknesses.
3. Determine which technique or algorithm to be used and implemented in a system accordingly.
4. Discuss the implementation of cryptographic technique in any internet security protocols and user authentication mechanisms.
5. Apply the current cryptographic and security technology.

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 PROGRAMING

Credit: 3

Course Pre-requisite(s): None

Medium of Instruction: English

Learning Outcomes

1. Identify the concept and architecture of an embedded system.
2. Apply an embedded system application.
3. Use interfacing technique between embedded system applications.

Synopsis of Course Contents

This course covers the embedded system overview, special variable processor design, embedded system memory, 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. Identify the suitable principles and techniques in computer penetration.
2. Apply the computer penetration techniques based upon the suitable selection process.
3. Solve security problems on appliances by using the computer penetration process.

Synopsis of Course Content

This course introduces the concepts and techniques used in computer penetration which mainly focussing on ethical hacking. Topic includes Ethical Hacking, Footprinting, Scanning Networks, System Hacking, Malware, Hacking Webservers, Hacking Wireless and Penetration Testing.

Assessment Methods

Continuous Assessment: 50%
Final Examination: 50%

WIC3005 ENTERPRISE NETWORK DESIGN AND MANAGEMENT

Credit: 3

Course Pre-requisite(s): None

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. Develop 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 Method

Continuous Assessment: 50%
Final Examination: 50%

WIC3007 PRINCIPLES OF DISTRIBUTED SYSTEMS
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Credit: 3

Course Pre-requisite(s): None

Medium of Instruction: English

Learning Outcomes

1. Recognize the underlying principles of distributed systems.
2. Determine the fundamental paradigms of distributed systems.
3. Identify the issues and problems, together with the solutions in implementing distributed systems.
4. Implement distributed systems.

Synopsis of Course Content

This course covers the introduction to distributed systems which includes foundations on system models & inter-process communication, low level network programming using socket, distributed algorithms, systems middleware, system infrastructure and distributed computing paradigms.

Assessment Methods

Continuous Assessment: 60%
Final Examination: 40%

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 concept of computer systems 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%

<p style="text-align: center;">WIC3009 PARALLEL PROGRAMMING</p>

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 in GPU and their hardware communication. 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)

**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%

**WID2003
COGNITIVE SCIENCE**

Credit: 3

Course Pre-requisite(s): None

Medium of Instruction: English

Learning Outcomes

1. Identify various concepts and processes of cognition.
2. Explain the functions of memory in relation to learning activities.
3. Apply cognitive theories in solving problems in everyday life.

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 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%

**WID3003
NEURAL COMPUTING**

Credit: 3

Course Pre-requisite(s): None

Medium of Instruction: English

Learning Outcomes

1. Describe the components of neuron and the Artificial Neural Network (ANN) architecture.
2. Use appropriate data as input for the neural network system.
3. Apply suitable learning rules for a given ANN problem.

Synopsis of Course Content

This course covers topics such as the history, design, biology motivation, and characteristics of Artificial Neural Network to Deep Learning. It also covers topics such as linear algebra, categorisation of neural networks, learning rules of perceptron, *Hebbian*, backpropagation, and competitive learning.

Assessment Methods

Continuous Assessment: 50%
Final Examination: 50%

**WID3004
NUMERICAL METHODS**

Credit: 3

Course Pre-requisite(s): None

Medium of Instruction: English

Learning Outcomes

1. Write equations using numerical methods.
2. Use numerical methods to solve differentiation and integration problems.
3. Apply numerical methods to write computer programs.

Synopsis of Course Contents

This course covers numerical analysis and the computer implementation of numerical problems. Topics include interpolation and function approximation, system of linear equations, solving algebraic equations, numerical differentiation and integration, numerical solution of ordinary and partial differential equations, mathematical modelling and computer simulation applications of numerical method in various fields: computer graphics, robotic, neural network, machine learning, networking.

Assessment Methods

Continuous Assessment: 50%
Final Examination: 50%

**WID3005
INTELLIGENT ROBOTICS**

Credit: 3

Course Pre-requisite(s): None

Medium of Instruction: English

Learning Outcomes

1. Describe various components of a robot and its sensors.
2. Apply robot vision and speech processing techniques in artificial intelligence problems.
3. Simulate robot.

Synopsis of Course Content

This course covers the fundamentals of robot intelligence. It covers topics on the background of robotic, applications (such as military, industries, medical, and, search and rescue), effects of robots on life, robot components, types of robots with functions and applications, senses – vision (image, pattern recognition, pixel analysis), acoustic, speech, touch, olfactory (artificial nose), robot kinematics, artificial emotions, navigation and cognitive mapping, sensors and robot problem solving. It also covers new development in robotics (such as bio-inspired robotics, evolutionary robotic and evolutionary algorithms).

Assessment Methods

Continuous Assessment: 50%
Final Examination: 50%

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%

WID3007 FUZZY LOGIC

Credit: 3

Course Pre-requisite(s): None

Medium of Instruction: English

Learning Outcomes

1. Identify the concept of fuzzy logics.
2. Determine the operations, inferences and relation in fuzzy logics.
3. Apply fuzzy logic techniques and concepts in various problems.

Synopsis of Course Content

This course explores how principles from theories of fuzzy logic can be used to construct machines in real-world of uncertainty. In particular, the course covers techniques from fuzzification, defuzzification, fuzzy operator and fuzzy type-II in solving real-world problems.

Assessment Method

Continuous Assessment: 50%
Final Examination: 50%

WID3008 IMAGE PROCESSING

Credit: 3

Course Pre-requisite(s) : None

Medium of Instruction: English

Learning Outcomes

1. Develop knowledge of image processing techniques and methodologies.
2. Explain various image processing methods and algorithms for particular classes of problems.
3. Apply various image processing methods and algorithms in variety of open-ended design problems.

Synopsis of Course Content

This course explores how principles from theories of image processing can be used to construct machines that exhibit nontrivial behavior. In particular, the course covers techniques from geometry, computer vision, machine learning and image processing in solving real-world problems.

Assessment Methods

Continuous Assessment: 50%
Final Examination: 50%

WID3009 ARTIFICIAL INTELLIGENCE GAME PROGRAMMING

Credit: 3

Course Pre-requisite(s):

WID3004 Numerical Methods

Medium of Instruction: English

Learning Outcomes

1. Apply the laws of physics in programing simulations.
2. Write programs that represent a state-space and elements within it.
3. Use Artificial Intelligence techniques in game programs.

Synopsis of Course Content

This course covers applications of Artificial Intelligence (AI) in games and their implementation of these techniques. Using AI in games allows students to create interactive games that are entertaining and challenging. This course includes topics such as reasoning, tracking player behavior, movement and animation.

Assessment Methods

Continuous Assessment: 50%
Final Examination: 50%

COURSE INFORMATION: SPECIALIZATION ELECTIVE COURSES

Bachelor of Computer Science (Information Systems)

**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, 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. Write applications using open source programming language to populate, retrieve and update database.
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 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 large datasets.
3. Categorize suitable tools and technologies used in data science.

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%

**WIE2004
INFORMATION SERVICE ORIENTED
ARCHITECTURE**

Credit: 3

Course Pre-requisite(s): None

Medium of Instruction: English

Learning Outcomes

1. Explain the need for Web services and Service Oriented Architecture in business.
2. Describe the philosophy and architecture of Web services and Service Oriented Architecture.
3. Interpret the essential ingredients (SOAP, UDDI, WSDL) of a Web Service.
4. Design a Service Oriented Architecture using XML Web Services (Model of SOA).

Synopsis of Course Content

This course introduces the major concepts and technologies relating to service oriented architectures which represent a new approach for building interoperable, loosely coupled distributed systems. This includes the core architecture, overview and main principles of service orientation, web services, evolution of distributed system technologies, and standards which includes XML, SOAP, UDDI, and WSDL to address the basics of interoperable services.

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. To use 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 are implemented, scaling up to big data size databases.

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 had potential commercialization values.

Synopsis of Course Content

This course consists of the following components: (a) History of e-Commerce 1: Development of telegraph, mail orders, call centres, EDI, web businesses, network economy, real and virtual network; (b) History of e-Commerce 2: Economy scale offer vs. demand, Metcalfe's Law, dominant enterprise model and cost model; (c) Market opportunity analysis; (d) Online business models; (e) Interface design and system design; (f) Market communication and branding; (g) Implementation of resources system, website development and web architecture; (h) Electronic payment system; (i) E-commerce issues including security and policies and cyber laws; (j) E-commerce in practice and future trend and (k) Mobile commerce.

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. Explain 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.
4. Apply ethical value in each of the security development of information system complying to the law and policy for better control.

Synopsis of Course Contents

There are ten elements of the syllabus of the course are; (a) Information Security and Risk Management; (b) Access Control System and Methodology; (c) Cryptography; (d) Physical/Environmental Security; (e) Enterprise security system architecture and design; (f) Business Continuity and Disaster Recovery Planning; (g) Telecommunication, Networks and Internet Security; (h) Application Security; (i) Operation Security; (j) Law, Investigation, Compliance and Ethics.

Assessment Methods

Continuous Assessment: 50%
Final Examination: 50%

**WIE3004
INFORMATION RETRIEVAL**

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. Discuss new research directions in the field of Web Information Retrieval and the new features being developed by today's commercial search engines.

Synopsis of Course Content

The objective of this course is to examine the main computer science principles that lie behind search engines. To this end, we will provide an introduction to 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%

**WIE3005
KNOWLEDGE MANAGEMENT AND
ENGINEERING**

Credit: 3

Course Pre-requisite(s): None

Medium of Instruction: English

Learning Outcomes

1. Describe the concepts of Knowledge Management and Engineering (KME).
2. Describe the technological approaches toward KME.
3. Use of various tools and methods for KME.
4. Use working knowledge and skills to plan, assess, develop and implement KM project.

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 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%

**WIE3006
INFORMATION SYSTEM AUDITING**

Credit: 3

Course Pre-requisite(s):

WIE3003 Information System Control and Security

Medium of Instruction: English

Learning Outcomes

1. Understand the role of IS Auditors, IS audit functions and the purpose of controls in IS environment.
2. Identify effective auditing processes and tools for information systems.
3. Discuss the basic theory and models in information security to mitigate risks, effective procedures for an organization to control information security issues.
4. Use the works, procedures and control learned to solve current problems faced by organizations for effective auditing purpose.

Synopsis of Course Content

This course provides a general and practical view of information systems audit and control concepts and management practices. This course emphasizes on the purpose and value of IS audit in current business scenario, the impact on the control process and audit procedures in current technology and new technology advancement. Upon completion of this course, students will be able to discuss and conduct basic audits of information systems.

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. 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%

WIE3009 ENTERPRISE SYSTEM DESIGN AND IMPLEMENTATION

Credit: 3

Course Pre-requisite(s): None

Medium of Instruction: English

Learning Outcomes

1. Identify the basic concepts of enterprise systems.
2. Describe key issues about the development, implementation, and management of Enterprise Systems;
3. Apply the benefits of Enterprise Systems.

Synopsis of Course Content

This course is designed to provide a comprehensive insight into theoretical foundations, concepts, tools and current practice of enterprise systems. It covers the entire design process for an enterprise, includes design of the information, process, and organization. It covers enterprise design methods, enterprise architecture, requirements analysis, enterprise strategy, process design, information design, organization design and the integration of the enterprise.

Assessment Method

Continuous Assessment: 50%
Final Examination: 50%

WIE3010 DATA VISUALIZATION

Credit: 3

Course Pre-requisite(s): None

Medium of Instruction: English

Learning Outcomes

1. Explain concepts and techniques relevant to data visualization, 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%

WIE3011 STRATEGIC INFORMATION SYSTEMS AND MANAGEMENT

Credit: 3

Course Pre-requisite(s): None

Medium of Instruction: English

Learning Outcomes

1. Recognize various types of information systems that are used in business.

2. Explain business and IS strategies and services, and their strategic impact on the business world.
3. Identify issues and implications of IS management.

Synopsis of Course Content

This course focuses on the introduction and utilization of various types of information system encountered in everyday life and in the business world. This course will also look at the effect of integrating business and IS system. Challenges and issues in IS management will also be identified.

Assessment Method

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)

**WIF2001
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 interface design.
3. Design, prototype and evaluate interactive systems (website, mobile applications or games), featuring a strong focus on user-centred design.
4. Employ selected interface construction tools to the implementation of an interactive system.

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, UI Development process, and interface design and programming. Overview of HCI introduces human, computer and interactions; User Interfaces (UI); usability and user experience (UX). Essential interaction design principles include topics on Psychopathology of everyday things, Psychology of everyday actions, Knowledge in the head and in the world, knowing what to do, understanding and designing for error. UI 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, The Web and Mobile Devices.

Assessment Methods

Continuous Assessment: 50%
Final Examination: 50%

**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. Explain the concepts and functions of client-server architecture on the Web.
2. Apply different protocols, languages, techniques, and tools for Web programming.
3. Recognize different quality issues in relation to Web based applications.
4. Implement an interactive website with regard to relevant quality issues.

Synopsis of Course Content

This course covers theoretical and technical issues of Web development. Theoretical issues include the concepts of Web, client-server architecture, and quality attributes of Web-based systems. Technical issues include topics on systematic development of Web-based systems using different protocols, languages, techniques, 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 and test types.
2. Explain test approaches in software development.
3. Apply the test design techniques of static and 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. 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. Define the fundamental concepts of software quality, software process and software process improvement.
2. Describe the components and activities involved in Software Quality Assurance (SQA).
3. Apply various existing software development methodologies.
4. Analyze 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. 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%

WIF3003 CONCURRENT PROGRAMMING

Credit: 3

Course Pre-requisite(s):

WIX1002 Fundamentals of Programming
WIA2004 Operating Systems

Medium of Instruction: English

Learning Outcomes

1. Define the concept of concurrent processing.
2. Identify methods to implement concurrent processing.
3. Classify systems requiring simultaneous process execution.
4. Solve problems related to concurrent systems.

Synopsis of Course Content

Concurrent programming plays a vital role in systems where many events appear to occur simultaneously. This course aims to provide an introduction to the problems common to concurrent systems such as operating systems, distributed systems and real-time systems, and practical knowledge of the programming constructs and techniques offered by modern concurrent programming languages.

Assessment Methods

Continuous Assessment: 50%
Final Examination: 50%

WIF3004 SOFTWARE ARCHITECTURE AND DESIGN PARADIGMS

Credit: 3

Course Pre-requisite(s):

WIA2002 Software Modelling

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 design.
3. Analyze software architecture.

Synopsis of Course Contents

This course covers detailed design and architecture design of software system. These include 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 (such as Singleton, Template Method, and so on); 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. Recognize the fundamentals of software maintenance, maintenance processes and activities.
2. Distinguish the main categories of maintenance and techniques that are associated with them.
3. Apply suitable techniques and tools for performing software maintenance activities.
4. 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 Software Modelling

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. Develop component-based application using various component models and programming APIs.
3. Incorporate changes to the component application using component-based approach.

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, middleware, object-oriented paradigm within middleware, component-based software engineering models 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%

WIF3007 DESIGN PATTERNS

Credit: 3

Course Pre-requisite(s): None

Medium of Instruction: English

Learning Outcomes

1. Classify a design pattern into the correct category.
2. Identify the design patterns used in software systems.
3. Apply suitable design patterns in developing software.

Synopsis of Course Content

This course covers the different design patterns under different categories, and the benefits of using design patterns in software development. It also covers common design patterns in-depth (for examples, observer, decorator, factory, singleton, command, adapter, façade, template method, iterator, composite, state, and proxy). It also covers refactoring existing code to design patterns.

Assessment Method

Continuous Assessment: 50%

Final Examination: 50%

WIF3008

REAL TIME SYSTEMS

Credit: 3

Course Pre-requisite(s): None

Medium of Instruction: English

Learning Outcomes

1. Define the principles of real time systems.
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.
4. Compare real time system architectures.

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%

COURSE INFORMATION: SPECIALIZATION ELECTIVE COURSES

Bachelor of Information Technology (Multimedia)

**WIG2001
DIGITAL IMAGE PROCESSING**

Credit: 3

Course Pre-requisite(s): None

Medium of Instruction: English

Learning Outcomes

1. Explain about the digital image processing techniques in specific.
2. Differentiate the use of digital image processing techniques in several multimedia application.
3. Apply the appropriate digital image processing techniques.

Synopsis of Course Content

This course covers topics in digital image processing as follow: digital image representation; image enhancement; image restoration; image segmentation and image representations and descriptions.

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. Describe the concepts and basic algorithms for 2D graphics primitive objects.
2. Describe the concepts and techniques used in 3D computer graphics.
3. To implement 2D and 3D graphics objects using a computer graphics API.

Synopsis of Course Content

The course will cover the principles of interactive raster graphics. Topics include an introduction to the basic concepts, coordinate system, 2D and 3D transformations, 2D and 3D viewing transformations, projection, lighting, texture mapping and geometry. Students will be using OpenGL, multi-platform open source API to create and to render both 2D and 3D graphic objects.

Assessment Methods

Continuous Assessment: 50%
Final Examination: 50%

**WIG2003
MULTIMEDIA VISUAL ARTS**

Credit: 3

Course Pre-requisite(s): None

Medium of Instruction: English

Learning Outcomes

1. Explain the techniques for visual arts in interactive multimedia, including Digital Entertainment Technology, New Media Technology, Digital Arts and Visual and Audio Digital.
2. Develop multimedia application based on visual arts techniques.
3. Evaluate interactive multimedia based on visual arts theory and techniques.

Synopsis of Course Content

This course starts with an introduction of Digital Entertainment Technologies including interactive computer games, MMORPG, Wearable devices, Haptic devices and Home automation. The students will be exposed to various Digital Art including algorithmic art, software art, GUI arts and VR arts. Theory on Visual and Audiotory media will be taught in order to develop a prototype of interactive multimedia application. The course concludes with a discussion on new media and its implication into our lifestyle

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 the discussion on the characteristics of a speech synthesis and speech recognition systems and their applications.

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; area and linear; time and frequency; sampling and prediction; scaling and resolution; and repetition and information.

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, compositing and rendering. At the end of this course, students will be equipped with the

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. Develop multimedia application using Java programming language.
3. Apply the multimedia elements in programming various mobile applications (Android & iOS).

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, 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. Show the technology that support virtual reality applications and human perceptions involved in designing virtual reality devices. (P2)
2. Develop a virtual reality environment using suitable tools (C3)
3. Integrating other technologies including visualization and augmented reality (P4)

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, a research area that is closely related to 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 contents.

Synopsis of Course Content

This course covers the following topics related to multimedia forensic and security: Digital Right Management, Multimedia security issues, Multimedia Encryption, Authentication for multimedia content, Information hiding, Biometric spoofing, Anti-piracy technology.

Assessment Methods

Continuous Assessment: 50%
Final Examination: 50%

WIG3009 MULTIMEDIA RETIEVAL
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Credit: 3

Course Pre-requisite(s) : None .

Medium of Instruction: English

Learning Outcomes

1. Describe issues and techniques involved in retrieving multimedia information.
2. Discuss the main challenges facing the representation, storage and retrieval of multimedia information.
3. Build an application to search and retrieve multimedia information from the web.

Synopsis of Course Content

This course covers the following topics: concepts of information retrieval, IR metrics precision and recall; search engine concept and architecture (i.e. document indexing, querying, ranking and information retrieval models); textual information retrieval - information retrieval models (e.g. Boolean, Vector Space, Probabilistic, Fuzzy), indexing (e.g. suffix tree, inverted files), querying (e.g. keyword-based queries, context queries, natural language queries); image retrieval – manual image indexing using metadata, indexing by visual features (i.e. color, shape, texture), shape and color based retrieval; speech retrieval, speech recognition and retrieval; video retrieval – motion detection and video segmentation.

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				✓	✓		✓	
FACULTY ELECTIVE COURSES										
WIX3001	Soft Computing	3		✓		✓		✓		
WIX3002	Social Informatics	3			✓			✓	✓	
WIX3003	Information Security Management and Ethics	3			✓	✓			✓	
WIX3004	Mobile Application Development	3			✓			✓	✓	
WIX3005	Digital Cinematography	3		✓		✓			✓	
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	✓	✓				✓		
WIA1004	Fundamentals of Artificial Intelligence	3	✓	✓			✓			
WIA1005	Network Technology Foundation	4	✓	✓				✓		
WIA2001	Database	3	✓	✓				✓		
WIA2002	Software Modeling	3	✓	✓				✓		
WIA2003	Probability and Statistics	3	✓	✓				✓		
WIA2004	Operating Systems	4	✓	✓			✓			
WIA2005	Algorithm Design and Analysis (#WIA1002)	4	✓	✓				✓		
WIA3001	Industrial Training *	12				✓		✓	✓	
WIA3002	Academic Project I **	3						✓	✓	✓
WIA3003	Academic Project II (#WIA3002)	5						✓	✓	✓
SPECIALIZATION ELECTIVE COURSES										
WIC2001	Advanced Network Technology	3	✓	✓				✓		
WIC2002	Network Security	3	✓	✓				✓		
WIC2003	Digital Design and Hardware Description Language	3	✓	✓				✓		
WIC2004	Internet Technology	3	✓	✓			✓			
WIC3001	Mathematics in Networking	3	✓			✓		✓		

COURSE CODE	COURSE TITLE	CREDITS	PROGRAMME OUTCOMES (PO)								
			PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	
WIC3002	Cryptography	3	✓					✓	✓		
WIC3003	Embedded System Programming	3	✓	✓					✓		
WIC3004	Computer Penetration	3	✓	✓		✓					
WIC3005	Enterprise Network Design and Management	3	✓	✓					✓		
WIC3006	Mobile Computing	3		✓		✓		✓			
WIC3007	Principles of Distributed Systems	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				✓	✓		✓	
FACULTY ELECTIVE COURSES										
WIX3001	Soft Computing	3		✓		✓		✓		
WIX3002	Social Informatics	3			✓			✓	✓	
WIX3003	Information Security Management and Ethics	3			✓	✓			✓	
WIX3004	Mobile Application Development	3			✓			✓	✓	
WIX3005	Digital Cinematography	3		✓		✓			✓	
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	✓	✓				✓		
WIA1004	Fundamentals of Artificial Intelligence	3	✓	✓			✓			
WIA1005	Network Technology Foundation	4	✓	✓				✓		
WIA2001	Database	3	✓	✓				✓		
WIA2002	Software Modeling	3	✓	✓				✓		
WIA2003	Probability and Statistics	3	✓	✓				✓		
WIA2004	Operating Systems	4	✓	✓			✓			
WIA2005	Algorithm Design and Analysis (#WIA1002)	4	✓	✓				✓		
WIA3001	Industrial Training *	12				✓		✓	✓	
WIA3002	Academic Project I **	3						✓	✓	✓
WIA3003	Academic Project II (#WIA3002)	5						✓	✓	✓
SPECIALIZATION ELECTIVE COURSES										
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	
WID3003	Neural Computing	3	✓		✓				✓		
WID3004	Numerical Methods	3	✓	✓					✓		
WID3005	Intelligent Robotics	3	✓	✓					✓		
WID3006	Machine Learning	3	✓	✓					✓		
WID3007	Fuzzy Logic	3	✓	✓					✓		
WID3008	Image Processing	3	✓	✓					✓		
WID3009	Artificial Intelligence Game Programming (#WID3004)	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				✓	✓		✓	
FACULTY ELECTIVE COURSES										
WIX3001	Soft Computing	3		✓		✓		✓		
WIX3002	Social Informatics	3			✓			✓	✓	
WIX3003	Information Security Management and Ethics	3			✓	✓			✓	
WIX3004	Mobile Application Development	3			✓			✓	✓	
WIX3005	Digital Cinematography	3		✓		✓			✓	
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	✓	✓				✓		
WIA1004	Fundamentals of Artificial Intelligence	3	✓	✓			✓			
WIA1005	Network Technology Foundation	4	✓	✓				✓		
WIA2001	Database	3	✓	✓				✓		
WIA2002	Software Modeling	3	✓	✓				✓		
WIA2003	Probability and Statistics	3	✓	✓				✓		
WIA2004	Operating Systems	4	✓	✓			✓			
WIA2005	Algorithm Design and Analysis (#WIA1002)	4	✓	✓				✓		
WIA3001	Industrial Training *	12				✓		✓	✓	
WIA3002	Academic Project I **	3						✓	✓	✓
WIA3003	Academic Project II (#WIA3002)	5						✓	✓	✓
SPECIALIZATION ELECTIVE COURSES										
WIE2001	Trends in Information Systems	3	✓	✓				✓		
WIE2002	Open Source Programming: Application and Technology	3	✓	✓				✓		
WIE2003	Introduction to Data Science	3	✓					✓	✓	
WIE2004	Information Service Oriented Architecture	3	✓			✓		✓		
WIE3001	Advanced Database	3	✓	✓					✓	

COURSE CODE	COURSE TITLE	CREDITS	PROGRAMME OUTCOMES (PO)							
			PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
WIE3002	Electronic Commerce	3	✓		✓					✓
WIE3003	Information System Control and Security	3	✓	✓		✓				
WIE3004	Information Retrieval	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	✓	✓				✓		
WIE3009	Enterprise System Design and Implementation	3	✓	✓					✓	
WIE3010	Data Visualisation	3	✓	✓					✓	
WIE3011	Strategic Information Systems and Management	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										
WIE2003	Introduction to Data Science	3	✓				✓	✓	✓	
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	✓	✓				✓		
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				✓	✓		✓	
FACULTY ELECTIVE COURSES										
WIX3001	Soft Computing	3		✓		✓		✓		
WIX3002	Social Informatics	3			✓			✓	✓	
WIX3003	Information Security Management and Ethics	3			✓	✓			✓	
WIX3004	Mobile Application Development	3			✓			✓	✓	
WIX3005	Digital Cinematography	3		✓		✓			✓	
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	✓	✓				✓		
WIA1004	Fundamentals of Artificial Intelligence	3	✓	✓			✓			
WIA1005	Network Technology Foundation	4	✓	✓				✓		
WIA2001	Database	3	✓	✓				✓		
WIA2002	Software Modeling	3	✓	✓				✓		
WIA2003	Probability and Statistics	3	✓	✓				✓		
WIA2004	Operating Systems	4	✓	✓			✓			
WIA2005	Algorithm Design and Analysis (#WIA1002)	4	✓	✓				✓		
WIA3001	Industrial Training *	12				✓		✓	✓	
WIA3002	Academic Project I **	3						✓	✓	✓
WIA3003	Academic Project II (#WIA3002)	5						✓	✓	✓
SPECIALIZATION ELECTIVE COURSES										
WIF2001	Human Computer Interaction	3	✓	✓	✓					
WIF2002	Software Requirements Engineering	3	✓	✓			✓			
WIF2003	Web Programming	3		✓	✓			✓		
WIF3001	Software Testing	3		✓		✓		✓		
WIF3002	Software Process and Quality	3	✓			✓	✓			
WIF3003	Concurrent Programming (#WIX1002; WIA2004)	3		✓			✓	✓		

COURSE CODE	COURSE TITLE	CREDITS	PROGRAMME OUTCOMES (PO)							
			PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
WIF3004	Software Architecture and Design Paradigms (#WIA2002)	3		✓			✓	✓		
WIF3005	Software Maintenance and Evolution	3		✓			✓	✓		
WIF3006	Component-Based Software Engineering (#WIA2002)	3	✓	✓			✓			
WIF3007	Design Patterns	3		✓			✓	✓		
WIF3008	Real Time Systems	3		✓			✓	✓		

MAPPING COURSES TO PROGRAMME OUTCOMES

PROGRAMME: BACHELOR OF INFORMATION TECHNOLOGY (MULTIMEDIA)

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			✓	✓			✓	
WIX3004	Mobile Application Development	3			✓			✓	✓	
WIX3005	Digital Cinematography	3		✓		✓			✓	
PROGRAMME CORE COURSES										
WIB1001	Fundamental of Multimedia	3	✓					✓		✓
WIB1002	Data Structure (#WIX1002)	5	✓	✓				✓		

COURSE CODE	COURSE TITLE	CREDITS	PROGRAMME OUTCOMES (PO)							
			PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
WIB1003	Data Communication and Networking	3	✓	✓				✓		
WIB2001	Database	3	✓	✓				✓		
WIB2002	Interactive Design	3	✓	✓			✓			
WIB2003	Probability and Statistics	3	✓	✓				✓		
WIB2004	Operating Systems	4	✓	✓			✓			
WIB2005	Open Source Programming: Application and Technology	3	✓		✓			✓		
WIB2006	System Analysis, Modelling and Design	3	✓	✓					✓	
WIB2007	Information System Control and Security	3		✓	✓	✓				
WIB3001	Industrial Training *	12				✓		✓	✓	
WIB3002	Academic Project I **	3						✓	✓	✓
WIB3003	Academic Project II (#WIB3002)	5						✓	✓	✓
SPECIALIZATION ELECTIVE COURSES										
WIG2001	Digital Image Processing	3	✓	✓				✓		
WIG2002	Computer Graphics	3	✓	✓				✓		
WIG2003	Multimedia Visual Arts	3		✓	✓		✓			
WIG2004	Audio Synthesis	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				✓			✓	✓	
WIG3009	Multimedia Retrieval	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	✓	✓	✓				✓	✓	✓			✓	✓	✓		
FACULTY ELECTIVE COURSES																		
WIX3001	Soft Computing	3	✓	✓	✓				✓	✓								
WIX3002	Social Informatics	3	✓	✓	✓									✓	✓	✓		
WIX3003	Information Security Management and Ethics	3	✓	✓	✓									✓	✓	✓		
WIX3004	Mobile Application Development	3	✓	✓	✓	✓			✓	✓				✓	✓	✓		
WIX3005	Digital Cinematography	3	✓	✓	✓				✓	✓				✓	✓	✓		
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	✓	✓	✓				✓	✓	✓			✓	✓	✓		
WIA1004	Fundamentals of Artificial Intelligence	3	✓	✓	✓				✓	✓	✓			✓	✓	✓		
WIA1005	Network Technology Foundation	4	✓	✓	✓				✓	✓	✓			✓	✓	✓		
WIA2001	Database	3	✓	✓	✓				✓	✓	✓			✓	✓			
WIA2002	Software Modeling	3		✓	✓				✓	✓	✓			✓	✓	✓		
WIA2003	Probability and Statistics	3	✓	✓	✓				✓	✓	✓			✓	✓	✓		
WIA2004	Operating Systems	4	✓	✓	✓				✓	✓	✓			✓	✓	✓		
WIA2005	Algorithm Design and Analysis (#WIA1002)	4	✓	✓	✓				✓	✓	✓			✓	✓	✓		
WIA3001	Industrial Training *	12	✓	✓	✓	✓			✓	✓				✓	✓	✓		
WIA3002	Academic Project I **	3	✓	✓	✓				✓	✓				✓	✓	✓		
WIA3003	Academic Project II (#WIA3002)	5	✓	✓	✓	✓			✓	✓	✓			✓	✓	✓		
SPECIALIZATION ELECTIVE COURSES																		
WIC2001	Advanced Network Technology	3	✓	✓	✓				✓	✓								
WIC2002	Network Security	3	✓	✓	✓				✓	✓				✓	✓	✓		
WIC2003	Digital Design and Hardware Description Language	3	✓	✓	✓				✓	✓								
WIC2004	Internet Technology	3	✓	✓	✓	✓			✓	✓	✓			✓	✓	✓		
WIC3001	Mathematics in Networking	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
WIC3002	Cryptography	3	✓	✓	✓	✓			✓	✓	✓							
WIC3003	Embedded System Programming	3	✓	✓	✓				✓	✓	✓							
WIC3004	Computer Penetration	3	✓	✓	✓				✓	✓				✓	✓	✓		
WIC3005	Enterprise Network Design and Management	3	✓	✓	✓				✓	✓	✓							
WIC3006	Mobile Computing	3							✓	✓	✓			✓	✓	✓		
WIC3007	Principles of Distributed Systems	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	✓	✓	✓				✓	✓	✓			✓	✓	✓		
FACULTY ELECTIVE COURSES																		
WIX3001	Soft Computing	3	✓	✓	✓				✓	✓								
WIX3002	Social Informatics	3	✓	✓	✓									✓	✓	✓		
WIX3003	Information Security Management and Ethics	3	✓	✓	✓									✓	✓	✓		
WIX3004	Mobile Application Development	3	✓	✓	✓	✓			✓	✓				✓	✓	✓		
WIX3005	Digital Cinematography	3	✓	✓	✓				✓	✓				✓	✓	✓		
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	✓	✓	✓				✓	✓	✓			✓	✓	✓		
WIA1004	Fundamentals of Artificial Intelligence	3	✓	✓	✓				✓	✓	✓			✓	✓	✓		
WIA1005	Network Technology Foundation	4	✓	✓	✓				✓	✓	✓			✓	✓	✓		
WIA2001	Database	3	✓	✓	✓				✓	✓	✓			✓	✓			
WIA2002	Software Modeling	3		✓	✓				✓	✓	✓			✓	✓	✓		
WIA2003	Probability and Statistics	3	✓	✓	✓				✓	✓	✓			✓	✓	✓		
WIA2004	Operating Systems	4	✓	✓	✓				✓	✓	✓			✓	✓	✓		
WIA2005	Algorithm Design and Analysis (#WIA1002)	4	✓	✓	✓				✓	✓	✓			✓	✓	✓		
WIA3001	Industrial Training *	12	✓	✓	✓	✓			✓	✓				✓	✓	✓		
WIA3002	Academic Project I **	3	✓	✓	✓				✓	✓				✓	✓	✓		
WIA3003	Academic Project II (#WIA3002)	5	✓	✓	✓	✓			✓	✓	✓			✓	✓	✓		
SPECIALIZATION ELECTIVE COURSES																		
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	COGNITIVE						PSYCHOMOTOR					AFFECTIVE				
			C1	C2	C3	C4	C5	C6	P1	P2	P3	P4	P5	A1	A2	A3	A4	A5
WID3003	Neural Computing	3	✓	✓	✓	✓			✓	✓	✓			✓	✓			
WID3004	Numerical Methods	3	✓	✓	✓	✓								✓	✓	✓		
WID3005	Intelligent Robotics	3	✓	✓	✓	✓			✓	✓	✓			✓	✓			
WID3006	Machine Learning	3	✓	✓	✓	✓			✓	✓	✓			✓	✓			
WID3007	Fuzzy Logic	3	✓	✓	✓	✓			✓	✓	✓			✓	✓			
WID3008	Image Processing	3	✓	✓	✓	✓			✓	✓	✓			✓	✓			
WID3009	Artificial Intelligence Game Programming (#WID3004)	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	✓	✓	✓				✓	✓	✓			✓	✓	✓		
FACULTY ELECTIVE COURSES																		
WIX3001	Soft Computing	3	✓	✓	✓				✓	✓								
WIX3002	Social Informatics	3	✓	✓	✓									✓	✓	✓		
WIX3003	Information Security Management and Ethics	3	✓	✓	✓									✓	✓	✓		
WIX3004	Mobile Application Development	3	✓	✓	✓	✓			✓	✓				✓	✓	✓		
WIX3005	Digital Cinematography	3	✓	✓	✓				✓	✓				✓	✓	✓		
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	✓	✓	✓				✓	✓	✓			✓	✓	✓		
WIA1004	Fundamentals of Artificial Intelligence	3	✓	✓	✓				✓	✓	✓			✓	✓	✓		
WIA1005	Network Technology Foundation	4	✓	✓	✓				✓	✓	✓			✓	✓	✓		
WIA2001	Database	3	✓	✓	✓				✓	✓	✓			✓	✓			
WIA2002	Software Modeling	3		✓	✓				✓	✓	✓			✓	✓	✓		
WIA2003	Probability and Statistics	3	✓	✓	✓				✓	✓	✓			✓	✓	✓		
WIA2004	Operating Systems	4	✓	✓	✓				✓	✓	✓			✓	✓	✓		
WIA2005	Algorithm Design and Analysis (#WIA1002)	4	✓	✓	✓				✓	✓	✓			✓	✓	✓		
WIA3001	Industrial Training *	12	✓	✓	✓	✓			✓	✓				✓	✓	✓		
WIA3002	Academic Project I **	3	✓	✓	✓				✓	✓				✓	✓	✓		
WIA3003	Academic Project II (#WIA3002)	5	✓	✓	✓	✓			✓	✓	✓			✓	✓	✓		
SPECIALIZATION ELECTIVE COURSES																		
WIE2001	Trends in Information Systems	3	✓	✓	✓	✓			✓	✓	✓							
WIE2002	Open Source Programming: Application and Technology	3	✓	✓	✓	✓			✓	✓	✓	✓						
WIE2003	Introduction to Data Science	3	✓	✓	✓	✓								✓	✓	✓		
WIE2004	Information Service Oriented Architecture	3	✓	✓	✓	✓								✓	✓	✓		
WIE3001	Advanced Database	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
WIE3002	Electronic Commerce	3	✓	✓	✓									✓	✓	✓		
WIE3003	Information System Control and Security	3	✓	✓	✓									✓	✓	✓		
WIE3004	Information Retrieval	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	✓	✓	✓				✓	✓	✓			✓	✓			
WIE3009	Enterprise System Design and Implementation	3	✓	✓	✓	✓			✓	✓								
WIE3010	Data Visualisation	3	✓	✓	✓				✓	✓	✓							
WIE3011	Strategic Information Systems and Management	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																		
WIE2003	Introduction to Data Science	3	✓	✓	✓	✓								✓	✓	✓		
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		✓	✓				✓	✓	✓			✓	✓	✓		
WID3006	Probability and Statistics	3	✓	✓	✓	✓			✓	✓	✓			✓	✓			
WIA2003	Operating Systems	3	✓	✓	✓				✓	✓	✓			✓	✓	✓		
WIA2004	Machine Learning	4	✓	✓	✓				✓	✓	✓			✓	✓	✓		
WIA3001	Industrial Training	12	✓	✓	✓	✓			✓	✓				✓	✓	✓		
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	✓	✓	✓				✓	✓	✓			✓	✓	✓		
FACULTY ELECTIVE COURSES																		
WIX3001	Soft Computing	3	✓	✓	✓				✓	✓								
WIX3002	Social Informatics	3	✓	✓	✓									✓	✓	✓		
WIX3003	Information Security Management and Ethics	3	✓	✓	✓									✓	✓	✓		
WIX3004	Mobile Application Development	3	✓	✓	✓	✓			✓	✓				✓	✓	✓		
WIX3005	Digital Cinematography	3	✓	✓	✓				✓	✓				✓	✓	✓		
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	✓	✓	✓				✓	✓	✓			✓	✓	✓		
WIA1004	Fundamentals of Artificial Intelligence	3	✓	✓	✓				✓	✓	✓			✓	✓	✓		
WIA1005	Network Technology Foundation	4	✓	✓	✓				✓	✓	✓			✓	✓	✓		
WIA2001	Database	3	✓	✓	✓				✓	✓	✓			✓	✓			
WIA2002	Software Modeling	3		✓	✓				✓	✓	✓			✓	✓	✓		
WIA2003	Probability and Statistics	3	✓	✓	✓				✓	✓	✓			✓	✓	✓		
WIA2004	Operating Systems	4	✓	✓	✓				✓	✓	✓			✓	✓	✓		
WIA2005	Algorithm Design and Analysis (#WIA1002)	4	✓	✓	✓				✓	✓	✓			✓	✓	✓		
WIA3001	Industrial Training *	12	✓	✓	✓	✓			✓	✓				✓	✓	✓		
WIA3002	Academic Project I **	3	✓	✓	✓				✓	✓				✓	✓	✓		
WIA3003	Academic Project II (#WIA3002)	5	✓	✓	✓	✓			✓	✓	✓			✓	✓	✓		
SPECIALIZATION ELECTIVE COURSES																		
WIF2001	Human Computer Interaction	3	✓	✓	✓	✓			✓	✓	✓							
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
WIF3003	Concurrent Programming (#WIX1002; WIA2004)	3		✓	✓	✓			✓	✓	✓							
WIF3004	Software Architecture and Design Paradigms (#WIA2002)	3	✓	✓	✓	✓			✓	✓								
WIF3005	Software Maintenance and Evolution	3	✓	✓	✓	✓			✓	✓	✓			✓	✓	✓		
WIF3006	Component-Based Software Engineering (#WIA2002)	3	✓	✓	✓	✓			✓	✓	✓							
WIF3007	Design Patterns	3	✓	✓	✓	✓			✓	✓								
WIF3008	Real Time Systems	3	✓	✓	✓	✓			✓	✓	✓							

MAPPING COURSES TO PROGRAMME OUTCOMES

PROGRAMME: BACHELOR OF INFORMATION TECHNOLOGY (MULTIMEDIA)

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			✓	✓			✓	
WIX3004	Mobile Application Development	3			✓			✓	✓	
WIX3005	Digital Cinematography	3		✓		✓			✓	
PROGRAMME CORE COURSES										
WIB1001	Fundamental of Multimedia	3	✓					✓		✓
WIB1002	Data Structure (#WIX1002)	5	✓	✓				✓		

COURSE CODE	COURSE TITLE	CREDITS	PROGRAMME OUTCOMES (PO)							
			PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
WIB1003	Data Communication and Networking	3	✓	✓				✓		
WIB2001	Database	3	✓	✓				✓		
WIB2002	Interactive Design	3	✓	✓			✓			
WIB2003	Probability and Statistics	3	✓	✓				✓		
WIB2004	Operating Systems	4	✓	✓			✓			
WIB2005	Open Source Programming: Application and Technology	3	✓		✓			✓		
WIB2006	System Analysis, Modelling and Design	3	✓	✓					✓	
WIB2007	Information System Control and Security	3		✓	✓	✓				
WIB3001	Industrial Training *	12				✓		✓	✓	
WIB3002	Academic Project I **	3						✓	✓	✓
WIB3003	Academic Project II (#WIB3002)	5						✓	✓	✓
SPECIALIZATION ELECTIVE COURSES										
WIG2001	Digital Image Processing	3	✓	✓				✓		
WIG2002	Computer Graphics	3	✓	✓				✓		
WIG2003	Multimedia Visual Arts	3		✓	✓		✓			
WIG2004	Audio Synthesis	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				✓			✓	✓	
WIG3009	Multimedia Retrieval	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
Willingness to participate in an activity to attend to a stimulus; getting and holding the attention of students	Actively participates; demonstrates interest in an object, activity or phenomena; seeks or pursues this object, activity or phenomena	Value or worth attached to an object, activity, or phenomena; varies from simple acceptance to commitment	Compare and contrast, and resolve conflict to build a consistent value system; emphasis on comparing and synthesizing values	Adopt a value system for length of time that contributes to a particular "lifestyle" (i.e. directs behavior)
* Locate * Give * Point to * Follow * Sit erect * Hold * Name * Reply * Identify * Choose *	* Label * Answer * Perform * Write * Conform * Assist * Recite * Report * Read * Greet * Help * Present * Compile *	* Work * Form * Follow * Join * Invite * Justify * Study * Explain * Share * Propose * Select * Complete * Describe * Read * Report * Differentiate * Initiate *	* Relate * Synthesize * Identify * Prepare * Defend * Generalize * Modify * Integrate * Order * Compare * Complete * Organize * Adhere * Arrange * Combine * Explain * Alter *	* Influence * Propose * Use * Quality * Revise * Serve * Solve * Modify * Practice * Listen * Question * Perform * Act * Discriminate * Verify *

MAPPING COURSES TO SOFT SKILLS

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

COURSE CODE	CREDITS	CS								CT							TS					LL			KK				EM			LS																				
		1	2	3	4	5	6	7	8	1	2	3	4	5	6	7	1	2	3	4	5	1	2	3	1	2	3	4	1	2	3	1	2	3	4																	
FACULTY CORE COURSES																																																				
WIX1001	3									✓	✓	✓																													✓	✓										
WIX1002	5									✓	✓	✓																														✓	✓									
WIX1003	3									✓	✓	✓																																✓	✓							
WIX2001	3	✓	✓	✓	✓																							✓	✓		✓																					
WIX2002	3																		✓	✓								✓	✓															✓	✓							
FACULTY ELECTIVE COURSES																																																				
WIX3001	3									✓	✓	✓							✓	✓																						✓	✓									
WIX3002	3									✓	✓	✓																✓	✓													✓	✓									
WIX3003	3	✓	✓	✓															✓	✓																						✓	✓									
WIX3004	3									✓	✓	✓																✓	✓													✓	✓									
WIX3005	3									✓	✓	✓							✓	✓								✓	✓																							
PROGRAMME CORE COURSES																																																				
WIA1001	3	✓	✓	✓						✓	✓	✓																														✓	✓									
WIA1002	5									✓	✓	✓																																✓	✓							

COURSE CODE	CREDITS	CS								CT							TS					LL			KK				EM			LS										
		1	2	3	4	5	6	7	8	1	2	3	4	5	6	7	1	2	3	4	5	1	2	3	1	2	3	4	1	2	3	1	2	3	4							
WIA1003	3									✓	✓	✓																							✓	✓			✓	✓		
WIA1004	3									✓	✓	✓																											✓	✓		
WIA1005	4									✓	✓	✓																							✓	✓			✓	✓		
WIA2001	3									✓	✓	✓																							✓	✓			✓	✓		
WIA2002	3									✓	✓	✓																							✓	✓						
WIA2003	3									✓	✓	✓																							✓	✓			✓	✓		
WIA2004	4	✓	✓	✓						✓	✓	✓						✓	✓																							
WIA2005	4									✓	✓	✓																							✓	✓			✓	✓		
WIA3001	12	✓	✓	✓														✓	✓					✓	✓																	
WIA3002	3	✓	✓	✓																				✓	✓		✓															
WIA3003	5																							✓	✓		✓								✓	✓						
SPECIALIZATION ELECTIVE COURSES																																										
WIC2001	3									✓	✓	✓	✓																						✓	✓			✓	✓		
WIC2002	3																																		✓	✓						
WIC2003	3									✓	✓	✓																														
WIC2004	3	✓	✓	✓	✓					✓	✓	✓						✓	✓																							
WIC3001	3									✓	✓	✓						✓	✓																				✓	✓		

COURSE CODE	CREDITS	CS								CT							TS					LL			KK				EM			LS																					
		1	2	3	4	5	6	7	8	1	2	3	4	5	6	7	1	2	3	4	5	1	2	3	1	2	3	4	1	2	3	1	2	3	4																		
WIC3002	3	✓	✓	✓													✓	✓	✓																											✓	✓						
WIC3003	3									✓	✓	✓																								✓	✓									✓	✓						
WIC3004	3									✓	✓	✓	✓				✓	✓																		✓	✓									✓	✓						
WIC3005	3									✓	✓	✓	✓																							✓	✓									✓	✓						
WIC3006	3									✓	✓	✓					✓	✓																												✓	✓						
WIC3007	3									✓	✓	✓	✓																							✓	✓									✓	✓						
WIC3008	3									✓	✓	✓																								✓	✓									✓	✓						
WIC3009	3									✓	✓	✓																								✓	✓									✓	✓						

MAPPING COURSES TO SOFT SKILLS

PROGRAMME: BACHELOR OF COMPUTER SCIENCE (ARTIFICIAL INTELLIGENCE)

COURSE CODE	CREDITS	CS								CT							TS					LL			KK				EM			LS																									
		1	2	3	4	5	6	7	8	1	2	3	4	5	6	7	1	2	3	4	5	1	2	3	1	2	3	4	1	2	3	1	2	3	4																						
FACULTY CORE COURSES																																																									
WIX1001	3									✓	✓	✓																						✓	✓																						
WIX1002	5									✓	✓	✓																								✓	✓																				
WIX1003	3									✓	✓	✓																																		✓	✓										
WIX2001	3	✓	✓	✓	✓																			✓	✓		✓																														
WIX2002	3																		✓	✓				✓	✓																					✓	✓										
FACULTY ELECTIVE COURSES																																																									
WIX3001	3									✓	✓	✓						✓	✓																	✓	✓																				
WIX3002	3									✓	✓	✓											✓	✓													✓	✓																			
WIX3003	3	✓	✓	✓														✓	✓																		✓	✓																			
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WIX3005	3									✓	✓	✓						✓	✓				✓	✓																																	
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WIA1001	3	✓	✓	✓						✓	✓	✓																								✓	✓																				
WIA1002	5									✓	✓	✓																																				✓	✓								

COURSE CODE	CREDITS	CS								CT							TS					LL			KK				EM			LS											
		1	2	3	4	5	6	7	8	1	2	3	4	5	6	7	1	2	3	4	5	1	2	3	1	2	3	4	1	2	3	1	2	3	4								
WIA1003	3									✓	✓	✓																								✓	✓			✓	✓		
WIA1004	3									✓	✓	✓																												✓	✓		
WIA1005	4									✓	✓	✓																								✓	✓			✓	✓		
WIA2001	3									✓	✓	✓																								✓	✓			✓	✓		
WIA2002	3									✓	✓	✓																								✓	✓						
WIA2003	3									✓	✓	✓																								✓	✓			✓	✓		
WIA2004	4	✓	✓	✓						✓	✓	✓						✓	✓																								
WIA2005	4									✓	✓	✓																								✓	✓			✓	✓		
WIA3001	12	✓	✓	✓														✓	✓						✓	✓																	
WIA3002	3	✓	✓	✓																					✓	✓		✓															
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SPECIALIZATION ELECTIVE COURSES																																											
WID2001	3	✓	✓	✓						✓	✓	✓																															
WID2002	3	✓	✓	✓						✓	✓	✓	✓												✓	✓																	
WID2003	3	✓	✓	✓						✓	✓	✓						✓	✓																								
WID3001	3	✓	✓	✓						✓	✓	✓	✓																							✓	✓						
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COURSE CODE	CREDITS	CS								CT							TS					LL			KK				EM			LS				
		1	2	3	4	5	6	7	8	1	2	3	4	5	6	7	1	2	3	4	5	1	2	3	1	2	3	4	1	2	3	1	2	3	4	
WID3003	3	✓	✓	✓						✓	✓	✓	✓																	✓	✓					
WID3004	3	✓	✓	✓						✓	✓	✓	✓				✓	✓												✓	✓		✓	✓		
WID3005	3	✓	✓	✓						✓	✓	✓	✓																	✓	✓					
WID3006	3	✓	✓	✓						✓	✓	✓	✓																	✓	✓					
WID3007	3	✓	✓	✓						✓	✓	✓																		✓	✓					
WID3008	3	✓	✓	✓						✓	✓	✓	✓																	✓	✓					
WID3009	3	✓	✓	✓						✓	✓	✓	✓				✓	✓												✓	✓		✓	✓		

MAPPING COURSES TO SOFT SKILLS

PROGRAMME: BACHELOR OF COMPUTER SCIENCE (INFORMATION SYSTEMS)

COURSE CODE	CREDITS	CS								CT							TS					LL			KK				EM			LS							
		1	2	3	4	5	6	7	8	1	2	3	4	5	6	7	1	2	3	4	5	1	2	3	1	2	3	4	1	2	3	1	2	3	4				
FACULTY CORE COURSES																																							
WIX1001	3									✓	✓	✓																		✓	✓								
WIX1002	5									✓	✓	✓																		✓	✓								
WIX1003	3									✓	✓	✓																						✓	✓				
WIX2001	3	✓	✓	✓	✓																			✓	✓		✓												
WIX2002	3																✓	✓						✓	✓									✓	✓				
FACULTY ELECTIVE COURSES																																							
WIX3001	3									✓	✓	✓					✓	✓												✓	✓								
WIX3002	3									✓	✓	✓												✓	✓					✓	✓								
WIX3003	3	✓	✓	✓													✓	✓												✓	✓								
WIX3004	3									✓	✓	✓												✓	✓					✓	✓								
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PROGRAMME CORE COURSES																																							
WIA1001	3	✓	✓	✓						✓	✓	✓																		✓	✓								
WIA1002	5									✓	✓	✓																						✓	✓				

COURSE CODE	CREDITS	CS								CT							TS					LL			KK				EM			LS										
		1	2	3	4	5	6	7	8	1	2	3	4	5	6	7	1	2	3	4	5	1	2	3	1	2	3	4	1	2	3	1	2	3	4							
WIA1003	3									✓	✓	✓																							✓	✓			✓	✓		
WIA1004	3									✓	✓	✓																											✓	✓		
WIA1005	4									✓	✓	✓																							✓	✓			✓	✓		
WIA2001	3									✓	✓	✓																							✓	✓			✓	✓		
WIA2002	3									✓	✓	✓																							✓	✓						
WIA2003	3									✓	✓	✓																							✓	✓			✓	✓		
WIA2004	4	✓	✓	✓						✓	✓	✓						✓	✓																							
WIA2005	4									✓	✓	✓																							✓	✓			✓	✓		
WIA3001	12	✓	✓	✓														✓	✓					✓	✓																	
WIA3002	3	✓	✓	✓																				✓	✓		✓															
WIA3003	5																							✓	✓		✓								✓	✓						
SPECIALIZATION ELECTIVE COURSES																																										
WIE2001	3									✓	✓	✓																							✓	✓			✓	✓		
WIE2002	3									✓	✓	✓																							✓	✓			✓	✓		
WIE2003	3	✓	✓	✓						✓	✓	✓												✓	✓																	
WIE2004	3									✓	✓	✓						✓	✓	✓																						
WIE3001	3									✓	✓	✓												✓	✓														✓	✓		

COURSE CODE	CREDITS	CS								CT							TS					LL			KK				EM			LS																
		1	2	3	4	5	6	7	8	1	2	3	4	5	6	7	1	2	3	4	5	1	2	3	1	2	3	4	1	2	3	1	2	3	4													
WIE3002	3	✓	✓	✓						✓	✓	✓													✓																							
WIE3003	3									✓	✓	✓						✓	✓																		✓	✓										
WIE3004	3	✓	✓	✓	✓													✓	✓																										✓	✓		
WIE3005	3	✓	✓	✓						✓	✓	✓																									✓	✓										
WIE3006	3									✓	✓	✓																									✓	✓										
WIE3007	3									✓	✓	✓																									✓	✓							✓	✓		
WIE3008	3	✓	✓	✓						✓	✓	✓						✓	✓																													
WIE3009	3									✓	✓	✓																									✓	✓							✓	✓		
WIE3010	3									✓	✓	✓																									✓	✓							✓	✓		
WIE3011	3									✓	✓	✓																									✓	✓							✓	✓		

MAPPING COURSES TO SOFT SKILLS

PROGRAMME: BACHELOR OF COMPUTER SCIENCE (DATA SCIENCE)

COURSE CODE	CREDITS	CS								CT							TS					LL			KK				EM			LS																
		1	2	3	4	5	6	7	8	1	2	3	4	5	6	7	1	2	3	4	5	1	2	3	1	2	3	4	1	2	3	1	2	3	4													
FACULTY CORE COURSES																																																
WIX1001	3									✓	✓	✓																							✓	✓												
WIX1002	5									✓	✓	✓																									✓	✓										
WIX1003	3									✓	✓	✓																																	✓	✓		
WIX2001	3	✓	✓	✓	✓																		✓	✓		✓																						
WIX2002	3																		✓	✓				✓	✓																				✓	✓		
FACULTY ELECTIVE COURSES																																																
WIX3001	3									✓	✓	✓							✓	✓																	✓	✓										
WIX3002	3									✓	✓	✓											✓	✓														✓	✓									
WIX3003	3	✓	✓	✓															✓	✓																		✓	✓									
WIC2004	3	✓	✓	✓						✓	✓	✓							✓	✓																												
PROGRAMME CORE COURSES																																																
WIE2003	3	✓	✓	✓						✓	✓	✓											✓	✓																								
WIA1001	3	✓	✓	✓						✓	✓	✓							✓	✓	✓																											
WIA1002	5									✓	✓	✓																																			✓	✓

COURSE CODE	CREDITS	CS								CT							TS					LL			KK				EM			LS										
		1	2	3	4	5	6	7	8	1	2	3	4	5	6	7	1	2	3	4	5	1	2	3	1	2	3	4	1	2	3	1	2	3	4							
WIA1003	3									✓	✓	✓																							✓	✓		✓	✓			
WIA1005	4									✓	✓	✓																							✓	✓		✓	✓			
WIA2001	3									✓	✓	✓																							✓	✓		✓	✓			
WIA2002	3									✓	✓	✓						✓	✓																							
WIA2003	3									✓	✓	✓																							✓	✓		✓	✓			
WIA2004	4	✓	✓	✓						✓	✓	✓						✓	✓																							
WIA3001	12	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓										✓	✓	✓	✓	✓			
WID3006	3	✓	✓	✓						✓	✓	✓	✓																						✓	✓						
WIH3001	3	✓	✓	✓	✓					✓	✓	✓		✓				✓	✓									✓							✓	✓		✓	✓			
WIH3002	14	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓										✓	✓	✓	✓	✓			
SPECIALIZATION ELECTIVE COURSES																																										
WIH2001	3									✓	✓	✓						✓	✓																✓	✓		✓	✓			
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WID3001	3	✓	✓	✓						✓	✓	✓	✓																						✓	✓						
WID3002	3	✓	✓	✓						✓	✓	✓											✓	✓																		
WIE3007	3	✓	✓	✓						✓		✓						✓	✓																							

COURSE CODE	CREDITS	CS								CT							TS					LL			KK				EM			LS											
		1	2	3	4	5	6	7	8	1	2	3	4	5	6	7	1	2	3	4	5	1	2	3	1	2	3	4	1	2	3	1	2	3	4								
WIE3008	3	✓	✓	✓						✓	✓	✓					✓	✓																									
WIE3010	3									✓	✓	✓																								✓	✓			✓	✓		
WIH3003	3									✓	✓						✓	✓																		✓	✓						
WIH3004	3									✓	✓	✓																								✓	✓			✓	✓		

MAPPING COURSES TO SOFT SKILLS

PROGRAMME: BACHELOR OF COMPUTER SCIENCE (SOFTWARE ENGINEERING)

COURSE CODE	CREDITS	CS								CT							TS					LL			KK				EM			LS																										
		1	2	3	4	5	6	7	8	1	2	3	4	5	6	7	1	2	3	4	5	1	2	3	1	2	3	4	1	2	3	1	2	3	4																							
FACULTY CORE COURSES																																																										
WIX1001	3									✓	✓	✓																								✓	✓																					
WIX1002	5									✓	✓	✓																										✓	✓																			
WIX1003	3									✓	✓	✓																																				✓	✓									
WIX2001	3	✓	✓	✓	✓																																											✓	✓									
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WIX3003	3	✓	✓	✓																																			✓	✓																		
WIX3004	3									✓	✓	✓																											✓	✓																		
WIX3005	3									✓	✓	✓																											✓	✓																		
PROGRAMME CORE COURSES																																																										
WIA1001	3	✓	✓	✓						✓	✓	✓																										✓	✓																			
WIA1002	5									✓	✓	✓																																					✓	✓								

COURSE CODE	CREDITS	CS								CT							TS					LL			KK				EM			LS											
		1	2	3	4	5	6	7	8	1	2	3	4	5	6	7	1	2	3	4	5	1	2	3	1	2	3	4	1	2	3	1	2	3	4								
WIA1003	3									✓	✓	✓																							✓	✓			✓	✓			
WIA1004	3									✓	✓	✓																											✓	✓			
WIA1005	4									✓	✓	✓																							✓	✓			✓	✓			
WIA2001	3									✓	✓	✓																							✓	✓			✓	✓			
WIA2002	3									✓	✓	✓																							✓	✓							
WIA2003	3									✓	✓	✓																							✓	✓			✓	✓			
WIA2004	4	✓	✓	✓						✓	✓	✓						✓	✓																								
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WIA3001	12	✓	✓	✓														✓	✓				✓	✓																			
WIA3002	3	✓	✓	✓																		✓	✓		✓																		
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SPECIALIZATION ELECTIVE COURSES																																											
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WIF2003	3									✓	✓	✓						✓	✓																✓	✓							
WIF3001	3									✓	✓	✓						✓																	✓	✓			✓	✓			
WIF3002	3	✓	✓	✓						✓	✓	✓																											✓	✓			

COURSE CODE	CREDITS	CS								CT							TS					LL			KK				EM			LS										
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WIF3003	3									✓	✓	✓	✓	✓																					✓	✓			✓	✓		
WIF3004	3									✓	✓	✓						✓	✓																							
WIF3005	3									✓	✓	✓																							✓	✓			✓	✓		
WIF3006	3									✓	✓	✓																							✓	✓			✓	✓		
WIF3007	3	✓	✓							✓	✓	✓						✓	✓																							
WIF3008	3									✓	✓	✓	✓	✓																					✓	✓			✓	✓		

MAPPING COURSES TO SOFT SKILLS

PROGRAMME: BACHELOR OF INFORMATION TECHNOLOGY (MULTIMEDIA)

COURSE CODE	CREDITS	CS								CT							TS					LL			KK				EM			LS																						
		1	2	3	4	5	6	7	8	1	2	3	4	5	6	7	1	2	3	4	5	1	2	3	1	2	3	4	1	2	3	1	2	3	4																			
FACULTY CORE COURSES																																																						
WIX1001	3									✓	✓	✓																								✓	✓																	
WIX1002	5									✓	✓	✓																																										
WIX1003	3									✓	✓	✓																																										
WIX2001	3	✓	✓	✓	✓																																																	
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COURSE CODE	CREDITS	CS								CT							TS					LL			KK				EM			LS										
		1	2	3	4	5	6	7	8	1	2	3	4	5	6	7	1	2	3	4	5	1	2	3	1	2	3	4	1	2	3	1	2	3	4							
WIB1003	3									✓	✓	✓																							✓	✓						
WIB2001	3									✓	✓	✓																							✓	✓			✓	✓		
WIB2002	3	✓	✓	✓														✓	✓																				✓	✓		
WIB2003	3									✓	✓	✓																							✓	✓			✓	✓		
WIB2004	4	✓	✓	✓						✓	✓	✓						✓	✓																							
WIB2005	3									✓	✓	✓						✓	✓																✓	✓						
WIB2006	3									✓	✓	✓											✓	✓																✓	✓	
WIB2007	3									✓	✓	✓						✓	✓																✓	✓						
WIB3001	12	✓	✓	✓														✓	✓					✓	✓																	
WIB3002	3	✓	✓	✓																				✓	✓		✓															
WIB3003	5																							✓	✓		✓								✓	✓						
SPECIALIZATION ELECTIVE COURSES																																										
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WIG2003	3	✓	✓	✓						✓	✓	✓						✓	✓																							
WIG2004	3									✓	✓	✓																							✓	✓			✓	✓		
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COURSE CODE	CREDITS	CS								CT							TS					LL			KK				EM			LS											
		1	2	3	4	5	6	7	8	1	2	3	4	5	6	7	1	2	3	4	5	1	2	3	1	2	3	4	1	2	3	1	2	3	4								
WIG3002	3	✓	✓	✓						✓	✓	✓						✓	✓																								
WIG3003	3	✓	✓	✓						✓	✓	✓																								✓	✓						
WIG3004	3									✓	✓	✓																								✓	✓			✓	✓		
WIG3005	3	✓	✓	✓						✓	✓	✓																								✓	✓						
WIG3006	3									✓	✓	✓																								✓	✓			✓	✓		
WIG3007	3									✓	✓	✓																								✓	✓			✓	✓		
WIG3008	3									✓	✓	✓													✓	✓										✓	✓						
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GUIDELINES FOR THE ELEMENTS OF SOFT SKILLS

Soft skills elements are as follows:

1. Communication Skills (CS)

Level	Details
CS1	The ability to present ideas clearly, effectively and confidently, in both oral and written forms.
CS2	The ability to practice active listening skills and provide feedback.
CS3	The ability to present clearly with confidence and appropriate to the level of the listener.
CS4	The ability to use technology in presentations.
CS5	The ability to negotiate and reach an agreement.
CS6	The ability to communicate with others from different cultures.
CS7	The ability to develop interpersonal communication skills.
CS8	The ability to use non-verbal skills.

2. Critical Thinking and Problem Solving Skills (CT)

Level	Details
CT1	The ability to identify and analyse problems in complex and vague situations, as well as to make justified evaluations.
CT2	The ability to develop and improve thinking skills such as to explain, analyse and evaluate discussions.
CT3	The ability to find ideas and alternative solutions.
CT4	The ability to think out of the box.
CT5	The ability to make decisions based on concrete evidence.
CT6	The ability to persevere as well as to fully concentrate on a given task.
CT7	The ability to understand and to fit in with the culture of the community and new work environment.

3. Team Work Skills (TS)

Level	Details
TS1	The ability to build good relations, interact with others and work effectively with them to achieve the same objectives.
TS2	The ability to understand and interchange roles between that of a team leader and a team member.
TS3	The ability to recognize and respect the attitude, behavior and beliefs of others.
TS4	The ability to contribute towards the planning and coordination of the team's efforts.
TS5	Be responsible for the group's decision.

4. Lifelong Learning and Information Management (LL)

Level	Details
LL1	The ability to search and manage relevant information from different sources.
LL2	The ability to accept new ideas and the capability for autonomous learning.
LL3	The ability to develop a curious mind and the thirst for knowledge.

5. Entrepreneurial Skills (KK)

Level	Details
KK1	The ability to identify business opportunities.
KK2	The ability to outline business frameworks.
KK3	The ability to build, explore and seize business and work opportunities.
KK4	The ability to work independently.

6. Professional Ethics and Moral (EM)

Level	Details
EM1	The ability to recognize the effects on the economy, environment and socio culture in professional practice.
EM2	The ability to analyze and make decisions in solving problems related to ethics.
EM3	The ability to practice ethically, apart from being responsible towards the society.

7. Leadership Skills (LS)

Level	Details
LS1	Knowledge of basic leadership theory.
LS2	The ability to lead a project.
LS3	The ability to understand and interchange roles between that of a team leader and a team member.
LS4	The ability to supervise team members.

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

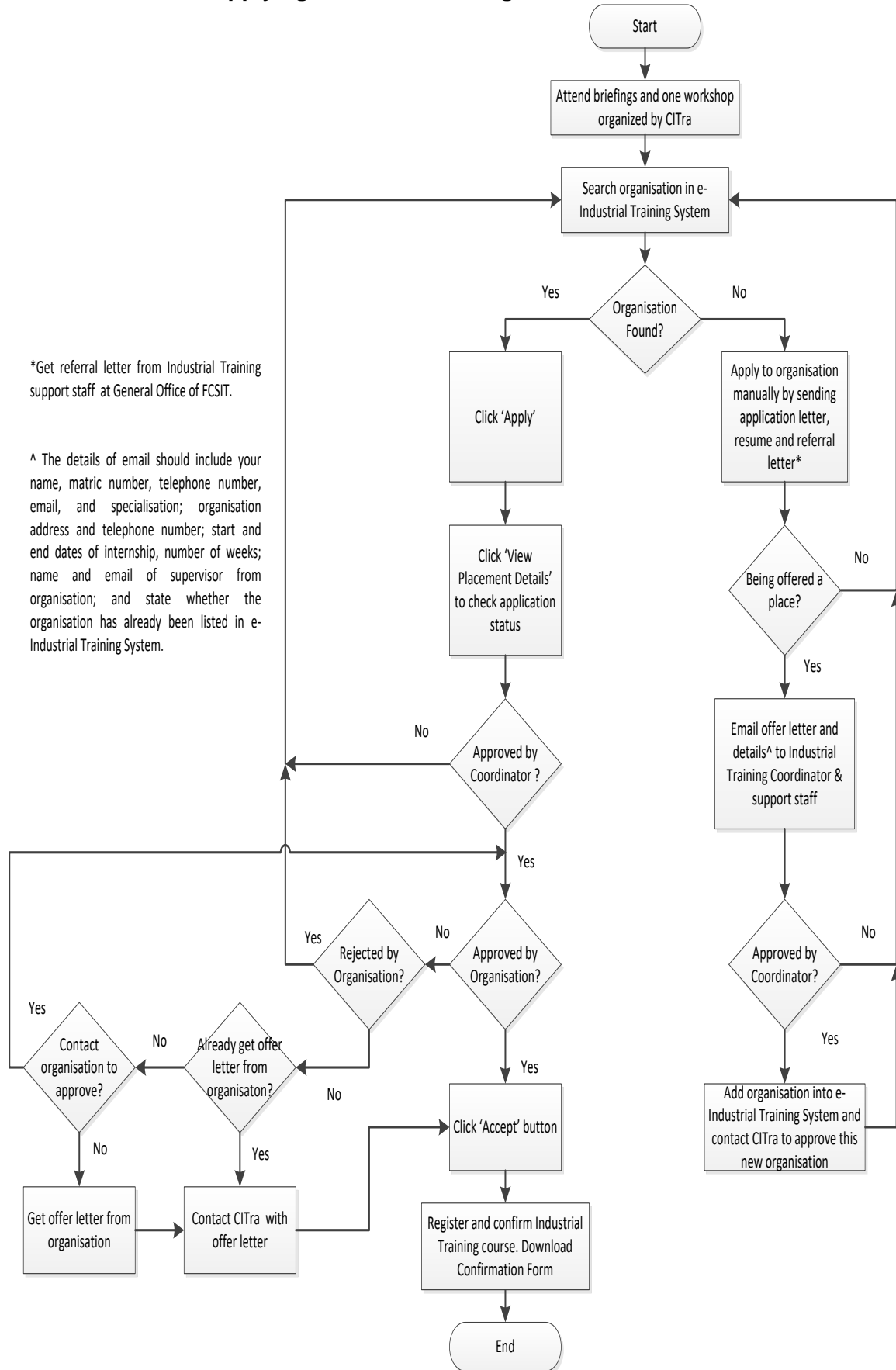
- a) Identify and apply directly to suitable organisations/companies for Industrial Training placement one semester before the Industrial Training Programme for local placement, and at least two semesters before the Industrial Training Programme for abroad placement. Refer to Section 5.7.
- b) Should 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.

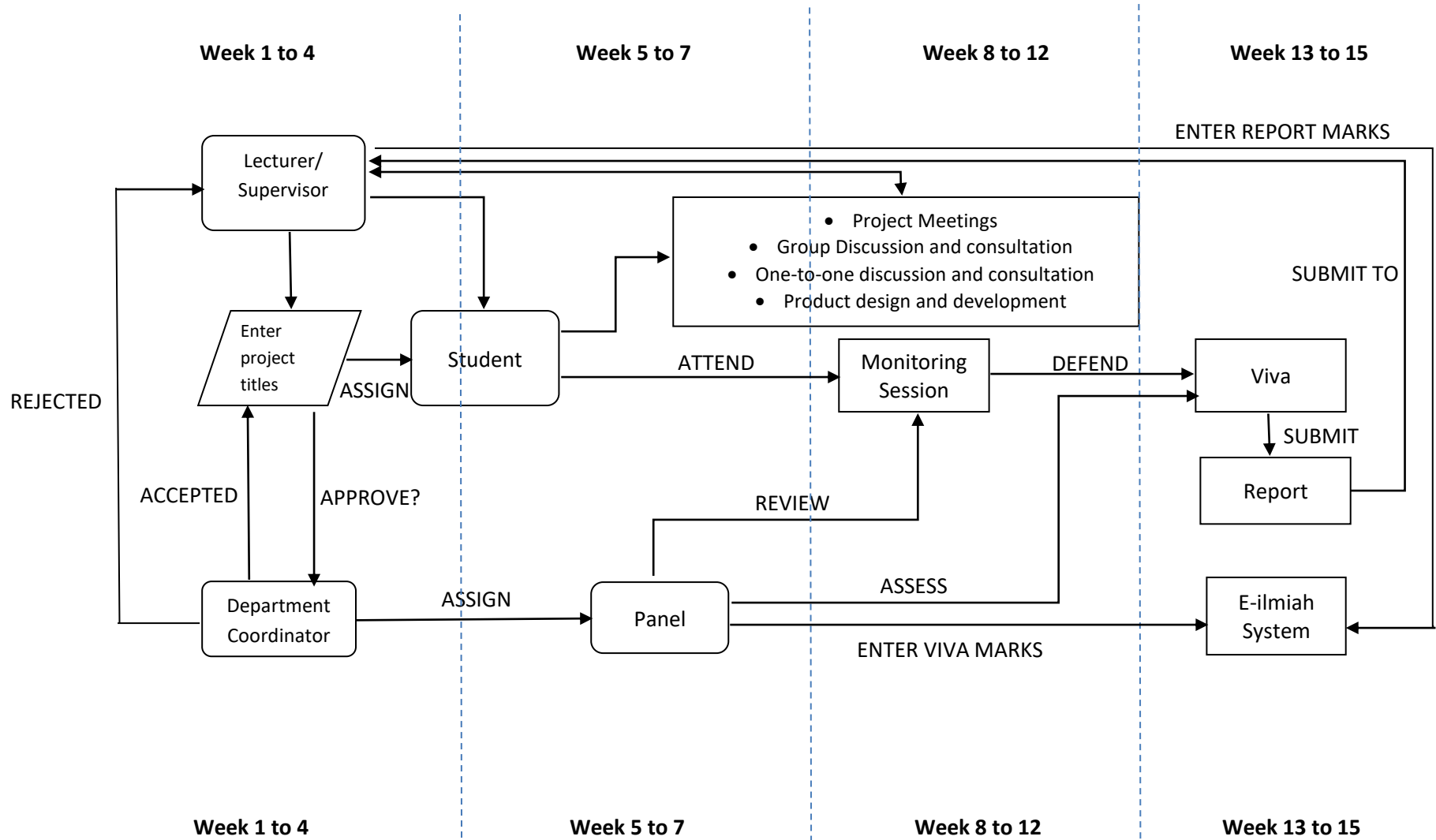
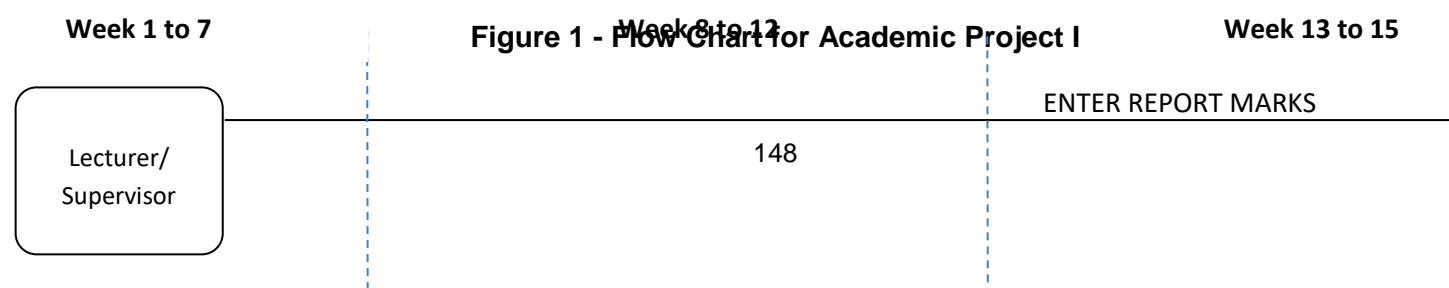


Figure 1 - Flow Chart for Academic Project I



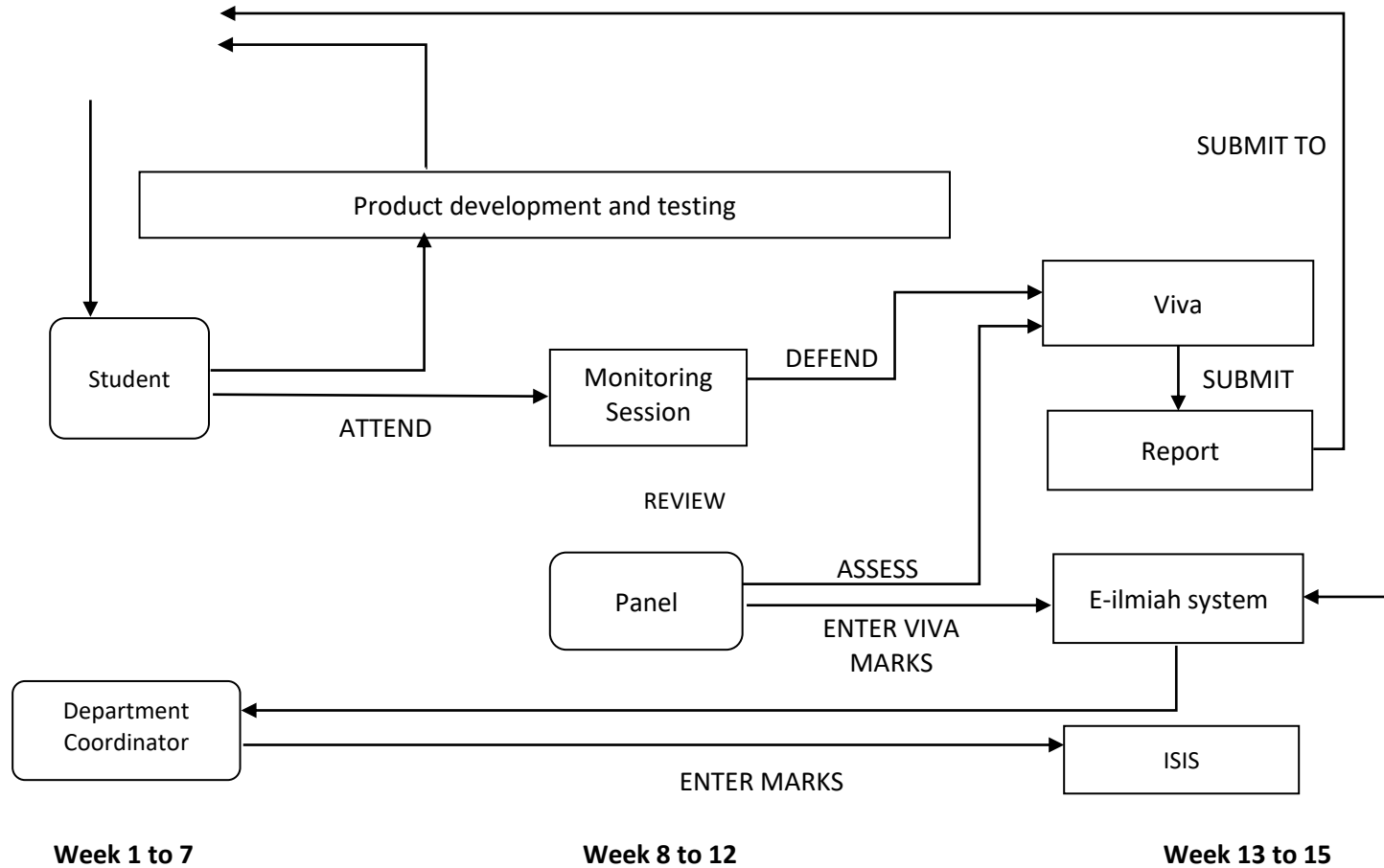


Figure 2 - Flow Chart for Academic Project II

**UNIVERSITY ENGLISH LANGUAGE COURSES
FACULTY OF LANGUAGES AND LINGUISTICS
FOR MALAYSIAN STUDENTS
WITH EFFECT FROM 2020/2021 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>COMPULSORY - (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>COMPULSORY - (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>COMPULSORY - (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>COMPULSORY - (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.

**UNIVERSITY ENGLISH LANGUAGE COURSES
FACULTY OF LANGUAGES AND LINGUISTICS
FOR INTERNATIONAL STUDENTS
WITH EFFECT FROM 2020/2021 ACADEMIC SESSION**

PATH 1	PATH 2	PATH 3	PATH 4
<ul style="list-style-type: none"> • IELTS Band 4 • TOEFL Paper – Based Test (437 – 473) / Computer – Based Test (123 – 150) / Internet – Based Test (41 – 52) • Grade C / C+ (Special Intensive Courses offered by FLL) 	<ul style="list-style-type: none"> • IELTS Band 4.5 – 5 • TOEFL Paper – Based Test (477 – 510) / Computer – Based Test (153 – 180) / Internet – Based Test (53 – 64) • Grade B- / B / B+ (Special Intensive Courses offered by FLL) 	<ul style="list-style-type: none"> • 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 • LULUS Advanced English (Level 6) (English Language Proficiency Programme offered by UMCCed) 	<ul style="list-style-type: none"> • 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>COMPULSORY - (3 Courses x 2 Credit Hours)</p> <ul style="list-style-type: none"> • GLT1002 - Mastering English I • GLT1003 - Mastering English II • GLT 1004 – Mastering English III 	<p>COMPULSORY - (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>COMPULSORY - (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>COMPULSORY - (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 .*

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) Prohibition against plagiarism

- (1) A student shall not plagiarize any idea, writing, data or invention belonging to another person.
- (2) For the purpose of this rule, plagiarism includes:-
 - (a) the act of taking an idea, writing, data or invention of another person and claiming that the idea, writing, data or invention is the result of one's findings or creation; or
 - (b) an attempt to make out or the act of making out in such a way, that one is the original source or the creator of an idea, writing, data or invention which has actually been taken from some other source.
- (3) Without prejudice to the generally of subrule (2) a student plagiarizes when he:-
 - (a) publishes, with himself as the author, an abstract, article, scientific or academic paper, or book which is wholly or partly written by some other person;
 - (b) incorporates himself or allows himself to be incorporated as a coauthor of an abstract, article, scientific or academic paper, or book, when he has not at all made any written contribution to the abstract, article, scientific or academic paper, or book;
 - (c) forces another person to include his name in the list of co-researchers for a particular research project or in the list of co-authors for a publication when he has not made any contribution which may qualify him as a co-researcher or co-author;
 - (d) extracts academic data which are the results of research undertaken by some other person, such as laboratory findings or field work findings or data obtained through library research, whether published or unpublished and incorporate those data as part of his academic research without giving due acknowledgement to the actual source;
 - (e) uses research data obtained through collaborative work with some other person, whether or not that other person is a staff member or a student of the University, as part of another distinct personal academic research of his, or for a publication in his own name as sole author, without obtaining the consent of his co-researchers prior to embarking on his personal research or prior to publishing the data;
 - (f) transcribes the ideas or creations of others kept in whatever form, whether written, printed or available in electronic form, or in slide form, or in whatever form of teaching or research apparatus, or in any other form, and claims whether directly or indirectly that he is the creator of that idea or creation;
 - (g) translates the writing or creation of another person from one language to another whether or not wholly or partly, and subsequently presents the translation in whatever form or manner as his own writing or creation; or
 - (h) extracts ideas from another person's writing or creation and makes certain modifications without due reference to the original source and rearranges them in such a way that it appears as if he is the creation of those ideas.

(B) 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.

(C) 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.

(D) 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 – 100	A+	4.0	Distinction
80 – 89	A	4.0	Distinction
75 – 79	A-	3.7	Distinction
70 – 74	B+	3.3	Good
65 – 69	B	3.0	Good
60 – 64	B-	2.7	Good
55 – 59	C+	2.3	Pass
50 – 54	C	2.0	Pass
45 – 49	C-	1.7	Fail
40 – 44	D+	1.3	Fail
35 – 39	D	1.0	Fail
00 – 34	F	0.0	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 are 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 comprises:

- 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
- Informetrics 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 elarning@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)	Huswadi Hussain	03-79676317	huswadi@um.edu.my
Micro Lab 2 (MM2)	Jamal Amran	03-79676364	jamalamr@um.edu.my
Postgraduate Lab (ML)	Nor Shuhadah Yahiya	03-79676364	adik@um.edu.my
CCNA Lab (MC)	Huswadi Hussain	03-79676317	huswadi@um.edu.my
Micro Lab 3 (MM3)	Aini Munira Ahmad	03-79676394	aini_munira@um.edu.my
Micro Lab 4 (MM4)	Jamal Amran	03-79676364	jamalamr@um.edu.my
iOS Application Development Lab	Nor Shuhadah Yahiya	03-79676364	adik@um.edu.my
Micro Lab 6 (MM6)	Aini Munira Ahmad	03-79676394	aini_munira@um.edu.my
Stroustrup Lab 1 (MS1)	Mohd Jalaluddin Ahmad	03-79676407	jalal@um.edu.my
Robotic Teaching Lab	Mohd Jalaluddin Ahmad	03-79676407	jalal@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.*

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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.

General Information

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