

# ACADEMIC HANDBOOK SESSION 2020/2021 FOR BACHELOR DEGREE AND DIPLOMA PROGRAMMES



# FTMK

FACULTY OF INFORMATION &  
COMMUNICATION TECHNOLOGY  
UNIVERSITI TEKNIKAL MALAYSIA MELAKA

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# **ACADEMIC HANDBOOK**

**Bachelor Degree and Diploma Programmes**  
**Session 2020/2021**

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**FACULTY OF INFORMATION AND COMMUNICATION  
TECHNOLOGY**  
**UNIVERSITI TEKNIKAL MALAYSIA MELAKA**

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# UTeM's Senior Management



**PROF. DATUK WIRA DR. RAHA  
BINTI ABDUL RAHIM**

Vice Chancellor



**PROF. DR. ZULKIFILIE  
BIN IBRAHIM**

Performing the function of  
Deputy Vice Chancellor  
(Academic & International)



**PROF. DR. ZULKIFILIE  
BIN IBRAHIM**

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Assistant Vice Chancellor  
(Development & Facility Management)



**UTeM**

جامعة ملaka  
Teknikal Universiti  
UNIVERSITI TEKNIKAL MALAYSIA MELAKA

Universiti Teknikal Malaysia Melaka (UTeM) was established under Section 20 University and University College Act 1971 (Act 30) through “Perintah Universiti Teknikal Malaysia Melaka (Pemerbadanan 2007)” gazetted as P.U. (A) 43 on the 1st of February 2007.

UTeM was initially known as Kolej Universiti Kebangsaan Malaysia (KUTKM), established on the 1st of December 2001.

## VISION

To be one of the world's leading **innovative** and **creative technical** universities.

## MISSION

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

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

## MOTTO

Excellence through competency



## **EDUCATIONAL GOALS**

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

# **FOREWARD BY THE DEAN**

**Prof. Ts. Dr. Rabiah Ahmad**  
Dean,  
Faculty of  
Information and Communication Technology



Assalamualaikum w.r.t. and greetings,

On behalf of the Faculty members, I would like to welcome all of you to the Faculty of Information and Communication Technology, FTMK, Universiti Teknikal Malaysia Melaka, UTeM. It has been a privilege that you have chosen FTMK and we look ahead to support your success.

As the Dean of FTMK, it is my pleasure to serve you and enhance your learning experiences driven by industrial demand, practical oriented and professional certifications. It is important to note that you will gain much information and knowledge in related fields extracted from the curriculum and programmes offered. Throughout your undergraduate study, you will be attached to an academic advisor. Your academic advisor will provide guidance and advice in taking appropriate action for you to achieve success.

Apart from having an academic advisor, we at FTMK also provide structured information and it is documented in this academic handbook. The handbook will be your major reference in preparing your study plan and it is structured into four major topics, that is, programme educational objectives, facilities and their regulations, academic system and curriculum structure.

At the university, you are encouraged to have creative and critical thinking skill. In addition, you are also advised to focus and strive for academic success by actively engaging with classroom activities. These will help you survive in your working life. Moreover, you will receive great support and valuable experiences from the Faculty, which will aid you in facing global challenges as ICT leader in the future.

As a final note, I would like to express my appreciation to the Faculty Publication Committee and all parties involved in producing this academic handbook. Together we make a difference.

FTMK Truly World!

All the best and Good Luck!

## **Faculty Vision**

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

## **Faculty Mission**

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

## **Faculty Objectives**

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

# FTMK

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



SE

Department of Software Engineering



SKK

Department of Computer System and Communication



MI

Department of Interactive Media



ICA

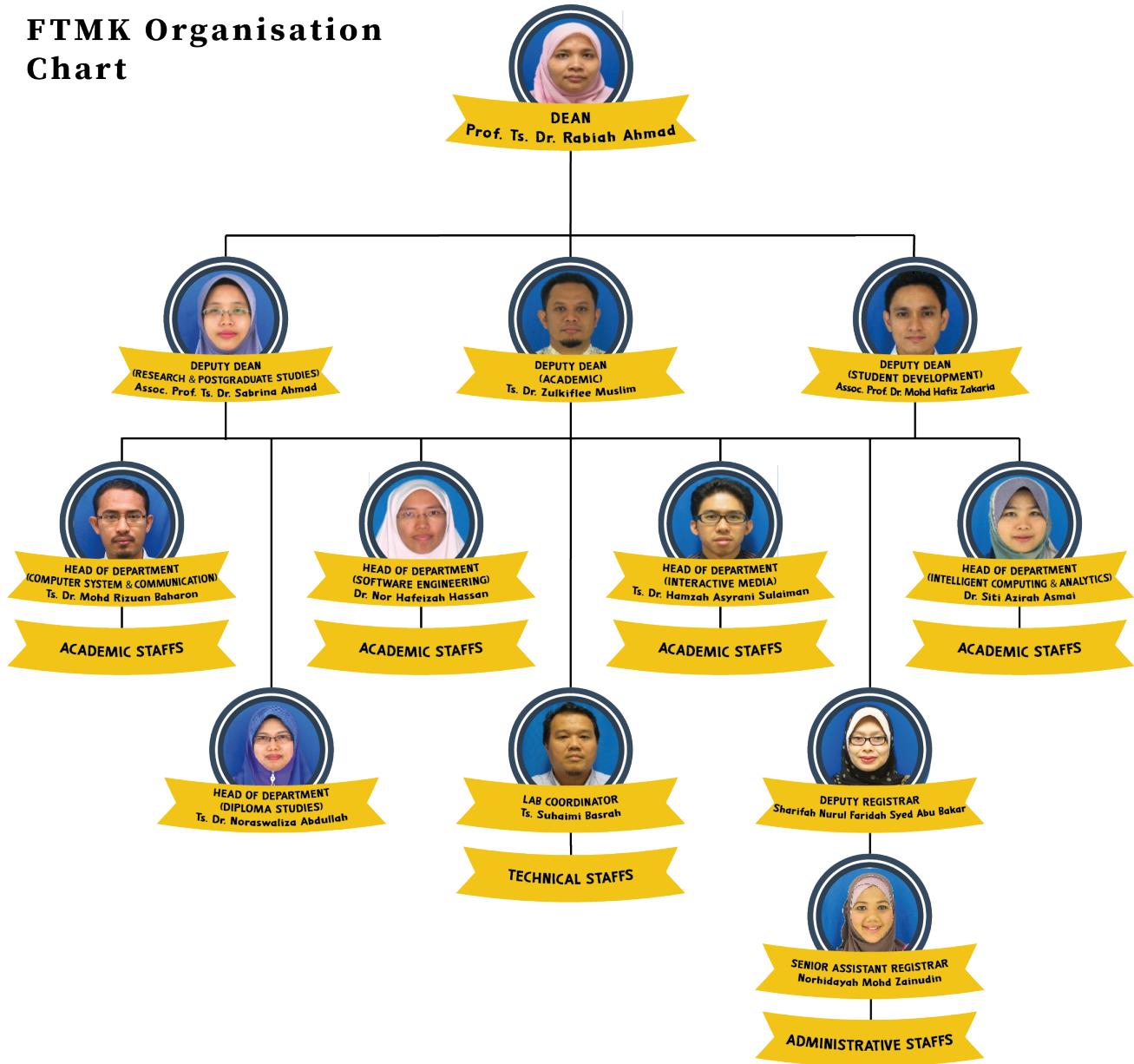
Department of Intelligent Computing and Analytics



Diploma

Department of Diploma Studies

# FTMK Organisation Chart



# **List of Programme offered (Postgraduate)<sup>1</sup>**

## **DOCTOR OF PHILOSOPHY**

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

## **MASTER'S DEGREE**

### **By research:**

1. Master in Information and Communication Technology, MITA.

### **By coursework:**

1. Master of Computer Science (Database Technology), MITD.
2. Master of Computer Science (Internetworking Technology), MITI.
3. Master of Computer Science (Software Engineering), MITS.
4. Master of Computer Science (Security Science), MITZ.
5. Master of Computer Science (Multimedia Computing), MCSM.
6. Master of Software Engineering (Mobile Development), MSMD.
7. Master of Technology (Data Science and Analytics), MTDS.
8. Master of Information System, MIS.

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<sup>1</sup>Please browse through our **Postgraduate Academic Handbook** for details of Postgraduate Programmes

# **List of Programme offered (Undergraduate) And Its Coordinator**

## **BACHELOR'S DEGREE**

1. Bachelor of Computer Science (Computer Networking) with Honours, BITC.  
Coordinator: Ts. Dr. Wahidah Md Shah.
2. Bachelor of Computer Science (Database Management) with Honours, BITD.  
Coordinator: Ts. Dr. Norashikin Ahmad.
3. Bachelor of Computer Science (Artificial Intelligence) with Honours, BITI.  
Coordinator: Dr. Siti Azirah Asmai.
4. Bachelor of Computer Science (Interactive Media) with Honours, BITM.  
Coordinator: Ts. Dr. Hamzah Asyranie Sulaiman.
5. Bachelor of Computer Science (Software Development) with Honours, BITS.  
Coordinator: Dr. Nor Hafeizah Hassan.
6. Bachelor of Computer Science (Computer Security) with Honours, BITZ.  
Coordinator: Ts. Dr. Mohd Rizuan Baharon.
7. Bachelor of Information Technology (Game Technology) with Honours, BITE.  
Coordinator: Assoc. Prof. Ts. Dr. Ahmad Naim Chee Pee Che Hanapi.

## **DIPLOMA**

1. Diploma in Information and Communication Technology, DIT.  
Coordinator: Ts. Dr. Noraswaliza Abdullah.

# Programme Educational Objectives (PEO)

Programme Educational Objectives (PEO) is specific goals describing expected achievements of graduates in their career and professional life after graduation.

<b>PEO for Bachelor of Computer Science:</b> 1. Software Development (BITS) 2. Database Management (BITD) 3. Interactive Media (BITM) 4. Computer Networking (BITC) 5. Artificial Intelligence (BITI) 6. Computer Security (BITZ)	<b>PEO 1</b> Have strong knowledge of sciences, engineering and technology in their profession.  <b>PEO 2</b> Attain knowledge of contemporary issues in technology through research and life-long learning activities.  <b>PEO 3</b> Ability to function as an effective team player with the capability to lead and appreciate team work and leadership qualities.  <b>PEO 4</b> Appreciate and uphold professional attitudes and ethics necessary in fulfilling their responsibilities towards the Almighty, clients and the society.
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<p><b>PEO for Bachelor of Information Technology:</b></p> <p>1. Game Technology (BITE)</p>	<p><b>PEO 1</b> Practice broad knowledge and skills in IT and specialist knowledge in game technology to solve problems through gamification.</p> <p><b>PEO 2</b> Lead in game industry through innovation and continuous professional development.</p> <p><b>PEO 3</b> Demonstrate effective communication and technical leadership through involvement in various ICT projects, consultation and entrepreneurial activities.</p> <p><b>PEO 4</b> Demonstrate moral and professional commitment for the betterment of the society.</p>
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<p><b>PEO for Diploma in Information and Communication Technology</b></p>	<p><b>PEO 1</b> Practice technical knowledge and skills of Information and Communication Technology (ICT) and lead a team of programmers or ICT technicians.</p> <p><b>PEO 2</b> Pursue life-long learning and continuous education at bachelor degree or in ICT professional development.</p> <p><b>PEO 3</b> Demonstrate effective communicate verbally and written technical solutions in project team and end user.</p> <p><b>PEO 4</b> Demonstrate ethical behaviours and interpersonal skills in ICT profession.</p>
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## Professional Certification Courses

Professional certification courses are designed to enable undergraduate students to obtain professional certificates or at least to prepare themselves for professional certificates. This professional certificate will be an added value and increase the employability amongst graduates.

Listed are the professional certificates scheduled for undergraduate programmes, respectively.

- BITC :: Cisco Certified Network Associate (CCNA) Professional Certificate.
- BITZ :: Cisco Certified Network Associate (CCNA) Security Professional Certificate.
- BITD :: Database Foundations Certified Junior Associate.
- BITS :: Java Foundation Certified Junior Associate.
- BITI :: RapidMiner Analyst Professional Certificate.
- BITM and BITE :: Web Developer Professional Certificate (HTML5).



# **Facilities**

## **Lab Facilities**

Faculty of Information and Communication Technology (FTMK) has been equipped with the state-of-art computers and software and integrated into UTeM Network. These facilities ease the process of teaching and learning in FTMK.

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

## **Lab Staffs**

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

## **Loan Facilities on Lab Equipment**

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

## **Lab Operational Hours**

During Semester:

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

During Semester Break:

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

Saturday-Sunday / Public Holidays   Close

NAME OF FACILITY	DESCRIPTION
Seminar Hall	The hall is equipped with audio-visual facility for 250 pax at a time
Lecture Rooms	Rooms No. 1 to 12 with each room for 60 pax
Recording Capture System (ReCap)	Mini Theatre for interactive learning environment for 114 pax
Collaborative Learning Laboratory (CLeAR)	A collaborative learning laboratory with 60 pax capacity
Mini Theatre	The theatre room for student animation presentation for 15 pax
Virtual Reality Studio	Laboratory for motion capture and games development
Photography/Recording Studio	Multimedia recording and editing studio
Research Laboratories	Seven (7) research laboratories for postgraduates students based on faculty's research clusters under Centre for Advanced Computing Technology (C-ACT): <ol style="list-style-type: none"> <li>1. Innovative Software System &amp; Services (IS3) Laboratory</li> <li>2. Information Security Forensics &amp; Computer Networking (INSFORNET) Laboratory</li> <li>3. Optimization, Modelling, Analytics and Simulation (OptiMAS) Laboratory</li> <li>4. Computational Intelligence and Technologies (CIT) Laboratory</li> <li>5. Human Centered Computing and Information Systems Lab (HCC-ISL) Laboratory</li> <li>6. Pervasive Computing &amp; Educational Technology (PET) Laboratory</li> <li>7. Biomedical and Engineering (BIOCORE) Laboratory</li> </ol>

University-Industry Laboratory	Coordinated Malware Eradication and Remediation Project (CMERP) Satellite Laboratory – collaboration with Cyber Security Malaysia
Teaching Laboratories	<ol style="list-style-type: none"><li>1. Computer Game Laboratory</li><li>2. Software Engineering Lab 1, 2 and 3</li><li>3. Programming Laboratory 1, 2, 3 and 4</li><li>4. Database Laboratory 1, 2 and 3</li><li>5. Network Laboratory 1 and 2</li><li>6. CCNA &amp; CCNP Laboratory</li><li>7. Fiber Optic Laboratory</li><li>8. Security Laboratory</li><li>9. System / Hardware Laboratory</li><li>10. Wireless Laboratory</li><li>11. Virtual Reality Laboratory</li><li>12. Multimedia Laboratory 1, 2, 3 and 4</li><li>13. Artificial Intelligence Laboratory 1, 2, 3 and 4</li><li>14. Student Workshop Laboratory</li></ol>
Other Facilities	<ol style="list-style-type: none"><li>1. Visiting Professor Rooms</li><li>2. Executive Laboratory</li><li>3. Administration Office – Level 2 &amp; 3</li><li>4. FICTS Room</li><li>5. Surau or Prayer Room</li><li>6. Lobby Area</li><li>7. Parking Area for students and staffs</li></ol>

## **Lab Usage Regulation**

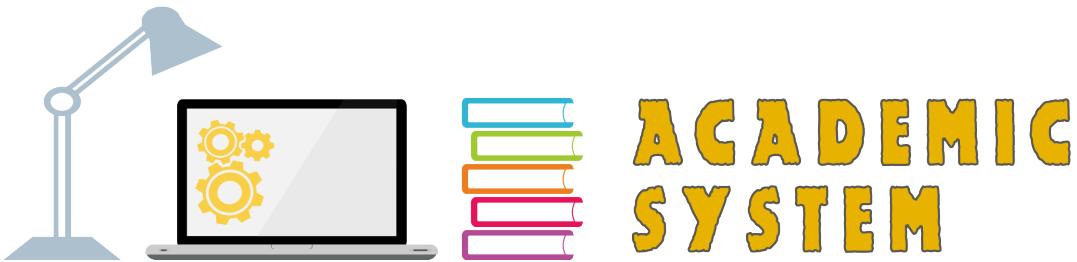
1. Students must display their matric card at all times in the lab.
2. Students are not allowed to bring in their bags into the lab.
3. Students are not allowed to eat/drink or bring in any foods or drinks into the lab.
4. Students are not allowed to wear sandals in the lab except sandals with back straps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

18. Students must report immediately to lecturer or Assistant Engineers on duty if there is any lab equipment that is lost or broken prior to the students' usage.
19. Research labs are for post graduates' students ONLY. Post-graduate students can get the access by referring to their supervisor.

#### **Additional Lab Rules Outside Teaching and Learning Allocated Times**

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

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

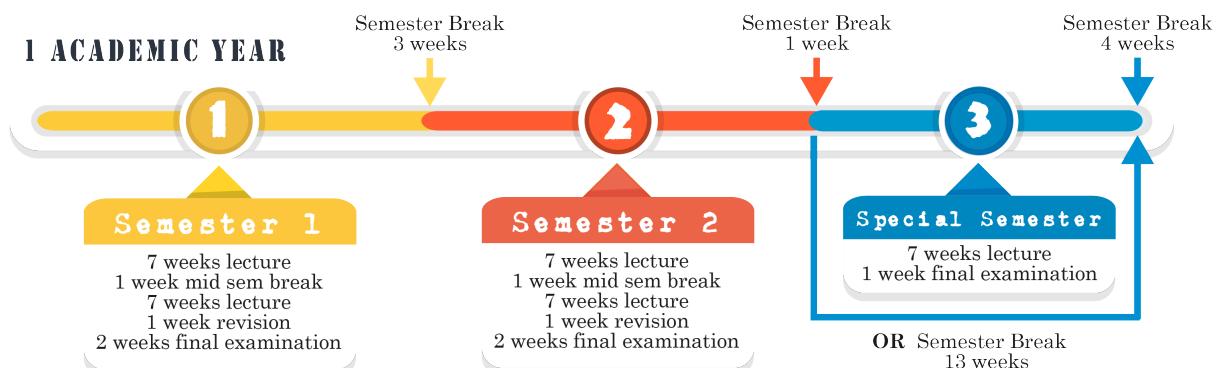


The university has implemented its academic system according to semester system. Every academic year comprises of two semesters and in some instances the faculty also offers a special semester which is arranged during the semester break.

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

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

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



## Duration of Studies

<b>Full-time mode</b>	<b>Durations of studies</b>	
	<b>Minimum</b>	<b>Maximum</b>
Bachelor's Degree of all programme	7 semesters ( $3 \frac{1}{2}$ years)	11 semester ( $5 \frac{1}{2}$ years)
Diploma	5 semesters ( $2 \frac{1}{2}$ years)	10 semesters (5 years)

<b>Part-time mode</b>	<b>Durations of studies</b>	
	<b>Minimum</b>	<b>Maximum</b>
Bachelor's Degree (BITS, BITC, BITM) <sup>1</sup>	14 trimesters (5 years)	29 trimesters (10 years)

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<sup>1</sup> Details can be obtained from Lifelong Learning Centre (*Pusat Pembelajaran Sepanjang Hayat*), UTeM



## Grading System

The following shows the grading system adopted by the university.

80 - 100		4.0	Excellent
75 - 79		3.7	Excellent
70 - 74		3.3	Very Good
65 - 69		3.0	Very Good
60 - 64		2.7	Very Good
55 - 59		2.3	Pass
50 - 54		2.0	Pass
47 - 49		1.7	Marginal Pass
44 - 46		1.3	Marginal Pass
40 - 43		1.0	Marginal Pass
0 - 39		0.0	Fail



## Academic Achievement

### GRADE POINT AVERAGE (GPA):

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

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

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

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

where

$k_n$  = credit hour for course  $n$ ,

$m$  = grade point obtained for course  $n$ ,

$n$  = number of courses registered.

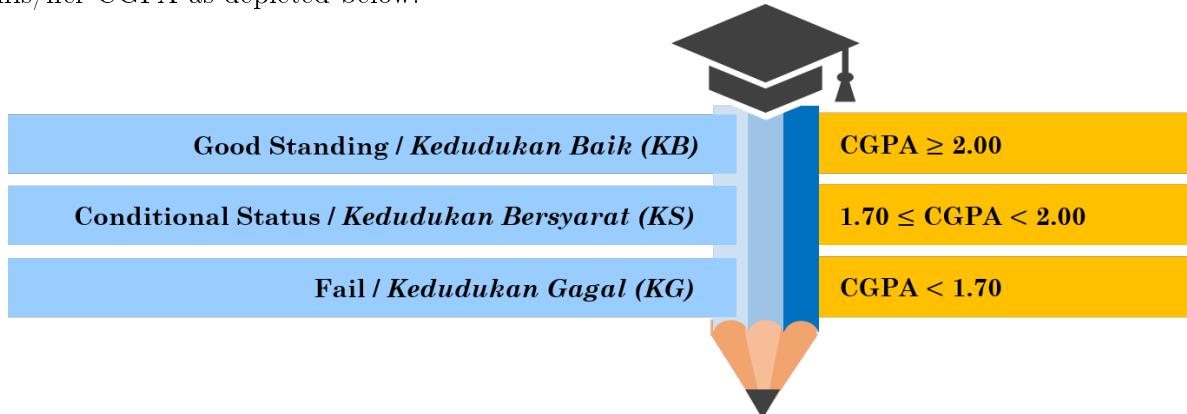
### CUMULATIVE GRADE POINT AVERAGE (CGPA):

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

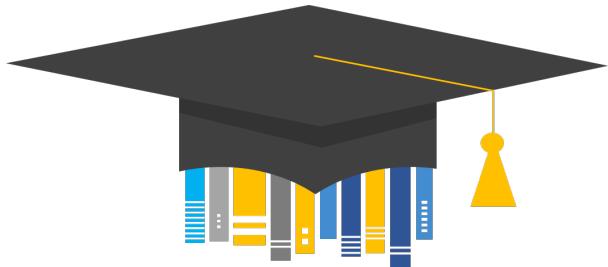
$$\text{CGPA} = \frac{TGP_1 + TGP_2 + \dots + TGP_n}{TCP_1 + TCP_2 + \dots + TCP_n}$$

## Academic Standing

A student's academic standing is determined at the end of every regular semester based on his/her CGPA as depicted below:



1. With the approval of the Senate, a student who obtains  $\text{CGPA} \geq 2.00$  but  $\text{GPA} < 1.00$  may;
  - i. continue his/her studies with KB; or
  - ii. be instructed to defer his studies to the next semester with KB; or
  - iii. be terminated from his studies with KG.
2. With the approval of the Senate, a student who obtains  $1.70 \leq \text{CGPA} < 2.00$  but  $\text{GPA} < 1.00$  may;
  - i. be instructed to defer his/her studies to the next semester with KS; or
  - ii. be terminated from his/her studies with KG.
3. The Academic Standing of a student in the Special Semester shall not be determined. Grades obtained in the Special Semester shall be counted when calculating the CGPA of the subsequent semester. For a student who is due to graduate in the Special Semester, the CGPA will be calculated based on the Repeat or Redeem Course.
4. A student who obtains KS for three (3) consecutive semesters shall be given KG.
5. A student who obtains KG shall be terminated from his/her studies.
6. For students with KS, maximum permissible credit for the upcoming semester is 12 credits.



## **Dean's List Award**

A student who obtains a GPA of 3.50 and above will be awarded a Dean's List Certificate. The list will be published at the University board and webpage. Student's transcripts will carry the Dean's List Award notation.

## **Graduation Requirement**

A student shall only be conferred a Bachelor Degree or Diploma subject to the following requirements:

1. The student must obtain a Good Academic Standing (KB) in his/her final semester.
2. The student must pass all Courses required by the curriculum.
3. Any other requirements set by the University.

# **Academic Advisory System**

## **RESPONSIBILITY OF ACADEMIC ADVISOR**

The importance of having an academic advisory system are as follows:

1. The Academic Advisor is required to explain to the students the important information concerning university's policy and procedure, curriculum and syllabus, academic calendar and etc.
2. The Academic Advisor also needs to assess the students' aptitude to ensure credit hours and Courses registered are suitable with their capability.
3. In addition, the Academic Advisor must approve application to add/drop Courses based on student performance.

## **RESPONSIBILITY OF STUDENT**

Students are responsible to consistently meet with their Academic Advisor twice per semester (minimum) to get advice and help in solving any academic problems arise. In general, students are responsible to:

1. meet with the Academic Advisor in the first week of each semester and obtain the general explanation about the Semester System and related issues concerning learning process as well as monitoring students' performance.
2. obtain an assistance from the Academic Advisor in preparing their study plan throughout their study in UTeM, such as Courses to be registered every semester.
3. inform the Faculty's Administration and Academic Advisor concerning their performance and problems.
4. check and verify Courses registered for the examination.
5. seek advice and explanation from their Academic Advisor the effects of registering and dropping Courses.

# Student Clubs

## Programme BITE

Club Advisor:  
Dr. Mohamad Lutfi  
Dolhalit



## Programme BITM

Club Advisor:  
Dr. Mohamad Lutfi  
Dolhalit



## Programme BITD

Club Advisor:  
Mrs. Hidayah  
Rahmalan



## Programme BITS

Club Advisor:  
Mrs. Hidayah  
Rahmalan



The establishment of student club is aimed to encourage active involvement of students with co-curricular activities at the department and faculty level. This is in line with the direction of educational development and talent achievement as outlined in the Malaysia Higher Education Development Plan. There are eight student clubs which represent each programme in the faculty.

## Programme BITC

Club Advisor:  
Mr. Muhammad Syahrul  
Azhar Sani



## Programme BITZ

Club Advisor:  
Mr. Mohd Najwan  
Md Khambari



## Programme BITI

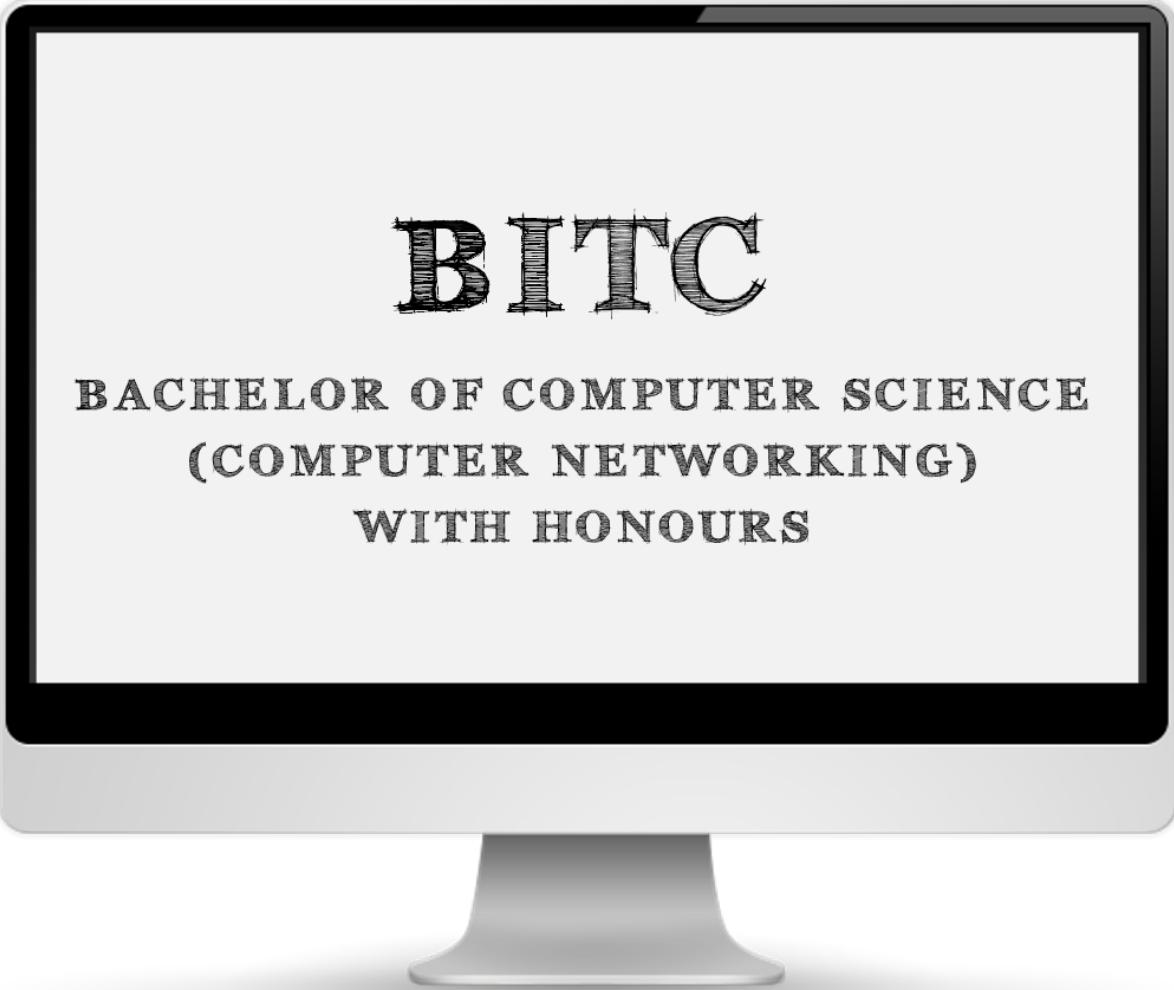
Club Advisor:  
Dr. Nur Zareen  
Zulkarnain



## Programme DIT

Club Advisor:  
Ts. Nor Mas Aina  
Md Bohari





A computer monitor with a black frame and a light grey base, displaying text about a degree program. The screen shows 'BITC' at the top, followed by 'BACHELOR OF COMPUTER SCIENCE' on three lines, and '(COMPUTER NETWORKING)' on the second line of the title.

**BITC**

**BACHELOR OF COMPUTER SCIENCE  
(COMPUTER NETWORKING)  
WITH HONOURS**



## Programme Details

Bachelor of Computer Science (Computer Networking) is aimed to produce highly knowledgeable and skilful graduates in the field of information technology and communication. Graduates are competent in advanced specialised knowledge and skill in analysing, developing, installing, administrating, servicing and controlling the networking system and communication.

## Programme Learning Outcomes (PLO)

The aim of the Bachelor of Computer Science (Computer Networking) programme is to produce students with the following characteristics:

1. Able to apply knowledge of computer science and information technology.
2. Able to analyse, design and develop ICT applications.
3. Able to analyse, create, assemble, configure, implement, manage, maintain and administer network infrastructure and security.
4. Able to develop advanced computer network applications.
5. Able to obtain recognition from professional bodies.
6. Able to resolve problems in creative way and able to communicate effectively.
7. Able to contribute individually or in team in various disciplines and domains.
8. Able to lead with ethics and have Entrepreneurship skills.
9. Able to perform continuous self-learning to obtain knowledge and skills.

## Career Prospects

There is a wide range of career opportunities in the field of computer science and information technology available for graduates who are specialised in Computer Networking, either in the government sector or private sector, as well as undertaking business ventures of their own. Among the career opportunities are:

1. Information System Executive.
2. Computer Security Executive.
3. Network Project Administrator.
4. System Analyst.
5. Network Programmer.
6. Network Engineer.

Other than that, the graduates also have the opportunity to further their studies at postgraduate level.

## **Curriculum Structure**

Students are required to complete a minimum of 120 credits to graduate with a Bachelor of Computer Science (Computer Networking) with Honours. The programme components are as follows:

<b>Bachelor's Degree (Computer Science)</b>		
Minimum graduating credit - 120		
<b>Component</b>	<b>Component's Code</b>	<b>Credits</b>
General Module	W	14
Core Module	P	45
Specialisation Module	K	30
Final Year Project	P	6
Industrial Training	P	12
Free Module	E	13
<b>Total Credits</b>		<b>120</b>

## **Professional Certification**

Preparation for CCNA Professional Certificate (BITS 2610) :: Year 2, Semester 1.

# Curriculum Structure for Each Semester

## Year One : Semester 1

Course Code	Course Name	Comp Code	Contact Hrs		Crdt	Pre-requisite
			Lect	Lab		
BLHW 1442	English for Academic Purposes	W	2	0	2	
BLHW 1762	Philosophy and Current Issues	W	2	0	2	
BITI 1213	Linear Algebra and Discrete Mathematics	P	2	2	3	
BITM 1113	Multimedia System	P	2	2	3	
BITP 1113	Programming Technique	P	2	2	3	
BITS 1123	Computer Organisation and Architecture	P	2	2	3	
<b>Total Credits</b>					<b>16</b>	

## Year One : Semester 2

Course Code	Course Name	Comp Code	Contact Hrs		Crdt	Pre-requisite
			Lect	Lab		
BITI 1223	Calculus and Numerical Methods	P	2	2	3	
BITM 2313	Human Computer Interaction	P	2	2	3	
BITP 1123	Data Structure and Algorithm	P	2	2	3	BITP 1113
BITP 1323	Database	P	2	2	3	
BITS 1313	Data Communication and Networking	P	2	2	3	
B**** ***3	Free Module I	E	2	2	3	
<b>Total Credits</b>					<b>18</b>	

## Year Two : Semester 1

Course Code	Course Name	Comp Code	Contact Hrs		Crdt	Pre-requisite
			Lect	Lab		
BLHW 2452	Academic Writing	W	2	0	2	BLHW 1442
BLHW 2772	<i>Penghayatan Etika dan Peradaban</i> <sup>1</sup>	W	2	0	2	
BITU 2913	Workshop I	P	<sup>1</sup> <sup>2</sup>		3	BITP 1113
BITI 2233	Statistics and Probability	P	2	2	3	
BITP 3113	Object Oriented Programming	P	2	2	3	
BITS 1213	Operating System	P	2	2	3	
BITS 2313	Local Area Network	K	2	2	3	BITS 1313
<b>Total Credits</b>					<b>19</b>	

<sup>1</sup>For International Students, change to BLHW 2752 Malaysian Culture.

<sup>2</sup>Average official contact hours per week.

Preparation for CCNA Professional Certificate (BITS 2610).

## Year Two : Semester 2

Course Code	Course Name	Comp Code	Contact Hrs		Crdt	Pre-requisite
			Lect	Lab		
BKK* ***1	Co-Curriculum I <sup>1</sup>	W	0	3	1	
BITI 1113	Artificial Intelligence	P	2	2	3	
BITP 2213	Software Engineering	P	2	2	3	
BITS 2323	Wide Area Network	K	2	2	3	BITS 2313
BITS 2333	Network Analysis and Design	K	2	2	3	BITS 2313
BLH* ***2	Free Module II <sup>2</sup>	E	2	0	2	
B*** ***3	Free Module III	E	2	2	3	
<b>Total Credits</b>					<b>18</b>	

<sup>1</sup>This course can be taken in any semester. Please refer to Co-Curriculum Unit before register.

<sup>2</sup>For International Students, compulsory to choose BLHL 1012 Bahasa Melayu Komunikasi.

## Year Three : Semester 1

Course Code	Course Name	Comp Code	Contact Hrs		Crdt	Pre-requisite
			Lect	Lab		
BLHW 3462	English for Professional Interaction	W	2	0	2	BLHW 2452
BKK* ***1	Co-Curriculum II <sup>1</sup>	W	0	3	1	
BITU 3923	Workshop II	K	1 <sup>2</sup>		3	BITU 2913
BITS 3313	Network Administration and Management	K	2	2	3	BITS 2333
BITS 3323	Network Project Management	K	2	2	3	
BITS 3533	Wireless Network and Mobile Computing	K	2	2	3	BITS 1313
B*** ***3	Free Module IV	E	2	2	3	
<b>Total Credits</b>					<b>18</b>	

<sup>1</sup>This course can be taken in any semester. Please refer to Co-Curriculum Unit before register.

<sup>2</sup>Average official contact hours per week.

## Year Three : Semester 2

Course Code	Course Name	Comp Code	Contact Hrs		Crdt	Pre-requisite
			Lect	Lab		
BTMW 4012	Technology Entrepreneurship	W	2	0	2	
BITU 3973	Final Year Project I	P	1 <sup>1</sup>		3	BITU 3923
BITS 3333	Multimedia Networking	K	2	2	3	BITS 2313
BITS 3413	Information Technology and Network Security	K	2	2	3	BITS 1213, BITS 1313
BITS 3513	TCP/IP Programming	K	2	2	3	BITP 1113
BLH* ***2	Free Module V	E	2	0	2	
<b>Total Credits</b>					<b>16</b>	

<sup>1</sup>Average official contact hours per week.

## Year Three : Special Semester

Course Code	Course Name	Comp Code	Contact Hrs		Crdt	Pre-requisite
			Lect	Lab		
BITU 3983	Final Year Project II	P	1 <sup>1</sup>		3	BITU 3973
		<b>Total Credits</b>		<b>3</b>		

<sup>1</sup> Average official contact hours per week.

## Year Four : Semester 1

Course Code	Course Name	Comp Code	Duration (weeks)	Crdt	Pre-requisite
BITU 3926	Industrial Training	P	24	6 (Attend & Pass)	BITU 3983 <sup>1</sup>
BITU 3946	Industrial Training Report	P	24	6	BITU 3983 <sup>1</sup>
		<b>Total Credits</b>		<b>12</b>	

<sup>1</sup> Completed all Courses.

## List of Courses in Free Module

Below is the list of courses in free module that can be selected as part of the curriculum. Students need to choose a minimum of **THREE (3)** courses with **THREE (3)** credits and **TWO (2)** courses with **TWO (2)** credits, to complete **at least 13 credits**.

List of courses offered can be changed from time to time in accordance with industry needs.

Course Code	Course Name	Contact Hrs		Crdt	Pre-requisite
		Lect	Lab		
BITM 1123	Interactive Media Authoring	2	2	3	
BITM 2113	Web Application Development	2	2	3	
BITM 2123	Digital Audio and Video Technology	2	2	3	
BITS 2513	Internet Technology	2	2	3	
BITS 3343	Fibre Optic	2	2	3	BITS 1313
BITS 3443	Digital Forensics	2	2	3	
BLHC 4012	Organisational Communication	2	0	2	
BLHC 4022	Negotiation Skills	2	0	2	
BLHC 4032	<i>Pemikiran Kritis dan Kreatif</i> <sup>1</sup>	2	0	2	
BLHH 1032	Industrial Psychology and Organisation	2	0	2	
BLHL ***2	Third Language <sup>2</sup>	1	2	2	

<sup>1</sup>For International Students, change to BLHL 1012 Bahasa Melayu Komunikasi.

<sup>2</sup>Refer to Third Language Courses table.

### Third Language Courses

Course Code	Course Name <sup>1</sup>	Contact Hrs		Crdt
		Lect	Lab	
BLHL 1112	Arabic I	1	2	2
BLHL 1212	Mandarin I	1	2	2
BLHL 1312	Japanese I	1	2	2
BLHL 1412	German I	1	2	2
BLHL 1612	Korean Languague	1	2	2

<sup>1</sup>Note: Students are NOT allowed to take Third Language Courses that are in their native language.

**BITD**

**BACHELOR OF COMPUTER SCIENCE  
(DATABASE MANAGEMENT)  
WITH HONOURS**



## Programme Details

Bachelor of Computer Science (Database Management) academic programme is offered to produce knowledge and highly skilled graduates in the field of information and communication technology (ICT). Graduates pursuing the programme are equipped with the in-depth knowledge and specialised skills in database management area. This includes the ability to analyse, design, develop programme using structured programming methods, manage and maintain database system which could meet the industrial needs in the field. Students should be able to develop data mining application with required security standard to protect the system database.

## Programme Learning Outcomes (PLO)

The aim of the Bachelor of Computer Science (Database Management) programme is to produce students with the following characteristics:

1. Able to apply knowledge of computer science and information technology.
2. Able to analyze, design and develop ICT applications.
3. Able to develop database by applying database concept using latest technology.
4. Able to develop database application with standard security measures.
5. Able to administer and maintain database according to the standard procedure and policy.
6. Able to resolve problems in creative way and able to communicate effectively.
7. Able to contribute individually or in a team in various discipline and domains.
8. Able to lead with ethics and have Entrepreneurship skills.
9. Able to perform continuous self-learning to obtain knowledge and skills.

## Career Prospects

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

1. Database Analyst.
2. Database System Administrator.
3. Database Designer.

Other than that, the graduates also have the opportunity to further their studies at postgraduate level.

# **Curriculum Structure**

Students are required to complete a minimum of 120 credits to graduate with a Bachelor of Computer Science (Database Management) with Honours. The programme components are as follows:

<b>Bachelor's Degree (Computer Science)</b>		
Minimum graduating credit - 120		
<b>Component</b>	<b>Component's Code</b>	<b>Credits</b>
General Module	W	14
Core Module	P	45
Specialisation Module	K	30
Final Year Project	P	6
Industrial Training	P	12
Free Module	E	13
<b>Total Credits</b>		<b>120</b>

## **Professional Certification**

Database Foundations Certified Junior Associate (BITP 2620) :: Year 2, Semester 1.

# Curriculum Structure for Each Semester

## Year One : Semester 1

Course Code	Course Name	Comp Code	Contact Hrs		Crdt	Pre-requisite
			Lect	Lab		
BLHW 1442	English for Academic Purposes	W	2	0	2	
BLHW 1762	Philosophy and Current Issues	W	2	0	2	
BKK* ***1	Co-Curriculum I <sup>1</sup>	W	0	3	1	
BITI 1213	Linear Algebra and Discrete Mathematics	P	2	2	3	
BITM 1113	Multimedia System	P	2	2	3	
BITP 1113	Programming Technique	P	2	2	3	
BITS 1123	Computer Organisation and Architecture	P	2	2	3	
<b>Total Credits</b>					<b>17</b>	

<sup>1</sup>This course can be taken in any semester. Please refer to Co-Curriculum Unit before register.

## Year One : Semester 2

Course Code	Course Name	Comp Code	Contact Hrs		Crdt	Pre-requisite
			Lect	Lab		
BLHW 2772	<i>Penghayatan Etika dan Peradaban</i> <sup>1</sup>	W	2	0	2	
BKK* ***1	Co-Curriculum II <sup>2</sup>	W	0	3	1	
BITI 1223	Calculus and Numerical Methods	P	2	2	3	
BITP 1123	Data Structure and Algorithm	P	2	2	3	BITP 1113
BITP 1323	Database	P	2	2	3	
BITP 2213	Software Engineering	P	2	2	3	
BLH* ***2	Free Module I <sup>3</sup>	E	2	0	2	
<b>Total Credits</b>					<b>17</b>	

<sup>1</sup>For International Students, change to BLHW 2752 Malaysian Culture.

<sup>2</sup>This course can be taken in any semester. Please refer to Co-Curriculum Unit before register.

<sup>3</sup>For International Students, compulsory to choose BLHL 1012 Bahasa Melayu Komunikasi.

## Year Two : Semester 1

Course Code	Course Name	Comp Code	Contact Hrs		Crdt	Pre-requisite
			Lect	Lab		
BITU 2913	Workshop I	P	1 <sup>1</sup>		3	BITP 1113
BITI 2233	Statistics and Probability	P	2	2	3	
BITM 2313	Human Computer Interaction	P	2	2	3	
BITS 1213	Operating System	P	2	2	3	
BITP 2303	Database Programming	K	2	2	3	BITP 1323
BITP 2313	Database Design	K	2	2	3	BITP 1323
<b>Total Credits</b>					<b>18</b>	

<sup>1</sup> Average official contact hours per week.

Database Foundations Certified Junior Associate (BITP 2620).

## Year Two : Semester 2

Course Code	Course Name	Comp Code	Contact Hrs		Crdt	Pre-requisite
			Lect	Lab		
BLHW 2452	Academic Writing	W	2	0	2	BLHW 1442
BITI 1113	Artificial Intelligence	P	2	2	3	
BITP 3113	Object Oriented Programming	P	2	2	3	
BITS 1313	Data Communication and Networking	P	2	2	3	
BITP 2223	Software Requirement and Design	K	2	2	3	
BITP 2323	Database Administration	K	2	2	3	BITP 1323
BLH* ***2	Free Module II	E	2	0	2	
<b>Total Credits</b>					<b>19</b>	

### Year Three : Semester 1

Course Code	Course Name	Comp Code	Contact Hrs		Crdt	Pre-requisite
			Lect	Lab		
BLHW 3462	English for Professional Interaction	W	2	0	2	BLHW 2452
BITU 3923	Workshop II	K	1 <sup>1</sup>		3	BITU 2913
BITS 3423	Information Technology and Database	K	2	2	3	
BITP 3223	Software Project Management	K	2	2	3	
BITP 3363	Data Warehousing and Business Intelligence	K	2	2	3	
BITP 3483	Geographic Information System	K	2	2	3	
<b>Total Credits</b>					<b>17</b>	

<sup>1</sup> Average official contact hours per week.

### Year Three : Semester 2

Course Code	Course Name	Comp Code	Contact Hrs		Crdt	Pre-requisite
			Lect	Lab		
BTMW 4012	Technology Entrepreneurship	W	2	0	2	
BITU 3973	Final Year Project I	P	1 <sup>1</sup>		3	BITU 3923
BITP 3353	Multimedia Database	K	2	2	3	BITP 1323
BIT* ***3	Free Module III	E	2	2	3	
BIT* ***3	Free Module IV	E	2	2	3	
BIT* ***3	Free Module V	E	2	2	2	
<b>Total Credits</b>					<b>17</b>	

<sup>1</sup> Average official contact hours per week.

## Year Three : Special Semester

Course Code	Course Name	Comp Code	Contact Hrs		Crdt	Pre-requisite
			Lect	Lab		
BITU 3983	Final Year Project II	P	1 <sup>1</sup>		3	BITU 3973
		<b>Total Credits</b>		<b>3</b>		

<sup>1</sup> Average official contact hours per week.

## Year Four : Semester 1

Course Code	Course Name	Comp Code	Duration (weeks)	Crdt	Pre-requisite
BITU 3926	Industrial Training	P	24	6 (Attend & Pass)	BITU 3983 <sup>1</sup>
BITU 3946	Industrial Training Report	P	24	6	BITU 3983 <sup>1</sup>
		<b>Total Credits</b>		<b>12</b>	

<sup>1</sup>Completed all Courses.

## List of Courses in Free Module

Below is the list of courses in free module that can be selected as part of the curriculum. Students need to choose a minimum of **THREE (3)** courses with **THREE (3)** credits and **TWO (2)** courses with **TWO (2)** credits, to complete **at least 13 credits**.

List of courses offered can be changed from time to time in accordance with industry needs.

Course Code	Course Name	Contact Hrs		Crdt	Pre-requisite
		Lect	Lab		
BITI 2223	Machine Learning	2	2	3	BITI 1113
BITM 2113	Web Application Development	2	2	3	
BITP 3233	Strategic Information System Planning	2	2	3	
BITP 3253	Software Validation and Verification	2	2	3	BITP 2213
BITP 3423	Special Topic in Software Engineering	2	2	3	
BITP 3513	Advanced Database Programming	2	2	3	BITP 2303
BITP 3523	Advanced Database Administration	2	2	3	BITP 2323
BITS 2313	Local Area Network	2	2	3	
BITS 2513	Internet Technology	2	2	3	
BLHC 4012	Organisational Communication	2	0	2	
BLHC 4022	Negotiation Skills	2	0	2	
BLHC 4032	<i>Pemikiran Kritis dan Kreatif</i> <sup>1</sup>	2	0	2	
BLHH 1032	Industrial Psychology and Organisation	2	0	2	
BLHL *** <sup>2</sup>	Third Language <sup>2</sup>	1	2	2	

<sup>1</sup>For International Students, change to BLHL 1012 Bahasa Melayu Komunikasi.

<sup>2</sup>Refer to Third Language Courses table.

## Third Language Courses

Course Code	Course Name <sup>1</sup>	Contact Hrs		Crdt
		Lect	Lab	
BLHL 1112	Arabic I	1	2	2
BLHL 1212	Mandarin I	1	2	2
BLHL 1312	Japanese I	1	2	2
BLHL 1412	German I	1	2	2
BLHL 1612	Korean Languague	1	2	2

<sup>1</sup>Note: Students are NOT allowed to take Third Language Courses that are in their native language.



**BITI**

**BACHELOR OF COMPUTER SCIENCE  
(ARTIFICIAL INTELLIGENCE)  
WITH HONOURS**



## Programme Details

Bachelor of Computer Science (Artificial Intelligence) academic programme is offered to prepare graduates with a thorough understanding and superior skills of Computer Science, particularly in the area of Artificial Intelligence. Graduates will also be equipped with advanced scientific knowledge and engineering skills in Artificial Intelligence (AI) to fulfil industri needs especially in the field of information and communication technology (ICT), robotics and manufacturing.

## Programme Learning Outcomes (PLO)

The aim of the Bachelor of Computer Science (Artificial Intelligence) programme is to produce students with the following characteristics:

1. Able to apply knowledge of computer science and information technology.
2. Able to analyse, design and develop ICT applications.
3. Able to apply AI techniques such as searching techniques, fuzzy logic, machine learning, neural networks, evolutionary computing and intelligent agents in developing a system.
4. Equipped with skills to develop individually or in a group on AI-based systems such as intelligent systems, expert systems, intelligent agent systems and robotic systems.
5. Able to conduct research in the fields related and based on AI.
6. Able to resolve problems in a creative way and able to communicate effectively.
7. Able to contribute individually or in a team in various disciplines and domains.
8. Able to lead with ethics and have entrepreneurship skills.
9. Able to perform continuous self-learning to obtain knowledge and skills.

## Career Prospects

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

1. Knowledge Engineer / AI Engineer / Machine Learning Engineer.
2. Intelligent Systems / Expert Systems Developer.
3. Data Analyst / Data Engineer.
4. System Analyst / Programmer / Designer.
5. Software Developer / Consultant.
6. Computer / Data Scientist.
7. Researcher.

Other than that, the graduates also have the opportunity to further their studies at postgraduate level.

# **Curriculum Structure**

Students are required to complete a minimum of 120 credits to graduate with a Bachelor of Computer Science (Artificial Intelligence) with Honours. The programme components are as follows:

<b>Bachelor's Degree (Computer Science)</b>		
Minimum graduating credit - 120		
<b>Component</b>	<b>Component's Code</b>	<b>Credits</b>
General Module	W	14
Core Module	P	45
Specialisation Module	K	30
Final Year Project	P	6
Industrial Training	P	12
Free Module	E	13
<b>Total Credits</b>		<b>120</b>

## **Profesional Certification**

Preparation for RapidMiner Analyst Profesional Certificate<sup>1</sup> (BITI 3910) :: Year 2, Special Semester.

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<sup>1</sup>subject to changes by the ICA Department

# Curriculum Structure for Each Semester

## Year One : Semester 1

Course Code	Course Name	Comp Code	Contact Hrs		Crdt	Pre-requisite
			Lect	Lab		
BLHW 1442	English for Academic Purposes	W	2	0	2	
BLHW 1762	Philosophy and Current Issues	W	2	0	2	
BKK* ***1	Co-Curriculum I <sup>1</sup>	W	0	3	1	
BITI 1213	Linear Algebra and Discrete Mathematics	P	2	2	3	
BITM 1113	Multimedia System	P	2	2	3	
BITP 1113	Programming Technique	P	2	2	3	
BITS 1123	Computer Organisation and Architecture	P	2	2	3	
<b>Total Credits</b>					<b>17</b>	

<sup>1</sup>This course can be taken in any semester. Please refer to Co-Curriculum Unit before register.

## Year One : Semester 2

Course Code	Course Name	Comp Code	Contact Hrs		Crdt	Pre-requisite
			Lect	Lab		
BITI 1113	Artificial Intelligence	P	2	2	3	
BITI 1223	Calculus and Numerical Methods	P	2	2	3	
BITP 1123	Data Structure and Algorithm	P	2	2	3	BITP 1113
BITP 1323	Database	P	2	2	3	
BITS 1213	Operating System	P	2	2	3	
BITS 1313	Data Communication and Networking	P	2	2	3	
<b>Total Credits</b>					<b>18</b>	

## Year Two : Semester 1

Course Code	Course Name	Comp Code	Contact Hrs		Crdt	Pre-requisite
			Lect	Lab		
BLHW 2452	Academic Writing	W	2	0	2	BLHW 1442
BLHW 2772	<i>Penghayatan Etika dan Peradaban</i> <sup>1</sup>	W	2	0	2	
BITU 2913	Workshop I	P	1 <sup>2</sup>		3	BITP 1113
BITI 2233	Statistics and Probability	P	2	2	3	
BITP 3113	Object Oriented Programming	P	2	2	3	
BITI 2213	Knowledge Based System	K	2	2	3	BITI 1113
BITI 2223	Machine Learning	K	2	2	3	BITI 1113
<b>Total Credits</b>					<b>19</b>	

<sup>1</sup>For International Students, change to BLHW 2752 Malaysian Culture.

<sup>2</sup>Average official contact hours per week.

## Year Two : Semester 2

Course Code	Course Name	Comp Code	Contact Hrs		Crdt	Pre-requisite
			Lect	Lab		
BITM 2313	Human Computer Interaction	P	2	2	3	
BITP 2213	Software Engineering	P	2	2	3	
BITI 3123	Fuzzy Logic	K	2	2	3	BITI 1113
BITI 3133	Neural Network	K	2	2	3	BITI 1113
BITI 3143	Evolutionary Computing	K	2	2	3	BITI 1113
B*** ***3	Free Module I	E	2	2	3	
<b>Total Credits</b>					<b>18</b>	

## Year Two : Special Semester

Preparation for Rapid Miner Analyst Profesional Certificate<sup>3</sup> (BITI 3910).

<sup>3</sup>subject to changes by the ICA Department

## Year Three : Semester 1

Course Code	Course Name	Comp Code	Contact Hrs		Crdt	Pre-requisite
			Lect	Lab		
BLHW 3462	English for Professional Interaction	W	2	0	2	BLHW 2452
BKK* ***1	Co-Curriculum II <sup>1</sup>	W	0	3	1	
BITU 3923	Workshop II	K	1 <sup>2</sup>		3	BITU 2913
BITI 3413	Natural Language Processing	K	2	2	3	BITI 1113
BITI 3523	Artificial Intelligence in Robotics and Automation	K	2	2	3	
BITI 3533	Artificial Intelligence Project Management	K	2	2	3	
B*** ***3	Free Module II	E	2	2	3	
<b>Total Credits</b>					<b>18</b>	

<sup>1</sup>This course can be taken in any semester. Please refer to Co-Curriculum Unit before register.

<sup>2</sup>Average official contact hours per week.

## Year Three : Semester 2

Course Code	Course Name	Comp Code	Contact Hrs		Crdt	Pre-requisite
			Lect	Lab		
BTMW 4012	Technology Entrepreneurship	W	2	0	2	
BITU 3973	Final Year Project I	P	1 <sup>1</sup>		3	BITU 3923
BITS 3423	Information Technology Security	K	2	2	3	
B*** ***3	Free Module III	E	2	2	3	
BLH* ***2	Free Module IV <sup>2</sup>	E	2	0	2	
BLH* ***2	Free Module V	E	2	0	2	
<b>Total Credits</b>					<b>15</b>	

<sup>1</sup>Average official contact hours per week.

<sup>2</sup>For International Students, compulsory to choose BLHL 1012 Bahasa Melayu Komunikasi.

## Year Three : Special Semester

Course Code	Course Name	Comp Code	Contact Hrs		Crdt	Pre-requisite
			Lect	Lab		
BITU 3983	Final Year Project II	P	1 <sup>1</sup>		3	BITU 3973
		<b>Total Credits</b>		<b>3</b>		

<sup>1</sup> Average official contact hours per week.

## Year Four : Semester 1

Course Code	Course Name	Comp Code	Duration (weeks)	Crdt	Pre-requisite
BITU 3926	Industrial Training	P	24	6 (Attend & Pass)	BITU 3983 <sup>2</sup>
BITU 3946	Industrial Training Report	P	24	6	BITU 3983 <sup>2</sup>
		<b>Total Credits</b>		<b>12</b>	

<sup>1</sup> Completed all Courses.

## List of Courses in Free Module

Below is the list of courses in free module that can be selected as part of the curriculum. Students need to choose a minimum of **THREE (3)** courses with **THREE (3)** credits and **TWO (2)** courses with **TWO (2)** credits, to complete **at least 13 credits**.

List of courses offered can be changed from time to time in accordance with industry needs.

Course Code	Course Name	Contact Hrs		Crdt	Pre-requisite
		Lect	Lab		
BITI 3113	Intelligent Agent	2	2	3	
BITI 2113	Logic Programming	2	2	3	
BITI 2513	Introduction to Data Science	2	2	3	
BITI 3213	Decision Support Systems	2	2	3	
BITI 3313	Image Processing and Pattern Recognition	2	2	3	BITI 1113
BITI 3513	Artificial Intelligence in Manufacturing	2	2	3	BITI 1113
BITM 2113	Web Application Development	2	2	3	
BITM 3133	Computer Games Development	2	2	3	
BITP 3253	Software Validation and Verification	2	2	3	BITP 2213
BITP 3453	Mobile Application Development	2	2	3	
BITP 3473	Formal Methods	2	2	3	
BITS 2513	Internet Technology	2	2	3	
BTMT 3323	Contemporary Business Management	2	2	3	
BENT 4733	Digital Signal Processing	2	2	3	
BLHC 4012	Organisational Communication	2	0	2	
BLHC 4022	Negotiation Skills	2	0	2	
BLHC 4032	<i>Pemikiran Kritis dan Kreatif</i> <sup>1</sup>	2	0	2	
BLHH 1032	Industrial Psychology and Organisation	2	0	2	
BLHL ***2	Third Language <sup>2</sup>	1	2	2	

<sup>1</sup>For International Students, change to BLHL 1012 Bahasa Melayu Komunikasi.

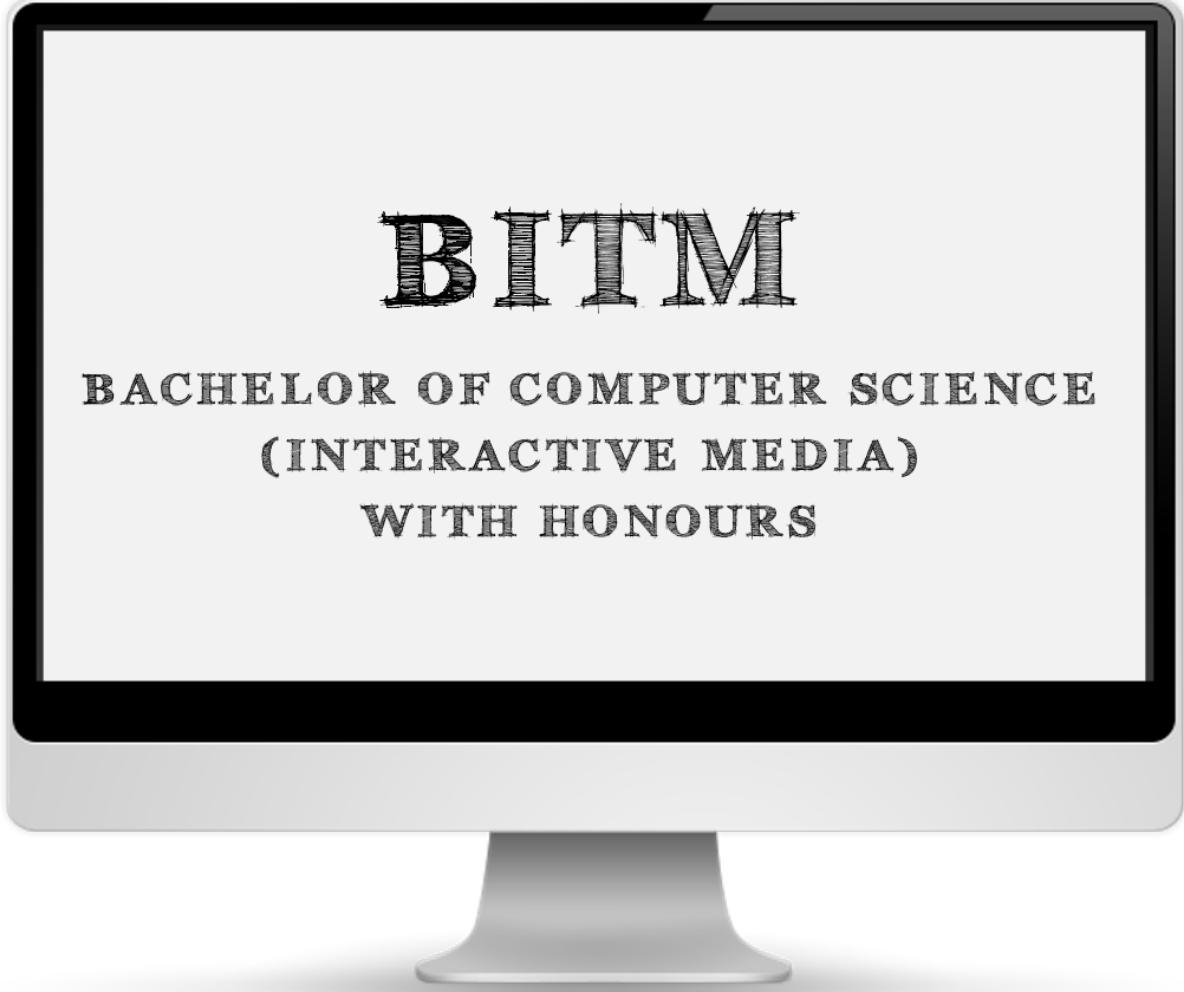
<sup>2</sup>Refer to Third Language Courses table.

## Third Language Courses

Course Code	Course Name <sup>1</sup>	Contact Hrs		Crdt
		Lect	Lab	
BLHL 1112	Arabic I	1	2	2
BLHL 1212	Mandarin I	1	2	2
BLHL 1312	Japanese I	1	2	2
BLHL 1412	German I	1	2	2
BLHL 1612	Korean Languague	1	2	2

<sup>1</sup>Note: Students are NOT allowed to take Third Language Courses that are in their native language.





A computer monitor with a black frame and a light grey bezel. The screen displays the following text:

**BITM**

**BACHELOR OF COMPUTER SCIENCE  
(INTERACTIVE MEDIA)  
WITH HONOURS**



## Programme Details

Bachelor of Computer Science (Interactive Media) academic programme is offered to prepare graduates with a thorough understanding and superior skills in information technology particularly in the area of multimedia.

The learning outcomes of this programme are to equip the students with the basic knowledge in every aspect of information technology, to provide the students with sufficient theoretical knowledge and skills to apply the knowledge learnt through the practiced concept, enable the students to be able to apply the interactivity concept in the design and development of multimedia-based application, to equip the students with deep understanding and high skills in the development and management of web sites, animation, computer graphics, virtual reality and development of computer games, as well as to produce graduates that are capable to develop high quality interactive media products and multimedia applications which fulfill the industry specifications.

## Programme Learning Outcomes (PLO)

The aim of the Bachelor of Computer Science (Interactive Media) programme is to produce students with the following characteristics:

1. Able to apply knowledge of computer science and information technology.
2. Able to analyse, design and develop Information and Communication Technology (ICT) applications.
3. Able to apply interactivity concept in designing and developing multimedia-based applications and products.
4. Able to analyse requirements, configure, implement and maintain digital audio/video equipment.

5. Able to develop multimedia application with the quality that fulfills industry specifications.
6. Able to resolve problems in creative way and able to communicate effectively.
7. Able to contribute individually or in a team in various disciplines and domains.
8. Able to lead with ethics and have Entrepreneurship skills.
9. Able to perform continuous self-learning to obtain knowledge and skills.

## Career Prospects

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

1. Web Designer / Web Developer.
2. Computer Games Designer.
3. Computer Graphics Designer.
4. Animator.
5. Digital Audio Video Engineer.
6. User Interface Designer.
7. Interactive Media Application Developer.
8. Multimedia Consultant.

Other than that, the graduates may also choose career based on their basic knowledge in Computer Science and ICT, such as programmer and information system officer or system analyst.

## **Curriculum Structure**

Students are required to complete a minimum of 120 credits to graduate with a Bachelor of Computer Science (Interactive Media) with Honours. The programme components are as follows:

<b>Bachelor's Degree (Computer Science)</b>		
Minimum graduating credit - 120		
<b>Component</b>	<b>Component's Code</b>	<b>Credits</b>
General Module	W	14
Core Module	P	45
Specialisation Module	K	30
Final Year Project	P	6
Industrial Training	P	12
Free Module	E	13
<b>Total Credits</b>		<b>120</b>

## **Professional Certification**

Web Developer Professional Certificate (BITM 2130) :: Year 3, Semester 1.

# Curriculum Structure for Each Semester

## Year One : Semester 1

Course Code	Course Name	Comp Code	Contact Hrs		Crdt	Pre-requisite
			Lect	Lab		
BLHW 1762	Philosophy and Current Issues	W	2	0	2	
BKK* ***1	Co-Curriculum I <sup>1</sup>	W	0	3	1	
BITI 1213	Linear Algebra and Discrete Mathematics	P	2	2	3	
BITM 1113	Multimedia System	P	2	2	3	
BITP 1113	Programming Technique	P	2	2	3	
BITS 1123	Computer Organisation and Architecture	P	2	2	3	
BLH* ***2	Free Module I <sup>2</sup>	E	2	0	2	
<b>Total Credits</b>					<b>17</b>	

<sup>1</sup>This course can be taken in any semester. Please refer to Co-Curriculum Unit before register.

<sup>2</sup>For International Students, compulsory to choose BLHL 1012 Bahasa Melayu Komunikasi.

## Year One : Semester 2

Course Code	Course Name	Comp Code	Contact Hrs		Crdt	Pre-requisite
			Lect	Lab		
BKK* ***1	Co-Curriculum II <sup>1</sup>	W	0	3	1	
BLHW 1442	English for Academic Purposes	W	2	0	2	
BITI 1223	Calculus and Numerical Methods	P	2	2	3	
BITP 1123	Data Structure and Algorithm	P	2	2	3	BITP 1113
BITP 1323	Database	P	2	2	3	
BITS 1213	Operating System	P	2	2	3	
BITM 1123	Interactive Media Authoring	K	2	2	3	
<b>Total Credits</b>					<b>18</b>	

<sup>1</sup>This course can be taken in any semester. Please refer to Co-Curriculum Unit before register.

## Year Two : Semester 1

Course Code	Course Name	Comp Code	Contact Hrs		Crdt	Pre-requisite
			Lect	Lab		
BLHW 2452	Academic Writing	W	2	0	2	BLHW 1442
BLHW 2772	<i>Penghayatan Etika dan Peradaban</i> <sup>1</sup>	W	2	0	2	
BITU 2913	Workshop I	P	<sup>1</sup> <sup>2</sup>		3	BITP 1113
BITI 1113	Artificial Intelligence	P	2	2	3	
BITS 1313	Data Communication and Networking	P	2	2	3	
BITM 2123	Digital Audio and Video Technology	K	2	2	3	
BITM 2213	Computer Animation	K	2	2	3	
<b>Total Credits</b>					<b>19</b>	

<sup>1</sup>For International Students, change to BLHW 2752 Malaysian Culture.

<sup>2</sup>Average official contact hours per week.

## Year Two : Semester 2

Course Code	Course Name	Comp Code	Contact Hrs		Crdt	Pre-requisite
			Lect	Lab		
BTMW 4012	Technology Entrepreneurship	W	2	0	2	
BITI 2233	Statistics and Probability	P	2	2	3	
BITM 2313	Human Computer Interaction	P	2	2	3	
BITP 3113	Object Oriented Programming	P	2	2	3	
BITM 3213	Interactive Computer Graphics	K	2	2	3	
BLH* ***2	Free Module II	E	2	0	2	
BIT* ***3	Free Module III	E	2	2	3	
<b>Total Credits</b>					<b>19</b>	

## Year Three : Semester 1

Course Code	Course Name	Comp Code	Contact Hrs		Crdt	Pre-requisite
			Lect	Lab		
BITP 2213	Software Engineering	P	2	2	3	
BITU 3923	Workshop II	K	1 <sup>1</sup>		3	BITU 2913
BITM 2113	Web Application Development	K	2	2	3	
BITM 3113	Interactive Media Project Management	K	2	2	3	
BITM 3133	Computer Games Development	K	2	2	3	
BIT* ***3	Free Module IV	E	2	2	3	
<b>Total Credits</b>					<b>18</b>	

<sup>1</sup> Average official contact hours per week.

Web Developer Professional Certificate (BITM 2130).

## Year Three : Semester 2

Course Code	Course Name	Comp Code	Contact Hrs		Crdt	Pre-requisite
			Lect	Lab		
BLHW 3462	English for Professional Interaction	W	2	0	2	BLHW 2452
BITU 3973	Final Year Project I	P	1 <sup>1</sup>		3	BITU 3923
BITM 3223	Virtual Reality Technology	K	2	2	3	
BITS 3423	Information Technology Security	K	2	2	3	
BIT* ***3	Free Module V	E	2	2	3	
<b>Total Credits</b>					<b>14</b>	

<sup>1</sup> Average official contact hours per week.

## Year Three : Special Semester

Course Code	Course Name	Comp Code	Contact Hrs		Crdt	Pre-requisite
			Lect	Lab		
BITU 3983	Final Year Project II	P	1 <sup>1</sup>		3	BITU 3973
		<b>Total Credits</b>		<b>3</b>		

<sup>1</sup> Average official contact hours per week.

## Year Four : Semester 1

Course Code	Course Name	Comp Code	Duration (weeks)	Crdt	Pre-requisite
BITU 3926	Industrial Training	P	24	6 (Attend & Pass)	BITU 3983 <sup>1</sup>
BITU 3946	Industrial Training Report	P	24	6	BITU 3983 <sup>1</sup>
		<b>Total Credits</b>		<b>12</b>	

<sup>1</sup>Completed all Courses.

## List of Courses in Free Module

Below is the list of courses in free module that can be selected as part of the curriculum. Students need to choose a minimum of **THREE (3)** courses with **THREE (3)** credits and **TWO (2)** courses with **TWO (2)** credits, to complete **at least 13 credits**.

List of courses offered can be changed from time to time in accordance with industry needs.

Course Code	Course Name	Contact Hrs		Crdt	Pre-requisite
		Lect	Lab		
BITE 3623	Motion Graphics	2	2	3	
BITE 3633	Game Play	2	2	3	
BITE 3713	Multi-platform Game	2	2	3	
BITI 2223	Machine Learning	2	2	3	
BITM 2323	Digital Imaging for Multimedia	2	2	3	
BITP 2223	Software Requirements and Design	2	2	3	
BITP 3453	Mobile Application Development	2	2	3	
BITP 3353	Multimedia Database	2	2	3	
BITS 2513	Internet Technology	2	2	3	
BLHC 4012	Organisational Communication	2	0	2	
BLHC 4022	Negotiation Skills	2	0	2	
BLHC 4032	<i>Pemikiran Kritis dan Kreatif</i> <sup>1</sup>	2	0	2	
BLHH 1032	Industrial Psychology and Organisation	2	0	2	
BLHL *** <sup>2</sup>	Third Language <sup>2</sup>	1	2	2	

<sup>1</sup>Offered to local students only. For International Students, change to BLHL 1012 Bahasa Melayu Komunikasi.

<sup>2</sup>Refer to Third Language Courses table.

## Third Language Courses

Course Code	Course Name <sup>1</sup>	Contact Hrs		Crdt
		Lect	Lab	
BLHL 1112	Arabic I	1	2	2
BLHL 1212	Mandarin I	1	2	2
BLHL 1312	Japanese I	1	2	2
BLHL 1412	German I	1	2	2
BLHL 1612	Korean Languague	1	2	2

<sup>1</sup>Note: Students are NOT allowed to take Third Language Courses that are in their native language.





A computer monitor with a black frame and a light grey base, displaying text about a degree program. The screen shows the letters 'BITS' in large, bold, serif capital letters. Below this, the text 'BACHELOR OF COMPUTER SCIENCE' is followed by '(SOFTWARE DEVELOPMENT)' and 'WITH HONOURS' on separate lines.

**BITS**

**BACHELOR OF COMPUTER SCIENCE  
(SOFTWARE DEVELOPMENT)  
WITH HONOURS**



## Programme Details

The Bachelor in Computer Science (Software Development) degree course is offered in order to produce knowledgeable and highly skilled graduates in the field of information technology and communication (ICT). Graduates pursuing the programme are equipped with the necessary knowledge and specialized skills in engineering and software development which could meet the industrial needs in the field. This includes the ability to analyze, synthesize, design complex systems, maintain, test, control software quality and manage software projects.

## Programme Learning Outcomes (PLO)

The aim of the Bachelor of Computer Science (Software Development) programme is to produce students with the following characteristics:

1. Able to apply knowledge of computer science and information technology.
2. Able to analyze, design and develop ICT applications.
3. Able to perform system coding using relevant programming language according to industry need.
4. Able to manage software development project by applying software engineering concepts.
5. Able to perform research in software engineering field.
6. Able to resolve problems in creative way and able to communicate effectively.
7. Able to contribute individually or in a team in various disciplines and domains.
8. Able to lead with ethics and have Entrepreneurship skills.
9. Able to perform continuous self learning to obtain knowledge and skills.

## Career Prospects

There is a wide range of career opportunities (both in the Government sector and private sector) in the field of computer science and information technology available for graduates who are specialised in Software Engineering. Among the career opportunities are:

1. Information System Officer.
2. System Analyst.
3. Software Engineer.
4. Software Development Manager.
5. Team member of Software Quality Assurance.
6. System Administrator.
7. Software Tester / Software Development Consultant.

Other than that, the graduates also have the opportunity to further their studies at postgraduate level.

## **Curriculum Structure**

Students are required to complete a minimum of 120 credits to graduate with a Bachelor of Computer Science (Software Development) with Honours. The programme components are as follows:

<b>Bachelor's Degree (Computer Science)</b>		
Minimum graduating credit - 120		
<b>Component</b>	<b>Component's Code</b>	<b>Credits</b>
General Module	W	14
Core Module	P	45
Specialisation Module	K	30
Final Year Project	P	6
Industrial Training	P	12
Free Module	E	13
<b>Total Credits</b>		<b>120</b>

## **Professional Certification**

Java Foundation Certified Junior Associate (BITP 2610) :: Year 2, Special Semester.

# Curriculum Structure for Each Semester

## Year One : Semester 1

Course Code	Course Name	Comp Code	Contact Hrs		Crdt	Pre-requisite
			Lect	Lab		
BLHW 1442	English for Academic Purposes	W	2	0	2	
BKK* ***1	Co-Curriculum I <sup>1</sup>	W	0	3	1	
BLHW 1762	Philosophy and Current Issues	W	2	0	2	
BITI 1213	Linear Algebra and Discrete Mathematics	P	2	2	3	
BITP 1113	Programming Technique	P	2	2	3	
BITM 1113	Multimedia System	P	2	2	3	
BITS 1123	Computer Organisation and Architecture	P	2	2	3	
<b>Total Credits</b>					<b>17</b>	

<sup>1</sup>This course can be taken in any semester. Please refer to Co-Curriculum Unit before register.

## Year One : Semester 2

Course Code	Course Name	Comp Code	Contact Hrs		Crdt	Pre-requisite
			Lect	Lab		
BLHW 2772	<i>Penghayatan Etika dan Peradaban</i> <sup>1</sup>	W	2	0	2	
BKK* ***1	Co-Curriculum II <sup>2</sup>	W	0	3	1	
BITI 1223	Calculus and Numerical Methods	P	2	2	3	
BITP 1123	Data Structure and Algorithm	P	2	2	3	BITP 1113
BITP 2213	Software Engineering	P	2	2	3	
BITP 1323	Database	P	2	2	3	
B*** ***2	Free Module I <sup>3</sup>	E	2	0	2	
<b>Total Credits</b>					<b>17</b>	

<sup>1</sup>For International Students, change to BLHW 2752 Malaysian Culture.

<sup>2</sup>This course can be taken in any semester. Please refer to Co-Curriculum Unit before register.

<sup>3</sup>For International Students, compulsory to choose BLHL 1012 Bahasa Melayu Komunikasi.

## Year Two : Semester 1

Course Code	Course Name	Comp Code	Contact Hrs		Crdt	Pre-requisite
			Lect	Lab		
BITU 2913	Workshop I	P	1 <sup>1</sup>		3	BITP 1113
BITI 2233	Statistics and Probability	P	2	2	3	
BITP 3113	Object Oriented Programming	P	2	2	3	
BITS 1213	Operating System	P	2	2	3	
BITP 2113	Algorithm Analysis	K	2	2	3	
BITP 2313	Database Design	K	2	2	3	
<b>Total Credits</b>					<b>18</b>	

<sup>1</sup> Average official contact hours per week.

## Year Two : Semester 2

Course Code	Course Name	Comp Code	Contact Hrs		Crdt	Pre-requisite
			Lect	Lab		
BLHW 2452	Academic Writing	W	2	0	2	BLHW 1442
BITI 1113	Artificial Intelligence	P	2	2	3	
BITS 1313	Data Communication and Networking	P	2	2	3	
BITP 2223	Software Requirement and Design	K	2	2	3	
BITP 3253	Software Verification and Validation	K	2	2	3	
BITP 3123	Distributed Application Development	K	2	2	3	
B*** ***2	Free Module II	E	2	0	2	
<b>Total Credits</b>					<b>19</b>	

## Year Two : Special Semester

Java Foundation Certified Junior Associate (BITP 2610).

### Year Three : Semester 1

Course Code	Course Name	Comp Code	Contact Hrs		Crdt	Pre-requisite
			Lect	Lab		
BLHW 3462	English for Professional Interaction	W	2	0	2	BLHW 2452
BITM 2313	Human Computer Interaction	P	2	2	3	
BITU 3923	Workshop II	K	1 <sup>1</sup>		3	BITU 2913
BITS 3423	Information Technology Security	K	2	2	3	
BITP 3223	Software Project Management	K	2	2	3	
BITP 3453	Mobile Application Development	K	2	2	3	
<b>Total Credits</b>					<b>17</b>	

<sup>1</sup> Average official contact hours per week.

### Year Three : Semester 2

Course Code	Course Name	Comp Code	Contact Hrs		Crdt	Pre-requisite
			Lect	Lab		
BTMW 4012	Technology Entrepreneurship	W	2	0	2	
BITU 3973	Final Year Project I	P	1 <sup>1</sup>		3	BITU 3923
BITP 3423	Special Topic in Software Engineering	K	2	2	3	
B**** ***3	Free Module III	E	2	2	3	
B**** ***3	Free Module IV	E	2	2	3	
B**** ***3	Free Module V	E	2	2	3	
<b>Total Credits</b>					<b>17</b>	

<sup>1</sup> Average official contact hours per week.

### Year Three : Special Semester

Course Code	Course Name	Comp Code	Contact Hrs		Crdt	Pre-requisite
			Lect	Lab		
BITU 3983	Final Year Project II	P	1 <sup>1</sup>		3	BITU 3973
<b>Total Credits</b>					<b>3</b>	

<sup>1</sup>Average official contact hours per week.

### Year Four : Semester 1

Course Code	Course Name	Comp Code	Duration (weeks)	Crdt	Pre-requisite
BITU 3926	Industrial Training	P	24	6 (Attend & Pass)	BITU 3983 <sup>1</sup>
BITU 3946	Industrial Training Report	P	24	6	BITU 3983 <sup>1</sup>
<b>Total Credits</b>				<b>12</b>	

<sup>1</sup>Completed all Courses.

### List of Courses in Free Module

Below is the list of courses in free module that can be selected as part of the curriculum. Students need to choose a minimum of **THREE (3)** courses with **THREE (3)** credits and **TWO (2)** courses with **TWO (2)** credits, to complete **at least 13 credits**.

List of courses offered can be changed from time to time in accordance with industry needs.

Course Code	Course Name	Contact Hrs		Crdt	Pre-requisite
		Lect	Lab		
BITI 2213	Knowledge Based System	2	2	3	
BITM 1123	Interactive Media Authoring	2	2	3	
BITM 2113	Web Application Development	2	2	3	
BITP 2323	Database Administration	2	2	3	BITP 1323
BITP 3233	Strategic Information System Planning	2	2	3	
BITP 3443	Enterprise Application Development	2	2	3	
BITP 3473	Formal Methods	2	2	3	
BITP 3483	Geographic Information System	2	2	3	
BITS 2313	Local Area Network	2	2	3	
BITS 2513	Internet Technology	2	2	3	
BLHC 4012	Organisational Communication	2	0	2	
BLHC 4022	Negotiation Skills	2	0	2	
BLHC 4032	<i>Pemikiran Kritis dan Kreatif</i> <sup>1</sup>	2	0	2	
BLHH 1032	Industrial Psychology and Organisation	2	0	2	
BLHL *** <sup>2</sup>	Third Language <sup>2</sup>	1	2	2	

<sup>1</sup>For International Students, change to BLHL 1012 Bahasa Melayu Komunikasi.

<sup>2</sup>Refer to Third Language Courses table.

## Third Language Courses

Course Code	Course Name <sup>1</sup>	Contact Hrs		Crdt
		Lect	Lab	
BLHL 1112	Arabic I	1	2	2
BLHL 1212	Mandarin I	1	2	2
BLHL 1312	Japanese I	1	2	2
BLHL 1412	German I	1	2	2
BLHL 1612	Korean Languague	1	2	2

<sup>1</sup>Note: Students are NOT allowed to take Third Language Courses that are in their native language.





A computer monitor with a black frame and a light grey base, displaying text about a degree program. The screen shows the word 'BITZ' in large, bold, serif capital letters at the top. Below it, the degree details are presented in a smaller, bold, serif font.

**BITZ**

**BACHELOR OF COMPUTER SCIENCE  
(COMPUTER SECURITY)  
WITH HONOURS**



## Programme Details

Bachelor of Computer Science (Computer Security) is aimed to produce highly knowledgeable and skilful graduates in the field of security related to computer science and information technology. Graduates are competent in advanced specialised knowledge and skill to analyse, design, install, configure, implement, administer, maintain and monitor the security infrastructure.

## Programme Learning Outcomes (PLO)

The aim of the Bachelor of Computer Science (Computer Security) programme is to produce students with the following characteristics:

1. Able to apply knowledge of computer science and information technology.
2. Able to analyse, design and develop ICT applications.
3. Able to analyse, create, assemble, configure, implement, manage, maintain and administer network infrastructure and security.
4. Able to analyse and design the physical and cybersecurity policy.
5. Able to obtain recognition from professional bodies.
6. Able to resolve problems in creative way and able to communicate effectively.
7. Able to contribute individually or in a team in various disciplines and domains.
8. Able to lead with ethics and have Entrepreneurship skills.
9. Able to perform continuous self-learning to obtain knowledge and skills.

## Career Prospects

There is a wide range of career opportunities in the field of computer science and information technology available for graduates who are specialised in Computer Security, either in the government sector or private sector, as well as undertaking business ventures of their own. Among the career opportunities are:

1. Computer Security Executive or Consultant.
2. Network Security Administrator/Manager/Executive/Engineer/Consultant.
3. System Security Administrator/Manager/Consultant.
4. System Analyst.
5. Information Technology Executive.
6. Information Technology Project Manager.
7. Researcher.

Other than that, the graduates also have the opportunity to further their studies at postgraduate level.

## **Curriculum Structure**

Students are required to complete a minimum of 120 credits to graduate with a Bachelor of Computer Science (Computer Security) with Honours. The programme components are as follows:

<b>Bachelor's Degree (Computer Science)</b>		
Minimum graduating credit - 120		
<b>Component</b>	<b>Component's Code</b>	<b>Credits</b>
General Module	W	14
Core Module	P	45
Specialisation Module	K	30
Final Year Project	P	6
Industrial Training	P	12
Free Module	E	13
<b>Total Credits</b>		<b>120</b>

## **Professional Certification**

Preparation for CCNA Security Professional Certificate (BITS 2620) :: Year 2, Special Semester.

# Curriculum Structure for Each Semester

## Year One : Semester 1

Course Code	Course Name	Comp Code	Contact Hrs		Crdt	Pre-requisite
			Lect	Lab		
BLHW 1442	English for Academic Purposes	W	2	0	2	
BLHW 1762	Philosophy and Current Issues	W	2	0	2	
BKK* ***1	Co-Curriculum I <sup>1</sup>	W	0	3	1	
BITI 1213	Linear Algebra and Discrete Mathematics	P	2	2	3	
BITM 1113	Multimedia System	P	2	2	3	
BITP 1113	Programming Technique	P	2	2	3	
BITS 1123	Computer Organisation and Architecture	P	2	2	3	
<b>Total Credits</b>					<b>17</b>	

<sup>1</sup>This course can be taken in any semester. Please refer to Co-Curriculum Unit before register.

## Year One : Semester 2

Course Code	Course Name	Comp Code	Contact Hrs		Crdt	Pre-requisite
			Lect	Lab		
BITI 1223	Calculus and Numerical Methods	P	2	2	3	
BITM 2313	Human Computer Interaction	P	2	2	3	
BITP 1123	Data Structure and Algorithm	P	2	2	3	BITP 1113
BITP 1323	Database	P	2	2	3	
BITS 1313	Data Communication and Networking	P	2	2	3	
BLH* ***2	Free Module I <sup>1</sup>	E	2	0	2	
<b>Total Credits</b>					<b>17</b>	

<sup>1</sup>For International Students, compulsory to choose BLHL 1012 Bahasa Melayu Komunikasi.

## Year Two : Semester 1

Course Code	Course Name	Comp Code	Contact Hrs		Crdt	Pre-requisite
			Lect	Lab		
BLHW 2452	Academic Writing	W	2	0	2	BLHW 1442
BKK* ***1	Co-Curriculum II <sup>1</sup>	W	0	3	1	
BITU 2913	Workshop I	P	1 <sup>2</sup>		3	BITP 1113
BITI 1113	Artificial Intelligence	P	3	2	2	
BITI 2233	Statistics and Probability	P	2	2	3	
BITS 1213	Operating System	P	2	2	3	
BITS 2343	Computer Network	K	2	2	3	
<b>Total Credits</b>					<b>17</b>	

<sup>1</sup>This course can be taken in any semester. Please refer to Co-Curriculum Unit before register.

<sup>2</sup>Average official contact hours per week.

## Year Two : Semester 2

Course Code	Course Name	Comp Code	Contact Hrs		Crdt	Pre-requisite
			Lect	Lab		
BITP 3113	Object Oriented Programming	P	2	2	3	
BITP 2213	Software Engineering	P	2	2	3	
BITS 2413	Network Security Infrastructure and Design	K	2	2	3	
BITS 2423	Physical Security and Electronic Surveillance	K	2	2	3	
BITS 2523	Cyber Law and Security Policy	K	2	2	3	
BIT* ***3	Free Module II	E	2	2	3	
<b>Total Credits</b>					<b>18</b>	

## Year Two : Special Semester

Preparation for CCNA Security Professional Certificate (BITS 2620).

## Year Three : Semester 1

Course Code	Course Name	Comp Code	Contact Hrs		Crdt	Pre-requisite
			Lect	Lab		
BLHW 2772	Penghayatan Etika dan Peradaban <sup>1</sup>	W	2	0	2	
BITU 3923	Workshop II	K	1 <sup>2</sup>		3	BITU 2913
BITS 3353	Network Security Administration and Management	K	2	2	3	
BITS 3363	Network Security Project Management	K	2	2	3	
BITS 3463	Cryptography Application and Information Theory	K	2	2	3	
BIT* ***3	Free Module III	E	2	2	3	
<b>Total Credits</b>					<b>17</b>	

<sup>1</sup> For International Students, change to BLHW 2752 Malaysian Culture.

<sup>2</sup> Average official contact hours per week.

## Year Three : Semester 2

Course Code	Course Name	Comp Code	Contact Hrs		Crdt	Pre-requisite
			Lect	Lab		
BLHW 3462	English for Professional Interaction	W	2	0	2	BLHW 2452
BTMW 4012	Technology Entrepreneurship	W	2	0	2	
BITU 3973	Final Year Project I	P	1 <sup>1</sup>		3	BITU 3923
BITS 3523	Computer Audit and Risk Management	K	2	2	3	
BITS 3613	Hacking Techniques and Prevention	K	2	2	3	
BIT* ***3	Free Module IV	E	2	2	3	
BLH* ***2	Free Module V	E	2	0	2	
<b>Total Credits</b>					<b>18</b>	

<sup>1</sup> Average official contact hours per week.

## Year Three : Special Semester

Course Code	Course Name	Comp Code	Contact Hrs		Crdt	Pre-requisite
			Lect	Lab		
BITU 3983	Final Year Project II	P	1 <sup>1</sup>		3	BITU 3973
		<b>Total Credits</b>		<b>3</b>		

<sup>1</sup> Average official contact hours per week.

## Year Four : Semester 1

Course Code	Course Name	Comp Code	Duration (weeks)	Crdt	Pre-requisite
BITU 3926	Industrial Training	P	24	6 (Attend & Pass)	BITU 3983 <sup>1</sup>
BITU 3946	Industrial Training Report	P	24	6	BITU 3983 <sup>1</sup>
		<b>Total Credits</b>		<b>12</b>	

<sup>1</sup> Completed all Courses.

## List of Courses in Free Module

Below is the list of courses in free module that can be selected as part of the curriculum. Students need to choose a minimum of **THREE (3)** courses with **THREE (3)** credits and **TWO (2)** courses with **TWO (2)** credits, to complete **at least 13 credits**.

List of courses offered can be changed from time to time in accordance with industry needs.

Course Code	Course Name	Contact Hrs		Crdt	Pre-requisite
		Lect	Lab		
BITM 2113	Web Application Development	2	2	3	
BITS 2513	Internet Technology	2	2	3	
BITS 3443	Digital Forensics	2	2	3	
BITS 3453	Malware Analysis and Digital Investigation	2	2	3	BITS 3443
BITS 3473	Watermarking and Steganography	2	2	3	BITS 3463
BITS 3513	TCP/IP Programming	2	2	3	BITP 1113
BITS 3533	Wireless Network and Mobile Computing	2	2	3	BITS 1313
BLHC 4012	Organisational Communication	2	0	2	
BLHC 4022	Negotiation Skills	2	0	2	
BLHC 4032	<i>Pemikiran Kritis dan Kreatif</i> <sup>1</sup>	2	0	2	
BLHH 1032	Industrial Psychology and Organisation	2	0	2	
BLHL *** <sup>2</sup>	Third Language <sup>2</sup>	1	2	2	

<sup>1</sup>For International Students, change to BLHL 1012 Bahasa Melayu Komunikasi.

<sup>2</sup>Refer to Third Language Courses table.

### Third Language Courses

Course Code	Course Name <sup>1</sup>	Contact Hrs		Crdt
		Lect	Lab	
BLHL 1112	Arabic I	1	2	2
BLHL 1212	Mandarin I	1	2	2
BLHL 1312	Japanese I	1	2	2
BLHL 1412	German I	1	2	2
BLHL 1612	Korean Languague	1	2	2

<sup>1</sup>Note: Students are NOT allowed to take Third Language Courses that are in their native language.

**BITE**

**BACHELOR OF**

**INFORMATION TECHNOLOGY**

**(GAME TECHNOLOGY)**

**WITH HONOURS**





## Programme Details

Bachelor of Information Technology (Game Technology) academic programme is offered to produce knowledgeable and skilful graduates in information technology particularly in the area of computer games technology that includes both entertainment and educational ‘serious games’ industry.

The learning outcomes of this programme are to equip the students with the basic knowledge in every aspect of computer games technology, to provide the students with sufficient theoretical knowledge and skills to apply the knowledge learnt through the practised concept, to enable the students to be able to apply the interactivity concept in the design and development of computer games, to equip the students with deep understanding and high skills in the development and management of computer games, as well as to produce graduates that are capable to develop high quality interactive games products and games applications which fulfil the industry specifications.

## Programme Learning Outcomes (PLO)

The aim of the Bachelor of Information Technology (Game Technology) programme is to produce students with the following characteristics:

1. Able to apply knowledge of computer science and information technology.
2. Able to analyse, design and develop information and communication technology applications.
3. Able to apply interactivity concept in designing and developing interactive games technique.
4. Able to apply the knowledge and practice of interactive game development process using various software and tools.

5. Able to develop interactive games with the quality that fulfils industry specifications.
6. Able to resolve problems in creative way and able to communicate effectively.
7. Able to contribute individually or in a team in various disciplines and domains.
8. Able to lead with ethics and have entrepreneurship skills.
9. Able to perform continuous self-learning to obtain knowledge and skills.

## Career Prospects

This course is offered to produce graduates who are highly knowledgeable and skilled in the field of computer games technology. The graduates are well equipped with knowledge and specific skills such as computer game programming, design and develop various types of computer games, the principle of games, web-based games, project management as well as 2D and 3D game development. Graduates of this course are able to contribute their expertise and skills to the education and entertainment industry such as game-based education and game content development.

## **Curriculum Structure**

Students are required to complete a minimum of 120 credits to graduate with a Bachelor of Information Technology (Game Technology) with Honours. The programme components are as follows:

<b>Bachelor's Degree (Information Technology)</b>		
Minimum graduating credit - 120		
<b>Component</b>	<b>Component's Code</b>	<b>Credits</b>
General Module	W	14
Core Module	P	45
Specialisation Module	K	30
Final Year Project	P	6
Industrial Training	P	12
Free Module	E	13
<b>Total Credits</b>		<b>120</b>

## **Professional Certification**

Web Developer Professional Certificate (BITM 2130) :: Year 3, Semester 1.

# Curriculum Structure for Each Semester

## Year One : Semester 1

Course Code	Course Name	Comp Code	Contact Hrs		Crdt	Pre-requisite
			Lect	Lab		
BITE 1513	Programming Fundamentals	P	2	2	3	
BITI 1213	Linear Algebra and Discrete Mathematics	P	2	2	3	
BITS 1123	Computer Organisation and Architecture	P	2	2	3	
BITS 1213	Operating System	P	2	2	3	
BITE 1723	Game Design Principle	K	2	2	3	
BLH* ***2	Free Module I <sup>1</sup>	E	2	0	2	
<b>Total Credits</b>					<b>17</b>	

<sup>1</sup>For International Students, compulsory to choose BLHL 1012 Bahasa Melayu Komunikasi.

## Year One : Semester 2

Course Code	Course Name	Comp Code	Contact Hrs		Crdt	Pre-requisite
			Lect	Lab		
BLHW 1762	Philosophy and Current Issues	W	2	0	2	
BLHW 1442	English for Academic Purposes	W	2	0	2	
BITI 1223	Calculus and Numerical Methods	P	2	2	3	
BITP 1323	Database	P	2	2	3	
BITE 1523	Computer Game Programming	K	2	2	3	
BITE 1613	2D Game Development	K	2	2	3	
<b>Total Credits</b>					<b>16</b>	

## Year Two : Semester 1

Course Code	Course Name	Comp Code	Contact Hrs		Crdt	Pre-requisite
			Lect	Lab		
BLHW 2452	Academic Writing	W	2	0	2	BLHW 1442
BLHW 2772	<i>Penghayatan Etika dan Peradaban</i> <sup>1</sup>	W	2	0	2	
BKK* ***1	Co-Curriculum I <sup>2</sup>	W	0	3	1	
BITU 2913	Workshop I	P	1 <sup>3</sup>		3	
BITS 1313	Data Communication and Networking	P	2	2	3	
BITE 1713	Game Architecture	K	2	2	3	
BITE 2513	Game Engine Development I	K	2	2	3	
BLH* ***2	Free Module II	E	2	0	2	
<b>Total Credits</b>					<b>19</b>	

<sup>1</sup>For International Students, change to BLHW 2752 Malaysian Culture.

<sup>2</sup>This course can be taken in any semester. Please refer to Co-Curriculum Unit before register.

<sup>3</sup>Average official contact hours per week.

## Year Two : Semester 2

Course Code	Course Name	Comp Code	Contact Hrs		Crdt	Pre-requisite
			Lect	Lab		
BKK* ***1	Co-Curriculum II <sup>1</sup>	W	0	3	1	
BITI 2233	Statistics and Probability	P	2	2	3	
BITM 2313	Human Computer Interaction	P	2	2	3	
BITE 2123	Artificial Intelligence for Games	K	2	2	3	
BITE 2613	Interactive 3D Animation	K	2	2	3	
BITE 2633	Audio Video Production for Game	K	2	2	3	
B*** ***3	Free Module III	E	2	2	3	
<b>Total Credits</b>					<b>19</b>	

<sup>1</sup>This course can be taken in any semester. Please refer to Co-Curriculum Unit before register.

### Year Three : Semester 1

Course Code	Course Name	Comp Code	Contact Hrs		Crdt	Pre-requisite
			Lect	Lab		
BLHW 3462	English for Professional Interaction	W	2	0	2	BLHW 2452
BITU 3923	Workshop II	K	1 <sup>1</sup>		3	BITU 2913
BITE 2523	Web Game Development	K	2	2	3	
BITE 3513	Game Engine Development II	K	2	2	3	
BITE 3713	Multi-platform Game	K	2	2	3	
B*** ***3	Free Module IV	E	2	2	3	
<b>Total Credits</b>					<b>17</b>	

<sup>1</sup> Average official contact hours per week.

Web Developer Professional Certificate (BITM 2130).

### Year Three : Semester 2

Course Code	Course Name	Comp Code	Contact Hrs		Crdt	Pre-requisite
			Lect	Lab		
BTMW 4012	Technology Entrepreneurship	W	2	0	2	
BITS 3423	Information Technology Security	P	2	2	3	
BITU 3973	Final Year Project I	P	1 <sup>1</sup>		3	BITU 3923
BITE 2623	3D Game Development	K	2	2	3	
BITE 3613	Game Project Management	K	2	2	3	
B*** ***3	Free Module V	E	2	2	3	
<b>Total Credits</b>					<b>17</b>	

<sup>1</sup> Average official contact hours per week.

### Year Three : Special Semester

Course Code	Course Name	Comp Code	Contact Hrs		Crdt	Pre-requisite
			Lect	Lab		
BITU 3983	Final Year Project II	P	1 <sup>1</sup>		3	BITU 3973
		<b>Total Credits</b>		<b>3</b>		

<sup>1</sup> Average official contact hours per week.

### Year Four : Semester 1

Course Code	Course Name	Comp Code	Duration (weeks)	Crdt	Pre-requisite
BITU 3926	Industrial Training	P	24	6 (Attend & Pass)	BITU 3983 <sup>1</sup>
BITU 3946	Industrial Training Report	P	24	6	BITU 3983 <sup>1</sup>
		<b>Total Credits</b>		<b>12</b>	

<sup>1</sup>Completed all Courses.

### List of Courses in Free Module

Below is the list of courses in free module that can be selected as part of the curriculum. Students need to choose a minimum of **THREE (3)** courses with **THREE (3)** credits and **TWO (2)** courses with **TWO (2)** credits, to complete **at least 13 credits**.

List of courses offered can be changed from time to time in accordance with industry needs.

Course Code	Course Name	Contact Hrs		Crdt	Pre-requisite
		Lect	Lab		
BITE 3523	Game Physics	2	2	3	
BITE 3623	Motion Graphics	2	2	3	
BITE 3633	Game Play	2	2	3	
BITE 3723	Game Mechanics	2	2	3	
BITS 3333	Multimedia Networking	2	2	3	
BLHC 4012	Organisational Communication	2	0	2	
BLHC 4022	Negotiation Skills	2	0	2	
BLHC 4032	<i>Pemikiran Kritis dan Kreatif</i> <sup>1</sup>	2	0	2	
BLHH 1032	Industrial Psychology and Organisation	2	0	2	
BLHL ***2	Third Language <sup>2</sup>	1	2	2	

<sup>1</sup>Offered to local students only. For International Students, change to BLHL 1012 Bahasa Melayu Komunikasi.

<sup>2</sup>Refer to Third Language Courses table.

### Third Language Courses

Course Code	Course Name <sup>1</sup>	Contact Hrs		Crdt
		Lect	Lab	
BLHL 1112	Arabic I	1	2	2
BLHL 1212	Mandarin I	1	2	2
BLHL 1312	Japanese I	1	2	2
BLHL 1412	German I	1	2	2
BLHL 1612	Korean Language	1	2	2

<sup>1</sup>Note: Students are NOT allowed to take Third Language Courses that are in their native language.



**DIT**

**DIPLOMA IN  
INFORMATION AND  
COMMUNICATION TECHNOLOGY**



## **Programme Details**

The Diploma in Information and Communication Technology programme deals with designing innovative methodologies and sophisticated tools for developing software systems. Students are exposed to various techniques of analysing user requirements and specifications, as well as design and implementation of software systems. Some of the core courses include object-oriented programming, database systems, software engineering and introduction to multimedia.

## **Programme Learning Outcomes (PLO)**

The aim of the Diploma in Information and Communication Technology programme is to produce students with the following characteristics:

1. Graduates should be able to understand fundamental principles of Computer Science and Information Technology.
2. Graduates should be able to analyse, design and develop Information and Communication Technology (ICT) software and database.
3. Graduates should be able to configure hardware, maintain and administer computer operation systems and network.
4. Graduates should be able to use multimedia authoring tools and develop multimedia application and simple multimedia presentation.
5. Graduates should be able to exhibit critical and creative thinking in resolving problems and able to communicate in delivering ideas.
6. Graduates should be able to contribute individually or in a team in various discipline and domain.
7. Graduates should have good personalities and ethics with leadership and entrepreneurship skills.

8. Graduates should be able to continue learning independently in the acquisition of new knowledge and skill.

## Career Prospects

There is a wide range of career opportunities in the field of computer science and information technology available for graduates of Diploma in Information and Communication Technology. Among the career opportunities are:

1. Programmers / Analyst Programmers / Multimedia Programmers.
2. Network Administrators.
3. Software Developers.
4. Any IT related positions.

Other than that, the graduates also have the opportunity to further their studies at degree level in UTeM.

## **Curriculum Structure**

Students are required to complete a minimum of 91 credits to graduate with a Diploma in Information and Communication Technology. The programme components are as follows:

<b>Diploma in Information and Communication Technology</b>		
Minimum graduating credit - 91		
<b>Component</b>	<b>Component's Code</b>	<b>Credits</b>
General Module	W	16
Core Module	P	18
Specialisation Module	K	36
Final Year Project	P	4
Industrial Training	P	5
Free Module	E	12
<b>Total Credits</b>		<b>91</b>

# Curriculum Structure for Each Semester

## Year One : Special Semester

Course Code	Course Name	Comp Code	Contact Hrs		Crdt	Pre-requisite
			Lect	Lab		
DLHW 1012	Foundation English	W	2	0	2	
DLHW 2722	<i>Penghayatan Etika dan Peradaban</i>	W	2	0	2	
DLHW 1742	<i>Kepimpinan</i>	W	2	0	2	
<b>Total Credits</b>					<b>6</b>	

## Year One : Semester 1

Course Code	Course Name	Comp Code	Contact Hrs		Crdt	Pre-requisite
			Lect	Lab		
DKK* ***1	Co-Curriculum I <sup>1</sup>	W	0	3	1	
DITI 1213	Calculus	P	2	2	3	
DITP 1113	Programming I	P	2	2	3	
DITP 1333	Database	K	2	2	3	
DITS 1133	Computer Organisation and Architecture	K	2	2	3	
DITM 2113	Multimedia System	K	2	2	3	
<b>Total Credits</b>					<b>16</b>	

<sup>1</sup>This course can be taken in any semester. Please refer to Co-Curriculum Unit before register.

## Year One : Semester 2

Course Code	Course Name	Comp Code	Contact Hrs		Crdt	Pre-requisite
			Lect	Lab		
DLHW 2422	English for Effective Communication	W	1	2	2	
DITI 1223	Discrete Mathematics	P	2	2	3	
DITP 2213	System Analysis and Design	K	2	2	3	DITP 1333
DITP 1123	Programming II	K	2	2	3	DITP 1113
DITS 2213	Operating System	K	2	2	3	DITS 1133
DITM 2123	Web Programming	K	2	2	3	
<b>Total Credits</b>					<b>17</b>	

## Year Two : Semester 1

Course Code	Course Name	Comp Code	Contact Hrs		Crdt	Pre-requisite
			Lect	Lab		
DLHW 1722	<i>Falsafah Sains dan Teknologi</i>	W	2	0	2	
DLHW 3432	English for Marketability	W	2	0	2	
DKK* ***1	Co-Curriculum II <sup>1</sup>	W	0	3	1	
DITI 2213	Linear Algebra and Numerical Methods	P	2	2	3	
DITP 2113	Data Structure and Algorithm	K	2	2	3	DITP 1123 & DITP 1113
DITP 3113	Object-oriented Programming	K	2	2	3	DITP 1113
DITS 2313	Data Communication and Networking	K	2	2	3	
<b>Total Credits</b>					<b>17</b>	

<sup>1</sup>This course can be taken in any semester. Please refer to Co-Curriculum Unit before register.

## Year Two : Semester 2

Course Code	Course Name	Comp Code	Contact Hrs		Crdt	Pre-requisite
			Lect	Lab		
DTMW 1012	Asas Pembudayaan Keusahawanan	W	1	2	2	
DITI 2233	Statistics and Probability	P	2	2	3	
DITU 3933	System Development Workshop	P	0	6	3	DITP 2213
DITP 2123	Event-based Programming	K	2	2	3	DITP 1113
DIT* ****	Free Module I	E	2	2	3	
DIT* ****	Free Module II	E	2	2	3	
<b>Total Credits</b>					<b>17</b>	

## Year Two : Special Semester

Course Code	Course Name	Comp Code	Duration (weeks)	Crdt	Pre-requisite
DITU 2343	Industrial Training	P	10	3	
DITU 2362	Industrial Training Report	P	10	2	
<b>Total Credits</b>			<b>5</b>		

## Year Three : Semester 1

Course Code	Course Name	Comp Code	Contact Hrs		Crdt	Pre-requisite
			Lect	Lab		
DITU 3964	Diploma Project	P	1 <sup>1</sup>		4	DITU 3933
DITS 2413	Computer Security	K	2	2	3	DITS 2213
DIT* ****	Free Module III	E	2	2	3	
DIT* ****	Free Module IV	E	2	2	3	
<b>Total Credits</b>					<b>13</b>	

<sup>1</sup> Average official contact hours per week.

## List of Courses in Free Module

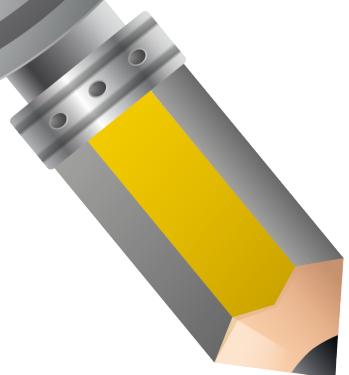
Below is the list of courses in free module that can be selected as part of the curriculum. Students need to choose a minimum of **FOUR (4)** courses during the study to complete at least 12 credits.

List of courses offered can be changed from time to time in accordance with industry needs.

Course Code	Course Name	Contact Hrs		Crdt	Pre-requisite
		Lect	Lab		
DITI 3113	Artificial Intelligence	2	2	3	
DITI 3123	Logic Programming	2	2	3	
DITI 3513	Artificial Intelligence in Robotic and Automation	2	2	3	
DITM 3133	Digital Audio and Video Technology	2	2	3	
DITM 3143	Digital Media Design	2	2	3	
DITM 3313	User Interface Design	2	2	3	
DITM 3323	Introduction to Computer Games Programming	2	2	3	
DITP 2313	Database Programming	2	2	3	
DITP 3213	Software Engineering	2	2	3	
DITP 3253	Software Requirements and Design	2	2	3	
DITP 3263	Software Verification and Validation	2	2	3	DITP 3213
DITP 3273	Strategic Information System Planning	2	2	3	
DITP 3313	Database Design	2	2	3	DITP 1333
DITP 3323	Database Administration	2	2	3	DITP 1333
DITS 3613	Basic Networking	2	2	3	DITS 2313
DITS 3623	Network Routing	2	2	3	DITS 3613
DITS 3633	Implementing and Administering Active Directory	2	2	3	DITS 2213
DITS 3643	Implementing and Administering Network Infrastructure	2	2	3	DITS 3633



**Course Synopsis  
Mata Pelajaran  
Umum (MPU)  
Module**





## **BLHW 1442 English for Academic Purposes**

### **Learning Outcomes:**

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

1. Apply correct grammar rules according to context.
2. Demonstrate knowledge of various reading skills in the reading tasks given.

### **Synopsis:**

This course aims to develop students' reading skills and grammar. A variety of academic reading texts and reading skills are explored to facilitate students' comprehension of the texts. These reading skills are also necessary in assisting students to master study skills. Grammar elements are taught in context to develop students' accuracy in the use of the language. This course also includes elements of blended learning.

### **References:**

- ★ Chazal, E. D., & Rogers, L. (2013) Oxford EAP: A course in English for Academic Purposes. Oxford: Oxford University Press.
- ★ McDonald, A. & Hancock, M. (2010) English result. Oxford: Oxford University Press.
- ★ Paterson, K. & Wedge, R. (2013) Oxford grammar for EAP. Oxford: Oxford University Press.

## **BLHW 1762 Philosophy and Current Issues**

### **Learning Outcomes:**

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

1. Explain the current issues related to philosophy, National Education Philosophy and National Ideology.
2. Analyse the current issues based on main scholarly thought and various philosophical theories.
3. Examine the current issues according to philosophical comparative studies between dialogue and culture.

### **Synopsis:**

This course will discuss on the concept of knowledge, ethics and civilisation which emphasize on comparative available systems, social development and multi-cross cultural activities in Malaysia. Besides, this course is stressing on current and contemporary issues discussion related to economy, politic, social, culture and environment based on ethical and civilisational approach. This course will cover the comparative system, developmental phase, social development and cross cultural activities in order to produce a man with positive values.

### **References:**

- ★ Dzulkifli A. R. & Rosnani H. (Eds). (2019). Pentafsiran Baharu Falsafah Pendidikan Kebangsaan dan Pelaksanaannya Pasca 2020. Kuala Lumpur: IIUM.
- ★ Bakar, O. (2019) Classification of Knowledge in Islam: A Study in Islamic Schools of Epistemology. Kuala Lumpur: IBT.
- ★ Bakar, O. (2016) Qur'anic Pictures of the Universe: The Scriptural Foundation of Islamic Cosmology. Kuala Lumpur: UBD dan IBT.

- ★ Bakar, O. (2008) Tawhid and Science: Islamic Perspectives on Religion and Science, 2<sup>nd</sup> Ed., Shah Alam: Arah Publications.
- ★ Mohamad Zain, S. (2012) Berakhir Sudahkah Ilmu dalam Acuan Sendiri?. Pusat Dialog Peradaban UM.
- ★ Mohamad Zain, S. (2018) Falsafah Ilmu daripada Karya-karya Besar Sains dan Matematik Islam Malayonesia, Akademik Kajian Ketamadunan.
- ★ Noordin, T. A. (1993) PErspektif Falsafah dan Pendidikan di Malaysia, Kuala Lumpur: DBP.
- ★ Malik, M. (2017) Foundation of Islamic Governace: A Southeast Asian Perspective, 1<sup>ed</sup>, London & New York: A Routledge.

## BLHW 2452 Academic Writing

### Learning Outcomes:

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

1. Prepare clear and detailed descriptions of a product related to fields of interest.
2. Express arguments systematically in a composition.
3. Prepare short reviews of technical materials.

### Synopsis:

This course aims to equip the students with the skills to communicate clear and detailed viewpoints in writing. The students are expected to have a stand on topics of their fields by providing advantages and disadvantages to support their arguments. From time to time, consultations with the students will be conducted throughout the completion of their assignments. This serves as the formative evaluation in the course. Grammar components are embedded in the course to support the required writing skills. Blended learning is incorporated in this course.

### References:

- ★ Chazal, E. D. & Rogers, L. (2012) Oxford EAP: A course in English for Academic Purposes. New York: Oxford University Press.
- ★ Hancock, M. & McDonald, A. (2010) English Result Upper-intermediate. New York: Oxford University Press.
- ★ Paterson, K. & Wedge, R. (2013) Oxford Grammar for EAP. UK: Oxford University Press.

## **BLHW 2772 Penghayatan Etika dan Peradaban**

### **Learning Outcomes:**

Di akhir kursus ini, pelajar berupaya untuk:

1. Menjelaskan konsep etika daripada peradaban yang berbeza.
2. Membandingkan sistem, tahap perkembangan, kemajuan sosial dan kebudayaan merentas budaya.
3. Membincangkan isu kontemporari berkaitan ekonomi, politik, sosial, budaya dan alam sekitar daripada perspektif etika dan peradaban.

### **Synopsis:**

Kursus ini membincangkan tentang konsep ilmu, etika serta peradaban yang berunsurkan perbandingan sistem, kemajuan sosial dan kebudayaan merentas budaya yang pelbagai di Malaysia. Selain itu, kursus ini juga menekankan tentang perbincangan isu kontemporari berkaitan bidang ekonomi, politik, sosial, budaya dan alam sekitar mengikut acuan etika dan peradaban. Pendekatan kursus ini meliputi perbandingan sistem, tahap perkembangan, kemajuan sosial dan kebudayaan merentas budaya bagi melahirkan manusia yang mempunyai nilai-nilai positif.

### **References:**

- ★ Mil, C. W. (2010) The Sociological Imagination: Contemporary Perspective (Edited): John Scott & Ann Nilson.
- ★ Malik, M. (2017) Foundation of Islamic Governance: A Southeast Asian Perspective (1<sup>st</sup> Ed.), London & New York: A Routledge.
- ★ MacKinnon, B. (2015) Ethic Theory and Contemporary Issues (8<sup>th</sup> Ed.), Standford, CT: Cengage Learning.
- ★ Fakhry, M. (1991) Ethical Theories In Islam, Leidin: J.J. Brill.

## **BLHW 2752 Malaysian Culture**

### **Learning Outcomes:**

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

1. Analyse the general issues related to Malaysian culture.
2. Report the scenario of cultural diversity in Malaysia.
3. Explain the comparison between Malaysian culture with their home countries in various aspects.

### **Synopsis:**

This subject exposes international students to the socio-cultural background of Malaysia which includes ethnic composition, religions, traditions and values. Other elements like music, arts, cuisine, costume, ethnic games, celebrations and national festivals are also highlighted. Student Centered Learning (SCL) methods such as group discussion and presentation will be used in order to assist international students in developing their understanding and appreciation of Malaysian culture.

### **References:**

- ★ None.

## **BLHW 3462 English for Professional Interaction**

### **Learning Outcomes:**

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

1. Listen and infer based on situations in context.
2. Respond to standard spoken language using communication strategies.
3. Display detailed descriptions by expanding and supporting points of view using relevant examples.

### **Synopsis:**

This course which is designed based on a blended and student-centred learning approach aims to develop students' listening skills as well as communication skills and strategies. Among the elements covered are professional interactions that include group discussion and public speaking. Students are also required to express ideas with relevant examples in public speaking and online assessments. They are also exposed to the rudiments of grammar implicitly via the communicative activities.

### **References:**

- ★ Fry, R. (2016) 101 smart questions to ask on your interview, UK: New Page Books.
- ★ Cooper, S. (2016) 100 tricks to appear smart in meetings: How to get by without even trying, Andrews McMeel Publishing.
- ★ Hood, J. H. (2013) How to book of meetings: A complete guide for every business, South Australia: Magill.
- ★ Carmine, G. (2014) Talk like TED: The 9 public-speaking secret of the world's top minds, New York: St Martins Press.
- ★ Jason, S. W. (2013) Workplace communication for the 21st century: Tools and strategies that impact the bottom line, California: Praeger.

## **BTMW 4012 Technology Entrepreneurship**

### **Learning Outcomes:**

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

1. Recognize the importance of entrepreneurship, the role of entrepreneurship in today's society, and the technical knowledge of the entrepreneurial process.
2. Explain the basic concepts of interdisciplinary competences in management and create technology-based businesses.
3. Propose a business plan project.

### **Synopsis:**

The subject provides students with technological knowledge about entrepreneurship as well as the skills to turn such knowledge into practice. The teaching and learning (T&L) activities include case study and field work with the aim to inculcate entrepreneurship values and entrepreneurship acculturation with a view to successfully launch and subsequently manage their enterprises. Students will be exposed with the support systems available or government agencies in starting new ventures, including the tactics commonly employed by entrepreneurs starting a business. The subject allows students to critically evaluate business in terms of technical feasibility, investment potential and risks.

### **References:**

- ★ Arifin, S. & Hamidon, S. (2017) Introduction to Entrepreneurship, Oxford Fajar.
- ★ Barringer, B. R. & Ireland, R. D. (2015) Entrepreneurship: Successfully Launching New Ventures, 5<sup>th</sup> International Ed., Pearson.
- ★ Ariffin, S., Wahab, I. A. & Hambali, Z. (2013) Fundamentals of Entrepreneurship, Oxford Fajar.
- ★ Scarborough, N. (2014) Essentials of entrepreneurship and small business management, Boston: Pearson.
- ★ UiTM Entrepreneurship Study Group (2010) Fundamentals of Entrepreneurship, Revised Ed., Pearson.

## **DLHW 1012 Foundation English**

### **Learning Outcomes:**

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

1. Interpret and express ideas and thoughts from various types of texts.
2. Demonstrate group interaction skills by expressing ideas and thoughts verbally.
3. Analyse data and write report based on non-linear texts using correct grammar.
4. Apply appropriate grammar elements.

### **Synopsis:**

This subject is designed to help students to improve their proficiency in the English Language and to communicate effectively in both spoken and written forms. Five main aspects: listening, speaking, reading, writing and grammar are taught in an integrated approach to build confidence among the learners to become efficient speakers of English in their tertiary education.

### **References:**

- ★ Bixby, J. & McVeigh, J. (2011) Skills for success: Reading and writing, New York: Oxford University Press.
- ★ Hooi, C. (2013) Mastering MUET, 3<sup>rd</sup> Ed., Johor Bahru: Pelangi Sdn. Bhd.
- ★ Swan, M. & Walter, C. (2011) Oxford English grammar course: Basic, New York: Oxford University Press.

## **DLHW 1722 Falsafah Sains dan Teknologi**

### **Learning Outcomes:**

Di akhir kursus ini, pelajar berupaya untuk:

1. Menilai kepentingan konsep ilmu dan isu-isu falsafah sains dan teknologi serta kepentingan isu dan cabaran berkaitan ilmu, falsafah sains dan teknologi
2. Membina pemahaman tentang ilmu dan isu falsafah sains dan teknologi dalam kehidupan masyarakat masa kini melalui kerja berpasukan.

### **Synopsis:**

Kursus ini membincangkan tentang konsep ilmu, konsep falsafah, sains dan teknologi yang berunsurkan kreativiti dan inovasi menurut sarjana Islam dan barat. Selain itu, kursus ini juga menekankan tentang metodologi dalam sains Islam, konsep dan pencapaian tamadun Islam dalam bidang matematik, astronomi, fizik, kimia, perubatan, konsep penciptaan alam dan kosmologi dalam Islam, pencapaian dalam bidang telekomunikasi terkini dan isu-isu sains semasa. Pendekatan sarjana Islam silam menjadi contoh kepada generasi masa kini menjadi manusia yang kreatif dan mempunyai pemikiran kritis dalam pelbagai bidang seperti penciptaan dan kejuruteraan.

### **References:**

- ★ Mohd Noor, A. R., et al. (2008) Modul Falsafah Sains dan Teknologi, Cetakan Dalaman Universiti Teknikal Malaysia Melaka.
- ★ Fakhry, M. (2005) A History of Islamic Philosophy, Columbia: Columbia University Press.
- ★ Jusoh, Y. & Muhammad, A. (2007) Pendidikan Falsafah Sains Al-Quran, Johor: Penerbit Universiti Teknologi Malaysia.
- ★ Abdullah, A. R. (2010) Wacana Falsafah Sains Sejarah Dan Pemikiran, Pulau Pinang: Pusat Kajian Pengurusan Pembangunan Islam Universiti Sains Malaysia.
- ★ Bakar, O. (2008) Tauhid dan Sains: Perspektif Islam Tentang Agama dan Sains, Bandung: Pustaka Hidayah.

## **DLHW 1742 Kepimpinan**

### **Learning Outcomes:**

Di akhir kursus ini, pelajar berupaya untuk:

1. Mengenal pasti dan menerangkan konsep utama dalam kepimpinan.
2. Menunjukkan kemahiran interpersonal dalam melaksanakan tugas kumpulan
3. Menghubung kait peranan dan kepimpinan dan kepengikutan.

### **Synopsis:**

Kursus ini membincangkan konsep-konsep kepimpinan, kemahiran interpersonal dalam kepimpinan, kerja berpasukan, kepengikutan, budaya kepimpinan dan kepelbagaiannya budaya dan etika organisasi. Tujuan kursus ini ialah memberi kefahaman dan penghayatan aspek kepimpinan dalam diri pelajar. Pengajaran dan pembelajaran akan dilaksanakan dalam bentuk pembelajaran berdasarkan pengalaman melalui aktiviti berpasukan di dalam dan di luar kuliah. Pada akhir kursus ini, pelajar diharapkan dapat membentuk keyakinan diri, kesedaran kendiri, etika dan profesionalisme disamping dapat mengaplikasi kemahiran komunikasi, kepimpinan dan kerja berpasukan dalam mengurus kehidupan sehari-hari mahupun dalam mengurus organisasi.

### **References:**

- ★ El-Muhammady, A. H. (1996) Pengurusan dalam Islam, Persatuan Bekas Mahasiswa Islam Timur Tengah.
- ★ Adair, J. (2013) Develop Your Leadership Skills, Koogan Page.
- ★ Lusier, R. N. & Achua, C. F (2009) Leadership: Theory, Application, Skill Development, International Ed., Cincinnati: South Western College Publishing.
- ★ Syed Mustafa, S. I. & Miskon, A. S. (2012) Asas Kepimpinan dan Perkembangan Profesional, Penerbitan Multimedia.

## **DLHW 2422 English for Effective Communication**

### **Learning Outcomes:**

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

1. Demonstrate interpersonal skills in communicative activities.
2. Explain products through informative speech.
3. Apply appropriate grammar elements in communicative activities.

### **Synopsis:**

This course is designed to provide students with the necessary communication skills to communicate effectively. The elements of grammar are taught to complement the topics covered in this course. Students demonstrate interpersonal skills through speeches and role-play. The elements of problem-based learning (PBL) are especially exercised during the oral presentation of the product as well as role-play.

### **References:**

- ★ Murphy, R. (2015) Essential Grammar in Use (4th Ed.). UK: Cambridge University Press.
- ★ Weinschenk, S. (2012) 100 things every presenter needs to know about people, California: New Riders.
- ★ Yule, G. (2012) Oxford Practice Grammar, New York: Oxford University Press.

## **DLHW 2772 Penghayatan Etika dan Peradaban**

### **Learning Outcomes:**

Di akhir kursus ini, pelajar berupaya untuk:

1. Menerangkan teori dan konsep etika daripada peradaban yang berbeza.
2. Menghuraikan kepentingan isu kontemporari berkaitan pelbagai bidang mengikut acuan etika dan peradaban.
3. Membincangkan sistem, tahap perkembangan, kemajuan sosial dan kebudayaan merentas budaya untuk Malaysia.

### **Synopsis:**

Kursus ini membincangkan tentang teori dan konsep ilmu, etika serta peradaban yang berunsurkan perbandingan sistem, kemajuan sosial dan kebudayaan merentas budaya yang pelbagai di Malaysia. Selain itu, kursus ini juga menerangkan tentang isu kontemporari berkaitan pelbagai bidang mengikut acuan etika dan peradaban di Malaysia. Pendekatan kursus ini boleh membina rakyat Malaysia yang datang dari pelbagai latar budaya merentasi nilai budaya bagi melahirkan budaya manusawi dengan nilai-nilai baik.

### **References:**

- ★ Mill, C. W. (2010) The Sociological Imagination: Contemporary Perspective (Edited by: John Scott & Ann Nilsen).
- ★ Malik, M. (2017) Foundation of Islamic Governance: A Southeast Asian Perspective, 1<sup>st</sup> Ed., London & New York: A Routledge.
- ★ MacKinnon, B. (2015) Ethic Theory and Contemporary Issues, 8<sup>th</sup> Ed., CT: Cengage Learning.
- ★ Fakhry, M. (1991) Ethical Theories In Islam, J.J. Brill.

## **DLHW 3432 English for Marketability**

### **Learning Outcomes:**

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

1. Produce effective written correspondence at workplace.
2. Justify opinions in spoken interaction at workplace.
3. Analyse grammar rules in workplace interaction.

### **Synopsis:**

This course aims to introduce and expose students to the basic tenets of communication specifically the oral and written communication required at the workplace. Students will be provided with the opportunity to produce a resume, a job-application letter and a letter of inquiry. They will also be able to participate in an interview and a group discussion. Students will be exposed to situations where they learn to function as individuals and team members by communicating in spoken and written forms using appropriate language in a variety of workplace contexts.

### **References:**

- ★ Searles, G. J. (2017) Workplace Communications, Boston: Pearson.
- ★ Samsiah, A. H. & Rosyati, A. R. (2012) Mastering English for Employment, Petaling Jaya: Cengage Learning Asia.
- ★ English, J. (2013) Professional Communications: Deliver Effective Written, Spoken and Visual Messages, 3<sup>rd</sup> Ed., Juta Academic.
- ★ White, P. (2012) The 5 Languages of Appreciation in the Workplace: Empowering Organizations by Encouraging People, Juta Academic.

## **DTMW 1012 Asas Pembudayaan Keusahawanan**

### **Learning Outcomes:**

Di akhir kursus ini, pelajar berupaya untuk:

1. Menerap budaya keusahawanan berdasarkan teori keusahawanan, revolusi usahawan, sejarah pembangunan usahawan dan perkembangan keusahawanan di Malaysia.
2. Mengaplikasikan kemahiran keusahawanan seperti kreativiti, inovasi, pro-aktif, mengambil risiko, mengenalpasti peluang, pemasaran dan rangkaian untuk memasuki atau menembusi pasaran.
3. Melaksanakan kerja lapangan perniagaan di samping membuat pembentangan projek perniagaan serta berkongsi pengalaman berkaitan pelaksanaan projek perniagaan kumpulan masing-masing.

### **Synopsis:**

Kursus ini membekalkan pelajar dengan motivasi dan kemahiran utama keusahawanan. Di samping itu, pelajar juga akan mendapat kemahiran tentang prinsip-prinsip dan amalan yang diperlukan untuk memulakan, mengembangkan dan memperkuuhkan sesbuah perniagaan. Aktiviti pengajaran, pembelajaran dan aplikasi yang menerapkan teori dan amalan akan membantu pelajar menguasai kompetensi yang perlu sebelum menceburkan diri dalam bidang perniagaan. Kursus ini juga membantu pelajar membentuk rangkaian perniagaan melalui perbincangan perniagaan, simulasi dan seminar. Pelajar akan didekah dengan isu-isu yang berkaitan dengan pemasaran, pengurusan strategi dan risiko. Di samping itu, pelajar akan dibekalkan dengan kemahiran yang perlu untuk menyediakan penyata aliran tunai dan asas dalam membangunkan dan menyediakan perancangan perniagaan.

### **References:**

- ★ UiTM Entrepreneurship Study Group (2004) Fundamental of Entrepreneurship, Prentice Hall.
- ★ Read, S., Sarasvathy, S., Dew, N., Wiltbank, R. & Ohlsson, A. V. (2011) Effectual Entrepreneurship, Taylor & Francis Group.
- ★ Acs, Z. J. & Audretsch, D. B. (2011) Handbook of Entrepreneurship Research: An Interdisciplinary Survey and Introduction, 2<sup>nd</sup> Ed., Springer.



**Course Synopsis**  
**Core Module**



## **BITI 1113 Artificial Intelligence**

### **Learning Outcomes:**

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

1. Explain the definition of Artificial Intelligence, AI, and its techniques.
2. Identify the types of AI techniques.
3. Use the AI techniques in problem solving.

### **Synopsis:**

Students are exposed to the basic and branches of AI such as the various search techniques, knowledge representation and reasoning, inference techniques, learning from experience and planning. Besides, some applications of AI including game playing, expert systems and machine learning will be introduced.

### **References:**

- ★ Russel, S. & Norvig, P. (2016) Artificial Intelligence: A Modern Approach, 3<sup>rd</sup> Ed., Prentice Hall.
- ★ Luger, G. F. (2015) Artificial Intelligence: Structures and Strategies for Complex Problem Solving, 5<sup>th</sup> Ed., Pearson Education.
- ★ Negnevitsky, M. (2011) Artificial Intelligence: A Guide to Intelligent System, 3<sup>rd</sup> Ed., Addison Wesley.
- ★ Kopec, D., Shetty, S. & Pileggi, C. (2014) Artificial Intelligence Problems and Their Solutions (Computer Science), T Mercury Learning & Information.

## **BITI 1213 Linear Algebra and Discrete Mathematics**

### **Learning Outcomes:**

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

1. Explain the basic concepts and application of related Linear Algebra topics.
2. Explain the basic concepts and application of related Discrete Mathematics topics.
3. Solve problems based on the concept and the theories that have been learned.

### **Synopsis:**

This course covers selected topics from two disciplines of mathematics (Linear Algebra and Discrete Mathematics) that are important for computer science students. Topics for Linear Algebra includes matrices, determinants, linear equations, vectors, eigenvalues and linear transformation while discrete mathematics covers introduction to logics, integers and algorithms, mathematical reasoning, combinatorics, relations, graphs and trees.

### **References:**

- ★ Ferland, K. (2017) Discrete Mathematics and Applications, 2<sup>nd</sup> Ed., CRC Press.
- ★ Johnsonbaugh, R. (2017) Discrete Mathematics, 8<sup>th</sup> Ed., Pearson.
- ★ Anton, H. (2013) Elementary Linear Algebra, 11<sup>th</sup> Ed., Wiley.
- ★ Lay, D. C., Lay, S. R. & McDonald, J. J. (2015) Linear Algebra and Its Applications, 5<sup>th</sup> Ed., Pearson.
- ★ Rosen, K. H. & Krishnamoorthy, R. (2013) Discrete Mathematics and Its Applications, 7<sup>th</sup> Ed., McGraw-Hill.

## **BITI 1223 Calculus and Numerical Methods**

### **Learning Outcomes:**

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

1. Apply fundamental concepts of Calculus and Numerical Methods.
2. Solve problems particularly in computer science with appropriate and high-level programming language or tools.
3. Use suitable techniques in Calculus and Numerical Methods to solve real-life application problems.

### **Synopsis:**

This course covers two areas of mathematics namely Elementary Calculus and Introductory Numerical Methods. Topics for first part include Functions, Differentiation, Exponential and Natural Logarithm Functions and Its Applications, Integration and Initial Value Problems. The second part topics consist of Errors, Taylor Polynomials, Root Finding, Interpolation, Numerical Integration and Differentiation and Numerical Solution for Initial Value Problems.

### **References:**

- ★ Sauer, T. (2017) Numerical Analysis, 3<sup>rd</sup> Ed., Pearson.
- ★ Butcher, J. C. (2016) Numerical Solution of Ordinary Differential Equations, New Jersey: John Wiley & Sons.
- ★ Gupta, R. S. (2015) Elements of Numerical Analysis, 2<sup>nd</sup> Ed., Cambridge University Press.
- ★ Fowler, J. & Snapp, B. (2014) MOOCulus Calculus, available at: <https://mooculus.osu.edu/textbook/mooculus.pdf> [Accessed on 5 August 2020].
- ★ Hass, J. R., Weir, M. D. & Thomas, G. B. (2016) Unviersity Calculus, Pearson.
- ★ Briggs & Cochran (2018) Calculus: Early Transcendentals, Pearson.

## **BITI 2233 Statistics and Probability**

### **Learning Outcomes:**

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

1. Demonstrate understanding of the concept and fundamentals of statistics and probability.
2. Reproduce solutions for application problems using statistical software.
3. Solve application problems using appropriate statistical techniques.

### **Synopsis:**

This course will provide a comprehensive introductory to statistics and probability for computer science students. Topics that will be covered in this course includes data description and numerical measures, probability, discrete random variables, continuous random variables and sampling distribution. Main topics for inferential statistics will start with estimation and will be followed by hypothesis testing, estimation and hypothesis testing for two populations, simple linear regression and correlation, and one-way ANOVA. In this course, students will be guide to use statistical software to perform descriptive and inferential statistics analysis.

### **References:**

- ★ Bluman, A. G. (2017) Elementary Statistics: A Step by Step Approach, 10<sup>th</sup> Ed., McGraw-Hill Education.
- ★ Navidi, W. (2014) Statistics for Engineers and Scientists, 4<sup>th</sup> Ed., McGraw-Hill Education.
- ★ Walpole R. E., Myers, R. H., Myers, S. L., & Ye, K. (2016) Probability and Statistics for Engineers & Scientist, 9<sup>th</sup> Ed., Pearson Educational International.
- ★ Devore, J. L. (2015) Probability & Statistics for Engineering & the Sciences, 8<sup>th</sup> Ed., Thomson.

## **BITM 1113 Multimedia System**

### **Learning Outcomes:**

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

1. Interpret the core concept of multimedia elements.
2. Manipulate multimedia applications by combining elements of text, graphic, audio, video and animation according to current needs.
3. Demonstrate problem solving skills for multimedia project development.

### **Synopsis:**

This course prepares students with the basic concept of multimedia, technology and the importance of multimedia application. It covers the introduction to multimedia elements such as text, graphic, audio, animation and video include 2D / 3D graphic and authoring, multimedia integration and multimedia application development. During lab sessions, students will be introduced to several tools for selected media element and authoring software for media integration. In addition, students will be trained for practical preparation of still image, simple animation, sound and effectively apply it to multimedia project. Students also will be exposed to teamwork, leadership, problem-solving and communication skills while performing their various tasks and project. Blended Learning / Flipped Classroom / Cooperative Learning (CL) / Problem Based Learning (PBL) / Collaborative Learning approach will be used to enhance students capability such as competency, attitude, knowledge and communication skills.

### **References:**

- ★ Vaughan, T. (2014) *Multimedia: Making It Work*, 9<sup>th</sup> Ed., McGraw-Hill Osborne Media.
- ★ Costello, V. (2017) *Multimedia Foundation: Core Concepts for Digital Design*, 2<sup>nd</sup> Ed., Routledge New York.
- ★ Farah, N. A., Norazlin, M. & Sazilah, S. (2018) *Multimedia System Module*, UTeM Press.
- ★ UTeM OCW, available at <http://ocw.utem.edu.my>.
- ★ MOOC, UTeM Open Learning, available at <http://www.openlearning.com/utemmooc>.

## **BITM 2313 Human Computer Interaction**

### **Learning Outcomes:**

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

1. Apply the concepts and theories of human computer interaction (HCI) in the system development.
2. Show conceptual thinking in problems solving related to application, website or product design.
3. Follow to the usability evaluation activities.

### **Synopsis:**

This course introduces the concept of HCI and its relationship in system development. The topics include the basic understanding of cognitive psychology, user interface design, interaction design, usability and evaluation. Other topics such as user-centered design, task analysis and user support design are also covered. The current issues on accessibility and localization are also discussed at the end of this course.

### **References:**

- ★ Preece, J., Rogers, Y. & Sharp, H. (2015) *Interaction Design: Beyond Human-Computer Interaction*, 4<sup>th</sup> Ed., John Wiley & Sons.
- ★ Dix, A., Finlay, J., Abowd, G. D. & Beale, R. (2005) *Human-Computer Interaction*, 3<sup>rd</sup> Ed., Prentice Hall.
- ★ Dov Te'eni, D., Jane Carey, J. & Zhang, P. (2007) *Human Computer Interaction: Developing Effective Organizational Information Systems*, John Wiley & Sons.
- ★ Preece, J., Rogers, Y., Sharp, H., Holland, S., Carey, T. & Benyon, D. (1994) *Human-Computer Interaction*, Addison Wesley.
- ★ Roojen, P. V. (2006) *Sign and Symbols*, The Pepin Press.
- ★ Frase, T. & Banks, A. (2004) *The Complete Guide To Colour*, ILEX Press Limited.
- ★ Hay, G. (2004) *Activity-Centred Design: An Ecological Approach to Designing Smart Tools and Usable Systems*, The MIT Press.

## **BITP 1113 Programming Technique**

### **Learning Outcomes:**

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

1. Illustrate programme codes by tracing and debugging in troubleshooting programme application.
2. Construct computer programme codes by applying suitable programming tools, structures and techniques.
3. Apply suitable programming structures and techniques in problem solving.

### **Synopsis:**

This course covers the introductory topics in programming using C++ language. It includes the introduction to computers and programming as well as the fundamentals of programming, problem solving and software development. Data types and operators, selection, repetition, function, array, file, structured data and pointer are among the topics covered in the course.

### **References:**

- ★ Gaddis, T. (2018) Starting Out with C++: From Control Structures Through Objects, 9<sup>th</sup> Ed., Pearson Education International.
- ★ Diane, Z. (2015) Introduction to Programming with C++, 8<sup>th</sup> Ed., Course Technology, Cengage Learning.
- ★ Malik, D. S. (2017) C++ Programming from Problem Analysis to Program Design, 8<sup>th</sup> Ed., Cengage Learning.
- ★ Liang, Y. D. (2013) Introduction to Programming with C++, 3<sup>rd</sup> Ed., Pearson Education International.
- ★ Friedman, K. (2011) Problem Solving, Abstraction and Design using C++, 6<sup>th</sup> Ed., Pearson.

## **BITP 1123 Data Structure and Algorithm**

### **Learning Outcomes:**

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

1. Illustrate the algorithm design and performance for different abstract data type operation.
2. Apply the suitable data structures for an application that requires data structures.
3. Construct the data structures and algorithms in problem solving.

### **Synopsis:**

This course will expose the students in data structures and algorithms. The basic concept in structure, class, array and pointer is discussed in order to understand the fundamental of data structures and algorithms. The course will focus on data structures such as list, stack, queue, tree, searching and hash while sorting, graph and heaps topics will concentrate on the algorithms. Algorithm efficiency for run time will also be discussed. Pseudo code and C++ programming language will be used for algorithm implementation. Apart from the theory, the students are asked to apply the data structures and algorithms through small application that is developed in a team.

### **References:**

- ★ Malik, D. S. (2010) Data Structures Using C++, 2<sup>nd</sup> Ed., Cengage Learning.
- ★ Malik, D. (2012) C++ programming: Program design including data structures, Nelson Education.
- ★ Main, M. & Savich, W. (2011) Data Structures and Other Objects Using C++, 4<sup>th</sup> Ed., Addison Wesley.
- ★ Goodrich, M. T., Tamassia, R. & Mount, D. M. (2011) Data Structures and Algorithms in C++, 2<sup>nd</sup> Ed., Wiley, John & Sons, Inc.
- ★ Drozdek, A. (2013) Data Structures and Algorithms in C++, 4<sup>th</sup> Ed., Cengage Learning.

## **BITP 1323 Database**

### **Learning Outcomes:**

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

1. Interpret database queries in Structured Query Language (SQL) and Relational Algebra (RA).
2. Construct a relational database according to user requirements.
3. Solve simple and complex queries using SQL.

### **Synopsis:**

This course will introduce student to the fundamental concepts of database management, which include the aspects of data models, database language; SQL and RA as well as database design. This course also focuses on practical skills which make students be able to apply fundamental concepts required for the use and design of database management systems (DBMS).

### **References:**

- ★ Coronel, C. & Morrisa, S. (2019) Database Systems: Design, Implementation and Management, 13<sup>th</sup> Ed., Cengage Learning.
- ★ Foster, E.C. & Godbole, S. (2016) Database Systems: A Pragmatic Approach, 3<sup>rd</sup> Ed., Apress.
- ★ Connolly, T. & Begg, C. (2015) Database Systems: A Practical Approach to Design, Implementation, and Management, 6<sup>th</sup> Ed., Pearson.
- ★ Churcher, C. (2016) Beginning SQL Queries, 2<sup>nd</sup> Ed., Apress.
- ★ Abd Rahim, Y., Hussain, A.R. & Ibrahim, Y. (2019) Database, FTMK, UTeM.

## **BITP 2213 Software Engineering**

### **Learning Outcomes:**

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

1. Explain the concept, principles and practices of software engineering for system development.
2. Apply the concept, principles and practices of software engineering in the system development.
3. Follow the standard guideline to produce formal specifications and software modeling in a collaborative team environment for the purpose of system development.

### **Synopsis:**

This course introduces the basic concept of software engineering to the student. It covers all the software development process which includes analysis, requirement, design, implementation and testing. The course also covers support areas such as project management and quality management. The course exposes the student to structured approach and object oriented approach.

### **References:**

- ★ Sommerville, I. (2015) Software Engineering, 10<sup>th</sup> Ed., Addison-Wesley.
- ★ Pressman R. S. (2015) Software Engineering: A Practitioner's Approach, 8<sup>th</sup> Ed., McGraw-Hill.
- ★ Pfleeger, S. L. & Atlee, J. M. (2010) Software Engineering, 4<sup>th</sup> Ed., Pearson.
- ★ Dennis, A., Wixom, B. H., & Roberta, M. R. (2012) System Analysis Design, 5<sup>th</sup> Ed., Wiley.
- ★ Bruegge, B. & Dutoit, A. H. (2010) Object-oriented Software Engineering: Using UML, patterns and Java, Prentice Hall .
- ★ Ahmad, S. (2018) A Student's Guide: UML for Software Engineering, UTeM Press.

## **BITP 3113 Object Oriented Programming**

### **Learning Outcomes:**

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

1. Define and explain object oriented programming principles and apply tools such as UML to model problem solutions and express the relationship among classes.
2. Demonstrate the understanding of object oriented principles such as abstraction, encapsulation, polymorphism and inheritance by program design.
3. Perform implementation of classes and methods using object oriented concept and making appropriate use of advanced features such as inheritance, exception handling and GUIs.

### **Synopsis:**

This course discusses about the concept of object-oriented approach by using Java programming language. The student will be able to apply and construct the object oriented programming basic structures (such as polymorphism, inheritance, encapsulation and abstraction), GUI, swing, event handling, interface components, exception handling, database, multimedia, networking and threads. The student should be able to develop a complete Java applications with database.

### **References:**

- ★ Rao, N. & Yoon, J. (2016) Introduction to Java Programming, Indo American Books.
- ★ Deitel, H. M. & Deitel, P. J. (2017) Java: How to Program Early Objects, 11<sup>th</sup> Ed., Pearson.
- ★ Liang, Y. D. (2014) Introduction Java Programming, 10<sup>th</sup> Ed., Prentice Hall.
- ★ Savitch, W. (2017) Java: An Introduction to Problem Solving and Programming, 8<sup>th</sup> Ed., Pearson.
- ★ Cadenhead, R. (2017) Java in 24 Hours, Sams Teach Yourself (Covers Java 9 and Android), 9<sup>th</sup> Ed., Pearson.
- ★ Baesens, B. & Backiel, A. (2015) Beginning Java Programming: The Object-Oriented Approach, WROX.

## **BITS 1123 Computer Organisation and Architecture**

### **Learning Outcomes:**

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

1. Demonstrate the concept of functional computer components and the detail interactions in computer systems.
2. Explain the principles and techniques used in implementing a processor.
3. Assemble basic computer components and its architectural attributes, including instruction set and technique for addressing memory.

### **Synopsis:**

This course provides a detail of computer system's functional components, characteristics, performance and interactions including system bus, different types of memory and Input / Output and CPU, as well as practical implementations of the components. Besides that, the architectural issues such as instruction set design and data types are covered. This course includes digital circuit design and its application in microprocessor architecture.

### **References:**

- ★ Patterson, D. A. & Hennessy, J. L. (2013) Computer Organization and Design: The Hardware/Software Interface, 5<sup>th</sup> Ed., Morgan Kauffman.
- ★ Aslinda, Fahmi, Nurul Azma, Zakiah & Zurina (2018) Lecture Slides: Computer Organization & Arcitecture, 2<sup>nd</sup> Ed, FTMK, UTeM.
- ★ Syarulnaziah, Zakiah, Marliza, Aslinda (2018) Lab Module: Computer Organization & Architecture with MIPS Programming, FTMK, UTeM.

- ★ Stallings, W. (2016) Computer Organization and Architecture, 10<sup>th</sup> Ed., Pearson.
- ★ Tanenbaum, A. S. (2013) Structured Computer Organization, 6<sup>th</sup> Ed., Prentice Hall.
- ★ Englander, I. (2014) The Architecture of Computer Hardware and System Software: An Information Technology Approach, 5<sup>th</sup> Ed., John Wiley & Sons.
- ★ Null, L. & Lobur, J. (2014) The Essentials of Computer Organization and Architecture, 4<sup>th</sup> Ed., Jones & Bartletts Pub.

## **BITS 1213 Operating System**

### **Learning Outcomes:**

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

1. Explain the basic concepts, theory and technology used in operating system.
2. Demonstrate the major components and functionalities of an operating system.
3. Display the basic administrative task on commonly used operating system.

### **Synopsis:**

This course is designed to give an exposure to students about basic concepts, theory and technology used in operating system such as concurrency, kernel, deadlock and multithreading. Student will learn about the fundamental of operating system including process, management of memory, file, I/O and CPU scheduling. In addition, students will be introduced to Linux operating system at basic administrative level.

### **References:**

- ★ Stallings, W. & Moumita, M. M. (2017) Operating Systems: Internals and Design Principles, 9<sup>th</sup> Ed., Pearson.
- ★ McHoes, A. & Flynn, I. M. (2017) Understanding Operating System, 7<sup>th</sup> Ed., Cengage Learning.
- ★ Tanenbaum, A. S. & Bos, H. (2016) Modern Operating Systems, 4<sup>th</sup> Ed., Pearson.
- ★ Anderson, T. & Dahlin, M. (2014) Operating Systems: Principles and Practice, 2<sup>nd</sup> Ed., Recursive Books.
- ★ Linux Ubuntu Guide, available at: [www.ubuntu.com](http://www.ubuntu.com).

## **BITS 1313 Data Communication and Networking**

### **Learning Outcomes:**

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

1. Build the understanding of data communication and networking concept and terminologies.
2. Differentiate types of network media, network topology and network technologies.
3. Manipulate network configuration using guided and unguided media.

### **Synopsis:**

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

### **References:**

- ★ Forouzan & Behrouz A. (2012) Data Communications and Networking, 5<sup>th</sup> Ed., McGraw-Hill.
- ★ Saaya, Z., Ramly, M., Bahaman, N., Sani, M. S. A., Harum, N., Nahar, H. & Mohd, O. (2014)

Lab Companion: Data Communications and Networking, 1<sup>st</sup> Ed, FTMK, UTeM.

- ★ Stallings, W. (2013) Data and Computer Communications, 10<sup>th</sup> Ed., Pearson.
- ★ Moussavi, M. (2011) Data Communication and Networking: A Practical Approach, 1<sup>st</sup> Ed., Cengage Learning.
- ★ Gerald, J. F., Dennis, A. & Durcikova, A., (2014) Business Data Communications and Networking, 12<sup>th</sup> Ed., Pearson.

## **BITU 2913 Workshop I**

### **Learning Outcomes:**

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

1. Apply the knowledge that had been learned especially in programming technique to build, run and develop the project individually.
2. Identify and solve problems in systematic way.
3. Defend while presenting result of the project.

### **Synopsis:**

This course aims to provide exposure and skills to the students in submitting and presenting a project of application/system development individually. Students must use the knowledge that had been learned to solve problems and think creatively to get result that achieved the objective and scope of the proposed project. Students must use the techniques learned in programming technique and system development subjects to assure that the project built will have a logical process flow and in precise with the system's criteria of robustness, consistent, have an interesting interface and able to handle error in data input/output process. At the end of this course, students must present and debate to defend the project that had been built. The process of supervision/evaluation is handled in terms of supervision and progress evaluation by a supervisor within 12 weeks besides the presentation evaluation by an evaluator. Workshop I is also functioned as the platform to prepare the students for their industrial training program.

### **References:**

- ★ JK Bengkel 1, Buku Panduan Bengkel 1 BITU 2913, 2018.
- ★ Horton, I. (2012) Ivor Horton's Beginning Visual C++ 2012, John Wiley & Son.

- ★ Gopalakrishnan, G. (2011) Oracle Database 11g Oracle Real Application Clusters Handbook, 2<sup>nd</sup> Ed., McGraw Hill.
- ★ McLaughlin, M. (2011) Oracle Database 11g & MySQL 5.6 Developer Handbook, McGraw Hill.
- ★ Sommerville, I. (2011) Software Engineering, 9<sup>th</sup> Ed., Pearson.

## **BITU 3973 Final Year Project I**

### **Learning Outcomes:**

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

1. Identify the problems associated with the needs of industry in the ICT domain with literature review.
2. Develop project using an appropriate method.
3. Defend the results to elaborate the significance of the project.
4. Organize information to produce a formal report.

### **Synopsis:**

This course joins together all the subjects learnt from year one of the studies including to analyse and to design a specific system, the application of database, algorithm and data structure, web programming, data communication, etc. It is compulsory to the final year students to develop a Final Project and to attend the offered courses.

### **References:**

- ★ Bachelor Degree Project and Diploma Project Committee, PSM Report Guideline 2017, FTMK, Universiti Teknikal Malaysia Melaka.
- ★ Bachelor Degree Project and Diploma Project Committee, PSM Report Guideline: Book, FTMK, Universiti Teknikal Malaysia Melaka.
- ★ Bachelor Degree Project and Diploma Project Committee, PSM Report Guideline: Reference, FTMK, Universiti Teknikal Malaysia Melaka.

## **BITU 3983 Final Year Project II**

### **Learning Outcomes:**

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

1. Verify the project based on the project timeline.
2. Complete the project output that has potential commercial value.
3. Defend the results to elaborate the significance of the project.
4. Organise information to produce a formal report.

### **Synopsis:**

This course joins together all the subjects learnt from year one of the studies including to analyse and to design a specific system, the application of database, algorithm and data structure, web programming, data communication, etc. It is compulsory to the final year students to develop a Final Project and to attend the offered courses.

### **References:**

- ★ Bachelor Degree Project and Diploma Project Committee, PSM Report Guideline 2017, FTMK, Universiti Teknikal Malaysia Melaka.
- ★ Bachelor Degree Project and Diploma Project Committee, PSM Report Guideline: Book, FTMK, Universiti Teknikal Malaysia Melaka.
- ★ Bachelor Degree Project and Diploma Project Committee, PSM Report Guideline: Reference, FTMK, Universiti Teknikal Malaysia Melaka.

## **BITU 3926 Industrial Training**

### **Learning Outcomes:**

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

1. Organise ICT tasks to fulfil an organisation's objectives.
2. Report technical tasks performed into a technical journal.
3. Report on the knowledge and skills gained throughout their internship.
4. Practise the knowledge and skills that they've learned in classes throughout their internship.
5. Develop interpersonal skill by interacting and communicating with staff, colleagues and personnel.

### **Synopsis:**

Students must do the internship no less than 24 weeks in an organisation which they have chosen. Throughout the internship, students are guided and monitored by the industrial supervisor. Students are required to report their internship's activities in their log book. The faculty supervisor will visit the student twice: one after 2 weeks of internship and another will be near the end of the 24 week period. During the second visit, students are required to do a presentation at the organisation in attendance of both Industrial and Faculty supervisor. Students must also submit a copy of Industrial Training Report to the faculty supervisor for evaluation.

### **References:**

- ★ Buku Panduan Latihan Industri, Universiti Teknikal Malaysia Melaka (2013).

## **BITU 3946 Industrial Training Report**

### **Learning Outcomes:**

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

1. Prepare an internship presentation.
2. Report on the knowledge and skills gained throughout their internship.

### **Synopsis:**

Students must do the internship no less than 24 weeks in an organisation which they have chosen. Throughout the internship, students are guided and monitored by the industrial supervisor. Students are required to report their internship's activities in their log book. The faculty supervisor will visit the student twice: one after 2 weeks of internship and another will be near the end of the 24 week period. During the second visit, students are required to do a presentation at the organisation in attendance of both Industrial and Faculty supervisor. Students must also submit a copy of Industrial Training Report to the faculty supervisor for evaluation.

### **References:**

- ★ Buku Panduan Latihan Industri, Universiti Teknikal Malaysia Melaka (2013).

## DITI 1213 Calculus

### Learning Outcomes:

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

1. Apply knowledge and fundamental concepts of Calculus.
2. Solve application problems using software by referring to Calculus theories.
3. Solve application problems by relevant information using suitable techniques.

### Synopsis:

This course covers one discipline of mathematics namely Calculus. Topics for Calculus include Set of Real Numbers, Functions, Derivative, Techniques of Differentiation, Application of Derivatives, Exponential and Natural Logarithm Functions, Definite Integral, Techniques of Integration and Application of Integration.

### References:

- ★ Bittinger, M. L., Ellenbogen, D. J. & Surgent, S. J. (2012) Calculus and Its Applications, Pearson International Ed.
- ★ Goldstein, L. J., Lay, D. C, Schneider, D. I. & Asmar, N. H. (2013) Brief Calculus and Its Applications, 13<sup>th</sup> Ed., Pearson.
- ★ Briggs, B., Cochran, L. & Gillett, B. (2014) Calculus: Early Transcendentals, Pearson.
- ★ Stewart, J. (2015) Calculus, 8<sup>th</sup> Ed., Pearson Education.
- ★ Larson (2012) Brief Calculus: An Applied Approach, 9<sup>th</sup> Ed., Cengage Learning.

## DITI 1223 Discrete Mathematics

### Learning Outcomes:

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

1. Explain the basic concepts and techniques of Discrete Mathematics.
2. Apply those concepts and techniques to related theoretical problems.
3. Propose solutions to problems in applied computer science with the assistance of an appropriate use of software.

### Synopsis:

This course introduces the fundamental concepts and techniques of Discrete Mathematics that are needed for computer science. It includes logics sets, functions, counting, relations, graphs and trees along with their applications to problems in computer science.

### References:

- ★ Rosen, K. H. & Krishnaswamy, K. (2013) Discrete Mathematics and Its Applications, 7<sup>th</sup> Ed., McGraw-Hill.
- ★ Malik, D. S. & Sen, M. K. (2010) Discrete Mathematics: Theory and Applications. Revised Ed., Cengage Learning.
- ★ Epp, S. S. (2011) Discrete Mathematics with Applications, 4<sup>th</sup> Ed., Cengage Learning.
- ★ Velleman, D. J. (2009) How to Prove it: A Structured Approach, 2<sup>nd</sup> Ed., Cambridge.
- ★ Deo, N. (2016) Graph Theory with Applications to Engineering and Computer Science, Dover Ed., Dover Publications.

## DITI 2213 Linear Algebra and Numerical Methods

### Learning Outcomes:

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

1. Solve problems on the basic concepts of Linear Algebra and Numerical Methods.
2. Manipulate with guidance steps of solving Linear Algebra problems using an appropriate tool or software.
3. Propose solutions to related problems by recognising relevant information and using suitable concepts and/or principles in Linear Algebra and Numerical Methods.

### Synopsis:

This course covers two introductory topics on Linear Algebra and Numerical Methods. The topics for Linear Algebra include Matrices, Determinant, Inverse, Linear Equations Systems, Vector Spaces, Eigenvalues & Eigenvectors and Linear Transformations. Numerical Methods topics consist of Taylor Polynomials, Error and Computer Arithmetic, Root finding, Interpolation, Numerical Differentiation, Numerical Integration and Numerical Solution to Ordinary Differential Equation.

### References:

- ★ Kolman, B. & Hill, D. R. (2014) Introductory Linear Algebra with Application, 9<sup>th</sup> Ed., Prentice Hall.
- ★ Anton, H. & Rorres, C. (2015) Elementary Linear Algebra with Supplemental Applications, 11<sup>th</sup> Ed., John Wiley & Sons.
- ★ Dorfman, K. D. & Daoutidis, P. (2017) Numerical Methods with Chemical Engineering Applications, Cambridge University Press.
- ★ Burden, R. L., Faires, J. D. & Burden, N. M. (2016) Numerical Analysis, 10<sup>th</sup> Ed., Cengage.

## DITI 2233 Statistics and Probability

### Learning Outcomes:

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

1. Explain the fundamental concepts of statistics and its application.
2. Apply concept of probability and inferential statistics techniques to solve application problems.
3. Manipulate solutions of application problems using statistical software.

### Synopsis:

Students are exposed to the concept of probability and inferential statistics. The course starts with data description and numerical measures, probability, discrete random variables, continuous random variables and sampling distributions. Main topics for inferential statistics will start with estimation and will be followed by hypothesis testing and simple linear regression. Besides that, this course will give some exposure to statistical software.

### References:

- ★ Bluman, A. G. (2018) Elementary Statistics: A Step by Step Approach, 10<sup>th</sup> Ed., McGraw-Hill Education.
- ★ Devore, J. L. (2015) Probability and Statistics for Engineering and the Sciences, 9<sup>th</sup> Ed., Cengage Learning.
- ★ Mann, P. S. (2013) Introductory Statistics, 8<sup>th</sup> Ed., Wiley.
- ★ Navidi, W. (2014) Statistics for Engineers and Scientists, 4<sup>th</sup> Ed., McGraw-Hill Education.
- ★ Walpole, R. E., Myers, R. H., Myers, S. L. & Ye, K. (2012) Probability and Statistics for Engineers & Scientist, 9<sup>th</sup> Ed., Pearson Educational International.
- ★ Sharifah Sara, Hanissah, Fauziah, Nortazi & Farah Shahnaz (2008) Introduction to Statistics and Probability: A Study Guide, Prentice Hall.
- ★ Levine, D. M., Ramsey, P. P. & Smidt, R. K. (2001) Applied Statistics for Engineers and Scientists Using Microsoft Excel and Minitab, Prentice Hall.

## DITP 1113 Programming I

### Learning Outcomes:

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

1. Illustrate programme codes by tracing and debugging in troubleshooting programme applications.
2. Construct computer programme codes by applying suitable programming tools, structures and techniques.
3. Demonstrate suitable programming structures and techniques in problem solving.

### Synopsis:

This course covers the introductory topics in programming using C++ language. It includes the introduction to computers and programming as well as the fundamentals of programming, problem solving and software development. Data types and operators, selection, repetition, function are among the topics covered in the course.

### References:

- ★ Gaddis, T., Walters, J. & Muganda, G. (2011) Starting Out with C++: Early Objects, International Version 7<sup>th</sup> Ed., Pearson Education International.
- ★ Gaddis, T. (2018) Starting Out with C++: From Control Structures Through Objects, 8<sup>th</sup> Ed., Pearson Education International.
- ★ Malik, D. S. (2011) C++ Programming from Problem Analysis to Program Design, 5<sup>th</sup> Ed., Cengage Learning.
- ★ Liang, Y. D. (2010) Introduction to Programming with C++, 2<sup>nd</sup> Ed., Pearson Education International.
- ★ Friedman, K. (2011) Problem Solving, Abstraction and Design using C++, 6<sup>th</sup> Ed., Pearson.

## DITU 3933 System Development Workshop

### Learning Outcomes:

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

1. Solve and develop a project in a group.
2. Apply systems development and design concepts to a current development project.
3. Manage the project in groups ethically.

### Synopsis:

In this course, students should be able to integrate subjects learned in earlier semesters such as analysis and design, database programming, data structures and algorithms, operating system, web programming, data communication and networking.

### References:

- ★ Stauffer, M. & Laravel (2016) Up and Running: A Framework for Building Modern PHP Apps.
- ★ Rob Foster, R. (2015) CodeIgniter Web Application Blueprints, Packt Publishing.
- ★ Skidmore, S. & Eva, M. (2003) Introducing Systems Development, Macmillan Education UK.
- ★ Britton, C. & Doake, J. (2000) Object-oriented Systems Development: A Gentle Introduction, McGraw-Hill.
- ★ Britton, C. & Doake, J. (2005) Software System Development: A Gentle Introduction, McGraw-Hill Education.

## DITU 3964 Diploma Project

### Learning Outcomes:

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

1. Identify problems related to industrial needs in the ICT domain.
2. Complete the development of a computer system using relevant project management methods.
3. Organise information to produce a formal report.
4. Present a completed project.

### Synopsis:

Diploma project trains the students to practice their knowledge by undertaking a project. The students are exposed to real system development environment in which they will have to analyse and solve system related problems, plan and develop the system as well as to meet the design and analysis requirements using appropriate computer programming language.

### References:

- ★ Bachelor Final Year Project and Diploma Project Committee (2014) Diploma Project Handbook, 5<sup>th</sup> Ed., FTMK, Universiti Teknikal Malaysia Melaka.

## DITU 2343 Industrial Training

### Learning Outcomes:

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

1. Manage tasks related to ICT.
2. Apply the knowledge and skills that they have learned in classes throughout their internship.
3. Demonstrate interpersonal skill by interacting and communicating with staff, colleagues and personnel.
4. Explain technical tasks performed into a logbook.

### Synopsis:

Students must do the internship no less than 10 weeks in an organisation which they have chosen. Throughout the internship, students are guided and monitored by the industrial supervisor. Students are required to report their internship's activities in their log book. The faculty supervisor will visit the student only once and usually it will be near the end of the 10-week period. During the visit, students are required to do a presentation at the organisation in attendance of both Industrial and Faculty supervisors. Students must also submit a copy of Industrial Training Report to the faculty supervisor for evaluation.

### References:

- ★ Buku Panduan Latihan Industri, Universiti Teknikal Malaysia Melaka (2009).

## **DITU 2362 Industrial Training Report**

### **Learning Outcomes:**

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

1. Perform an internship presentation.
2. Report on the knowledge and skills gained throughout their internship.

### **Synopsis:**

This course is an extension of DITU 2343 where students must do the internship no less than 10 weeks in an organisation which they have chosen. Throughout the internship, students are guided and monitored by the industrial supervisor. Students are required to report their internship's activities in their log book. The faculty supervisor will visit the student only once and usually it will be near the end of the 10-week period. During the visit, students are required to do a presentation at the organisation in attendance of both Industrial and Faculty supervisor. Students must also submit a copy of Industrial Training Report to the faculty supervisor for evaluation.

### **References:**

- ★ Buku Panduan Latihan Industri, Universiti Teknikal Malaysia Melaka (2009).



**Course Synopsis  
Specialisation  
Module**



## BITE 1523 Computer Game Programming BITE 1613 2D Game Development

### Learning Outcomes:

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

1. Describe the different Abstract Data Type (ADT) & algorithms used in game programming and the effects towards performance.
2. Apply structured data and algorithm in game application that requires data structures.
3. Produce game application by applying suitable type of data structures and algorithms to solve game programming problems.

### Synopsis:

This course covers the topics in fundamental ADT and algorithms which commonly applied in games application development. In this course, the data structures and the algorithms will be implemented using MSVC++ and Simple DirectMedia Layer (SDL) Libraries. ADT such as array, linked-list, stack, queue, tree, hash table and graph will be emphasized during the program development. The algorithms of data operations such as modifying data (insertion, remove, replace etc), recursion, sorting, searching and indexing which are always used to operate data in games will also be covered. This subject requires the students to have a sound background in fundamental C++ programming techniques they have learnt in Game Programming I. For this course, Object Oriented Programming (OOP) techniques will not be emphasized.

### References:

- ★ Ron Penton, R. (2003) Data Structure For Game Programmers, Game Development Series, The Premier Press, E-Book.
- ★ Robert, E. S. (2013) Programming Abstraction in C++, 1<sup>st</sup> Ed., Prentice Hall, E-Book.
- ★ Sherrod, A. (2007) Data Structures and Algorithms for Game Developers, Game Development Series, Charles River Media, Thomson Learning Inc., E-Book.

### Learning Outcomes:

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

1. Demonstrate the basic concept related to digital graphic design, computer graphics 2D and 2D computer game development.
2. Gather key skills, techniques and components in 2D computer games development.
3. Construct appropriate components for generating 2D computer games from different types and genres as the basis for continuous learning.

### Synopsis:

This course provides students with the concept of digital graphic design, computer graphics 2D, and basic concepts and techniques for the development of a 2D computer games. Students will be introduced to the concept of 2D raster graphics, and geometric 2D graphics. This course also covers the theory of computer games, game design, game logic and game engine development. In addition, students will also be exposed to other important matters related to the development of computer games such as the integration of 2D graphics and content development. At the end of this course, students will develop 2D games based on any given genres.

### References:

- ★ Rabin, S. (2010) Introduction to Game Development, 2<sup>nd</sup> Ed., Course Technology - Cengage Learning.
- ★ Ford Jr., J. L. (2010) Getting Started with Game, Course Technology - Cengage Learning.
- ★ Thompson, J., Berbark-Green, B. & Cusworth, N. (2007) Game Design: Principles, Practice and Techniques – The Ultimate Guide for the Inspiring Game Designer, John Wiley & Sons Inc.
- ★ Habgood, J., Neilsen, N. & Rijks, M. (2012) The Adobe Animate Companion, Game Development: The Journey Continues, Technology in Action.
- ★ Moore, M. E. (2007) Introduction to Game Industry, Pearson - Prentice Hall.

## BITE 1713 Game Architecture

### Learning Outcomes:

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

1. Apply the concepts, theories and methods of programming a computer game development.
2. Respond technical problems with the computer game development follow application development cycle.
3. Describes the current issues related to architectural design of computer games based on various sources of information relevant to the development of technology.

### Synopsis:

This course provides an introduction to the design aspects of the development of a computer games. The topics include basic technical understanding, game design and programming. Other topics include the game engine and the type of games. Current issues related to game development methods, technologies and trends in computer games is discussed at the end of the course.

### References:

- ★ Rabin, S. (2010) Introduction to Game Development, 3<sup>th</sup> Ed., Course Technology PTR.
- ★ Rolling, A. & Morris, D. (2009) Game Architecture and Design, New Riders.
- ★ Gregory, J. & Lander, J. (2009) Game Engine Architecture, A. K. Peters Ltd.

## BITE 1723 Game Design Principle

### Learning Outcomes:

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

1. Apply computer game design concepts and theories in the development of games.
2. Explain computer game design elements in various genres of games.
3. Follow game design principles in designing games using appropriate tools.

### Synopsis:

This course is designed to provide students with a fundamental working knowledge and understanding of critical concept and historical context for analyzing games, as well as the skills and techniques necessary to incorporate game design in their study. Students will learn how to identify, create and manipulate core game elements such as game philosophy, design process, player objectives, rule systems and the human elements in a game. This course will introduce students to the tools and concepts used to create levels for games. The course will incorporate level design and architecture theory, concepts of the critical path and flow, game balancing, playtesting and storytelling. Using user-friendly toolsets from industry titles, students will build and test levels that reflect design concepts.

### References:

- ★ Adams, E. (2014) Fundamentals of Game Design, 3<sup>rd</sup> Ed., New Riders.
- ★ Perry, D. & DeMaria, R. (2009) David Perry on Game Design: A Brainstorming Toolbox, Course Technology Cengage Learning.
- ★ Novak, J. (2012) Game Development Essentials : An Introduction, 3<sup>rd</sup> Ed., Delmar Cengage Learning.
- ★ Saunders, K. & Novak, J. (2013) Game Development Essentials: Game interface Design, 2<sup>nd</sup> Ed., Delmar Cengage Learning.

## **BITE 2123 Artificial Intelligence for Games**

### **Learning Outcomes:**

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

1. Explain the principles, current issues and techniques in academic and industry game AI.
2. Show how the functions of computer game AI can be used to create game experience including rule design, game mechanic, game balancing and social game integration into game experience.
3. Apply problem-solving skills in planning and developing a computer game AI project.

### **Synopsis:**

This course is for undergraduate and graduate students in Computing and related fields to gain a breadth of understanding of the toolbox of AI approaches employed in digital games. This involves learning some basic topics covered in other AI courses, but with a focus on applied knowledge within the context of digital games. The discipline of (academic) Game AI was launched with a justification of interactive entertainment (i.e., computer games) as a domain of study in AI when they posited that computer games could act as testbeds for achieving human-level intelligence in computers, leveraging the fidelity of their simulations of real world dynamics [c.f. ‘Human-Level AI’s Killer Application: Interactive Computer Games’ by Laird and van Lent]. There is an additional (industry) perspective on AI for games: increasing the engagement and enjoyment of the player.

### **References:**

- ★ Yannakakis, Georgios, N. & Togelius, J. (2018) Artificial Intelligence and Games, Springer.

- ★ Millington, I. (2009) Artificial Intelligence for Games, 2<sup>nd</sup> Ed., Morgan Kaufmann.
- ★ Lucci, S. & Kopec, D. (2012) Artificial Intelligence in the 21st Century, Mercury Learning & Information.
- ★ Armstrong, S. (2014) Smarter Than Us: The Rise of Machine Intelligence, Machine Intelligence Research Institute.
- ★ Kyaw, A., Peters, C. & Swe, T. (2013) Unity 4.x Game AI Programming, Packt Publishing.
- ★ Bandara, U. (2012) AI Game Programming for Beginners, CreateSpace Independent Publishing Platform.

## BITE 2513 Game Engine Development I

### Learning Outcomes:

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

1. Apply the theory and practice of programming video games.
2. Produce their own game engine design using basic game design approach.
3. Develop their own games using existing game engines.

### Synopsis:

This course provides students with an introduction to the theory and practice of video game programming. Students will participate in individual hands-on lab exercises, and also work together like a real game development team to design and build their own functional game using an existing game engine (e.g. OPENGL, UNITY, UNREAL, CRY Engine, etc). Concepts learned during this subject is introduction to game engine, math for game engine, engine support systems, game loop and real-time simulation, human interface devices, tools for debugging and development, rendering engine, animation system, collision detection and introduction to gameplay system.

### References:

- ★ Gregory, J. (2019) Game Engine Architecture, 3<sup>rd</sup> Ed., CRC Press.
- ★ Thorn, A. (2011) Game Engine Design and Implementation, Jones and Bartlett Learning.
- ★ Akenine-Moller, T., Haines, E. & Naty Hoffman, N. () Real-Time Rendering, 3<sup>rd</sup> Ed., A. K. Peters/CRC Press.
- ★ Millington, I. () Game Physics Engine Development: How to Build a Robust Commercial-Grade Physics Engine for your Game, CRC Press.
- ★ Dave Shreiner, D., Sellers, G., Kessenich, J. M. & Licea-Kane, B. M. () OpenGL Programming Guide: The Official Guide to Learning OpenGL, Version 4.3, 8<sup>th</sup> Ed., Addison-Wesley Professional.
- ★ Menard, M. () Game Development with Unity, Cengage Learning PTR.

## BITE 2523 Web Game Development

### Learning Outcomes:

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

1. Explain the latest web game technology and design approach.
2. Distinguish the design principles of web game design and production of experimental procedures using various tools and software.
3. Produce Web Game application in accordance to industry standard framework.

### Synopsis:

This course will expose the student with all necessary technologies into making a web game. The student will learn most of the common web technology and languages that comply with the World Wide Web Consortium (W3C) in order for them to create their initial web application. Moreover, the student will also learn the industry standards by engaging them with industry's best practices to their lab works, assignments and project. Upon understanding the web application development concept, the student will begin to develop their web game using various tools and some game engine. Similar to any software development, the student will develop their web game based on current industries framework.

### References:

- ★ Seidelin, J. (2012) HTML5 Games: Creating Fun with HTML5, CSS3, and WebGL, 3<sup>rd</sup> Ed., John Wiley & Sons.
- ★ Harris, A. (2013) HTML5 Game Development for Dummies, John Wiley & Sons.
- ★ Burchard, E. (2013) The Web Game Developer's Cookbook: Using Javascript And HTML5 To Develop Games (Game Design), 1<sup>st</sup> Ed., Addison-Wesley Professional.
- ★ Shankar, A. R. (2017) Pro HTML5 Games: Learn To Build Your Own Games Using HTML5 And Javascript, 2<sup>nd</sup> Ed., Apress.

## BITE 2613 Interactive 3D Animation

### Learning Outcomes:

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

1. Explain the animation principles, 3D environment development design for 3D modeling with interactivity elements.
2. Display, texturing, animating, lighting and rendering techniques using software and devices following 12 principles of animation.
3. Follow 3D environment development principles and interactivity in their interactive animation project.

### Synopsis:

This course addresses the design and creation of 3D environments using software for modeling and animation and using tools for adding interactivity. Students are invited to explore the unique feeling of being immersed in a virtual world by creating new types of user experiences. Attention is given to the use of physical input devices or interaction regimes in the service of creating the user's feeling of delight in the artificial world.

### References:

- ★ Derakhshani, D. (2015) Autodesk 3ds Max 2016 Essentials, Sybex.
- ★ Miles, J. (2016) Unity 3D and PlayMaker Essentials: Game Development from Concept to Publishing (Focal Press Game Design Workshops), A K Peters/CRC Press.
- ★ Lanham, M. (2017) Augmented Reality Game Development, Packt Publishing.
- ★ O'Rourke, M. (2003) Principles of Three-Dimensional Computer Animation, W.W. Norton & Company.

## BITE 2623 3D Game Development

### Learning Outcomes:

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

1. Apply 3D Game fundamentals to create 3D game.
2. Build several 3D games based on current trends and industry standard.
3. Integrate necessary game elements and assets according to 3D Game Development pipeline using various techniques and tools.

### Synopsis:

This course provides the student in depth study about 3D game development process. 3D environment has allow gaming to evolve from simple traditional side scrolling game into more sophisticated and realistic experience to the player. Students will participate from conceptual ideation, 3D assets integration, texture and material for 3D games, 3D gameplay, collision detection and many other. Moreover, student will develop a prototype of 3D game for playtesting and refinement phase. It also discuss few case study and current industry standard technique in 3D game development.

### References:

- ★ Rabin, S. (2008) Introduction to Game Development, Course Technology.
- ★ Hill, T. (2015) 3D Game Development, Practical Introduction.
- ★ Valcasara, N. (2015) Unreal Engine Game Development Blueprint, PACKT Publishing.

## BITE 2633 Audio Video Production for Game

### Learning Outcomes:

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

1. Apply the knowledge and principles of digital audio and video in computer games environment.
2. Demonstrate advanced skills in using audio video software and hardware including the digital media composition techniques as well as develop the idea and to edit digital audio video products in a group.
3. Construct audio video project in the conducive production environment with the latest and relevance information.

### Synopsis:

This course will give details and valuable insights of digital audio and video production in games industry. Throughout the semester, students will be introduced to relevant topics on digital audio and video hardware, the art of audio production, recording techniques, video production, the integration of other media in video product, implementing special effects, and storyboarding. Besides, various tools for editing, practical as well as composing digital audio and video will be taught during the course.

### References:

- ★ Zakaria, M. H., Maksom, Z., Saifudin, W. S. N. & Abdullah, M. H. L. in Press, Digital Audio and Video Technology: Classroom in a book, Penerbit Universiti UTeM.
- ★ Marks, A. (2009) The Complete Guide to Game Audio: for Composers, Musicians, Sound Designers, and Game Developers. Taylor & Francis: Oxford.
- ★ Pohlmann, K. C. (2010) Principles of Digital Audio, 6<sup>th</sup> Ed., McGraw-Hill Professional.
- ★ Mitra, A. (2010) Digital Video: Moving Images and Computers, Facts on File Publishing.
- ★ Adobe Creative Team (2010) Adobe Premiere Pro CS5 Classroom in a Book, Adobe Press.

## BITE 3513 Game Engine Development II

### Learning Outcomes:

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

1. Apply computer graphic interactive fundamentals as core architecture for Game Engine Development.
2. Manipulate various library such as physic library, sound library, input library for game development.
3. Integrate all of the components of game engine to become a template to develop game.

### Synopsis:

This course provides students with an in-depth exploration of game engine architecture. Students will learn state-of-the-art software architecture principles in the context of game engine design, investigate the subsystems typically found in a real production game engine, survey some engine architectures from actual shipping games, and explore how the differences between game genres can affect engine design. Students will participate in individual hands-on lab exercises, and also work together like a real game development team to design and build their own functional game engine by designing and implementing engine subsystems and integrating third party components of game engine architecture. The pinnacle of this course is that the student will be able to develop and customize a game on top of their game engine.

### References:

- ★ Gregory, J. (2009) Game Engine Architecture, 2<sup>nd</sup> Ed., AK Peters.
- ★ Lengyel, E., Series Editor, (2011) Game Engine Gems 2, Vol. 2, AK Peters/CRC Press.
- ★ Millington, I. () Game Physics Engine Development: How to Build a Robust Commercial-Grade Physics Engine for your Game, CRC Press.
- ★ Harbour, J. S. (2007) Game Programming: All in One, 3<sup>rd</sup> Ed., Boston: Thomson Course Technology.
- ★ Schwab, B. (2004) AI Game Engine Programming, Hingham, MA: Charles River Media.

## BITE 3613 Game Project Management

### Learning Outcomes:

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

1. Prepare related documentations of games project management according to industry specification.
2. Display leadership skills, ethics and professionalism in managing group project.
3. Follow games project management techniques in analyzing project's risk, planning, cost management and control, quality assurance and budgeting.

### Synopsis:

This course emphasizes on theory, application and practice in managing game projects. Students will gain knowledge and acquire skills in managing game projects such as planning, costing and preparing documentations. Students will demonstrate the key competencies required in managing game assets, resources and team members through group activities and case studies. They will be introduced to the roles as game producer, game artist, game designer, game developer and related supports in game production. At the end of the course, students must be able to adopt appropriate game project management tools in managing project activities. Students will be encouraged to actively participate and share their ideas through group discussions, presentations and role play.

### References:

- ★ Hight, H & Novak, J. (2008) Game Development Essentials: Game Project Management, Thomson Delmar Learning.
- ★ Vaughan, T. (2011) Multimedia: Making It Work, 8<sup>th</sup> Ed., McGraw-Hill Osborne Media.
- ★ England, E. & Finney, A. (2007) Managing Interactive Media: Project Management for Web and Digital Media, 4<sup>th</sup> Ed., Addison Wesley.
- ★ Frick, T. (2008) Managing Interactive Media Project, Thomson Delmar Learning.

## BITE 3713 Multi-platform Game

### Learning Outcomes:

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

1. Explain the latest game engine design approach and the concept of "game" and "play".
2. Distinguish the design principles of game design and production of experimental procedures using various software and tools.
3. Reproduce their own game engine design and implementation part of the engine and integrate third-party components in accordance with industry requirements specification.

### Synopsis:

This course provide student with a study of multiplatform development strategy in game development pipeline. Understanding multiplatform concept is an important step to determine business process and goal for the developer. Various architecture of game consoles and other platform such as mobile devices lead towards different performance and expectation toward one game title. Thus the need to understand various game development pipeline across multiple gaming platform is crucial in order to deliver the final game product expectation. Students will participate in individual hands-on lab exercises, and also work together like a real game development team to design and build their own game across several platform.

### References:

- ★ Gregory, J. (2009) Game Engine Architecture, 2<sup>nd</sup> Ed., AK Peters.
- ★ Lengyel, E., Series Editor (2011) Game Engine Gems 2, Vol. 2, AK Peters/CRC Press.
- ★ Ian Millington, I. () Game Physics Engine Development: How to Build a Robust Commercial-Grade Physics Engine for your Game, CRC Press.
- ★ Harbour, J. S. (2007) Game Programming: All in One, 3<sup>rd</sup> Ed., Boston: Thomson Course Technology.
- ★ Schwab, B. (2004) AI Game Engine Programming, Hingham, MA: Charles River Media.

## **BITI 2213 Knowledge Based System**

### **Learning Outcomes:**

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

1. Define the fundamental concept of knowledge based systems, components and lifecycle.
2. Compare different knowledge representations and reasoning in knowledge-based system.
3. Apply a basic knowledge based system based on appropriate concept and components.

### **Synopsis:**

This course introduces the students to the concept of Knowledge-Based Systems, KBS, such as phases of developing KBS, types of knowledge representations, knowledge acquisitions, and types of inference techniques and reasoning. Students also are exposed to Expert Systems as one of the KBS.

### **References:**

- ★ Negnevitsky, M. (2011) Artificial Intelligence: A Guide to Intelligent System, 3<sup>rd</sup> Ed., Addison Wesley.
- ★ Ryan, D. (2017) Expert Systems: Design, Applications and Technology (Computer Science, Technology and Applications).
- ★ Ritcher, M. M. & Weber, R. (2013) Case-Based Reasoning: A Textbook, 2013<sup>th</sup> Ed., Springer.
- ★ Micouin, P. (2014) Model Based Systems Engineering: Fundamentals and Methods (Control, Systems and Industrial Engineering Series), Wiley.
- ★ Vizureanu, P. *Eds* (2010) Expert Systems, Intech.

## **BITI 2223 Machine Learning**

### **Learning Outcomes:**

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

1. Differentiate the fundamental concept of machine learning theory.
2. Select the appropriate techniques in machine learning problem solving.
3. Demonstrate machine learning algorithm based on machine learning concepts.

### **Synopsis:**

In this course, students are exposed to the foundation of machine learning, which is the study of how to build a computer system that learns from experience. The course starts with an overview of Data Mining for a background study. Main topics that will be covered are such as concept learning, decision tree learning, Bayesian learning, linear model, instance-based learning, model evaluation, association analysis, and reinforcement learning. Besides, some applications of machine learning including robotic control, autonomous navigation, bioinformatics, speech recognition, and web data processing will be introduced.

### **References:**

- ★ Flach, P. (2012) Machine Learning: The Art and Science of Algorithms that Make Sense of Data, Cambridge University Press.
- ★ Kelleher, J. D., Namee, B. M., D'Arcy, A. (2015) Fundamentals of Machine Learning for Predictive Data Analytics: Algorithms, Worked Examples, and Case Studies, The MIT Press.
- ★ Marsland, S. (2014) Machine Learning: An Algorithmic Perspective, 2<sup>nd</sup> Ed., Chapman & Hall/Crc Machine Learning & Pattern Recognition.
- ★ Kotu, V. & Deshpande, B. (2014) Predictive Analytics and Data Mining: Concepts and Practice with RapidMiner, 1<sup>st</sup> Ed., Morgan Kaufmann.
- ★ Rapidminer inc., (2012) URL: <https://rapidminer.com/getting-started-central/> [Access on 7 February 2017].

## **BITI 3123 Fuzzy Logic**

### **Learning Outcomes:**

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

1. Relate various concepts of fuzzy logic to problem solving.
2. Organize solution steps in solving fuzzy logic problem.
3. Demonstrate computer program based on fundamental methods of fuzzy logic for problem solving.

### **Synopsis:**

This course aims to provide exposure on the foundation of fuzzy logic as one of the soft computing techniques. The course starts with an overview on the concept of fuzziness. The main topics will cover the algebra, quantities and the logical aspect of fuzzy sets, fuzzy membership functions, fuzzy operations, fuzzification, de-fuzzification, and fuzzy system. Various applications of fuzzy system such as the automated fuzzy system, fuzzy decision making system, fuzzy classification and clustering system, fuzzy pattern recognition system and fuzzy control system will be included in the discussion.

### **References:**

- ★ Ross, T. J. (2010) Fuzzy Logic with Engineering Applications, 3<sup>rd</sup> Ed., John Wiley.
- ★ The Mathworks Inc. (2013) Fuzzy Logic Toolbox, <http://www.mathworks.com/products/fuzzy-logic/index.html>, [Access on 16 August 2013].
- ★ Selected papers by Prof. L. A. Zadeh downloaded from the website at The Berkeley Initiative in Soft Computing (BISC) (2013), <http://www.cs.berkeley.edu/~zadeh/papers/index.htm>, [Access on 16 August 2013].
- ★ Sivanandam, S. N., Sumathi, S. & Deepa, S. N. (2010) Introduction to Fuzzy Logic using Matlab, Springer.
- ★ James, J.B. (2002) An Introduction to Fuzzy Logic and Fuzzy Sets, CRC Press.

## **BITI 3133 Neural Network**

### **Learning Outcomes:**

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

1. Describe various techniques in neural network.
2. Apply suitable neural networks techniques to solve neural network problems.
3. Develop computer programs based on fundamental method of neural network for problem solving.

### **Synopsis:**

This course will discuss soft computing techniques, which is neural network. The fundamental theories of neural network is introduced, which includes biological and statistical foundations of neural networks. Radial Basis, Hebbian and competitive learning also will be introduced. Additionally, types of learning, information theories and their applications in neural networks will be discussed.

### **References:**

- ★ Alessandro, V. E. P., Paolo, M., Rivero, P. & Antonio, J. (2016) Artificial Neural Networks and Machine Learning, Springer.
- ★ Kumar, S. (2013) Neural Networks: A Classroom Approach, Mc Graw Hill.
- ★ Hagan, T. M., Howard, B. D., Mark, H. B. & Orlando, D. (2014) Neural Network Design, Martin Hagan.
- ★ Haikin, S. (2013) Neural Networks and Learning Machines, Pearson Education, Inc.
- ★ Jeff, H. (2015) Artificial Intelligence for Humans: Deep Learning and Neural Networks, Heaton Research Inc.

## **BITI 3143 Evolutionary Computing**

### **Learning Outcomes:**

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

1. Demonstrate the understanding of the fundamental concept of evolutionary computing.
2. Identify different approaches in evolutionary computing.
3. Use the evolutionary computing techniques in problem solving.

### **Synopsis:**

This course introduces evolutionary computing in problem-solving. Evolutionary computing uses algorithms which are inspired by mechanisms of biological evolution. These search-algorithms apply the concepts of genetic recombination, mutation, and natural selection in producing the potential solutions. A number of evolutionary computing techniques will be taught, and this course puts greater emphasis on Genetic Algorithms. Other techniques such as Memetic Algorithm and constraints handling will also be covered in this course.

### **References:**

- ★ Eiben, A. E. & Smith, J. E. (2015) Introduction to Evolutionary Computing, Springer.
- ★ Jansen, T. (2013) Analyzing Evolutionary Algorithms: The Computer Science Perspective. Springer Science & Business Media.
- ★ De Jong, K. A. (2006) Evolutionary Computation: A Unified Approach, MIT Press.
- ★ Simon, D. (2013) Evolutionary Optimization Algorithms, Wiley.
- ★ Yu, X. & Gen, M. (2010) Introduction to Evolutionary Algorithms, Springer.

## **BITI 3413 Natural Language Processing**

### **Learning Outcomes:**

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

1. Differentiate various concept of natural language processing.
2. Organise solution steps in solving natural language processing problem.
3. Build a small natural language processing system.

### **Synopsis:**

This course deals with the application of computational models to text or speech data. This course provides knowledge to students about natural language processing, NLP. Topics covered are morphology (word formation), NLP tasks including syntax analysis (sentence structure and parsing), semantic analysis (meaning), and discourse analysis (pronoun resolution) and NLP applications such as machine translation, information retrieval and extraction, question-answering systems, and dialog systems.

### **References:**

- ★ Jurafsky, D. & Martin, J. (2009) Speech and Language Processing: An Introduction to Natural Language Processing, Computational Linguistics and Speech, 2<sup>nd</sup> Ed., Prentice-Hall.
- ★ Bird, S., Klein, E. & Loper, E. (2009) Natural Language Processing with Python: Analyzing Text with the Natural Language Toolkit, O'Reilly.
- ★ Thanaki, J. (2017) Python Natural Language Processing, Packt Publishing.
- ★ Mathur, I., Joshi, N., Chopra, D., Perkins, J. & Hardeniya, N. (2016) Natural Language Processing: Python and NLTK, Packt Publishing.
- ★ Manning, C. D. & Schütze, H (1999). H. Foundations of Statistical Natural Language Processing. The MIT Press.

## **BITI 3523 Artificial Intelligence in Robotics and Automation**

### **Learning Outcomes:**

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

1. Analyse fundamental concepts related to robotics.
2. Organise solution steps in solving robotics using Artificial Intelligence, AI, concepts.
3. Construct robotics and automation programming for practical uses.

### **Synopsis:**

This course covers introduction of robotics, which includes principles behind the AI approach to robotics and to programme an artificially intelligent robot for applications involving sensing, navigation and uncertainty. The students also will be exposed to the principles of automation and mobile robotics programming as well as health and safety issues. Ethical aspects and the future of AI in robotics and automation are also covered.

### **References:**

- ★ Murphy, R. R. (2000) Introduction to AI Robotics, The MIT Press.
- ★ Thrun, S., Burgard, W. & Fox, D. (2005) Probabilistic Robotics, The MIT Press.
- ★ McComb, G. (2011) Robot Builder's Bonanza, McGraw-Hill.
- ★ Budiharto, W. & Nalwan, P. A. (2013) Membuat Sendiri Robot Humanoid, Synergy Media.
- ★ Budiharto, W. (2013), Membuat Sendiri Robot, Synergy Media.
- ★ Craig, J. J. (2018) Introduction to Robotics: Mechanics and Control, Pearson.
- ★ Gunkel, D. J. (2012) The Machine Question: Critical Perspectives on AI, Robots, and Ethics, The MIT Press.

## **BITI 3533 Artificial Intelligence Project Management**

### **Learning Outcomes:**

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

1. Relate activities and scopes that involved in managing Artificial Intelligence, AI, project.
2. Analyse project requirements and choose appropriate approaches in managing AI project.
3. Organise AI development project effectively.

### **Synopsis:**

This course provides students with fundamental discipline in managing AI project. The course exposes students to a variety of techniques to manage people, budget, schedule, risk and quality of AI project. The course also provides skills to the students on how to analyse potential problems in managing project that they would responsible for.

### **References:**

- ★ Hanley, J. (2015) Project Management: A Compact Guide to the Complex World of Project Management, CreateSpace Independent Publishing Platform.
- ★ Stark, E. (2014) Project Management For Beginners: Proven Project Management Methods to Complete Projects with Time And Money To Spare, CreateSpace Independent Publishing Platform.
- ★ Rausch, P., Sheta, A. F. & Ayesh, A. (2013) Business Intelligence and Performance Management: Theory, Systems and Industrial Applications, Springer.
- ★ Project Management Institute (2013) A Guide to the Project Management Body of Knowledge: PMBOK(R) Guide, 5<sup>th</sup> Ed., Project Management Institute.
- ★ Andler, N. (2012) Tools for Project Management, Workshops and Consulting: A Must-Have Compendium of Essential Tools and Techniques, John Wiley & Sons.

## **BITM 1123 Interactive Media Authoring**

### **Learning Outcomes:**

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

1. Explain theories and knowledge of various interactive media applications using the multimedia authoring tools based on industrial requirements.
2. Demonstrate a systematic approach in developing interactive application for different multimedia domains and users.
3. Build interactivity in multimedia application based on the current authoring tools used by the industry.

### **Synopsis:**

This course will introduce the various stages of interactive media project development from definition to the delivery of a multimedia product. The students will be introduced to instructional design followed by different stages in the product development including learning objects including prior analysis, the design, delivery considerations and evaluation. The lessons will also cover different models in instructional design, e-learning standards and concept of interactivity. Lab sessions will cover tools that assist the development on an interactive learning product including iBook Author and Adobe Flash/ Unity. A complete project and report has to be submitted at the end of the semester.

### **References:**

- ★ Shaarani, A. S., Kasmuri, E., Abd Manap, N. & Karjanto, J. (2014) Widgetry Basics for i-Book Module, Penerbit UTeM.
- ★ Bakar, N. & Shahbodin, F. (2012) Adobe Flash CS5 Professional Includes Exercise Files and Training Videos, Penerbit UTeM.

- ★ Azman, F. N. (2011) Interactive Media Authoring Lab Module, Penerbit UTeM.
- ★ Blaire & Preston (2009) Cartoon Animation (The Collector's Series), Walter Foster.
- ★ McKesson, N. & Witwe, A. (2012) Publishing with iBooks Author, O'Reilly Media, Inc.
- ★ Garofalo, M. (2012) The Unofficial GameSalad®Textbook, Photics.
- ★ Creighton, R. H. (2010) Unity 3D Game Development by Example, Beginner's Guide, Packt Publishing.
- ★ Creighton, R. H. (2013) Unity 4. X Game Development by Example, Packt Publishing.

## **BITM 2113 Web Application Development**

### **Learning Outcomes:**

- By the end of the course, students should be able to:
1. Discuss the concept and the principle of Internet and WWW based on the latest technologies.
  2. Use the important components in web applications which are client site technology, server site technology, database server and web server.
  3. Demonstrate the appropriate use of important components in developing web applications.

### **Synopsis:**

The purpose of this course is to provide students with a comprehensive understanding of the tools and problem-solving techniques related to building effective World Wide Web sites. It emphasizes 4 components in developing web applications which are: client site technologies: HTML, XHTML, HTML5, CSS, JavaScript, jQuery; server site technologies: PHP; database server: MySQL; and web servers: Apache. This course also brings together all of the elements of web site design, graphics, animation, data storage in the construction of fully functional commercial web site applications.

### **References:**

- ★ Sebesta, R. W. (2014) Programming The World Wide Web, 8<sup>th</sup> Ed., Pearson.
- ★ Porter Scobey, P. & Lingras, P. (2018) Web Programming and Internet Technologies: An E-Commerce Approach, 2<sup>nd</sup> Ed., John & Bartlett Learning.
- ★ Nixon, R. (2014) Learning PHP, MySQL & JavaScript: With jQuery, CSS & HTML5 (Learning Php, Mysql, Javascript, Css & Html5), 4<sup>th</sup> Ed., O'Reilly.
- ★ Robbins, J. N. (2018) Learning Web Design: A Beginner's Guide to HTML, CSS, JavaScript, and Web Graphics, 5<sup>th</sup> Ed., O'Reilly.
- ★ Menhennett, A. (2014) A Guide to HTML5 and CSS3, available at: <https://html5hive.org/free-ebook-a-guide-to-html5-and-css3> [Accessed on 1 September 2017].

## **BITM 2123 Digital Audio and Video Technology**

### **Learning Outcomes:**

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

1. Apply the knowledge and principles of digital audio and video.
2. Manipulate various sources such as audio, images, videos, text, etc, as required components for audio and video production
3. Demonstrate audio and video production pipeline by adapting industry standard practices in a conducive production environment.

### **Synopsis:**

This course will give details and valuable insight of the wonderful world of digital audio and video. Students will be introduced to topics on audio production, recording techniques, video production tools, video hardware, shooting procedure, special effects, MIDI sequencing, and audio/video production concepts. Besides, various tools for editing, practical as well as composing digital audio and video will be taught during the course.

### **References:**

- ★ Zakaria, M. H. & Abdullah, M. H. L. (in press) Digital Audio and Video Technology: Classroom in a book, Penerbit UTeM.
- ★ Rabiger, M., (2016) Directing: Film techniques and aesthetics, 2<sup>nd</sup> Ed., Focal Press.
- ★ Watkinson, J., (2013) Introduction to Digital Audio, 2n<sup>nd</sup> Ed., Taylor & Francis.
- ★ Mitra, A. (2010) Digital Video: Moving Images and Computers, Facts on File Publishing.
- ★ Adobe Creative Team (2010) Adobe Premiere Pro CS5 Classroom in a Book, Adobe Press.
- ★ Austerberry, D. (2013) The Technology of Video and Audio Streaming, 2<sup>nd</sup> Ed., Focal Press.

## **BITM 2213 Computer Animation**

### **Learning Outcomes:**

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

1. Explain the concepts, techniques and basic 3D animation production process and principles of animation.
2. Construct 3D animation by combining the modeling, texturing, rigging and animating technique.
3. Respond to the theory and applied skill in 3D animation and cinematography of short animated movie to be applied on movie, educational software and mobile app.

### **Synopsis:**

This course will introduce the student to the technology and concepts of 2D and 3D computer animation. Emphasis will be placed on developing a working knowledge on the underlying process of 2D and 3D animation. Topics will cover overview of animation production, principles of 2D and 3D animation, modeling concepts and techniques, rendering concepts and techniques, camera, lighting, shading and surface, animation concepts and techniques, retouching and compositing, and output of the animation production. Student will also be exposed to the introduction of character animation the basic techniques in modeling a character. The output should meet the technical in nature as well as its artistic merit. While this may be different than either the typical art or computer science course, it closely resembles the workings of major movie studios where various projects have to meet specific technical details (in order to fit in the production pipeline and schedule) as well as achieving the artistic goals. The format of the subject is one-hour lecture followed by four hours lab.

Practical exercises will be given on each lab

session and to be submitted at the end of the lesson. Student will have to plan their time to achieve the goals given. Individual and group assignment will be given to develop the creative thinking skill among the students. Students will also work in groups to complete a project in order to foster ideas sharing and teamwork among themselves. At the end of the course, students will have to present their project in class and defend their ideas professionally. Evaluation will be given on soft skill development as well as practical work.

### **References:**

- ★ Derakhshani, D. (2015) Autodesk 3ds Max 2016 Essentials, Sybex.
- ★ Beane, A. (2012) 3D Animation Essentials, Sybex .
- ★ O'Hailey, T. (2013) Rig it Right! Maya Animation Rigging Concepts (Computers and People), Focal Press
- ★ Birn, J. (2013) Digital Lighting and Rendering, 3<sup>rd</sup> Ed., New Riders.
- ★ Blazer, L. (2015) Animated Storytelling: Simple Steps for Creating Animation and Motion Graphics, Pearson Education.

## **BITM 3113 Interactive Media Project Management**

### **Learning Outcomes:**

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

1. Determine appropriate techniques to scope, manage and evaluate multimedia project activities.
2. Follow problem solving strategies in integration of scopes, time, cost, resources and quality of a multimedia project.
3. Demonstrate team skills, professional practices in managing a group project.

### **Synopsis:**

This course emphasizes on theory, application and practice in managing a multimedia and information technology based projects. Students will gain knowledge and acquire skills in managing interactive media projects such as planning, costing and preparing documentations. Through group activities and case studies, students will practice key competencies that project manager must develop in managing media and multimedia team comprises artists, programmers and analysts. At the end of the course, students must also be able to apply interactive media project management process and use the appropriate tools such as multimedia network analysis and Gantt chart in managing project activities. Students will be introduced to software tools to support project management and they will be encouraged to actively participate and share their ideas through group discussions and presentations.

### **References:**

- ★ Frick, T. (2008) Managing Interactive Media Projects, Thomson Delmar Learning.
- ★ Marchewka, J. T. (2013) Information Technology Project Management, 4<sup>th</sup> Ed.,

Wiley.

- ★ Schwalbe, K. (2004) Information Technology Project Management, 3<sup>rd</sup> Ed., Thomson Course Technology.
- ★ Vaughan, T. (2011) Multimedia: Making It Work, 8<sup>th</sup> Ed., Mc Graw Hill.
- ★ Englad, E. & Finney, A. (2007) Managing Interactive Media: Project Management for Web and Digital Media, 4<sup>th</sup> Ed., Addison Wesley.

## **BITM 3133 Computer Games Development**

### **Learning Outcomes:**

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

1. Explain the principles, basic interface design and the technologies behind the rules to develop a game.
2. Demonstrate how the functions of a computer games can be used to create experience including rule design, game mechanic, game balancing and social game integration into game experience.
3. Display problem solving skills in planning and developing a computer game project.

### **Synopsis:**

This course is conducted to give an exposure to students with regards to core concepts of computer games design and games technology. The topics which the students will learn include the game concepts, character development, creating the user experience, game balancing as well as the game genre such as action games, adventure games, puzzle games and construction management games. Lab sessions will introduce students to the fundamental of design and constructing of a particular game. Students will also be assessed through practical sessions which involve individual and group tasks in order to produce a creative and quality games output. At the end of the semester, each individual and group will be required to present their projects.

### **References:**

- ★ Adams, E. (2013) Fundamentals of Game Design, 3<sup>rd</sup> Ed., New Riders.
- ★ Rodgers, S. (2014) Level Up!: The Guide to Great Video Game Design, Wiley.
- ★ Floyd, A.T. (2017) Game Development From Good to Great, Independently Published.
- ★ Tristem, B. & Geig, M. (2015) Unity Game Development in 24 Hours: Sams Teach Yourself, 2<sup>nd</sup> Ed., Pearson Education.
- ★ Felicia, P. (2015) Unity 5 from Zero to Proficiency (Beginner): A Step-by-step Guide to Coding Your First Game with Unity, Vol. 2, Patrick Felicia Publishing.

## **BITM 3213 Interactive Computer Graphics**

### **Learning Outcomes:**

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

1. Discuss the knowledge and concept of computer graphic application into 2D and 3D objects and image development.
2. Solve a computer graphic problem with a selected technique and method using OpenGL graphic application.
3. Follow a suitable technique from relevant information to solve a computer graphic application.

### **Synopsis:**

This course is to expose the students to the basic concept and digital graphic technology. This includes understanding and designing aspects by using a computer graphics application. The students will be exposed to the skill of using a computer graphics application such as OpenGL. It also emphasizes on the latest graphics design context which will focus on the 'graphic thinking' and 'creative design process'.

### **References:**

- ★ Angel, E. & Shreiner, D. (2012) Interactive Computer Graphics: A Top-down Approach With Shader-based OpenGL, 6<sup>th</sup> Ed., Pearson.
- ★ Wright Jr., R. S., et al. (2010) OpenGL Superbible, 5<sup>th</sup> Ed., Addison Wesley.
- ★ Angel, E. (2009) Interactive Computer Graphics: A Top Down Approach Using OpenGL, 5<sup>th</sup> Ed., Addison Wesley.
- ★ Hill, F. S. (2007) Computer Graphics Using OpenGL, 3<sup>rd</sup> Ed., Prentice Hall.
- ★ Hearn, D. & Baker, M. P. (2004) Computer Graphics with OpenGL, 3<sup>rd</sup> Ed., Prentice Hall.

- ★ Woo, M., et al. (1999) OpenGL Programming Guide, 3<sup>rd</sup> Ed., Addison-Wesley.
- ★ Watt, A. (2000) 3D Computer Graphics, 3<sup>rd</sup> Ed., Addison-Wesley.
- ★ Kilgard, M. J. (1996) The OpenGL Utility Toolkit (GLUT): Programming Interface, Silicon Graphics, Inc.
- ★ [www.opengl.com](http://www.opengl.com)

## BITM 3223 Virtual Reality Technology

### **Learning Outcomes:**

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

1. Define how virtual environment works.
2. Demonstrate and reproduce the techniques in computer graphics that is related to virtual reality aspect.
3. Build virtual reality application that is conforms with current standards and latest technology.

### **Synopsis:**

This course will introduce students to the technology and techniques used in Virtual Reality, VR, (also known as virtual environments). Students will gain knowledge about the history of VR, latest innovations in this field, understand the important research issues and methodologies for VR, and have the opportunity to gain practical experience with the hardware and software used to create VR applications.

### **References:**

- ★ Burdea, G. C. & Philippe, C. (2003) Virtual Reality Technology, 2<sup>nd</sup> Ed., Wiley-interscience.
- ★ Ames, A. L., Nadeau, D. R. & Moreland, J. L. (1997) The VRML 2.0 Sourcebook, John Wiley & Sons, Inc.
- ★ Parisi, T. (2015) Learning Virtual Reality, O'Reilly.
- ★ Mullen, T. (2011) Prototyping Augmented Reality, John Wiley & Sons.
- ★ Parisi, T. (2012) WebGL: Up and Running, O'Reilly.

## **BITP 2113 Algorithm Analysis**

### **Learning Outcomes:**

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

1. Apply the life cycle of algorithms.
2. Analyse factors influencing the quality of algorithms.
3. Optimize source codes and SQL statements.

### **Synopsis:**

This course will enable students to write source codes and SQL statements taking into consideration the efficiency of algorithms. Topics include introduction to algorithm analysis, code optimisation, algorithm design techniques, SQL and code tuning techniques.

### **References:**

- ★ Levitin, A. (2019) Introduction to the Design and Analysis of Algorithms, 3<sup>rd</sup> Ed., Pearson Education Limited.
- ★ Cormen, T.H., Lieserson, C.E., Rivest, R.L. & Stein, C. (2010) Introduction to Algorithms, 3<sup>rd</sup> Ed., MIT Press.
- ★ Heineman, G.T., Police, G. & Selkow, S. (2016) Algorithms in a Nutshell, O'Reilly Media.
- ★ Sedgewick, R. & Flajolet, P. (2014) Algorithms, 4<sup>th</sup> Ed., Pearson Education.
- ★ Kleinberg, J. & Tardos, E. (2014) Algorithm Design, Pearson Education.

## **BITP 2223 Software Requirement and Design**

### **Learning Outcomes:**

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

1. Analyse software requirements and design the software based on object oriented approach using UML.
2. Model software requirements analysis and software design based on object oriented approach.
3. Produce formal software specification document and software design document.

### **Synopsis:**

This course introduces the students to the object oriented approach using UML to apply Object Oriented Analysis and Design (OOAD) towards developing software project. The course covers UML modeling to capture requirements in use cases, perform analysis modeling to produce interaction diagrams; static and dynamic, and identifies design elements in classes. The students will be taught to know sources of requirement, major activities in requirement analysis, knowing tools in requirements management and identify classes via use case analysis, defining relationships and outlining attributes and methods. In design phase, the students will be exposed to designing software architecture, high level and detail design which will be realized through refined class diagram, component diagram and deployment diagram.

### **References:**

- ★ Phillip, A.L. (2017) Requirements Engineering for Software and Systems (Applied Software Engineering Series), 3<sup>rd</sup> Ed., Auerbach Publications.

- ★ Kendall, K.E. & Kendall, J.E. (2019) Systems Analysis and Design, 10<sup>th</sup> Ed., Pearson.
- ★ Sommerville, I. (2015) Software Engineering, 10<sup>th</sup> Ed., Pearson.
- ★ Horstman, C. (2012) Object Oriented Design and Patterns, John Wiley and Sons.
- ★ Arlow, J. & Neustadt, I. (2012) UML 2 and the Unified Process: Practical Object-Oriented Analysis and Design, 2<sup>nd</sup> Ed., Addison-Wesley Professional.

## BITP 2303 Database Programming

### Learning Outcomes:

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

1. Describe features, syntax, purpose and benefits of SQL and PL/SQL to developer and database administrator.
2. Construct and apply procedures, functions, and packages in suitable applications.
3. Construct and apply database triggers in suitable applications.

### Synopsis:

This course contents are based on the syllabus of two modules in Oracle certification (Oracle Certified Associate). The first part of the lesson introduces the concepts of relational database and SQL syntax. This includes topics related to Oracle database architecture, its ability, constraints in data integrity, and other database objects such as views, index, sequence and synonyms. The second part of the lesson explains the objectives, functions and benefits of PL/SQL in developing database applications. This includes the development, implementation and maintenance of procedures, functions, packages and database triggers. The lesson also explains the use of stored procedures and triggers in retrieving data and executing complex business rules to enhance data integrity. Students will be introduced to Oracle packages, subprograms and PL/SQL triggers.

### References:

- ★ Pataballa, N. & Nathan, P. (2001) Introduction to Oracle9i: SQL, Vol. 1 & Vol. 2, Oracle University.
- ★ Pataballa, N. & Nathan, P. (2001) Oracle9i: Program with PL/SQL, Vol. 1 & Vol. 2, Oracle University.
- ★ Urman, S., Hardman, R. & McLaughlin, M. (2004) Oracle Database 10g PL/SQL programming.
- ★ Feuerstein, S. & Pribyll, B. (2014) Oracle PL/SQL Programming, 6<sup>th</sup> Ed., O'Reilly Media Inc.
- ★ McDonald, C., et al. (2004) Mastering Oracle PL/SQL: Practical Solutions, Apress.

## **BITP 2313 Database Design**

### **Learning Outcomes:**

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

1. Explain the database design process and its' importance in database system development life cycle.
2. Construct data model using relational and non-relational data modeling techniques.
3. Explain database design issues in specialised applications such as DSS and E-Commerce.

### **Synopsis:**

This course emphasizes the importance of database design and presents the fundamental principles of relational and non-relational data models which include object-oriented and object-relational data model together with the enhanced features of an entity-relationship diagram. A practical database design methodology is used to demonstrate the design process which involves not only constructing the data model but also checking and validating the accuracy of the model in line with the user transaction requirements. Design issues related to distributed databases such as data fragmentation, allocation, transparency and replication are also discussed. The course also discusses database design issues in specialised database applications such as data warehousing, data mining, online analytical processing, decision support system and electronic commerce.

### **References:**

- ★ Connolly, T. & Begg, C. (2015) Database Systems: A practical approach to design, implementation, and management, 6<sup>th</sup> Ed., Pearson Education.
- ★ Coronel, C., Morris, S. & Rob, P. (2016) Database Principles Fundamentals of Design,

Implementation, and Management, 12<sup>th</sup> Ed., Course Technology.

- ★ Hoffer, J.A., Ramesh, V. & Topi, U.H. (2015) Modern Database Management, 12<sup>th</sup> Ed., Pearson Education.
- ★ Elmasri, R. & Navathe, S.B. (2015) Fundamentals of Database Systems, 7<sup>th</sup> Ed., Addison-Wesley.
- ★ Starks, J. L., Pratt, P.J. & Last, M. Z. (2018) Concepts of Database Management, 9<sup>th</sup> Ed., Cengage Learning.

## **BITP 2323 Database Administration**

### **Learning Outcomes:**

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

1. Explain the concepts of database administration.
2. Apply functions of database administration.
3. Analyse database performance.

### **Synopsis:**

This course students will take up the roles, issues and responsibilities as database administrator. They will also identify the functions of the DBMS such as storage, access and data updates, database objects, data integrity, physical database design, user management and database performance.

### **References:**

- ★ Matishak, D. & Fuller, M. (2010) Oracle Database 11G: Administration Workshop I (Volume I & II), Ed. 2.0, Jobi Varghese and Veena Narasimhan (Oracle Corporation).
- ★ Rich, B. (2012) Oracle Database 2 Day DBA 11g Release 2 (11.2), (Oracle Corporation).
- ★ Oracle Corporation (2014) Oracle® Database Express Ed., Getting Started Guide & Installation guide 11g Release 2 (11.2).
- ★ Mullins, C. (2012) Database Administration: The Complete Guide to Practices and Procedures, 2<sup>nd</sup> Ed., Addison-Wesley.
- ★ Peasland, B. (2019) Oracle DBA Mentor: Succeeding as an Oracle Database Administrator, 1<sup>st</sup> Ed., Apress.

## **BITP 3123 Distributed Application Development**

### **Learning Outcomes:**

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

1. Apply the concept of distributed computing.
2. Conform to the architecture of distributed application development.
3. Develop an application for distributed environment.

### **Synopsis:**

This course exposes the students to the development of distributed programming applications which are used in the industry for network-based applications. Students are to be exposed to the introduction of distributed computing, multi-threading programming, client server application using socket programming, distributed object using RMI, web services and cloud computing.

### **References:**

- ★ Anthony, R.J. (2016) Systems Programming Designing and Developing Distributed Systems, Elsevier.
- ★ González, J.F. (2017) Mastering Concurrency Programming with Java 9, 2<sup>nd</sup> Ed., Packt Publishing.
- ★ Rubinger, A. & Burke, B. (2010) Enterprise JavaBeans 3.1, 6<sup>th</sup> Ed., O'Reilly Media.

## **BITP 3223 Software Project Management**

### **Learning Outcomes:**

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

1. Explain activities and scopes to manage software development project.
2. Manage software project start-up, monitoring, controlling and closing.
3. Writes formal software development plan document.

### **Synopsis:**

This course provides students with fundamental discipline in managing software development project. The course exposes students to a variety of techniques to prepare and manage people, budget, schedule, risks and quality of software project. The course also provides skills to the students how to use software tools in constructing software project plan such as Microsoft Project, MS Excel spreadsheets and MS Words.

### **References:**

- ★ Hughes, B. & Cotterell, M. (2017) Software Project Management, McGraw-Hill.
- ★ Abd Ghani, M.K. (2016) Software Project Management: A guide to manage small software project development, Penerbit UTeM.
- ★ Henry, J. (2004) Software Project Management: A real-world guide to success, Pearson.
- ★ Gray, C.F. & Larson, E.W. (2006) Project Management, Mc Graw-Hill.

## **BITP 3353 Multimedia Database**

### **Learning Outcomes:**

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

1. Explain the fundamental concept of multimedia database and its requirements.
2. Demonstrate understanding in dealing with various multimedia data types.
3. Apply the multimedia database design concept in storing and retrieving multimedia data.

### **Synopsis:**

Multimedia Database Management System, MMDBMSs, is a Database Management System, DBMS, that supports both traditional and multimedia data types, and is capable of handling large collections of multimedia entities. This course revolves around fundamental components that need to be integrated into conventional DBMSs to make them practical for developing multimedia database applications. The most important is to overview various feature and approaches for handling large collections of multimedia entities by existing relational and object-relational DBMSs. Then, developing a set of features and functions that a MMDBMSs should provide to effectively and efficiently support various multimedia data types, such as text document, images, audio and video.

### **References:**

- ★ Dunckley, L. (2003) Multimedia Databases: An Object-Relational Approach, Pearson.
- ★ Kratochvil, M. (2013) Managing Multimedia and Unstructured Data in the Oracle Database, PACKT Publishing.
- ★ Candan, K. S. & Sapino, M. L. (2010) Data Management for Multimedia Retrieval, Cambridge University Press.
- ★ Lu, G. (1999) Multimedia Database Management Systems.
- ★ Subrahmanian, V. S. (1998) Principles of Multimedia Database systems, Morgan Kaufmann.

## **BITP 3363 Data Warehousing and Business Intelligence**

### **Learning Outcomes:**

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

1. Explain the concepts, components and purpose of data warehousing and data mining.
2. Design data warehouses based on the data warehousing model and lifecycle.
3. Apply the techniques and tools related to business intelligence.

### **Synopsis:**

This course focuses on data warehousing fundamentals which includes the importance of data warehousing, multi-dimensional data analysis and factors involved in the analysis, planning, design, loading, maintenance and exploitation of successful data warehouse. It will also cover the tools and techniques supporting business intelligence such as decision making system, query and reporting, online analytical processing, statistical analysis, forecasting and data mining.

### **References:**

- ★ Ciampa, B. (2014) The Data Warehouse Workshop: Providing Practical Experience to the Aspiring ETL Developer, Createspace Independent.
- ★ Vaisman, A. & Zimányi, E. (2014) Data Warehouse Systems: Design and Implementation (Data-Centric Systems and Applications), Springer.
- ★ Kimball, R. & Ross, M. (2013) The Data Warehouse Toolkit: The Definitive Guide to Dimensional Modeling, 3<sup>rd</sup> Ed., John Wiley & Sons.
- ★ Sherman, R. (2014) Business Intelligence Guidebook: From Data Integration to Analytics, Morgan Kaufmann.
- ★ Harda, R., Delen, D. & Turban, E. (2018) Business Intelligence, Analytics and Data Science: A Managerial Perspective, 4<sup>th</sup> Ed., Pearson.

## **BITP 3423 Special Topic in Software Engineering**

### **Learning Outcomes:**

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

1. Describe the importance of IT Architecture and its elements.
2. Explain the IT Architecture and how it can be transformed into value centric initiative.
3. Demonstrate the ability of developing an IT Architecture initiative by using Business Model Canvas.

### **Synopsis:**

This course provides the students with the foundation in rationalizing the critical skill sets of the core architectural principles and alignment to the IT Architecture Body of Knowledge. Ultimately, the focus of IT Architecture for Special Topic in Software Engineering this semester underlies the need for a holistic IT Architecture approach, skills requirements and strategically equips individual roles in the enterprise to realize the business values of a sound technology adoption.

### **References:**

- ★ Lankhorst, M. (2017) Enterprise Architecture at Work: Modelling, Communication and Analysis, Springer.
- ★ Hausman, K.K. & Cook, S.L. (2010) IT Architecture for Dummies, Wiley Publishing.
- ★ Tinsley, T. (2009) Enterprise Architects: Masters of the Unseen City, BookSurge Publishing.
- ★ Perks, C. & Beveridge, T. (2011) Guide to Enterprise IT Architecture, Springer.
- ★ Brooks, F.D. (2001) The Mythical Man-Month: Essays on Software Engineering, U.S: Pearson.

## **BITP 3453 Mobile Application Development**

### **Learning Outcomes:**

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

1. Understand the concept of mobile application development.
2. Differentiate the architecture of hybrid versus native development.
3. Develop a mobile application for a specific platform/operating system.

### **Synopsis:**

This course exposes the students to the development of mobile application development focusing on Android. Students are to be exposed to the introduction of native and hybrid application development as well as multi-threading programming and client server interaction via web services.

### **References:**

- ★ Horton, B. (2019) Android Programming with Kotlin for Beginners: Build Android apps starting from zero programming experience with the new Kotlin programming language, Packt Publishing.
- ★ Griffiths, D. & Griffiths, D. (2019) Head First Kotlin: A Brain-Friendly Guide, O'Reilly Media.
- ★ Phillips, B., Stewart, C. & Marsicano, K. (2018) Android Programming, 4<sup>th</sup> Ed., Big Nerd Ranch Guides.
- ★ Wickham, M. (2018) Practical Android, 1<sup>st</sup> Ed., Apress.
- ★ Smyth, N. (2018) Android Studio 3.0 Development Essentials - Android 8 Edition, 1<sup>st</sup> Ed., CreateSpace Independent Publishing Platform.
- ★ Buckett, C. (2012) Dart in Action, 1<sup>st</sup> Ed., Manning Publications.
- ★ Payne, R. (2019) Beginning App Development with Flutter, 1<sup>st</sup> Ed., Apress.

## **BITP 3483 Geographic Information System**

### **Learning Outcomes:**

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

1. Apply the concepts, issues, techniques and various Geographic Information System (GIS) applications.
2. Solve information system problems based on the GIS language technique.
3. Evaluate the issues in GIS management based on the information from various resources.

### **Synopsis:**

This course will introduce students to GIS. GIS is a computer based data processing tool that is used to manage, analyse and visualise spatial data. It can be considered as advanced database. Students will explore some of the GIS applications in the area of electronic government, resources management, disaster management, businesses, banking and insurance industries. Students must be familiar with traditional methods of identifying and describing locations using paper maps. The students will begin by examining the geographic basics of mapping and examine the processes in which spatial data can be recorded, captured, stored, processed using computers. Next, the students will introduce the methods used in spatial analysis.

### **References:**

- ★ Gina Clemmer, G. (2018) The GIS 20: Essential Skills, 3<sup>rd</sup> Ed., Esri Press.
- ★ De By, R.A. et al. (2000) Principles of Geographic Information Systems, ITC Educational Text Book Series.
- ★ Chang, K. (2016) Introduction to Geographic Information Systems, 8<sup>th</sup> Ed., McGraw-Hill

- ★ Bolstad P., (2016) GIS Fundamentals: A First Text on Geographic Information Systems, 5<sup>th</sup> Ed.
- ★ Law, M. & Collins, A. (2016) Getting to know ArcGIS Pro, 1<sup>st</sup> Ed., Esri Press.
- ★ Gorr, W.L., & Kurland, K.S. (2017) GIS Tutorial 1 for ArcGIS Pro, a platform book, Esri Press.
- ★ Brewer, C.A. (2016) Designing Better Maps: A guide for GIS users, 2<sup>nd</sup> Ed., Esri Press.

## BITS 2313 Local Area Network

### Learning Outcomes:

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

1. Identify the suitable hardware and software for Local Area Networks, LAN, communication .
2. Evaluate the fundamental principles that influence the selection of LAN hardware, LAN topology and LAN protocols.
3. Demonstrate the setup of LAN and the alternative that exist in the selection of hardware and transmission facilities when design and implementing LANs.

### Synopsis:

This course is an introduction to the current methods and practices in the use of LANs. The emphasis will be placed on LAN hardware and software, installation management and connection to other networks. Topics covered include network architecture, network communication protocols, end-to-end protocol stacks, network components, network management and the Open Systems Interconnection reference model.

### References:

- ★ Kurose, J. & Ross, K. (2016) Computer Networking: A Top-Down Approach, 7<sup>th</sup> Ed., Pearson.
- ★ Comer, D. E. (2014) Computer Networks and Internets, 6<sup>rmth</sup> Ed., Pearson.
- ★ Lammle, T. (2016) CCNA Routing and Switching Complete Study Guide: Exam 100-105, Exam 200-105, Exam 200-125, Sybex.
- ★ McQuerry, S., Jansen, D., Hucaby, D. (2009) Cisco LAN Switching Configuration Handbook, 2<sup>nd</sup> Ed., CISCO Press.
- ★ Lewis, W. (2012) LAN Switching and Wireless, CCNA Exploration Companion Guide (Cisco

- Networking Academy Program), CISCO Press.
- ★ Mansfield Jr., K. C., & Antonakos, J. L. (2009) Computer Networking for LANs to WANs: Hardware, Software and Security (Networking (Course Technology)), 1<sup>st</sup> Ed., Delmar Cengage Learning.
  - ★ Kurose, J. F. & Ross, K. W. (2008) Computer Networking, 4<sup>th</sup> Ed., Pearson Addison Wesley.
  - ★ Forouzan, B. A. (2006) Data Communications and Networking, 4<sup>th</sup> Ed., McGraw-Hill Forouzan Networking Series(2006).

## BITS 2323 Wide Area Network

### Learning Outcomes:

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

1. Explain about the Wide Area Network, WAN, concept and technology.
2. Identify the suitable method in selecting server WAN devices and an appropriate network technology.
3. Demonstrate the integration of different network topology, security, reliability and management capabilities.
4. Construct the network architecture design using structure design approach to solve WAN problem.

### Synopsis:

This course introduces the concepts, practices, and technologies used in the design and implementation of WAN. Topics will include; overview of network fundamentals, considerations for Local Area Network, LAN, and WAN implementations, network security requirement, and trends in the carrier network services. Students will also be able to understand, explain and apply the fundamentals of WAN technology concepts and skills in network applications, troubleshooting, and preparing for CCNA examinations.

### References:

- ★ Graziani, R. & Vachon, B. (2014) Accessing The WAN, Companion Guide, 1<sup>st</sup> Ed., CISCO Press.
- ★ Regan, P. (2004) Wide Area Network, Pearson Prentice Hall.
- ★ Cisco Networking Academy (2014) Routing and Switching Essentials Companion Guide, 1<sup>st</sup> Ed., Cisco Press.
- ★ Cisco Networking Academy (2017) Connecting Networks v6 Companion Guide, CISCO Press.
- ★ Comer, D. E. (2004) Computer Networks and Internets with Internet Applications, 4<sup>th</sup> Ed.
- ★ Cisco Networking Academy (2013) Connecting Networks Lab Manual (Lab Guide), 1<sup>st</sup> Ed., CISCO Press.
- ★ Johnson, A. (2014) Scaling Networks Companion Guide, 1<sup>st</sup> Ed., Cisco Press.

## **BITS 2333 Network Analysis and Design**

### **Learning Outcomes:**

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

1. Manipulate the understanding of issues related to current computer network design, processes, tools and techniques.
2. Analyse the methodology for effective computer networking design.
3. Demonstrate the analysis and design of specific projects related to an organisation proposed by students.

### **Synopsis:**

This course covers a systems approach to network design, the concept, guidelines and practice for requirement analysis and flow analysis. The technology choices, interconnection mechanism, network management and security will be covered in logical design. Some issue on network design will be included in physical design, addressing and routing. Software for network analysis and design, namely the Microsoft Visio will be introduced and used to help in understanding and applying the network analysis and design knowledge areas and processes.

### **References:**

- ★ Helmers, S. A. (2013) Microsoft Visio 2013 Step by Step, O'Reilly Media.
- ★ Oppenheimer, P. (2011) Top Down Network Design, 3<sup>rd</sup> Ed., Cisco Press.
- ★ Peterson, L. L. & Davie, B. S. (2011) Computer Networks: A Systems Approach, 5<sup>th</sup> Ed., Morgan Kaufman.
- ★ Kaufmann, M. & Mc Cabe, J. (2007) Network Analysis, Architecture, and Design, Morgan Kaufman.
- ★ Yusof, R. (2007) Network Analysis and Design, UTeM.
- ★ McCabe, J. D. (1998) Practical Computer Network Analysis and Design, Morgan Kaufmann.

## **BITS 2343 Computer Network**

### **Learning Outcomes:**

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

1. Determine the basic concepts, elements and uses of Local Area Network, LAN, and Wide Area Network, WAN.
2. Demonstrate the ability to install, configure and operate networking hardware and software such as router, switch and wireshark.
3. Justify the alternatives that exist in the selection of hardware, software and transmission facilities from different resources when designing and implementing network in a project.

### **Synopsis:**

This course is an introduction to the current methods and practices in the use of Local and Wide Area Networks. The emphasis will be placed on LAN hardware and software, installation management and connection to other networks. Topics covered include network architecture, network communication protocols, end-to-end protocol stacks, network components, network management and the Open Systems Interconnection (OSI) reference model. Furthermore, WAN technologies such as Ethernet, Token Ring, ATM and FDDI also will be covered.

### **References:**

- ★ Kurose, J. F. & Ross, K. W. (2017) Computer Networking: A Top-down Approach, Pearson Education.
- ★ Comer, D. E. (2016) Computer Networks and Internet, Pearson Higher Education.
- ★ Stallings, W. (2015) Foundations of Modern Networking: SDN, NFV, QoE, IoT, and Cloud, Addison-Wesley Professional.
- ★ Cisco Networking Academy (2017) Introduction to Networks v6 Companion Guide, Cisco Press.

## **BITS 2413 Network Security Infrastructure and Design**

### **Learning Outcomes:**

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

1. Select a suitable technology to secure the network infrastructure.
2. Build the network topology with or without the cyber security policy.
3. Develop skills and knowledge in various settings and platforms to ensure a highly secured network infrastructure.

### **Synopsis:**

This course is designed to provide fundamental knowledge in planning and designing a secure network infrastructure. Topics covered include how to analyse security policies, procedures and requirements as well as how to identify and design for potential security threats. Students will also be exposed to designing a network infrastructure security, authentication strategy for the organisation domain, access control strategy for network resources and public key infrastructure with certificate services. They will also be involved in designing security for internet information services, servers with specific roles, as well as designing an infrastructure for updating computers and secure network management infrastructure.

### **References:**

- ★ Woland, A., Santuka, V., Harris, M. & Sanbower, J. (2018) Integrated Security Technologies and Solutions, Volume I: Cisco Security Solutions for Advanced Threat Protection with Next Generation Firewall, Intrusion Prevention, AMP, and Content Security, Cisco Press.
- ★ Kizza, J. M. (2017) Guide to Computer Network Security, Springer International Publishing.

Publishing.

- ★ Sivarajan, S. (2015) Getting Started with Windows Server Security, Packt Publishing.
- ★ Santos, O. & Stuppi, J. (2015) CCNA Security 210-260 Official Cert Guide, Cisco Press.
- ★ Muniz, J., AlFardan, N. & McIntyre, G. (2015) Overview of Security Operations Center Technologies, Cisco Press.
- ★ Muniz, J. (2015) 5 Steps to Building and Operating an Effective Security Operations Center (SOC), Cisco Press.

## **BITS 2423 Physical Security and Electronic Surveillance**

### **Learning Outcomes:**

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

1. Demonstrate methods in physical security and electronic surveillance.
2. Analyse and explains steps in producing policies of physical security and electronic surveillance.
3. Organise by using appropriate equipments in designing physical security and electronic surveillance.

### **Synopsis:**

This course is designed to provide fundamental knowledge in physical security and electronic surveillance. It addresses the threats, vulnerabilities and countermeasures that can be utilised to physically protect an enterprise's resources and sensitive information. These resources include people, the facility in which they work and the data, equipment, support systems, media and supplies they utilise. Topics cover protection techniques for the entire facility, from the outside perimeter to the inside office space, including all of the information system resources. These focus on the methods of recognition, anticipation, selection and design of security technologies as well as examining the principles and applications of security systems.

### **References:**

- ★ Fennelly, L. J. (2017) Effective Physical Security, Todd Green.
- ★ Silverman, L. (2016) Physical Security and Wireless Access Control Systems, Taylor and Francis Publisher.
- ★ Baker, P. R. & Benny, D. J. (2013) The Complete Guide to Physical Security, CRC Press.
- ★ Carr, H. H., Snyder, C. A. & Bailey, B. N. (2009) The Management of Network Security: Technology, Design and Management Control, Prentice Hall.
- ★ Contos, B. T., Crowell, W. P., Derodeff, C., Dunkel, D. & Cole, E. (2007) Physical and Logical Security Convergence Powered by Enterprise Security Management, Syngress Publishing, Burlington.

## **BITS 2523 Cyber Law and Security Policy**

### **Learning Outcomes:**

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

1. Discuss the concept of cyber law, security policy, intellectual property and cybercrime issues in cyber world.
2. Report on the scope of protection covered by each type of cyber law.
3. Explain about security policies based on related acts and laws.

### **Synopsis:**

This course is designed to provide fundamental skills needed to understand cyber laws related to copyright, patents, digital rights, computer crimes, privacy issues, hacking and prosecution in Malaysia. This course will also covers the scope and enforcement bodies in Malaysia. Furthermore, students will be exposed to design and produce security policies accordance with legal laws.

### **References:**

- ★ Bellia, P., Berman, P., Frischmann, B. & Post, D. (2018) Cyberlaw: Problems of Policy and Jurisprudence in the Information Age (American Casebook Series), West Academic Publishing.
- ★ Craig, B. (2012) Cyberlaw: The Law of the Internet and Information Technology, 1<sup>st</sup> Ed., Prentice Hall.
- ★ Bishop, M. (2018) Computer Security: Art and Science, 2<sup>nd</sup> Ed., Addison Wesley.
- ★ Corn, G. & Gurule, J. (2015) National Security Law: Principles and Policy, Wolters Kluwer Law & Business.
- ★ Chawki, M., Darwish, A., Khan, M. A. & Tyagi, S. (2016) Cybercrime, Digital Forensics and Jurisdiction (Studies in Computational Intelligence), Springer.
- ★ Desmedt, Y. (2018) Secure Public Key Infrastructure: Standards, PGP and Beyond (Advances in Information Security), Springer.
- ★ Landoll, D. J. (2016) Information Security Policies, Procedures, and Standards: A Practitioner's Reference, Auerbach Publications.

## **BITS 3313 Network Administration and Management**

### **Learning Outcomes:**

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

1. Categorize the standards and protocols used for network administration and management.
2. Propose suitable technique of problem solving in network administration and management.
3. Manipulate the software tools for network administration and management.

### **Synopsis:**

This course covers the topics in network administration and management, duties as network administrators/managers, host management, infrastructure components, users management, simple network management protocol, management information base, remote monitoring, web-based management and network security management.

### **References:**

- ★ Subramanian, M. (2012) Network Management: Principles and Practices, 2<sup>nd</sup> Ed., Prentice Hall.
  - ★ Coleman, D. D. & Westcott, D. A. (2014) CWNA: Certified Wireless Network Administrator Official Study Guide: Exam CWNA-106, 4<sup>th</sup> Ed., Sybex.
  - ★ Coleman, D. D. & Westcott, D. A. (2018) CWNA: Certified Wireless Network Administrator Official Study Guide: Exam CWNA-106, 5<sup>th</sup> Ed., Sybex.
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- ★ Comer, D. E. (2007) Automated Network Management Systems, Addison-Wesley.
  - ★ Clemm, A. (2006) Network Management Fundamentals, Cisco Press.
  - ★ Claise, B. & Wolter, R. (2007) Network Management: Accounting and Performance Strategies, Cisco Press.
  - ★ Limoncelli, T. A., Hogan, C. J. & Chalup, S. R. (2007) The Practice of System and Network Administration, 2<sup>nd</sup> Ed., Pearson Education Inc.
  - ★ Farrel, A. (2008) Network Management Know It All, Morgan Kaufmann.
  - ★ Sander, C. & Smith, J. (2013) Applied Network Security Monitoring: Collection, Detection and Analysis, Syngress.

## **BITS 3323 Network Project Management**

### **Learning Outcomes:**

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

1. Manipulate the concept of network project management in term of processes, tools and techniques.
2. Demonstrate the understanding of all the project management body of knowledge, processes, tools and techniques.
3. Organise projects related to information technology and specifically related to computer network.

### **Synopsis:**

This course covers project management body of knowledge (project integration management, scope management, time management, cost management, quality management, and human management). It also covers the processes or steps in project management (project initiation, planning, executing, controlling and project closing or termination). Software for project management (Microsoft Project and Microsoft Excel) will be introduced and used to help in understanding and applying the project management knowledge areas and processes.

### **References:**

- ★ Schwalbe, K. (2013) Managing Information Technology Projects, 7<sup>th</sup> Ed., Course Technology, Cengage Learning.
- ★ Kerzner, H. (2009) Project Management: A Systems Approach to Planning, Scheduling and Controlling, 10<sup>th</sup> Ed., Wiley.
- ★ PMI (2008) A Guide to the Project Management Body of Knowledge (PMBOK® Guide), 4<sup>th</sup> Ed.
- ★ Comer, D. E. (2007) Automated Network Management System, Pearson International Edition.
- ★ Salam, S., Mohd Sanusi, N., Khalid, F., Yusof, R., Wan Mohd Ghazali, K. & Buyong, E. (2009) Project Management, Penerbit UTeM.

## **BITS 3333 Multimedia Networking**

### **Learning Outcomes:**

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

1. Identify the suitable technique to solve networking problems related to multimedia networks.
2. Compare various concepts of data representations, compression techniques, QoS mechanisms and applications in multimedia networking.
3. Manipulate the mechanisms that support the multimedia application in multimedia networking environment.

### **Synopsis:**

This course covers topics in basic and advanced network multimedia. Certain topics will be selected from multimedia information representation, compression, network high-speed such as frame relay and ATM network local high-speed computers. The emphasis will also be given to the transmission protocol (TCP/IP, RSVP, MPLS, RTP) and Quality of Service, QoS, in networks such as integrated services and differentiate services.

### **References:**

- ★ Hwang, J. (2009) Multimedia Networking: From Theory to Practice, Cambridge University Press.
- ★ Kurose, J. F. & Ross, K. W. (2012) Computer Networking: A Top-Down Approach, 6<sup>th</sup> Ed., Pearson Education.
- ★ Alvarez, S. (2012) QoS for IP/MPLS Networks, Cisco Press.
- ★ Stallings, W. (2002) High Speed Networks and Internets: Performance and Quality of Service, Prentice Hall.
- ★ Halsall, F. (2001) Multimedia Communication: Applications, Networks, Protocols and Standards, Pearson Education.

## **BITS 3353 Network Security Administration and Management**

### **Learning Outcomes:**

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

1. Analyse the principles, strategies and standard practices in network security administration and management.
2. Verify the system in operation is secured according to accepted industry practices and in compliance with any specific organisation policies and procedures.
3. Manipulate appropriate network tools for security monitoring, network administration and management in accordance to current scenario.

### **Synopsis:**

This course covers the topics in network security administration and management. The students will be equipped with the knowledge and practicality of a network security administrator / manager. Together with the tools used in lab sessions and the skills trained, the students will be educated and qualified enough to be network security practitioners.

### **References:**

- ★ Lucas, M. W. (2010) Network Flow Analysis, No Starch Press.
- ★ Singh, B. (2012) Network Security and Management, 3<sup>rd</sup> Ed., PHI Learning.
- ★ Nestler, V., Harrison, K., Hirsch, M. & Conklin, W. A. (2014) Principles of Computer Security: Lab Manual, 4<sup>th</sup> Ed., McGraw-Hill Education.
- ★ Ciampa, M. (2018) Security+: Guide to Network Security Fundamentals, 6<sup>th</sup> Ed., Course Technology.
- ★ Dulaney, E. & Easttom, C. (2017) CompTIA Security+ Study Guide: Exam SY0-501, 7<sup>th</sup> Ed., Sybex.
- ★ Harris, S. & Maymi, F. (2016) CISSP: All in one Exam Guide, 7<sup>th</sup> Ed., McGraw-Hill Education.
- ★ Kizza, M. J. (2015) Guide to Computer Network Security, Springer.

## **BITS 3363 Network Security Project Management**

### **Learning Outcomes:**

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

1. Identify the processes, tools and techniques in network security project management.
2. Demonstrate the understanding of all the project management body of knowledge, processes, tools and techniques.
3. Organise projects that are related to information technology and computer network security in groups.

### **Synopsis:**

This course provides distinct knowledge in network security project management. The topics cover project management body of knowledge namely managing projects in aspects of integration, scope, time, cost, quality and human resource. It also covers the phases of network security project management namely project initiation, planning, executing, controlling and closing or termination. Software for security project management such as Microsoft Project and Microsoft Excel will be introduced and used to help in applying the network security project management knowledge areas and processes.

### **References:**

- ★ Kathy, S. (2018) Information Technology Project Management, 9<sup>th</sup> Ed., Cengage Learning Custom Publishing.
- ★ Pryke, S. (2017) Managing Networks in Project-Based Organizations, John Wiley & Sons Ltd.
- ★ Phillips, J. (2017) Project Management with CompTIA Project+: On Track From Start to Finish, 4<sup>th</sup> Ed., Mc Graw Hill.

- ★ Chatfield, C. & Johnson, T. (2010) Microsoft Project 2010: Step by Step, Microsoft Press.
- ★ Harris, P. E. (2010) Planning and Control Using Microsoft Office Project and PMBOK Guide, 4<sup>th</sup> Ed., Eastwood Harris.
- ★ Webber, L. & Webber, F. (2009) IT Project Management Essentials, Aspen Publisher.
- ★ Snedaker, S. (2006) Syngress IT Security Project Management Handbook, 6<sup>th</sup> Ed., Syngress.

## **BITS 3413 Information Technology and Network Security**

### **Learning Outcomes:**

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

1. Distinguish the appropriate methods to safeguards the elements of information technology and network.
2. Build the elements in information technology and network with the appropriate methods and tools / software.
3. Explain issues related to ethics and law in information technology and networks and relate it with cyber laws in Malaysia.

### **Synopsis:**

This course covers background views of ICT threats and the needs to have theoretical security method on information security in software, operating system, data centre, computer networks. The course will also cover the basic cryptographic elements and authentication, IP security, firewalls, security management, and the related issue in computer crimes and cyber laws. Security related computing namely Microsoft Excel and Windows 2012 will be introduced and used to help in understanding and applying the security mechanism and algorithms.

### **References:**

- ★ Stewart, J. M., Chapple, M. & Gibson, D. (2015) CISSP (ISC)<sup>2</sup> Certified Information Systems Security Professional Official Study Guide, 7<sup>th</sup> Ed., Sybex.
- ★ Bragg, R. (2003) Certified Information Systems Security Professional Training Guide, Que Certification.
- ★ Whitman, M. E., & Mattord, H. J. (2015) Principles of Information Security, 5<sup>th</sup> Ed., Course Technology.

- ★ Merkow, M. & Breithaupt, J. (2006) Information Security: Principles and Practices, Pearson Prentice Hall.
- ★ Maiwald, E. & Sieglein, W. (2003) Security Planning and Disaster Recovery, McGraw Hill.
- ★ Oriyano, S. (2014) CEH: Certified Ethical Hacker Version 8 Study Guide, Wiley.
- ★ Selamat, S. R., Yusof, R., Abdollah, M. F. & Bahaman, N. (2006) Information Technology Security, Pearson.
- ★ Pfleeger, C. P. & Pfleeger, S. L. (2003) Security in Computing, 3<sup>rd</sup> Ed., Prentice Hall International.

## **BITS 3423 Information Technology Security**

### **Learning Outcomes:**

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

1. Explain the concept and issues of information technology security.
2. Distinguish the suitable components in providing security services and mechanism in computer software, operating system, database and network system.
3. Manipulate an appropriate security system mechanism ethically.

### **Synopsis:**

Security in information technology is a very important issue. It is an area that deserves study by computer professionals, students, and even many computer users. Through this course, student will be able to learn security services that covered Confidentiality, Integrity and Availability (CIA) in ICT based system. This course also highlights use of cyberlaw in protecting user rights. Finally, students will be able to learn methods in disaster recovery plan.

### **References:**

- ★ Goodrich, M. & Tamassia, R. (2013) Introduction to Computer Security, International Ed., Pearson New.
- ★ Stallings, W. (2014) Network Security Essentials: Applications and Standards, 5<sup>th</sup> Ed., Pearson Education Limited.
- ★ Pfleeger, C. P. & Pfleeger, S. L. (2011) Analyzing Computer Security: A Threat / Vulnerability / Countermeasure Approach, 1<sup>st</sup> Ed., Prentice Hall International.
- ★ Gollmann, D. (2011) Computer Security, 3<sup>rd</sup> Ed., John Wiley & Sons.

- ★ Stewart, J. M., Chapple, M. & Gibson, D. (2015) Certified Information Systems Security Professional Study Guide, 7<sup>th</sup> Ed., Sybex.
- ★ Ciampa, M. (2014) Security+ Guide to Network Security Fundamentals, 5<sup>th</sup> Ed., Cengage Learning.
- ★ Stallings, W. (2014) Cryptography and Network Security: Principles and Practice, 6<sup>th</sup> Ed., Pearson International Edition.

## **BITS 3433 Information Technology and Database Security**

### **Learning Outcomes:**

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

1. Explain security issues in the design, implementation and management of database systems.
2. Analyse security requirements for database application system development.
3. Construct a database with strong protection of data confidentiality, integrity and availability.

### **Synopsis:**

This course introduces the basic concepts of data security in an environment that involves databases, computer systems and networks, and the Internet. It outlines fundamental data security requirements and explains the risks that threaten the integrity and privacy of organisational data. Students are introduced to several technologies that can contribute to system and database security such as access control, cryptography, authentication methods, user administration, virtual private database and database auditing. In the aspect of database security students will be exposed to the standard practices and procedures in security implementation within Oracle9i database environment. Other security issues such as risk management, computer crime and cyber law will also be covered in this course.

### **References:**

- ★ Mullins, C. S. (2013) Database Administration: The Complete Guide to DBA Practices and Procedures, Addison-Wesley.
  - ★ Merkow, M. & Breithaupt, J. (2011) Information Security: Principles and Practices, Pearson Prentice Hall.
  - ★ Maiwald, E. (2013) Network Security: A Beginner's Guide, Mc Graw-Hill.
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- ★ Pfleeger, C. P. & Pfleeger, S. L. (2015) Security in Computing, 5<sup>th</sup> Ed., Prentice Hall International.
  - ★ Afyouni, H. A. (2006) Database Security And Auditing: Protecting Data Integrity And Accessibility, Thomson-Course Technology.

## **BITS 3463 Cryptography Application and Information Theory**

### **Learning Outcomes:**

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

1. Differentiate the basic concept of probability theory, information theory, complexity theory, number theory, abstract algebra and finite fields.
2. Build symmetric systems, asymmetric systems and cryptanalysis in cryptography.
3. Illustrate on the usage of information theory in cryptographic system.

### **Synopsis:**

This course covers the probability theory concept, information theory, complexity theory, number theory, abstract algebra and finite fields to understand the ideas regarding the discrete log problem, strength of an algorithm, information security, encryption, decryption, symmetric systems, symmetric systems and cryptanalysis in cryptography. The symmetric and asymmetric cryptosystems and its cryptographical mathematical theory behind it are emphasized.

### **References:**

- ★ Gray, R. M. (2011) Entropy and Information Theory, 2<sup>nd</sup> Ed., Springer.
- ★ Stallings, W. (2011) Cryptography and Network Security: Principles and Practice, 5<sup>th</sup> Ed., Prentice Hall.
- ★ Das, A. & Veni Madhavan, C. E. (2009) Public-Key Cryptography: Theory and Practice, Pearson.
- ★ Niederreiter, H. & Xing, C. (2009) Algebraic Geometry in Coding Theory and Cryptography, Princeton University Press.
- ★ Bose, R. (2008) Information Theory, Coding and Cryptography, 2<sup>nd</sup> Ed., McGraw Hill.
- ★ Stinson, D. R. (2006) Cryptography: Theory and Practice, 3<sup>rd</sup> Ed., Chapman & Hall/CRC.

## **BITS 3513 TCP/IP Programming**

### **Learning Outcomes:**

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

1. Differentiate various techniques and concepts of network programming.
2. Discover several common programming interfaces for network communication.
3. Manipulate advanced knowledge of programming to solve the network programming problem.

### **Synopsis:**

This course intended to expose student on how network programming works. Since Java is one of the most demanding skill in industry, so this course will emphasize on how to write a network programming by using Java language. This course will show students on how to use Java's network class library to quickly and easily write programmes that accomplish many common networking tasks.

### **References:**

- ★ Harold, E. R. (2013) Java Network Programming, 4<sup>th</sup> Ed., O'Reilly & Associates.
- ★ Graba, J. (2013) An Introduction to Network Programming with Java, 3<sup>rd</sup> Ed., Springer.
- ★ Pitt, E. (2006) Fundamental Networking in Java, Springer.
- ★ Basham, B., Sierra, K. & Bates, B. (2008) Head First Servlets and JSP, 2<sup>nd</sup> Ed., O'Reilly Media.

## **BITS 3523 Computer Audit and Risk Management**

### **Learning Outcomes:**

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

1. Explore and analyse the concepts as well as elements of computer audit and risk management.
2. Recommend the appropriate response in conformity with security issues in computer security audit.
3. Manage and manipulate on audit and mechanisms in physical security, operating systems, networks and administrations of computer security from various resources.

### **Synopsis:**

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

### **References:**

- ★ Benham, R. (2018) Cyber-Risk Management: Practical Strategies to Protect Your Organization from Cyber Threats, Kogan Page.
- ★ Campbell, T. (2017) Practical Information Security Management: A Complete Guide to Planning and Implementation, Berkeley, CA: Apress.
- ★ Pompon, R. (2016) IT Security Risk Control Management: An Audit Preparation Plan, Berkeley, CA: Apress.
- ★ Landoll, D. (2016) The Security Risk Assessment Handbook, CRC Press.
- ★ Whittman, M. E. (2016) Management of Information Security. Cengage Learning.

## **BITS 3533 Wireless Network and Mobile Computing**

### **Learning Outcomes:**

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

1. Differentiate standards of cellular telecommunication and wireless networks.
2. Identify different types of wireless network, its protocols and applications.
3. Construct online applications utilising wireless networks technologies.

### **Synopsis:**

This course is designed to give the knowledge of the concept of mobile computing and wireless networks, by exploring the relationship between hardware, software and development kits. Through class, research and application development, students will understand the current mobile technology and the relation to operating systems and standards. Students will be exposed to the challenges to handle the constraints of memory and storage of these hardware.

### **References:**

- ★ Osseiran, A., Monserrat, J. F., March, P. & Lianghai, J. (2016) 5G Mobile and Wireless Communications Techology, Cambridge University Press.
- ★ Liu, J., Wang, F., Ma, X., & Yang, Z. (2017) Recent Advances in Wireless Communication Protocols for Internet of Things, Wireless Communications and Mobile Computing, Vol. 2017, Article ID: 8791485.
- ★ Bedell, P. (2014) Cellular Networks: Design and Operation: A Real World Perspective, Outskirts Press.
- ★ Lassoff, M. A., Stachowitz, T. (2015) Mobile App Development with HTML5, LearnToProgram Inc.
- ★ Duffy, T. J. (2012) Programming with Mobile Applications: Android(TM), iOS, and Mobile Phone 7, Course Technology.

## **BITS 3613 Hacking Techniques and Prevention**

### **Learning Outcomes:**

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

1. Explain the fundamentals concept of hacking technique and prevention.
2. Applied the tools and methods to protect computers and networks against hacker attacks.
3. Measure the major software security design flaws such as buffer overflow and race condition and provide best practices for defending against attacks.

### **Synopsis:**

In this course, students will study and gain experience with the role of defending hosts and networks from attack as well as learning how the hacker uses tools to attack and penetrate networks. Students will be able to use several open software tools that will analyse host and networks for vulnerabilities and be exposed to the hacker technique of "thinking outside the box". It will immerse the student into an interactive environment where they will be shown how to scan, test, hack and secure their own systems. The lab intensive environment gives each student in-depth knowledge and practical experience with the current essential security systems. Students will begin by understanding how perimeter defences work and then be lead into scanning and attacking their own networks, no real network is harmed. Students then learn how intruders escalate privileges and what steps can be taken to secure a system.

### **References:**

- ★ Walker, M. (2016) CEH Certified Ethical Hacker Bundle, 3<sup>rd</sup> Ed. (All-in-One), McGraw-Hill Education.

- ★ Oriyano, S. (2016) CEH v9: Certified Ethical Hacker Version 9: Study Guide, Wiley.
- ★ Kim, P. (2015) The Hacker Playbook 2: Practical Guide To Penetration Testing, CreateSpace Independent Publishing Platform.
- ★ Beaver, K. (2016) Hacking For Dummies (For Dummies (Computers)), 5<sup>th</sup> Ed., John Wiley & Sons, Inc.
- ★ Patrick, E. (2013) The Basics of Hacking and Penetration Testing: Ethical Hacking and Penetration Testing Made Easy, Elsevier.

## **BITU 3923 Workshop II**

### **Learning Outcomes:**

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

1. Analyse project scopes based on their majoring.
2. Construct the project by applying the concept of system design and development learnt in the previous courses.
3. Organise the group project properly and able to present the project output.

### **Synopsis:**

This course provides an opportunity to the student to practice their knowledge and experience gained from previous courses. This course also develops the students understanding of problem solving techniques to solve a particular problem based on their respective project scopes. The project scope is based on their programme and they are required to develop their projects in groups of four or five.

### **References:**

- ★ Any related references according to their respective programme (please refer to teaching plan of each respective programme).

## **DITM 2113 Multimedia System**

### **Learning Outcomes:**

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

1. Explain the core concept of multimedia systems.
2. Construct multimedia applications by combining elements of text, graphic, audio, video and animation according to current needs.
3. Practice problem solving skills in planning and developing multimedia project.

### **Synopsis:**

This course prepares students with the basic concept of multimedia, technology and the importance of multimedia application. It covers the introduction to multimedia elements such as text, graphic, audio, animation and video include 2D/3D graphic and authoring, multimedia integration and multimedia application development. During lab sessions, students will be introduced to several tools for selected media element and authoring software for media integration. In addition, students will be trained for practical preparation of still image, simple animation, sound and effectively apply it to multimedia project. Students also will be exposed to teamwork, leadership, problem-solving and communication skills while performing their various tasks and project. Active Cooperative Learning, ACL, approach will be used to enhance students capability such as competency, attitude, knowledge and communication skills.

### **References:**

- ★ Vaughan, T. (2014) *Multimedia: Making It Work*, 9<sup>th</sup> Ed., McGraw-Hill Osborne Media.
- ★ Costello, V. (2017) *Multimedia Foundation: Core Concepts for Digital Design*, 2<sup>nd</sup> Ed., Routledge New York.
- ★ Azman, F. N., Mohammed, N. & Salam, S. (2018) *Multimedia System Module*, UTeM Press.
- ★ Savage, T. M. & Vogel, K. E. (2013) *An Introduction to Digital Multimedia*, Jones and Bartlett, Inc.
- ★ MOOC, UTeM Open Learning, available at <https://www.openlearning.com/utemmooc>.

## DITM 2123 Web Programming

### Learning Outcomes:

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

1. Explain the concept and the principle of Internet and WWW based on the latest technologies.
2. Use the important components in web applications which are client site technology, server site technology, database server and web server.
3. Display the appropriate use of important components in developing web applications.

### Synopsis:

The purpose of this course is to provide students with a comprehensive understanding of the tools and problem-solving techniques related to building effective World Wide Web sites. It emphasizes 4 components in developing web applications which are:

- Client site technologies: HTML, XHTML, HTML5, CSS, XML, and JavaScript.
- Server site technologies: PHP.
- Database server: MySQL.
- Web servers: Apache.

This course also brings together all of the elements of web site design, graphics, animation, data storage in the construction of fully functional commercial web site applications.

### References:

- ★ Sebesta, R. W. (2014) Programming The World Wide Web, 8<sup>th</sup> Ed., Pearson.
- ★ Dietel, P., Dietel, H. & Dietel, A. (2011) Internet & World Wide Web: How to Program, 5<sup>th</sup> Ed., Prentice Hall.
- ★ Nixon, R. (2014) Learning PHP, MySQL & JavaScript: With jQuery, CSS & HTML5 (Learning Php, Mysql, Javascript, Css & Html5), 4<sup>th</sup> Ed., O'Reilly.
- ★ Robbins, J. N. (2012) Learning Web Design: A Beginner's Guide to HTML, CSS, JavaScript, and Web Graphics, 4<sup>th</sup> Ed., O'Reilly.
- ★ Osborn, J. (2011) HTML5 Digital Classroom, John Wiley & Sons, Inc.

## DITP 1123 Programming II

### Learning Outcomes:

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

1. Illustrate programme codes by tracing and debugging in troubleshooting programme applications.
2. Construct computer programme codes by applying suitable programming tools, structures and techniques.
3. Apply suitable programming structures and techniques in problem solving.

### Synopsis:

This course covers the introductory topics in programming using C++ language. It includes problem solving using array, file, structured data and pointer are among the topics covered in the course.

### References:

- ★ Gaddis, T. (2012) Starting Out with C++: From Control Structures Through Objects, 7<sup>th</sup> Ed., Pearson Education International.
- ★ Malik, D. S. (2018) C++ Programming from Problem Analysis to Program Design, 8<sup>th</sup> Ed., Cengage Learning.
- ★ Liang, Y. D. (2010) Introduction to Programming with C++, 2<sup>nd</sup> Ed., Pearson Education International.
- ★ Friedman, K. (2011) Problem Solving, Abstraction and Design using C++, 6<sup>th</sup> Ed., Pearson.

## DITP 1333 Database

### Learning Outcomes:

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

1. Illustrate Entity Relationship Diagram, ERD, based on database and data modelling concepts.
2. Construct simple and complex Structured Query Language, SQL, queries.
3. Explain suitable data modelling concepts and SQL in problem solving.

### Synopsis:

This course will introduce student to the fundamental concepts of database management, which include the aspects of data models, database language, SQL and Relational Algebra, RA, as well as database design. This course also focuses on practical skills which make students be able to apply fundamental concepts required for the use and design of Database Management Systems, DBMS.

### References:

- ★ Coronel, C. & Morris, S. (2017) Database Systems: Design, Implementation and Management, 12<sup>th</sup> Ed., Cengage Learning.
- ★ Connolly, T. & Begg, C. (2015) Database Systems: A practical Approach to Design, Implementation, and Management, 6<sup>th</sup> Ed., Pearson Education.
- ★ Elmasri, R. & Navathe, S. B. (2015) Fundamentals of Database Systems, 7<sup>th</sup> Ed., Addison-Wesley.
- ★ Hoffer, J. A., Ramesh, V. & Topi, U. H. (2015) Modern Database Management, 12<sup>th</sup> Ed., Prentice Hall.

## DITP 2113 Data Structure and Algorithm

### Learning Outcomes:

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

1. Illustrate the algorithm design and performance for different abstract data type operation.
2. Construct and apply suitable data structures and algorithm for an application that requires data structures.
3. Demonstrate the data structures and algorithms in problem solving.

### Synopsis:

This course aims to develop students' knowledge in data structures and algorithms. The course begins with the introduction of concepts and techniques of structuring and operating on abstract data types in problem solving. Followed by the discussion on the operations for maintaining common data structures. Students are exposed on how to recognise the associated algorithms' operations and complexity. Common sorting, searching and graph algorithms will be discussed and the complexity and comparisons among these various techniques will be studied.

### References:

- ★ Malik, D. S. (2018) C++ Programming: Program Design Including Data Structures, 8<sup>th</sup> Ed., Cengage Learning.
- ★ Drozdek, A. (2013) Data Structures and Algorithms in C++, 4<sup>th</sup> Ed., Cengage Learning.
- ★ Malik, D. S. (2010) Data Structures Using C++, 2<sup>nd</sup> Ed., Cengage Learning.
- ★ Liang, Y. D. (2014) Introduction to Programming with C++, 3<sup>rd</sup> Ed., Pearson.
- ★ Weiss, M. A. (2014) Data Structures and Algorithm Analysis in C++, 4<sup>th</sup> Ed., Pearson.

## DITP 2123 Event-Driven Programming

### Learning Outcomes:

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

1. Discuss the concepts of event driven programming and data access technology.
2. Construct programmes with suitable Graphical User Interface, GUI, interface and event handling.
3. Apply the event-driven programming concepts and manipulate the databases to software development related to current problem requirements.

### Synopsis:

This course will introduce the concepts of Windows programming (applications with GUI) through C#. It will begin with an introduction to event-driven programming which includes types of programming, differences and advantage of event-driven programming. Followed by creating forms with suitable GUI, event handling that includes mouse and keyboard interactions as well as how to handle data storing with LINQ. Students are exposed in designing suitable problem solution which combines their basic programming concepts skills and their comprehension in C# and LINQ.

### References:

- ★ Skeet, J. (2018) C# in Depth, Manning Publications.
- ★ Gaddis, T. (2016) Starting out with Visual C#, 4<sup>th</sup> Ed., Pearson.
- ★ Deitel, P. & Deitel, H. (2016) Visual C# How to Program, 6<sup>th</sup> Ed., Pearson.
- ★ Deitel, P. & Deitel, H. (2016) C# 6 for Programmers, 6<sup>th</sup> Ed., Pearson.
- ★ Boehm, A. & Murach, J. (2016) Murach's C# 2015, Mike Murach & Associates.
- ★ Johansen, A. (2016) C#: The Ultimate Beginner's Guide!, CreateSpace Independent Publishing Platform.

## DITP 2213 System Analysis and Design

### Learning Outcomes:

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

1. Explain the information systems and system development methodology.
2. Manipulate several tools and techniques to plan, analyse and design a new system.
3. Apply the waterfall methodology to develop a system.

### Synopsis:

In this course, students will be introduced to a variety of information systems. Then, this course explains the development methodology especially the Waterfall and Rapid Application Development, RAD. After that, it discusses the planning phase with a focus on project management and project identification. The analysis phase will emphasize on the determination of user requirements, DFD and ERD in structuring user's needs. The design phase then discusses form design and report, database, and interface design. Final phase of system development will cover the coding, testing and system maintenance.

### References:

- ★ Kendall, K. E. & Kendall, J. E. (2014) System Analysis and Design, 9<sup>th</sup> Ed., Pearson.
- ★ Hoffer, J. A., George, J. F. & Valacich, J. S. (2017) Modern System Analysis & Design, 7<sup>th</sup> Ed., Prentice Hall.
- ★ Whitten, J., Bentley L. & Dittman, K. (2007) Systems Analysis and Design for Global Enterprise, 7<sup>th</sup> Ed., McGraw-Hill.
- ★ Dennis, A. & Barbara, H. W. (2003) System Analysis & Design, 2<sup>nd</sup> Ed., John Wiley & Sons, Inc.

## DITP 3113 Object-oriented Programming

### Learning Outcomes:

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

1. Illustrate the principle of object oriented programming.
2. Construct programmes which implement data abstraction, encapsulation, polymorphism and inheritance.
3. Perform implementation of object oriented principle and Graphical User Interface, GUI.

### Synopsis:

This course will introduce the fundamentals of object oriented programming such as encapsulation, polymorphism and inheritance. Apart from that, GUI, event handling and exception handling in Java will be explained.

### References:

- ★ Rao, N. & Yoon, J. (2016) Introduction to Java Programming, Indo American Books.
- ★ Deitel, H. M. & Deitel, P. J. (2017) Java How To Program, 10<sup>th</sup> Ed., Pearson Education International.
- ★ Daniel, L. Y. (2015) Introduction Java Programming, 10<sup>th</sup> Ed., Prentice Hall.
- ★ Savitch, W. (2018) Java: An Introduction to Problem Solving and Programming, 7<sup>th</sup> Ed., Addison Wesley.
- ★ Cadenhead, R. (2017) Java in 24 Hours, Sams Teach Yourself (Covering Java 8), 7<sup>th</sup> Ed., SAMS.
- ★ Baesens, B., & Backiel, A. (2015) Beginning Java Programming: The Object-Oriented Approach, WROX.

## DITS 1133 Computer Organisation and Architecture

### Learning Outcomes:

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

1. Explain the principles and techniques used in implementing a computer architecture and organisation concept.
2. Identify the concept of functional computer components and the detail interactions in computer systems.
3. Assemble basic computer components and its architectural attributes, including instruction set and technique for addressing memory.

### Synopsis:

This course provides a detail of computer system's functional components, their characteristics, their performance and their interactions including system bus, different types of memory and Input/Output and CPU, as well as practical implementations of the components. Besides, the architectural issues, such as instruction set design and data types, are covered. In addition to this, students are introduced to the increasingly important area of parallel organisation.

### References:

- ★ Stallings, W. (2017) Computer Organization & Architecture, 10<sup>th</sup> Ed., Prentice Hall.
- ★ Patterson, D. A. & Hennessy, J. L. (2016) Computer Organization and Design: The Hardware / Software Interface, 5<sup>th</sup> Ed., Morgan Kauffman.
- ★ Syarulnaziah, Zakiah, Marliza & Aslinda, Lab Module: Computer Organisation and Architecture With MIPS Programming.
- ★ Null, L. & Lobur, J. (2016) The Essential of Computer Organisation and Architecture, 4<sup>th</sup> Ed., Jones & Bartletts Pub.
- ★ Hamacher, C., Vranesic, Z. & Zaky, S. (2016) Computer Organization, 6<sup>th</sup> Ed., McGraw Hill.
- ★ Englander, I. (2016) The Architecture of Computer Hardware and System Software: An Information Technology Approach, 5<sup>th</sup> Ed., John Wiley & Sons.

## DITS 2213 Operating System

### Learning Outcomes:

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

1. Describe the major components and functionalities of operating system and the underlying structure.
2. Explain different types of operating system algorithms such as I/O scheduling, memory scheduling and uniprocessor scheduling.
3. Demonstrate basic system administration task in different operating system.

### Synopsis:

This course is designed to give an exposure to students about the fundamental of operating system including process, management of memory, file and I/O and also about CPU scheduling. The introduction part consists of the evolution of operating system since it started until now. Student will also learn about the basic concepts, technology and theory used in operating system such as concurrency, kernel, deadlock and multithreading. In addition, students will be introduced to few types of operating systems at basic administrative level.

### References:

- ★ Stallings, W. (2017) Operating Systems: Internals and Design Principles, 8<sup>th</sup> Ed., Prentice Hall International, Inc.
- ★ Anderson, T. & Dahlin, M. (2014) Operating Systems: Principles and Practice, 2<sup>nd</sup> Ed., Recursive Books.
- ★ Tanenbaum, A. S. (2016) Modern Operating Systems, 4<sup>th</sup> Ed., Prentice Hall International, Inc.
- ★ McHoes, A. & Flynn, I. M. (2017) Understanding Operating System, 6<sup>th</sup> Ed., Course Technology.
- ★ Silberschatz, A., Galvin, P. B. & Gagne, G. (2014) Operating System Concept, 8<sup>th</sup> Ed., John Wiley & Sons, Inc.
- ★ Eckert, J. (2012) Linux+ Guide to Linux Certification, 3<sup>rd</sup> Ed., Cengage Learning.
- ★ Md. Shah, W. & Anawar, S. (2019) Debian 9 Stretch Basic Administration, Penerbit UTeM.

## DITS 2313 Data Communication and Networking

### Learning Outcomes:

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

1. Apply the knowledge of data communication fundamental and networking concepts.
2. Differentiate types of media, network topology, network technologies and signal data transmissions.
3. Follow the best practices or techniques to configuring current network and telecommunication technology.

### Synopsis:

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

### References:

- ★ Forouzan, B. A. (2013) Data Communications and Networking, 5<sup>th</sup> Ed., McGraw-Hill.
- ★ Fitzgerald, J., Dennis, A. & Durcikova, A. (2014) Business Data Communications and

Networking, 12<sup>th</sup> Ed., John Wiley & Sons.

- ★ Saaya, Z., et al. (2014) Lab Companion: Data Communication and Networking, 1<sup>st</sup> Ed., Penerbit UTeM.
- ★ Boyle, R. J. & Clements, J. A. (2014) Applied Networking Labs, 2<sup>nd</sup> Ed., Prentice Hall.
- ★ White, C. M. (2015) Data Communications and Computer Networks, 8<sup>th</sup> Ed., Cengage Learning.

## DITS 2413 Computer Security

### Learning Outcomes:

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

1. Discover the fundamental knowledge and study in a field of security in computer systems.
2. Display workstation configuration to monitor the system's performance.
3. Display management skill of managing hard disks, data storage and device drivers for disaster recovery with device drivers signing and driver restoring.

### Synopsis:

This course provides students with the knowledge and skills which are mandatory to maintain Workstation resources, monitor Workstation performance, and safeguard data on a computer running on preferable operating systems.

### References:

- ★ Stanek, W. (2016) Windows Server 2016: Essentials for Administration: IT Pro Solutions, Stanek & Assoc.
- ★ Ciampa, M. (2018) CompTIA Security+ Guide to Network Security Fundamentals, 6<sup>th</sup> Ed., Cengage Learning.
- ★ Goodrich, M. & Tamassia, R. (2017) Introduction to Computer Security, Pearson New International Edition.
- ★ Stallings, W. (2017) Network Security Essentials: Applications and Standards, 6<sup>th</sup> Ed., Pearson Education Limited.
- ★ Stewart, J. M., Chapple, M. & Gibson, D. (2018) Certified Information Systems Security Professional Study Guide, 8<sup>th</sup> Ed., Sybex.
- ★ Ciampa, M. (2015) Lab Manual for Security+: Guide to Network Security Fundamentals, Cengage Learning.
- ★ Thejendra, B. S. (2015) Disaster Recovery and Business Continuity: A Quick Guide for Small Organisations and Busy Executives, 3<sup>rd</sup> Ed., IT Governance Publishing.
- ★ Pfleeger, C. P., Pfleeger, S. L. & Margulies, J. (2015) Security in Computing, 5<sup>th</sup> Ed., Pearson.



**Course Synopsis**  
**Free Module**



## BITE 3523 Game Physics

### Learning Outcomes:

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

1. Manipulate the concept of mathematics and physics in computer games programming.
2. Explain the application of computer games physics in problem solving computer game development.
3. Follow the techniques of 3D graphics in computer games physics to generate realistic design idea.

### Synopsis:

This course discusses techniques to create realistic 3D graphics environments using advanced computer game programming, C++. The emphasis is on mathematics and physic concepts in the development of computer games. The topics discussed range from geometry, matrix, kinematics, rotation and offense and its application in the development of computer games.

### References:

- ★ Flynt, J. P. & Kodicek, D. (2012) Mathematic and Physics for Programmers, 2<sup>nd</sup> Ed., Cengage Learning.
- ★ Eberly, D. H. & Shoemake, K. (2006) Game Physics, Morgan Kaufmann.
- ★ Verth, J. V. & Bishop, L. M. (2008) Essential Mathematics for Games and Interactive Applications, 2<sup>nd</sup> Ed., Morgan Kaufmann.

## BITE 3623 Motion Graphics

### Learning Outcomes:

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

1. Apply the knowledge and concept of visual effects and motion graphics development.
2. Solve a visual effects and motion graphics problem with selected approach using appropriate application.
3. Select a suitable approach from relevance information to solve a visual effects and motion graphics application.

### Synopsis:

This course is designed to expose the students to the basic visual effect and motion graphics. This includes understanding and designing aspects by using a visual effect and motion graphics application. The students will be exposed to the skill of using a visual effect and motion graphics software such as After Effect.

### References:

- ★ Meyer, T. & Meyer, C. (2008) Creating Motion Graphics with After Effect, Focal Press.
- ★ Fahs, C. & Weinman, L. (2007) Adobe After Effect 7 Hands-On Training, Peachpit Press.
- ★ Christiansen, M. (2009) Adobe After Effects CS4 Visual Effects and Compositing Studio Technique, Peachpit Press.
- ★ Meyer, T. & Meyer, C. (2009) After Effects Apprentice, Focal Press.

## BITE 3633 Gameplay

### Learning Outcomes:

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

1. Explain the concepts of game theory in solving computer problems.
2. Reproduce computer game design skills to apply basic design according to industry specifications.
3. Describe issues related to computer games according to various sources of information.

### Synopsis:

This course is designed to provide fundamental level and basic requirement aspects of game design and gameplay. Topics include basic understanding of casual gaming, game mechanic and gameplay type such as matching, sorting, seeking, managing, hitting, chaining, constructing, bouncing, tossing, rolling, stacking and socializing. Other topics include such as game reward and ranking in game. Current issues related to the latest trends and trend game players and platforms were also discussed at the end of the course.

### References:

- ★ Trefry, G. G. (2010) Casual Game Design: Designing Play for the Gamer in ALL of US, Morgan Kaufmann.
- ★ Oxland, K. (2004) Gameplay and Design, Addison-Wesley.
- ★ Salen, K. & Zimmerman, E. (2004) Rule of Play: Game Design Fundamental, MIT Press.

## BITE 3723 Game Mechanics

### Learning Outcomes:

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

1. Identify the core concepts of the game mechanic.
2. Develop applications combining elements of the game such as text, graphics, audio, video and animation according to the current requirements.
3. Relate learned skills to solve the problem by selecting some game mechanic environment in which can be used in the game presentation.

### Synopsis:

This course focuses on the game's graphics, physics, sound and input of artificial intelligent, networking and recognition levels. This course provides a comprehensive foundation in the relevant field of computer games, serving as a premier and provides a context for special courses in final year. This course provide students with an introduction to the theory and practice of video game programming. Students will be involved in lab training sessions and also work together as a team for the awakening of the real game, designing and building their own game works by using the existing game engine (e.g., OPENGL C++ or Microsoft XNA or DirectX).

### References:

- ★ Adams, E. & Dormans, J. (2012) Game Mechanics: Advanced Game Design (Voices That Matter), New Riders.
- ★ Dunnaway, T. & Novak, J. (2008) Game Development Essentials: Gameplay Mechanics, 1<sup>st</sup> Ed., Delmar Cengage Learning.
- ★ Gregory, J. (2010) Game Engine Architecture, AK Peters.

- ★ Millington, I. (2008) Game Physics Engine Development: How to Build a Robust Commercial-Grade Physics Engine for your Game, CRC Press.
- ★ Shreiner, D., Sellers, G., Kessenich, J. M. & Licea-Kane, B. M. (2013) OpenGL Programming Guide: The Official Guide to Learning OpenGL, Version 4.3, 8<sup>th</sup> Ed., Addison-Wesley Professional.
- ★ Menard, M. (2011) Game Development with Unity, Cengage Learning PTR.

## BITI 2113 Logic Programming

### Learning Outcomes:

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

1. Identify elements and concepts of logic and procedural programming.
2. Reproduce the Prolog algorithm for solving logic programming problems.
3. Demonstrate basic programmes using logic programming structures.

### Synopsis:

This course exposing students to the basic of logic programming which include the syntax and semantics of Prolog software. Elements such as predicate logic, rules, queries, recursive rule, controlling backtracking, unification and input output are the main concern while conducting this course. This course use Prolog software to develop the simple computer solution of some AI applications such as problem solving and expert systems.

### References:

- ★ Bratko, I. (2012) Prolog Programming for Artificial Intelligence, Addison Wesley.
- ★ Bramer, M., Bos, J. & Striegnitz, K. (2013) Logic Programming with Prolog, Springer.
- ★ Scott, R. (2010) A Guide to Artificial Intelligence with Visual Prolog, Outskirts Press.
- ★ O'Keeffe, R. (2009) The Craft of Prolog, The MIT Press.
- ★ Kaushik, S. (2007) Logic and Prolog Programming, New Age International.

## **BITI 2513 Introduction to Data Science**

### **Learning Outcomes:**

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

1. Analyse a data science problem.
2. Define the computing requirements appropriate to a data science problem.
3. Demonstrate computer programme based on data science fundamental for problem solving.

### **Synopsis:**

This course delivers an essential exposure on the fundamental concepts and techniques of data science. It is divided into two parts; Part 1 is the introductory lecture and guided practical session for the first 5 weeks. The main topics covers the five important phases in understanding data science; introduction to data science, data wrangling, exploratory data analysis, data manipulation, applied machine learning and data visualization and communication. Part 2 is a guided capstone project for another 9 weeks. The capstone project provides a platform to the students to applied their previously learn knowledge especially in Artificial Intelligent, AI, statistics, analytics, project managements and data science in a real project setting. The last 3 weeks is the project presentation and technical report submission. There is no final written examination for this course.

### **References:**

- ★ EMC Education Services, Ed. (2015) Data Science and Big Data Analytics: Discovering, Analyzing, Visualizing and Presenting Data, 1<sup>st</sup> Ed., John Wiley.
- ★ Thomas, E., Wajid, K. & Paul, B. (2016) Big Data Fundamentals: Concepts, Drivers & Techniques, 1<sup>st</sup> Ed., Prentice Hall.

- ★ Nolan, D. & Lang, D. T. (2015) Data Science in R: A Case Studies Approach to Computational Reasoning and Problem Solving, CRC Press.
- ★ Donoho, D. (2015) 50 Years of Data Science, available at: <http://courses.csail.mit.edu/18.337/2015/docs/50YearsDataScience.pdf> [Accessed on 12 February 2016].
- ★ Kabacoff, R. (2015) R in Action: Data Analysis and Graphics with R, 2<sup>nd</sup> Ed., Manning Publications.

## **BITI 3113 Intelligent Agent**

### **Learning Outcomes:**

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

1. Differentiate various concepts of intelligent agent.
2. Organise solution steps in solving intelligent agent problem.
3. Manipulate computer programme based on fundamental techniques of intelligent agents for problem solving.

### **Synopsis:**

This course will cover the underlying theory of agents, the common agent architectures, methods of cooperation and communication, and the potential applications for agents. Students will be exposed to the concept of intelligent agent and multiagent systems. Students will also construct their own agents for solving different types of problems. The potential applications of agents are numerous including web search assistants, travel advisors, electronic secretaries, bidders in on-line auctions, tutoring systems, and actors in games or simulations. Some of the tools to be used are Jade and Jason.

### **References:**

- ★ Weiss, G. (2013) Multiagent Systems, 2<sup>nd</sup> Ed., MIT Press.
- ★ Bordini, R. H., Dastani, M. & Seghrouchni, A. E. (2013) Multi-Agent Programming: Languages, Platforms and Applications, Multiagent Systems, Artificial Societies and Simulated Organizations.
- ★ Wilensky, U. & Rand, W. (2015) An Introduction to Agent-Based Modeling: Modeling Natural, Social and Engineered Complex Systems with NetLogo, MIT Press.
- ★ Kahl, Y. & Gelfond, M. (2014) Knowledge Representation, Reasoning, and the Design of Intelligent Agents: The Answer Set Programming Approach, 1<sup>st</sup> Ed., Kindle Edition, Cambridge University Press.
- ★ Farrukh Akhtar, S. M. (2017) Practical Reinforcement Learning: Develop self-evolving, Intelligent Agents with OpenAI Gym, Python and Java, Packt Publishing.

## **BITI 3213 Decision Support Systems**

### **Learning Outcomes:**

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

1. Differentiate various concept of decision support system.
2. Organise solution steps in solving decision support system problem.
3. Manipulate computer programme based on fundamental techniques of decision support system for building intelligent system.

### **Synopsis:**

This course aims to provide students with an overview of various Decision Support Systems, DSS, and artificial intelligence systems and the ways in which they support effective decision making in organisations. Topics covered are introduction to DSS, decision makers, types of DSS, development of DSS, modeling and optimisation, group DSS, executive ESS, and intelligent DSS.

### **References:**

- ★ Schwartz, D. (2015) Decision Support Systems, Clanrye International.
- ★ Forrester, J. W. (2015) Decision Support Systems: Emerging Tools for Planning, Palala Press.
- ★ Christian Albright, S. (2015) VBA for Modelers: Developing Decision Support Systems with Microsoft Office Excel, 5<sup>th</sup> Ed., Cengage Learning.
- ★ Sharda, R., Turban, E., Delen, D., Aronson, J. & Liang, T. (2014) Business Intelligence and Analytics: Systems for Decision, Pearson.
- ★ Berner, E. S. (2016) Clinical Decision Support Systems: Theory and Practice (Health Informatics), 3<sup>rd</sup> Ed., Springer.

## **BITI 3313 Image Processing and Pattern Recognition**

### **Learning Outcomes:**

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

1. Differentiate various concepts of image processing and pattern recognition.
2. Organise solution steps in solving image processing and pattern recognition problems.
3. Manipulate computer programme based on fundamental techniques of image processing and pattern recognition for building intelligent systems.

### **Synopsis:**

This course introduces essential image processing techniques, such as image enhancement, image restoration, colour image processing, image morphology, segmentation, feature extraction and motion from image sequences. Students will also be exposed with MATLAB programming in order to implement the image processing techniques. The image processing implementation makes use images from different sources including internet, satellite, UAV and digital camera.

### **References:**

- ★ Gonzalez, R. C. & Woods, R. E. (2017) Digital Image Processing, 4<sup>th</sup> Ed., Pearson.
- ★ Scott, E. U. (2017) Digital Image Processing And Analysis: Applications With Matlab®and Cvip tools, 3<sup>rd</sup> Ed., CRC Press.
- ★ Mcandrew, A. (2015) A Computational Introduction to Digital Image Processing, 2<sup>nd</sup> Ed., Chapman & Hall/CRC.

## **BITI 3513 Artificial Intelligence in Manufacturing**

### **Learning Outcomes:**

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

1. Analyse the situation of manufacturing operation.
2. Organise solution steps in solving intelligent manufacturing problem.
3. Manipulate computer programme based on fundamental techniques of artificial intelligence in manufacturing for problem solving.

### **Synopsis:**

Students are exposed to manufacturing operations in several areas/domain such as system design, planning, scheduling, monitoring and control. The theory and principles accompanied by the real world problem in each area will be studied. It will then be extended with the applications of AI techniques such as Knowledge-Based System, Neural Network and other that the students already learn from previous Artificial Intelligence course. At the end of the course, students will involve in the development of intelligence manufacturing module system by using appropriate AI techniques.

### **References:**

- ★ Ryan, D. (2017) Expert Systems: Design, Applications and Technology, Computer Science, Technology and Applications, Nova Science Pub Inc.
- ★ Negnevitsky, M. (2011) Artificial Intelligence: A Guide to Intelligent System, 3<sup>rd</sup> Ed., Addison Wesley.
- ★ Zongwei, L. (2014) Smart Manufacturing Innovation and Transformation: Interconnection and Intelligence: Advances in Logistics, Operations, and Management Science, 1<sup>st</sup> Ed., IGI Global.
- ★ Kalpakjian, S. (2013) Manufacturing Engineering & Technology, 7<sup>th</sup> Ed., Prentice Hall.

## **BITM 2323 Digital Imaging for Multimedia**

### **Learning Outcomes:**

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

1. Apply the knowledge and principles of digital imaging.
2. Show the skills in using photography software and hardware.
3. Demonstrate life long learning by applying photography understanding in other related courses.

### **Synopsis:**

This course is meant to help students to master the creation of one of the multimedia elements, image, using digital camera. They will learn the basic functions of DSLR camera, capturing high-quality images suitable for industry standard multimedia production. Lecturer will show them how to see the world like a photographer, whether they are just starting out or have been taking photos for years. This course focusing on practical training, rather than just theory.

Throughout the course, they will complete a series of photo projects that will help them practice the skills of photography. The lecturer will work with them, reviewing their photos and helping them to improve as they complete the program. A critics session among peers and audience will be held to help students to get better exposure in the process of learning. At the end of the course, they will have the skills and know-how to take professional-quality photographs.

### **References:**

- ★ Gatcum, C. (2016) The Beginner's Photography Guide, 2<sup>nd</sup> Ed., Dorling Kindersley Limited.
- ★ Peterson, B. (2016) Understanding Exposure: How to Shoot Great Photographs with Any Camera, 4<sup>th</sup> Ed., Amphoto Books.
- ★ Ang, T. (2016) Digital Photography Complete Photographer, Dorling Kindersley Limited.
- ★ Arena, S. (2012) Lighting for Digital Photography: From Snapshots to Great Shots (Using Flash and Natural Light for Portrait, Still Life, Action, and Product Photography), Peachpit Press.
- ★ Tharp, B. (2012) Extraordinary Everyday Photography: Awaken Your Vision to Create Stunning Images Wherever You Are, Amphoto Books.

## **BITP 2323 Database Administration**

### **Learning Outcomes:**

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

1. Explain the concepts of database administration.
2. Apply functions of database administration.
3. Analyse database performance.

### **Synopsis:**

This course students will take up the roles, issues and responsibilities as database administrator. They will also identify the functions of the DBMS such as storage, access and data updates, database objects, data integrity, physical database design, user management and database performance.

### **References:**

- ★ Matishak, D. & Fuller, M. (2010) Oracle Database 11G: Administration Workshop I (Volume I & II), Ed. 2.0, Jobi Varghese and Veena Narasimhan (Oracle Corporation).
- ★ Rich, B. (2012) Oracle Database 2 Day DBA 11g Release 2 (11.2), (Oracle Corporation).
- ★ Oracle Corporation (2014) Oracle® Database Express Ed., Getting Started Guide & Installation guide 11g Release 2 (11.2).
- ★ Mullins, C. (2012) Database Administration: The Complete Guide to Practices and Procedures, 2<sup>nd</sup> Ed., Addison-Wesley.
- ★ Peasland, B. (2019) Oracle DBA Mentor: Succeeding as an Oracle Database Administrator, 1<sup>st</sup> Ed., Apress.

## **BITP 3233 Strategic Information System Planning**

### **Learning Outcomes:**

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

1. Explain the business organisation components, environment, challenges and objectives of information systems (IS) investment.
2. Use the IS and strategic planning tools in planning process.
3. Propose information systems strategically appropriate for the business organisation.

### **Synopsis:**

This course will introduce the importance of IS to enhance organisation competitiveness. Therefore the students will be equipped with various types of information systems and a strategic planning process, tools and techniques to propose business information systems that strategically differentiate and competitive than other organisations. Then students will work to integrate organisation's business objectives with IS that support its business direction and creating competitive advantage to the organisation.

### **References:**

- ★ Wallace, P. (2015) Introduction to Information Systems, 2<sup>nd</sup> Ed., Pearson.
- ★ Laudon, K.C. & Laudon, J.P. (2011) Essentials of Business Information Systems, 9<sup>th</sup> Ed., Pearson.
- ★ Laudon, K.C. & Laudon, J.P. (2019) Management Information Systems: Managing The Digital Firm, 16<sup>th</sup> Ed., Pearson.
- ★ Robson, W. (1997) Strategic Management & Information Systems, 2<sup>nd</sup> Ed., Prentice Hall.
- ★ Ward, J. & Peppard, J. (2002) Strategic Planning for Information Systems, 3<sup>th</sup> Ed., John Wiley & Sons.
- ★ McNurlin, B.C. & Sprague, J.R. (2006) Information Systems and Management in Practice, 7<sup>th</sup> Ed., Pearson Prentice Hall.
- ★ Saunders, S. & Pearlson, E. (2016) Managing and Using Information System: A Strategic Approach, 6<sup>th</sup> Ed., John Wiley & Sons.

## **BITP 3253 Software Validation and Verification**

### **Learning Outcomes:**

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

1. Explain the principle of verification and validation focusing on testing the software as well as quality assurance.
2. Develop test requirements, test cases and test script for real software projects.
3. Classify the test design techniques and tools that could satisfy the quality of software products.

### **Synopsis:**

This course gives exposure to the students about the software testing concept and focus on process to develop and implement testing plan, testing strategy, software check, unit testing, integration testing, system testing and acceptance testing. The students will implement software quality assurance activity such as quality requirement, quality criteria, software metrics, software quality model, software evaluation, review, audit and accreditation.

### **References:**

- ★ Black, R., Veenendaall, E.V. & Graham, D. (2020) Foundations of Software Testing ISTQB Certification, 3<sup>rd</sup> ed., Cengage Learning.
- ★ ISTQB (2018) ISTQB Certified Tester Foundation Level Syllabus, International Software Testing Qualification Board.
- ★ Galin, D. (2004) Software Quality Assurance: From Theory to Implementation, Pearson Addison-Wesley.
- ★ Watkins, J. (2001) Testing IT: An Off-the-Shelf Software Testing Process< Cambridge University Press.
- ★ Myers, G.J. (2011) The Art of Software Testing, 2<sup>nd</sup> Ed., John Wiley & Sons.

## **BITP 3423 Special Topic in Software Engineering**

### **Learning Outcomes:**

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

1. Describe the importance of IT Architecture and it's elements.
2. Explain the IT Architecture and how it can be transformed into value centric initiative.
3. Demonstrate the ability of developing an IT Architecture initiative by using Business Model Canvas.

### **Synopsis:**

This course provides the students with the foundation in rationalizing the critical skill sets of the core architectural principles and alignment to the IT Architecture Body of Knowledge. Ultimately, the focus of IT Architecture for Special Topic in Software Engineering this semester underlies the need for a holistic IT Architecture approach, skills requirements and strategically equips individual roles in the enterprise to realize the business values of a sound technology adoption.

### **References:**

- ★ Lankhorst, M. (2017) Enterprise Architecture at Work: Modelling, Communication and Analysis, Springer.
- ★ Hausman, K.K. & Cook, S.L. (2010) IT Architecture for Dummies, Wiley Publishing.
- ★ Tinsley, T. (2009) Enterprise Architects: Masters of the Unseen City, BookSurge Publishing.
- ★ Perks, C. & Beveridge, T. (2011) Guide to Enterprise IT Architecture, Springer.
- ★ Brooks, F.D. (2001) The Mythical Man-Month: Essays on Software Engineering, U.S: Pearson.

## **BITP 3443 Enterprise Application Development**

### **Learning Outcomes:**

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

1. Point out the knowledge base and skill sets required for enterprise application development.
2. Define a prescriptive technical framework for raising a typical enterprise application.
3. Construct the enterprise application based on the construction map that bridges the gap between designers and developers.
4. Report the project deliverables for each development stage until roll out of the project.

### **Synopsis:**

This course exposes the students to the various process, life cycle stages, patterns, frameworks, tools and technologies required to build a successful enterprise application catering to the business needs of today's enterprises. The students will experience the overall journey of building enterprise application from inception to rollout phase. Enterprise application case study will help the student to point out the required skills sets for developing enterprise application. Enterprise analysis and business modeling is conducted in inception phase using tools such as UML (use case) and prototype. Framework and architecture of typical enterprise application will be defined in the next stage where several tools, framework, technologies and best practices are applied. A construction map will be layout to bridge the gap between designer and developer that deals with layers and layers of component. The student will construct the application using the construction map. Several of testing techniques and tools will be introduced to test the application. Finally, the

project will be roll out and wrap. A report is produced for each deliverables of the project.

### **References:**

- ★ Heffelfinger, D.R. (2017) Java EE 8 Application Development, Packt Publishing.
- ★ Senthilvel, G., Khan, O.M.A. & Qureshi, H.A. (2017) Enterprise Application Architecture with .NET Core, Packt Publishing.
- ★ Daschner, S. (2017) Architecting Modern Java EE Applications: Designing lightweight, business-oriented enterprise applications in the age of cloud, containers, and Java EE 8, Packt Publishing.
- ★ Pradhan, A., Nanjappa, S.B., Nallasamy S.K, Esakimuthu, E. (2010) Raising Enterprise Application, Wiley India Pvt Ltd.

## **BITP 3453 Mobile Application Development**

### **Learning Outcomes:**

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

1. Understand the concept of mobile application development.
2. Differentiate the architecture of hybrid versus native development.
3. Develop a mobile application for a specific platform/operating system.

### **Synopsis:**

This course exposes the students to the development of mobile application development focusing on Android. Students are to be exposed to the introduction of native and hybrid application development as well as multi-threading programming and client server interaction via web services.

### **References:**

- ★ Horton, B. (2019) Android Programming with Kotlin for Beginners: Build Android apps starting from zero programming experience with the new Kotlin programming language, Packt Publishing.
- ★ Griffiths, D. & Griffiths, D. (2019) Head First Kotlin: A Brain-Friendly Guide, O'Reilly Media.
- ★ Phillips, B., Stewart, C. & Marsicano, K. (2018) Android Programming, 4<sup>th</sup> Ed., Big Nerd Ranch Guides.
- ★ Wickham, M. (2018) Practical Android, 1<sup>st</sup> Ed., Apress.
- ★ Smyth, N. (2018) Android Studio 3.0 Development Essentials - Android 8 Edition, 1<sup>st</sup> Ed., CreateSpace Independent Publishing Platform.
- ★ Buckett, C. (2012) Dart in Action, 1<sup>st</sup> Ed., Manning Publications.
- ★ Payne, R. (2019) Beginning App Development with Flutter, 1<sup>st</sup> Ed., Apress.

## **BITP 3473 Formal Methods**

### **Learning Outcomes:**

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

1. Demonstrate the understanding of the usage of formal method and its function in general.
2. Apply formal method for specification, analysis and design.
3. Assess analysis techniques for appropriate usage.

### **Synopsis:**

This course covers the fundamentals of formal methods and can be used as a breadth course for Software Engineering. We will examine techniques for modeling and formally analysing computing systems and will consider applications in software and hardware. Students will learn the fundamentals of classical logic, induction and recursion, program semantics, rewriting, reactive systems, temporal logic, model checking, and abstraction. We will examine how these methods can be used to build reliable software and hardware.

### **References:**

- ★ Boulanger, J.L (Ed.) (2012) Formal Methods: Industrial Used from Model to the Code, Wiley.
- ★ Gupta, R., Le Guernic, P., Shukla, S.K. & Talpin, J.P (2012) Formal Methods and Models for System Design: A system level perspective. Springer-Verlag.
- ★ Ebbinghaus, H.D., Flum, J. & Thomas, W. (1994) Mathematical Logic, 2<sup>nd</sup> Ed., Springer-Verlag.
- ★ Kaufmann, M., Manolios, P. & Moore, J.S. (2006) Computer-Aided Reasoning: An Approach, Springer-Verlag New York Inc.
- ★ Clarke, E.C., Grumberg, O. & Peled, D.A. (2018) Model Checking, MIT Press.

## **BITP 3483 Geographic Information System**

### **Learning Outcomes:**

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

1. Apply the concepts, issues, techniques and various Geographic Information System (GIS) applications.
2. Solve information system problems based on the GIS language technique.
3. Evaluate the issues in GIS management based on the information from various resources.

### **Synopsis:**

This course will introduce students to GIS. GIS is a computer based data processing tool that is used to manage, analyse and visualise spatial data. It can be considered as advanced database. Students will explore some of the GIS applications in the area of electronic government, resources management, disaster management, businesses, banking and insurance industries. Students must be familiar with traditional methods of identifying and describing locations using paper maps. The students will begin by examining the geographic basics of mapping and examine the processes in which spatial data can be recorded, captured, stored, processed using computers. Next, the students will introduce the methods used in spatial analysis.

### **References:**

- ★ Gina Clemmer, G. (2018) The GIS 20: Essential Skills, 3<sup>rd</sup> Ed., Esri Press.
- ★ De By, R.A. et al. (2000) Principles of Geographic Information Systems, ITC Educational Text Book Series.
- ★ Chang, K. (2016) Introduction to Geographic Information Systems, 8<sup>th</sup> Ed., McGraw-Hill

- ★ Bolstad P., (2016) GIS Fundamentals: A First Text on Geographic Information Systems, 5<sup>th</sup> Ed.
- ★ Law, M. & Collins, A. (2016) Getting to know ArcGIS Pro, 1<sup>st</sup> Ed., Esri Press.
- ★ Gorr, W.L., & Kurland, K.S. (2017) GIS Tutorial 1 for ArcGIS Pro, a platform wookbook, Esri Press.
- ★ Brewer, C.A. (2016) Designing Better Maps: A guide for GIS users, 2<sup>nd</sup> Ed., Esri Press.

## **BITP 3513 Advanced Database Programming**

### **Learning Outcomes:**

- By the end of the course, students should be able to:
1. Construct form modules that consist of various component for database interaction with Graphical User Interface (GUI) control.
  2. Demonstrate the form and report modules that are created using the web server and the three-tier environment.
  3. Propose triggers that consist of various event such as function addition, transaction processing control and user interaction control.

### **Synopsis:**

This course gives opportunity for the students to develop, test and deploy interactive Internet applications using Oracle Forms and Reports Developer software. Working in a GUI environment, students will learn how to create and customize forms with user input items such as check boxes, list items and radio groups. Students will also learn how to modify data access by creating event-related triggers and display Forms elements and data in multiple canvases and windows. The course is designed to prepare the students for the corresponding Oracle Certified Professional (OCP) certification.

### **References:**

- ★ Oracle Forms and Reports 12.2.1, available on: <https://docs.oracle.com/middleware/1221/formsandreports/docs.htm>
- ★ Brumm, B. (2019) Beginning Oracle SQL for Oracle Database 18c: From Novice to Professional, Apress.
- ★ Palinski, J. (2003) Oracle 9i Developer Developing Web Application with Forms Builder, Thomson Learning.
- ★ Koletzke, P. & Mills, D. (2006) Oracle JDeveloper 10g for Forms & PL/SQL Developers: A Guide to Web Development with Oracle ADF (Osborne ORACLE Press Series).
- ★ Lulushi, A. (2002) Oracle Forms Developers Handbook, Pearson Professional.

## **BITP 3523 Advanced Database Administration**

### **Learning Outcomes:**

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

1. Build form modules that consist of various component for database interaction with Graphical User Interface, GUI, control.
2. Demonstrate the form and report modules that are created using the web server and the three-tier environment.
3. Create triggers that consist of various event such as function addition, transaction processing control and user interaction control.

### **Synopsis:**

This course gives opportunity for the students to develop, test and deploy interactive Internet applications using Oracle forms and Reports Developer software. Working in a GUI environment, student will learn how to create and customise forms with user input items such as check boxes, list items, and radio groups. Student will also learn how to modify data access by creating event-related triggers and display forms elements and data in multiple canvases and windows. This course is designed to prepare the students for the corresponding Oracle Certified Professional, OCP, certification.

### **References:**

- ★ Oracle Forms and Reports 12.2.1, available on: <https://docs.oracle.com/middleware/1221/formsandreports/docs.htm>.
- ★ Palinski, J. (2003) Oracle 9i Developer Developing Web Application with Forms Builder, Thomson Learning.
- ★ Koletzke, P. & Mills, D. (2006) Oracle JDeveloper 10g for Forms & PL/SQL Developers: A Guide to Web Development with Oracle ADF

Developers: A Guide to Web Development with Oracle ADF, Osborne ORACLE Press Series.

- ★ Lejk, M., Fowler, M. & Riccardi, G. (2004) Database Management: AND Oracle 9i Programming, a Primer: With Website Development Applications, Addison Wesley.
- ★ Lulushi, A. (2002) Oracle Forms Developers Handbook, Pearson Professional.

## BITS 2513 Internet Technology

### Learning Outcomes:

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

1. Discover the concepts of computer networks, core components of the Internet infrastructure, protocols and services.
2. Select the system requirements aligned with the current technology advancement.
3. Display the ability to configure and implement the Internet basics, clients and networking.

### Synopsis:

Internet has become a major tool in doing business today. The evolutions of web-based knowledge also contribute to this phenomenon. This course is purposely designed to provide an introduction to Internet technologies. This course covers a wide range of material about the Internet and the major areas of study include basic concepts and client, networking, programming on the Internet, security and Internet applications.

### References:

- ★ Andrews, J. & Beck, W. (2004) i-Net Guide to the Internet, 3<sup>rd</sup> Ed., Cengage Learning.
- ★ Comer, D. E. (2014) Computer Networks and Internets, Global Ed., Pearson.
- ★ Williams, B. & Swayer, S. (2010) Using Information Technology 9e Complete Edition, Career Education.
- ★ Geoffrey, S. (2010) Information Technology: Skills, Concepts and Problem Solving, 2<sup>nd</sup> Ed., Kendall Hunt Publishing.
- ★ Md. Shah, W., Yusof, R., Selamat, S. R., Zakaria, N. A. & Harum, N. (2013) Internet Technology Lab Module. UTeM Press.

## **BITS 3343 Fibre Optic**

### **Learning Outcomes:**

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

1. Illustrate the concept of fibre optic basic theories.
2. Assemble the suitable cable and network devices for fibre optic.
3. Demonstrate a network design using fibre optic cable and appropriate tools.

### **Synopsis:**

This course covers basic and advanced applications that will relate to optical fibre in common usage in the network. Specific mechanism will be discussed from operating principles of optical communication device to fibre optic communication technology.

### **References:**

- ★ Harum, N., Md Shah, W. & Ramly, M. (2018) Fiber Optic Lab Companion, UTeM Press.
- ★ Keiser, G. E. (2010) Fiber Optic Communications, 4<sup>th</sup> Ed., Mc-Graw Hill.
- ★ Hecht, J. (2005) Understanding Fiber Optic, 5<sup>th</sup> Ed., Prentice Hall.
- ★ Senor, J. M. (2009) Optical Fiber Communications: Principles and Practice, 3<sup>rd</sup> Ed., Prentice Hall.
- ★ Agrawal, G. P. (2010) Fiber Optic Communication Systems, 4<sup>th</sup> Ed., John Wiley & Sons.
- ★ Ramaswami, R., Sivarajan, K. N. & Sasaki, G. H. (2009) Optical Networks: A Practical Perspective, 3<sup>rd</sup> Ed., Morgan Kaufmann.
- ★ Hayes, J. (2010) Fiber Optics Technician's Manual, 4<sup>th</sup> Ed., Delmar Cengage Learning.
- ★ Kumar, S. & Deen, M. J. (2012) Fiber Optic Communications: Fundamental and Applications, Wiley.

## **BITS 3443 Digital Forensics**

### **Learning Outcomes:**

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

1. Describe the concept of digital forensic and investigation.
2. Distinguish multi-operating system nuance with respect to digital forensics.
3. Manipulate the process of forensic investigation using particular tools by referring the digital forensic investigation methodology.

### **Synopsis:**

This course is an introduction to digital forensics reflects the need for conducting professional computing investigations. Students will explore general computer investigations, security issues with operating systems, setup and maintenance of a digital forensics lab, use of computer forensics tools, digital evidence controls, data acquisition and analysis, e-mail investigations and the preparation of investigation report.

### **References:**

- ★ Sammons, J. (2012) The Basics of Digital Forensics: The Primer for Getting Started in Digital Forensics, Syngress.
- ★ Altheide, C. & Carvey, H. (2011) Digital Forensics with Open Source Tools, Syngress.
- ★ Casey, E. (2011) Digital Evidence and Computer Crime, 3<sup>rd</sup> Ed., Academic Press.
- ★ Nelson, B., Phillips, A., Enfinger, F. & Steuart, C. (2015) Guide to Computer Forensics and Investigations, 5<sup>th</sup> Ed., Thomson Course Technology.
- ★ Britz, M. T. (2013) The Basics of Digital Forensics: The Primer for Getting Started in Digital Forensics, 3<sup>rd</sup> Ed., Prentice Hall.

## **BITS 3453 Malware Analysis and Digital Investigation**

### **Learning Outcomes:**

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

1. Identify the malware taxonomy and malware intrusion.
2. Analyse the behaviour of malware.
3. Manipulate the digital forensics investigation framework in malware intrusion.

### **Synopsis:**

This course presents the malware issues that cover malware taxonomy, malware intrusion and malware behaviour. The course also offers the malware intrusion investigation based on digital forensic investigation framework. The goal is to provide an understanding of digital forensic investigation process implemented in malware intrusion crime. This course will use lectures, homework assignments, case studies and group projects to promote learning. Students are expected to be active participants, asking questions, challenging instructors and generally taking responsibility for their own learning.

### **References:**

- ★ Monnappa, K. A. (2018) Learning Malware Analysis: Explore the Concepts, Tools and Techniques to Analyze and Investigate Windows Malware, Packt Publishing Ltd.
- ★ Elisan, C. C. (2015) Advanced Malware Analysis, McGraw Hill Professional.
- ★ Ligh, M. H., Case, A., Levy, J. & Walters, A. (2014) The Art of Memory Forensics: Detecting Malware and Threats in Windows, Linux and Mac Memory, 1<sup>st</sup> Ed., Wiley.
- ★ Sikorski, M. & Andrew, H. (2012) Practical Malware Analysis: The Hands-On Guide to

Dissecting Malicious Software, 1<sup>st</sup> Ed., No Starch Press.

- ★ Casey, E. (2011) Handbook of Computer Crime Investigation: Forensic Tools and Technology, 3<sup>th</sup> Ed., Elsevier Academic Press.
- ★ Skoudis, E. (2008) Malware: Fighting Malicious Code, Prentice Hall.

## **BITS 3473 Digital Watermarking and Steganography**

### **Learning Outcomes:**

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

1. Determine and explain basic techniques of digital watermarking for embedding an ownership code and steganography (hiding information) to do digital image and audio processing.
2. Manipulate the types of digital watermarking techniques based on characteristics as well as applications using media editing platform.
3. Differentiate the mechanism of current and future intellectual property management and protection of multimedia.

### **Synopsis:**

This course provide students with the basic concept of digital watermarking, steganography including knowledge on fingerprint and biometric. It covers the introduction to the theoretical background on above-mentioned area and development as well as implementation of fundamental techniques in digital watermarking and steganography. In the lab session, students will be introduced to selected editing software for embedding information in the media. Students will be trained for practical embedding on text, image, audio and video. Students will be exposed to teamwork, leadership, problem-solving and communication skills while performing their various tasks and project.

### **References:**

- ★ Shih, F. Y. (2017) Digital Watermarking and Steganography: Fundamentals and Techniques, CRC Press.
- ★ Su, Q. & Press, T. U. (2017) Color Image Watermarking: Algorithms and Technologies,

De Gruyter.

- ★ Stim, R. (2016) Patent, Copyright and Trademark: An Intellectual Property Desk Reference, NOLO.
- ★ Wang, C., Gerdes, R. M., Guan, Y. & Kasera, S. K. (2016) Digital Fingerprinting, Springer Science+Business Media New York.
- ★ Fridrich, J. (2015) Steganography in Digital Media, Cambridge University Press.
- ★ Ngo, D. C. L., Teoh, A. B. J. & Hu, J. (2015) Biometric Security, Cambridge Scholars Publisher.
- ★ Lin, Y. & Abdulla, W. H. (2014) Audio Watermark: A Comprehensive Foundation Using MATLAB, Springer International Publishing.

## **BLHL 1012 Bahasa Melayu Komunikasi**

### **Learning Outcomes:**

Di akhir kursus ini, pelajar berupaya untuk:

1. Membaca dan menjelaskan maksud ayat serta petikan mudah.
2. Bertutur dalam situasi tertentu dengan menggunakan ayat mudah.
3. Menyusun idea dalam penulisan karangan pendek.

### **Synopsis:**

Kursus ini memperkenalkan susuk tatabahasa bahasa Melayu. Pelajar didekah dengan aspek-aspek nahu, klausula, terminologi, binaan ayat, penjodoh bilangan dan unsur sastera. Diharapkan pelajar dapat menguasai pertuturan atau berkomunikasi dengan baik dan mudah berdasarkan kemampuan pelajar asing.

### **References:**

- ★ Othman, Z., Hashim, R. & Abdullah, R. (2012) Modul Komunikasi Bahasa Melayu Antarabangsa, UKM Press.
- ★ Daftar Ejaan Rumi Bahasa Malaysia, Dewan Bahasa dan Pustaka (2016).
- ★ Daftar Istilah Majlis Bahasa Indonesia-Malaysia, Dewan Bahasa dan Pustaka (2005).
- ★ Yong, C. C., Mashudi, R. & Abd Rahman, M. (2012) Bahasa Kebangsaan untuk Pelajar Luar Negara (Malay Language for International Students), Pearson Malaysia Sdn. Bhd.

## **BLHH 1032 Industrial Psychology and Organisation**

### **Learning Outcomes:**

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

1. Menghubung kait proses persekitaran dan teori di tempat kerja dalam dunia organisasi dan perindustrian.
2. Mempamerkan ciri-ciri kepimpinan dalam aktiviti tugas kumpulan.
3. Memberi tindak balas terhadap peranan dan tanggungjawab sebagai seorang bakal pekerja di dalam organisasi.

### **Synopsis:**

Kursus ini memberi pendedahan kepada aspek psikologi dalam dunia pekerjaan dalam sektor industri serta permasalahan yang berhubung dengan tingkah laku dalam organisasi. Terdapat beberapa topik yang dibincangkan termasuk isu-isu semasa dalam psikologi di tempat kerja, perancangan personel, tekanan di tempat kerja dan psikologi kejuruteraan.

### **References:**

- ★ Abu Bakar, A. (2013) Psikologi Industri dan Pengurusan Sumber Manusia, UMT Press.
- ★ Schultz & Schultz, D. (2010) Psychology and Work Today, Prentice Hall.
- ★ Yukl, G. (2010) Leadership in Organizations, Pearson.

**Learning Outcomes:**

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

1. Membincangkan prinsip-prinsip asas kemahiran komunikasi organisasi untuk tujuan interaksi dalam organisasi.
2. Memberikan maklum balas mengenai isu-isu yang berkaitan dengan pembangunan kemahiran komunikasi organisasi.
3. Menyelesaikan masalah komunikasi organisasi berdasarkan konteks persekitaran organisasi sebenar.

**Synopsis:**

Kursus ini akan mendedahkan pelajar kepada idea-idea asas organisasi dalam komunikasi umum dan organisasi. Selain itu, pelajar juga akan dapat mengetahui teori-teori yang berkaitan dengan komunikasi organisasi dan memahami elemen-elemen penting dalam organisasi seperti kepimpinan, komunikasi rasmi dan komunikasi tidak rasmi. Selain itu, pelajar akan menyedari halangan, penyelesaian masalah dan membuat keputusan kemahiran dalam komunikasi organisasi. Akhirnya, pelajar akan mempunyai pemahaman iklim organisasi, hubungan teknologi dan organisasi dan komunikasi korporat dalam organisasi.

**References:**

- ★ Miller, K. (2012) Organizational Communication, 4<sup>rd</sup> Ed., Cengage Learning, Inc.
- ★ Mumby, D. K. (2018) Organizational Communication: A Critical Approach, 2<sup>nd</sup> Ed., SAGE Publications, Inc.

**Learning Outcomes:**

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

1. Mengenalpasti konsep-konsep asas dalam proses perundingan menggunakan amalan komunikasi berkesan.
2. Membuat kesimpulan terhadap teknik-teknik perundingan yang terbaik berdasarkan pendekatan teori yang pelbagai.
3. Menyelesaikan isu-isu perundingan berdasarkan teknik-teknik kemahiran perundingan yang berkesan berdasarkan pelbagai situasi.

**Synopsis:**

Kursus ini akan membincangkan konsep asas perundingan, teknik berfikiran secara kritis dan kreatif, teknik komunikasi berkesan dan teknik mendengar dan menyayal secara berkesan. Pelajar turut didedahkan dengan pengetahuan dan kemahiran yang diperlukan untuk menjalankan dan meguruskan proses perundingan pelbagai secara berkesan. Selain itu, kemahiran berfikir secara kritis dan kreatif, serta kemahiran komunikasi berkesan yang diperlukan bagi menjalankan proses perundingan juga akan dibincangkan.

**References:**

- ★ Lemiwki, R., Barry, B. & Saunders, D. (2016) Essentials of Negotiation, McGraw Hill Education.
- ★ Fisher, R & Ury (2011) Getting to YES: Negotiating Agreement without Giving In, 3<sup>rd</sup> Ed., Penguin Books.
- ★ Covey, S. (2013) The 3<sup>rd</sup> Alternative: Solving Life's Most Difficult Problems, Free Press.

## **BLHC 4032 Pemikiran Kritis dan Kreatif**

### **Learning Outcomes:**

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

1. Mengenalpasti prinsip asas kemahiran pemikiran kritis dan kreatif dalam menyelesaikan masalah harian.
2. Memberi maklum balas terhadap isu berkaitan perkembangan kemahiran pemikiran kritis dan kreatif.
3. Menyelesaikan masalah kajian kes terhadap isu semasa yang berkaitan bidang pengajian mereka.
4. Menganalisis kehendak pasaran akan datang dan mencadangkan penyelesaian berdasarkan produk.

### **Synopsis:**

Kursus ini direka untuk memberi pendedahan kepada pelajar tentang prinsip-prinsip asas dalam pemikiran kritis dan kreatif. Pelajar akan mengaplikasikan kaedah pemikiran kritis dan kreatif dalam penyelesaian masalah melalui pendekatan pembelajaran berpusatkan pelajar termasuk pendekatan pembelajaran berdasarkan permasalahan (PBL). Pelajar akan dipandu di dalam projek akhir di mana penganalisaan kehendak pasaran akan datang akan dilaksanakan dan cadangan penyelesaian adalah berasaskan produk keperluan pasaran dari pelbagai perspektif dan pemikiran di luar kotak (out of the box).

### **References:**

- ★ Yahya, A., Abdullah, A. N., Hasan, H. & Raja Abd Rahman, R. R. (2011) Critical and Creative Thinking Module 2, Penerbit UTeM.
- ★ Buzan, T. (2009) Mind Maps for Business: Revolutionise your Business Thinking and Practice, Pearson BBC Active.
- ★ Claxton, G. & Lucas, B. (2007) The Creative Thinking Plan, BBC Books.
- ★ Fisher, A. (2011) Critical Thinking: An Introduction, Cambridge University Press.

## **BENT 4733 Digital Signal Processing**

### **Learning Outcomes:**

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

1. Explain the basic theory in digital signal processing.
2. Apply the concepts of digital signal processing such as discrete-time signals and systems and spectrum representations.
3. Analyse the impulse response, signal flow graph using difference equations, stability determination using z-transform.

### **Synopsis:**

This course consists of topics: Introduction to DSP, discrete-time signals and systems, spectrum of representation of discrete-time signals, discrete Fourier transform, difference equations and discrete-time systems, z-transform and its applications, analysis and design of digital filters and random signal processing.

### **References:**

- ★ Mitra, S. K. (2011) Digital Signal Processing: A Computer Based Approach, 4<sup>th</sup> Ed., Mc Graw Hill.
- ★ Oppenheim, S. (2010) Discrete-time Signal Processing, 3<sup>rd</sup> Ed., Prentice-Hall.
- ★ Proakis, M. (2007) Digital Signal Processing: Principles, Algorithms and Applications, 4<sup>th</sup> Ed., Prentice-Hall.
- ★ Ifeachor, E. C. & Jervis B. W. (2002) Digital Signal Processing: A Practical Approach, 2<sup>nd</sup> Ed., Prentice Hall.
- ★ Poornachandra, S. & Sasikala, B. (2010) Digital Signal Processing, 3<sup>th</sup> Ed., McGraw-Hill.

## **BTMT 3323 Contemporary Business Management**

### **Learning Outcomes:**

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

1. Demonstrate an understanding of technology ventures approaches in advancing the digitisation, disruptive and converging technologies for societal and economic progress in the 4<sup>th</sup> Industrial Revolution.
2. Critically appraise the impact of digitisation, disruptive and converging technologies on business strategies and competitive advantage in the Industry 4.0.
3. Identify strategic challenges, formulate strategic solutions and propose new and disruptive business models to take advantage of technology-enabled business opportunities of Industry 4.0.

### **Synopsis:**

This course is designed to develop business talent for the future world of production. Students will be guided through the process of creating, analysing, planning and implementing disruptive and innovative business models with its operational strategies pertaining to the Industry 4.0. Students will be exposed to the theoretical and hands-on exercises of Industry 4.0 business management to enable them to apprehend the concept of the 4<sup>th</sup> Industrial Revolution.

Topics discuss will include the emergence of business model 4.0, coopetition and co-innovation, 4.0 products and services, Industrial Internet of Things (IIoT), cyber-physical system, digital business transformation, digital enterprise, smart factory, intelligent robots and intelligent production and manufacturing. In the hands-on exercises, students will use visualisation software as well as stationary modules or simulators.

Students are expected to acquire the skills and knowledge to utilise the Industry 4.0 model in the current and future global marketplace. These would enhance their professional career as technopreneur,

executive or consultant in the field of Industry 4.0 transformation. By end of this course, students should be able to define, discuss, understand and apply the business strategies and tactics learnt in the context of Industry 4.0.

### **References:**

- ★ Schwab, K. (2017) *The Fourth Industrial Revolution*, Crown Business.
- ★ Der Pijl, P. V., Lokitz, J. & Solomon, L. K. (2016) *Design a Better Business: New Tools, Skills, and Mindset for Strategy and Innovation*, Wiley.
- ★ Ross, A. (2016) *The Industries of the Future*, Simon & Schuster.
- ★ Brynjolfsson, E. & McAfee, A. (2016) *The Second Machine Age: Work, Progress and Prosperity in a Time of Brilliant Technologists*, W. W. Norton & Company.
- ★ Satell, G. (2017) *Mapping Innovation: A Playbook for Navigating a Disruptive Age*, McGraw-Hill Education.
- ★ Swaminathan, A. & Meffert, J. (2017) *Digital Scale: The Playbook You Need to Transform Your Company*, Wiley.
- ★ Kirchmer, M. (2017) *High Performance Through Business Process Management: Strategy Execution in a Digital World*, 3<sup>rd</sup> Ed., Springer.
- ★ Chernev, A. (2017) *The Business Model: How to Develop New Products, Create Market Value and Make the Competition Irrelevant*, Cerebellum Press.
- ★ Slama, D., Puhlmann, F., Morrish, J. & Bhatnagar, R. M. (2015) *Enterprise IoT: Strategies and Best Practices for Connected Products and Services*, O'Reilly Media.
- ★ Franz, C., ieger, T. & Herrmann, A. (2017) *Evolving Business Models: How CEOs Transform Traditional Companies (Management for Professionals)*, Springer.
- ★ Devezas, T., Leitão, J. & Sarygulov, A. (2017) *Industry 4.0: Entrepreneurship and Structural Change in the New Digital Landscape*, Springer.

## **BLHL 1112 Arabic I**

### **Learning Outcomes:**

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

1. Demonstrate the ability to converse in Arabic with correct and accurate pronunciation and respond to it accordingly.
2. Identify basic vocabulary and demonstrate writing skills.
3. Interpret the information in the simple text and construct sentences with correct grammar.

### **Synopsis:**

This course is designed for students who do not have prior knowledge in Arabic. It provides students with the foundation of knowledge to enable them to understand and respond in the oral and written forms. This course encompasses the listening, speaking, reading and writing components. This course aims to help students to obtain enough exposure of the Arabic language skills. The basic grammar introduced is related to the language used daily in conversation. Particular care is also taken to ensure the development of verbal communication and written skills in Arabic.

### **References:**

- ★ Omar, M. H. & Ibrahim, A. R. (2016) *Mari Belajar Bahasa Arab*, UTeM Press.
- ★ Mezah, C. R. & Mohammad, N. (2011) *Kosa Kata Arab: Teori dan Aplikasi*, UPM Press.
- ★ Mohd, A. G. (2010) *Kamus Mini: Asas Perbualan dan Perkataan*, Awfal Enterprise.
- ★ Noorli, M. N. (2012) *Bahasa Arab Mudah*, AE Books Enterprise.
- ★ Othman, A. (2009) *Cara Mudah Belajar Bahasa Arab (Buku 3)*, Al-Hidayah Publication.
- ★ Ragy, I. (2009) *Learn Arabic the Fast and Fun Way*, Barron's Educational Series.

## **BLHL 1212 Mandarin I**

### **Learning Outcomes:**

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

1. Demonstrate the ability to converse in Mandarin with correct and accurate pronunciation and respond to it accordingly.
2. Construct sentences with correct grammar and demonstrate writing skills.
3. Interpret the information in the simple text.

### **Synopsis:**

This course is designed for students who do not have prior knowledge in Mandarin. It provides students with the foundation of knowledge to enable them to understand and respond in the oral and written forms. This course encompasses the listening, speaking, reading and writing components. This course aims to help students to obtain enough exposure of the Mandarin phonetics (Han Yu Pin Yin). The basic grammar introduced is related to the language used daily by the Chinese. Particular care is also taken to ensure the development of verbal communication and written skills in Mandarin.

### **References:**

- ★ Cheong, K. M. (2015) *Mari Belajar Mandarin*, UTeM Press.
- ★ Ang, L. H. & Ooi, B. L. (2012) *Basic Chinese for Everyone*, Pelanduk Publications.
- ★ Wu, J. & Bai, L. (2011) *Chinese Grammar Step by Step*, Cengage Learning Asia Pte Ltd.
- ★ Soh, W. N., Chia, T. H., San, L. & Mok, S. S. (2009) *Conversational Mandarin Chinese for Non-native Speakers*, Xueer publisher.
- ★ Alison, L. M. (2006) *The first 100 Chinese Characters*, Tuttle Publishing.

## **BLHL 1312 Japanese I**

### **Learning Outcomes:**

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

1. Demonstrate the ability to converse in Japanese with correct and accurate pronunciation and respond to it accordingly.
2. Identify basic vocabulary and demonstrate writing skills.
3. Interpret the information in the simple text and construct sentences with correct grammar.

### **Synopsis:**

This course is designed for students who do not have any background in Japanese. It provides students with the knowledge to enable them to understand and communicate in the oral and written forms. This course encompasses the listening, speaking, reading and writing components. The grammar introduced is related to the language used daily by the Japanese. In addition, two types of Japanese language writing systems; Hiragana and Katakana are also introduced. Students are also exposed to elementary reading materials.

### **References:**

- ★ Tokyo International Japanese Language Institute (2012) Minna No Nihongo Shokyu 1 (Beginners 1) Sentence Pattern Workbook, 3A Network.
- ★ Tokyo International Japanese Language Institute (2012) Minna No Nihongo shokyu 1 (Beginners 1) Translation & Grammatical Notes, 3A Network.
- ★ The Association For Overseas Technical Scholarship (AOTS) (2009) Shin Nihongo No Kiso 1: English Translation, Asian Edition.
- ★ The Association for Japanese-Language Teaching (2009) Shin Nihongo No Kiso 1: English Translation, Asian Edition.

## **BLHL 1412 German I**

### **Learning Outcomes:**

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

1. Demonstrate the ability to converse in basic German with correct and accurate pronunciation and respond to it accordingly.
2. Identify basic vocabulary and demonstrate writing skills.
3. Interpret the information in the simple text and construct sentences with correct grammar.

### **Synopsis:**

This course is designed for students who do not have prior knowledge in German. It provides students with the foundation of knowledge to enable them to understand and respond in the oral and written forms. This course encompasses the listening, speaking, reading and writing components. This course aims to help students to obtain basic exposure of the German phonetics. The basic grammar introduced is related to the language used daily by the German. Particular care is also taken to ensure the development of verbal communication and written skills in German.

### **References:**

- ★ Aufderstrasse, H., Bock, H., Gerdes M., Gerdes, M., Mueller, J. & Mueller, H. (2003) Themen 1 Aktuel, Hueber Publishing.
- ★ Funk, H. E. (2002) Genil Deutsch als Fremdsprache fuer Jugendliche, Langenscheidt.

## **BLHL 1612 Korean Language**

### **Learning Outcomes:**

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

1. Demonstrate the ability to converse in Korean with correct and accurate pronunciation and respond to it accordingly.
2. Identify basic vocabulary and demonstrate writing skills.
3. Interpret the information in the simple text and construct sentences with correct grammar.

### **Synopsis:**

This course is designed for students who do not have prior knowledge in Korean. It provides students with the foundation of knowledge to enable them to understand and respond in the oral and written forms. This course encompasses the listening, speaking, reading and writing components. This course aims to help students to obtain basic knowledge about Korean language. The basic grammar introduced is related to the language used daily by the Korean. Particular care is also taken to ensure the development of verbal communication and written skills in Korean.

### **References:**

- ★ Park, K. (2015) Essential Korean Vocabulary, Tuttle Publishing.
- ★ Seok, P. J. & Chaemin, S. (2015) Korean: Language 1 for Beginners, Institut Terjemahan & Buku Malaysia.
- ★ Hong, J. & Lee, W. (2008) Korean for Dummies, Wiley Publishing Inc.

## **DITI 3113 Artificial Intelligence**

### **Learning Outcomes:**

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

1. Explain the definition of Artificial Intelligence, AI, and its techniques.
2. Classify the types of AI techniques.
3. Follow the AI techniques in problem solving.

### **Synopsis:**

Students are exposed to the basic and branches of AI such as the various search techniques, knowledge representation and reasoning, inference techniques, learning from experience and planning. Besides, some applications of AI including game playing, expert systems, and machine learning will be introduced.

### **References:**

- ★ Ertal, W. (2017) Introduction to Artificial Intelligence, Springer.
- ★ Kopec, D., Shetty, S. & Pileggi, C. (2014) Artificial Intelligence Problems and Their Solutions (Computer Science), T Mercury Learning & Information.
- ★ Negnevitsky, M. (2011) Artificial Intelligence: A Guide to Intelligent System, 3<sup>rd</sup> Ed., Addison Wesley.
- ★ Russel, S. & Norvig, P. (2010) Artificial Intelligence: A Modern Approach, 3<sup>rd</sup> Ed., Prentice Hall.
- ★ Luger, G. F. (2015) Artificial Intelligence: A Guide to Intelligent System, 5<sup>th</sup> Ed., Pearson Education.

## DITI 3123 Logic Programming

### Learning Outcomes:

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

1. Use the elements and concepts of logic and procedural programming.
2. Reproduce the Prolong algorithm for solving logic programming problems.
3. Construct basic programs using logic programming structures.

### Synopsis:

Students are exposed to the basic of logic programming which include the syntax and semantics of Prolog software. Elements such as predicate logic, rules, queries, recursive rule, controlling backtracking, unification and input output are the main concern while conducting this course. This course use Prolog software to develop a simple computer solution of some AI applications such as problem solving and expert systems.

### References:

- ★ Bratko, I. (2012) Prolog Programming for Artificial Intelligence, Addison Wesley.
- ★ Bramer, M., Bos, J. & Striegnitz, K. (2013) Logic Programming with Prolog, Springer.
- ★ Scott, R. (2010) A Guide to Artificial Intelligence with Visual Prolog, Outskirts Press.
- ★ O'Keeffe, R. (2009) The Craft of Prolog, The MIT Press.
- ★ Kaushik, S. (2007) Logic and Prolog Programming, New Age International.

## DITI 3513 Artificial Intelligence in Robotic and Automation

### Learning Outcomes:

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

1. Apply fundamental concepts related to robotics.
2. Demonstrate solution steps in solving robotics using Artificial Intelligence, AI, concepts.
3. Construct robotic programming for human function simulation.

### Synopsis:

This course covers introduction of robotics, which includes principles behind the AI approach to robotics and to program an artificially intelligent robot for applications involving sensing, navigation and uncertainty. The students also will be exposed to the principles of automation and mobile robotics programming as well as health and safety issues. Ethical aspects and the future of AI in robotics and automation are also covered.

### References:

- ★ Murphy, R. R. (2000) Introduction to AI Robotics, The MIT Press.
- ★ Thrun, S., Burgard, W. & Fox, D. (2005) Probabilistic Robotics, The MIT Press.
- ★ McComb, G. (2011) Robot Builder's Bonanza, McGraw-Hill.
- ★ Budiharto, W. & Nalwan, P. A. (2013), Membuat Sendiri Robot Humanoid, Synergy Media.
- ★ Budiharto, W. (2013) Membuat Sendiri Robot, Synergy Media.

## DITM 3133 Digital Audio and Video Technology

### Learning Outcomes:

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

1. Apply the knowledge and principles of digital audio and video.
2. Display advanced skills in using audio video software and hardware including the digital media composition techniques as well as develop the idea and to edit digital audio video products in a group.
3. Organise audio video software and hardware in the conducive production environment with the latest and relevance information.

### Synopsis:

This course is an extension from Multimedia System. It will give details and valuable insight of the wonderful world of digital audio and video. Throughout the semester, candidates will be introducing to topics on digital audio and video hardware, the art of audio production, recording techniques, video production, indoor and outdoor shooting procedure, implementing special effects, and storyboarding. Besides, various tools for editing, practical as well as composing digital audio and video will be taught during the course.

### References:

- ★ Zakaria, M. H., Maksom, Z., Saifudin, W. S. N. & Abdullah, M. H. L. (2012) Digital Audio and Video Technology: Classroom in a book, UTeM Press.
- ★ Abdullah, M. H. L., Zakaria, M. H. & Saifudin, W. S. N. (2010) Digital Audio and Video Technology: Lab Module, UTeM Press.
- ★ Pohlmann, K. C. (2010) Principles of Digital Audio, 6<sup>th</sup> Ed., McGraw-Hill Professional.
- ★ Mitra, A. (2010) Digital Video: Moving Images and Computers, Facts on File Publishing.
- ★ Adobe Creative Team (2010) Adobe Premiere Pro CS5 Classroom in a Book, Adobe Press.

## DITM 3143 Digital Media Design

### Learning Outcomes:

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

1. Explain the concepts, techniques, basic desktop publishing production process and graphic design theory.
2. Produce desktop publishing output by combining the use of text, colour selection, layout objects, graphics and image according to current needs.
3. Practice to the theory and applied skill in production design and layout of the interface and all areas of design, printing and publishing.

### Synopsis:

This course provides students with the concepts, techniques and desktop publishing process used in the industry. It emphasizes the use of text (typography), colour selection, paragraph, objects, graphics and images composition. At the end of the course, students can master the principles in generating design cases and printing for desktop publishing by using the appropriate software and tools.

### References:

- ★ Lake, S. & Bean, K. (2007) Digital Desktop Publishing: the Business of Technology, Div. of Thomson Learning.
- ★ Smith, C. (2010) Adobe Creative Team, Adobe InDesign CS5 Classroom in a Book, Adobe Press.
- ★ Aquent Creative Team & AGI Creative Team (2009) Illustrator CS4 Digital Classroom, John Wiley & Sons.
- ★ Smith, J., Aquent Creative Team & AGI Creative Team (2008) Photoshop CS4 Digital Classroom, John Wiley & Sons.
- ★ Cohen, S. (2009) From Design into Print: Preparing Graphics and Text for Professional Printing, Peachpit Press.

## DITM 3313 User Interface Design

### Learning Outcomes:

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

1. Follow the concept of user interface design components in interactive system.
2. Apply problem solving skill by integrating design components in user interface design.
3. Demonstrate lifelong learning by applying interaction design understanding in other related courses.

### Synopsis:

This course is preparing the students with the knowledge about concepts and user interface design techniques. Students will be exposed to the user interface design processes for interactive information system. This includes user scenario development, user object model, navigation model and components design.

### References:

- ★ Rogers, Y., Sharp, H. & Preece, J. (2011) Interaction Design: Beyond Human: Computer Interaction, 3<sup>rd</sup> Ed., Wiley.
- ★ Schlatter, T. & Levinson, D. (2013) Visual Usability: Principles and Practices for Designing Digital Application, Morgan Kaufman.
- ★ Cohen, S. (2009) From Design into Print: Preparing Graphics and Text for Professional Printing, Peachpit Press.
- ★ Shneiderman, B. & Plaisant, C. (2010) Designing the User interface: Strategy for Effective Human-Computer Interaction, 5<sup>th</sup> Ed., Pearson.

## DITM 3323 Introduction to Computer Games Programming

### Learning Outcomes:

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

1. Describe the fundamental of 2D/3D game development based on the latest technology.
2. Develop 2D/3D games using the latest technology.
3. Practice problem solving skills in developing a 2D/3D computer games project.

### Synopsis:

This course aims to equip the students with basic concepts and techniques in 2D/3D game development. Student will be provided with some exposures on computer game theories, game design and game logic. This includes teaching the students on how to develop game engine. Student will also expose related 2D game development such as 2D/3D graphic integration and content development. At the end of the course, student will be able to develop simple 2D/3D game based on the specified game genre.

### References:

- ★ Adams, E. (2014) Fundamentals of Game Design, 3<sup>rd</sup> Ed., New Riders.
- ★ Castledine, E. (2018) HTML5 Games: Novice to Ninja, SitePoint Pty. Ltd.
- ★ Gibson, J. (2015) Introduction to Game Design, Prototyping and Development, Addison-Wesley by Pearson.
- ★ Shankar, A. R. (2012) Pro HTML5 Games: Build Your Own Games Using HTML5 and JavaScript, Apress.
- ★ Harris, A. (2019) Game Programming: The L Line, The Express Line to Learning, John Wiley & Sons.

## DITP 2313 Database Programming

### Learning Outcomes:

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

1. Explain features, syntax, purpose and benefits of SQL and PL/SQL to developer and database administrator.
2. Construct control structures, records and cursors in PL/SQL blocks.
3. Demonstrate the usage of procedures, functions, packages and database triggers, and manipulation of large object sizes.

### Synopsis:

This course is based on the syllabus of two modules in Oracle certification (Oracle Certified Associate). The first part of the lesson introduces the concepts of relational database and SQL syntax. This includes topics related to Oracle database architecture, its ability, constraints in data integrity and other database objects such as views, index, sequence and synonyms. The second part of the lesson explains the objectives, functions and benefits of PL/SQL in developing database applications. This includes the development, implementation and maintenance of procedures, functions, packages and database triggers. The lesson also explains the use of stored procedures and triggers in retrieving data and executing complex business rules to enhance data integrity. Students will be introduced to Oracle packages, subprograms and PL/SQL triggers.

### References:

- ★ Pataballa, N. & Nathan, P. (2001) Introduction to Oracle 9i: SQL, Volume 1 and Volume 2, Oracle University.
- ★ Pataballa, N. & Nathan, P. (2001) Introduction to Oracle 9i: Program with PL/SQL, Volume 1 and Volume 2, Oracle University.
- ★ Feuerstein, S. & Pribyl, B. (2014) Oracle PL/SQL Programming, 6<sup>th</sup> Ed., O'Reilly Media.
- ★ Morris-Murphy, L. L. (2003) Oracle 9i: SQL with Introduction to PL/SQL, Course Technology.
- ★ Urman, S. (2002) PL/SQL Programming, McGraw-Hill, Oracle Press.

## DITP 3213 Software Engineering

### Learning Outcomes:

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

1. Describe the concept of software engineering for system development.
2. Explain concepts of software process and model in the system development.
3. Prepare formal specifications and software modelling in a collaborative team environment for the purpose of system development.

### Synopsis:

This course introduces the basic concept of software engineering to the student. It covers all the software development process which includes analysis, requirement, design, implementation and testing. This course also covers support areas such as project management and quality management. This course exposes the student to structured approach and object-oriented approach using UML.

### References:

- ★ Pfleeger, S. L. & Atlee, J. M. (2013) Software Engineering Theory and Practice, 4<sup>th</sup> Ed., Pearson.
- ★ Sommerville, I. (2015) Software Engineering, 10<sup>th</sup> International Ed., Addison-Wesley.
- ★ Pressman, R. S. & Maxim, B. R. (2015) Software Engineering: A Practitioner's Approach, 8<sup>th</sup> International Ed., McGraw-Hill.
- ★ Dennis, A. & Wixom, B.H. (2015) System Analysis Design with UML, 5<sup>th</sup> Ed., Wiley.
- ★ Seidl, M. & Scholz, M. (2015) UML@Classroom: An Introduction to Object-Oriented Modeling (Undergraduate Topics in Computer Science), Springer.

## DITP 3253 Software Requirements and Design

### Learning Outcomes:

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

1. Analyse software requirement and design the software using object-oriented approach and UML.
2. Model software analysis, software requirement and software design using object-oriented approach supported by case tool, StarUML.
3. Write formal software specification document and software design document.

### Synopsis:

This course introduces the student to the object-oriented approach using UML such as object-oriented concept, object oriented application development life cycle, UML history and notation, comparison between OOAD and SDM and introduction to object and class. The topics includes the use-case, use case diagram and use case description. Student will learn to identify the uses cases, actors, perform analysis modeling using dynamic or static diagram such as activity diagram, sequence diagram, collaboration diagram and class diagram.

### References:

- ★ Sommerville, I. (2016) Software Engineering, 10<sup>th</sup> Ed., Addison Wesley.
- ★ Fowler, M. (2003) UML Distilled: A Brief Guide to the Standard Object Modeling Language, 3<sup>rd</sup> Ed., Addison Wesley.
- ★ Horstman, C. (2006) Object Oriented Design and Patterns, John Wiley & Sons.
- ★ Shalloway, A. & Trott, J. (2005) Design Patterns Explained: A New Perspective

on Object-Oriented Design, 2<sup>nd</sup> Ed., Addison-Wesley Professional.

- ★ Arlow, J. & Neustadt, I. () UML 2 and the Unified Process: Practical Object-Oriented Analysis and Design, 2<sup>nd</sup> Ed., Addison-Wesley Professional.
- ★ Pohl, K. & Rupp, C. (2015) Requirement Engineering Fundamentals, 2<sup>nd</sup> Ed., Rocky Nook.
- ★ Kendall, K. E. & Kendall, J. E. (2014) System Analysis and Design, 9<sup>th</sup> Ed., Pearson.
- ★ Lamsweerde, A. (2009) Requirements Engineering, Wiley Education International.

## DITP 3263 Software Verification and Validation

### Learning Outcomes:

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

1. Analyse the suitable software testing techniques that can be applied.
2. Construct software test plan and test cases for the proposed project.
3. Report software test result and quality assurance plan using IEEE standard.

### Synopsis:

This course gives exposure to the students on the principles and terms of verification and validation. It will focus on the process of designing testing plan, test requirements and test cases to satisfy the quality of a software product. The study will also cover software quality assurance activities such as quality requirement, quality criteria, software metrics, software quality model, software evaluation, review, audit and accreditation.

### References:

- ★ Roman, A. (2018) A Study Guide to the ISTQB®Foundation Level, Syllabus-Test Techniques and Sample Mock Exams, Springer.
- ★ Galin, D. (2018) Software Quality: Concepts and Practice: Concepts and Practice, 1<sup>st</sup> Ed., Wiley.
- ★ Klaus O., et al. (2018) ISTQB Certified Tester Foundation Level Syllabus Version 2018, International Software Testing Qualification Board.
- ★ Debbabi, M., Hassaine, F., Jarraya, Y., Soeanu, A. & Alawneh, L. (2010) Verification and Validation in Systems Engineering, Springer.
- ★ Khan, R. A., Mustafa, K. & Ahson, S. I. (2006) Software Quality: Concepts and Practices, Alpha Science.

## DITP 3273 Strategic Information System Planning

### Learning Outcomes:

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

1. Explain the business organisation components, environment, challenges and objectives of Information Systems, IS, investment.
2. Discuss the IS and strategic planning tools used in planning process.
3. Propose IS strategically appropriate for small enterprise.

### Synopsis:

This course will introduce the importance of IS to enhance organisation competitiveness. Therefore, the students will be equipped with various types of IS and a strategic planning process, tools and techniques to propose business information systems that strategically differentiate and competitive than other organisations. Then students will work to integrate organisation's business objectives with IS that support its business direction and creating competitive advantage to the organisation.

### References:

- ★ Wallace, P. (2015) Introduction to Information Systems, 2<sup>nd</sup> Ed., Pearson.
- ★ Laudon, K. C. & Laudon, J. P. (2011) Essentials of Business Information Systems, 9<sup>th</sup> Ed., Pearson.
- ★ Laudon, K. C. & Laudon, J. P. (2012) Management Information Systems: Managing The Digital Firm, 12<sup>th</sup> Ed., Pearson.

## DITP 3313 Database Design

### Learning Outcomes:

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

1. Describe the characteristics of advanced database systems.
2. Construct data model using relational and non-relational data modelling techniques.
3. Explain database design issues in specialised applications such as DSS and e-commerce.
4. Apply the best approach in building a database system that meets the functional requirements with the required quality of service.

### Synopsis:

This course discusses the fundamental principles and design issues related to non-relational data models like object-oriented and object-relational data model together with the enhanced features of ERD. Advanced database concepts and applications such as data warehouse, OLAP, data mining, database in electronic commerce and distributed databases systems also will be discussed.

### References:

- ★ Coronel, C., Morris, S. & Rob, P. (2016) Database Systems: Design, Implementation and Management, 12<sup>th</sup> Ed., Course Technology.
- ★ Connolly, T. & Begg, C. (2015) Database Systems: A practical Approach to Design, Implementation and Management, 6<sup>th</sup> Ed., Pearson Education.
- ★ Elmasri, R. & Navathe, S. (2016) Fundamentals of Database Systems, 7<sup>th</sup> Ed., Addison-Wesley.
- ★ Silberschatz, A., Korth, H. F. & Sudarshan, S. (2010) Database System Concepts, 6<sup>th</sup> Ed., McGraw-Hill.
- ★ Nurul, A. E. (2006) Beginning Database Design: A Practical Approach for Non-relational Database, KUTKM Press.

## DITP 3323 Database Administration

### Learning Outcomes:

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

1. Explain the concept of database administration system.
2. Discuss the roles and responsibilities of a database administrator.
3. Discover the functions, architectures and performance of Database Management Systems, DBMS.

### Synopsis:

This course focus on the roles, issues and responsibilities of database administrators, functions of the DBMS such as storage, access and data updates; database objects; indexes and data integrity; planning and implementation of performance activities, upgrading and user management.

### References:

- ★ Mullins, C. S. (2012) Database Administration: The Complete Guide to DBA Practices and Procedures, 2<sup>nd</sup> Ed., Addison-Wesley.
- ★ Bryla, B. & Loney, K. (2008) Oracle Database 11g DBA Handbook, Oracle Press.
- ★ Matishak, D. & Fuller, M. (2009) Oracle Database 11g: Administration Workshop I, Oracle Corp.
- ★ Fogel, S., et al. (2015) Oracle Database Administrator's, Oracle Corp.

## DITS 3613 Basic Networking

### Learning Outcomes:

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

1. Apply mathematics, terminology and the network model to solve problems.
2. Propose the network specifications and functions when appropriate in accordance with the requirements.
3. Build local area networks using Cisco routers.

### Synopsis:

This course is the beginning of the course of four preparatory course towards professional certification CCNA. This course introduce students to the field of networking. This course focuses on network terminology, network protocol, local area networks, wide area networks, open-system model of the connection, cabling, cabling tools, routing, routing programming, technology, Ethernet, Internet protocol addressing and network standards.

### References:

- ★ Dye, M. A. & Reid, A. D. (2013) Introduction to Networking Companion Guide, Cisco Press.
- ★ Hamid, E., Bahaman, N. & Othman, M. F. I. (2008) Networking Basic, Practical Approach, Venton.
- ★ Cisco Networking Academy (2013) Introduction to Networks v5.0 Lab Manual (Lab Companion), 1<sup>st</sup> Ed., Cisco Press.
- ★ Sequeira, A. & Tiso, J. (2013) Cisco CCNA Routing and Switching 200-120 Foundation Learning Guide Library, Cisco Press.

## DITS 3623 Network Routing

### Learning Outcomes:

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

1. Explain the critical role routers play in enabling communications across multiple Networks.
2. Build a network by applying static and dynamic routing.
3. Apply suitable routing with a classless IP addressing scheme.

### Synopsis:

This course describes the architecture, components, and operation of routers, and explains the principles of routing and routing protocols. Students analyse, configure, verify and troubleshoot the primary routing protocols RIPv1, RIPv2, EIGRP and OSPF. By the end of this course, students will be able to recognise and correct common routing issues and problems. Students complete a basic procedural lab, followed by basic configuration, implementation and troubleshooting labs in each chapter.

### References:

- ★ Cisco Networking Academy (2014) Routing and Switching Essentials Companion Guide, 1<sup>st</sup> Ed., Cisco Pressmat Ariff.
- ★ Bahaman, N., Wan Ghazali, K. & Hamid, E. (2008) Routing Fundamental: Practical Approach, Venton.
- ★ Online Notes, CCNA 2 Exploration, available at: <http://Cisco.Netacad.Net>.
- ★ Misra, S. & Goswami, S. (2016) Network Routing: Fundamentals, Applications and Emerging Technologies, 1<sup>st</sup> Ed., Wiley.
- ★ Empson, S. (2016) CCNA Routing and Switching Portable Command Guide (Icnd1 100-105, Icnd2 200-105, And CCNA 200-125), 4<sup>th</sup> Ed., Cisco Press.
- ★ Odom, W. & Wilkins, S. (2013) CCNA Routing and Switching 200-120 Network Simulator, Pearson It.

## DITS 3633 Implementing and Administering Active Directory

### Learning Outcomes:

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

1. Explain the term, concept and the usage of directory services in various sources.
2. Apply the installation, configuration and management of active directory features.
3. Select and demonstrate active directory administration through the use of security features, group policy and software deployment tools.

### Synopsis:

This course teaches the student on how to implement and configure active directory. Besides, it guides to manage name resolution, schema and replication. The purpose of active directory usage is to manage users, groups, shared folder and network resource, and to administer the user environment and software with group policy. It also will cover monitoring and optimizing active directory.

### References:

- ★ Nahar, H. (2019) Windows 2012, AD Cookbook.
- ★ Nahar, H. (2017) Windows Active Directory: Theory & Practical, FTMK, UTeM.
- ★ Nahar, H. (2016) Learn to Manage Windows Server: Active Directory Infrastructure & Network Services, FTMK, UTeM.
- ★ Krause, J. (2018) Mastering Windows Group Policy: Control and Secure your Active Directory Environment a with Group Policy, Packt Publishing.
- ★ Francis, D. (2017) Mastering Active Directory: Understand the Core Functionalities of Active

Directory Services Using Microsoft Server 2016 and Powershell, Packt Publishing.

- ★ Svidergol, B. & Allen, R. (2013) Active Directory Cookbook: Solutions for Administrators and Developers, 4<sup>th</sup> Ed., O'Reilly Media.
- ★ Holme, D., Ruest, N., Ruest, D. & Kellington, J. (2011) Self-Paced Training Kit (Exam 70-640): Configuring Windows Server 2008 Active Directory, 2<sup>nd</sup> Ed., Microsoft Press.
- ★ Policelli, J. (2009) Active Directory Domain Services 2008 How-To, 1<sup>st</sup> Ed., Sams Publishing.

## **DITS 3643 Implementing and Administering Network Infrastructure**

### **Learning Outcomes:**

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

1. Explain the term, concept and goals for network infrastructure.
2. Organise the installation, configuration and management of network infrastructure elements based on the network environment.
3. Demonstrate the network infrastructure administration through the installing, configuring, monitoring, optimising server and managing network infrastructure.

### **Synopsis:**

This course teaches the student about various file system and disk management function. It also explain the elements of the network infrastructure such as intranet, remote access, remote office, Internet and extranet. Student should able to configuring and managing network infrastructures such as DHCP, DNS, WINS and FTP.

### **References:**

- ★ Nahar, H. (2016) Learn To Manage Your Window Server: Active Directory Infrastructure and Network Services, FTMK, UTeM.
- ★ Staneck, W. R. (2012) Windows Server 2012 Inside Out, Microsoft Press.
- ★ Staneck, W. R. (2012) Microsoft: Windows Server 2012 Pocket Consultant, 1<sup>st</sup> Ed., Microsoft Press.
- ★ Dean, T. (2013) Network+ Guide to Network, 6<sup>th</sup> Ed., Cengage Learning.
- ★ Panek, W. (2012) MCSA Windows Server 2012 R2 Complete Study Guide: Exams 70-410, 70-411 and 70-412, Wiley.
- ★ Manisa, M., et al. (2012) Mastering Windows Server 2012 R2, 1<sup>st</sup> Ed., Wiley.
- ★ Matthews, M. (2008) Microsot Windows Server 2008 A Beginner's Guide, McGraw Hill.



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