BACHELOR OF COMPUTER SCIENCE (DATA ENGINEERING) WITH HONOURS

PROGRAMME SPECIFICATIONS

The Bachelor of Computer Science (Data Engineering) with Honours is offered on a full-time basis. The full-time programme is offered only at the UTM Main Campus in Johor Bahru. The duration of study for the full-time programme is subjected to the student's entry qualifications and lasts between four (4) years to a maximum of six (6) years.

The programme is conducted in an industrial mode based on a 2-Semester per academic session. Generally, students are expected to undertake courses equivalent to between fourteen (14) to eighteen (18) credit hours per semester. Few courses are delivered in Work-based learning (WBL) from Year 1 until Year 3. Students will undergo 1 year industrial training with UTM industry partners in the final year of their study to gain a real-world data engineering professional experiences. Student learning and assessment for WBL courses will be facilitated by university and industry supervisors.

General Information

1.	Awarding Institution	Universiti Teknologi Malaysia
2.	Teaching Institution	Universiti Teknologi Malaysia
3.	Programme Name	Bachelor of Computer Science (Data Engineering) with Honours
4.	Final Award	Bachelor of Computer Science (Data Engineering) with Honours
5.	Programme Code	SECPH
6.	Professional or Statutory Body of Accreditation	Ministry of Higher Education
7.	Language(s) of Instruction	English
8.	Mode of Study (Conventional, distance learning, etc)	2u2i
9.	Mode of operation (Franchise, self-govern, etc)	Self-governing
10.	Study Scheme (Full Time/Part Time)	Full Time
11.	Study Duration	Minimum : 4 yrs (8 semesters) Maximum : 6 yrs (12 Semesters)

Type of Semester	No. of Semesters		No of Weeks/Semester	
	Full Time	Part Time	Full Time	Part Time
Normal	*8-12	-	18	-
Short	-	-	-	-
*2 Semesters Industrial Training				

Course Classification

No	Classification	Credit Hours	Percentage

i.	University Courses
	   a) General
	   b) Language
	   c) Co-Curriculum
	   d) IT Entrepreneurship
	   e) Free Elective
		
		6
		6
		2
		2
		3
			15%

ii.	Core Courses	51	40.1%
iii.	Elective Courses	31	24.4%

iv	Industrial Training
	   a) Professional Development Practice
	   b) Final Year Project Industry
		
		12
		14
			20.5%

	Total	**127**	**100%**

Total Credit Hours to Graduate	**127 credit hours**

Award Requirements

To graduate students MUST:

- Achieve a total of 127 credit hours with minimum CPA of 2.0;
- Pass industrial training at the industry (equivalent to 26 credit hours in two consecutive semesters in Year 4), where:
  - 14 credits will be graded at the first semester under the Professional Development and Practice course codes SECP4114, SECP4124, SECP4134 and Final Year Project Industry course code SECP4112; and
  - 12 credits will be graded at the second semester under the Industrial Integrated Project course codes SECP4223, SECP4235 and SECP4234.
- Pass 5 Professional Skills Certificate (PSC).

Programme Educational Objectives (PEO)

Code	Intended Educational Objectives
PEO1	To produce graduates who are able to obtain employment as computer scientist in local and global industries and organization, where they are competent in applying the fundamental knowledge, computational principles and skills in data engineering and computer science to develop software of increasing size and complexity across different application areas
PEO2	To produce graduates who are able to demonstrate an ability to continue to learn throughout their career (i.e., professional, technical or postgraduate education) which can strengthen their analytical and critical thinking skills to position them to advanced computer science practice and data engineering to contribute to the intellectual foundations of the computer science discipline

PEO3	To produce graduates who are capable to involve with a number of software and data engineering projects that they are proficient in applying theoretical computing and knowledge in analyzing, modelling, designing, developing and evaluating computing solutions.
PEO4	To produce graduates who are able to becoming leaders or technopreneurs in computer science discipline
PEO5	To produce graduates who are able to demonstrate an awareness of professional ethics and social responsibility as computer scientist.

Programme Learning Outcomes (PLO)

After having completed the programme, graduates should be able to demonstrate the following competencies:

Code	Intended Learning Outcomes
PLO1	Ability to acquire the theory and principles of Computer Science and Data Engineering and be equipped with social science and personal development knowledge.
PLO2	Ability to apply theoretical principles of Computer Science and Data Engineering for analyzing, designing and developing computer system and adapt it in practice.
PLO3	Ability to integrate and demonstrate knowledge to solve real world industry problems through data engineering principles and methodologies, and propose IT related business solutions innovatively using current tools and techniques.
PLO4	Ability to present technical solutions to a range of audience.
PLO5	Ability to think critically and creatively to solve problems
PLO6	Ability to continuously integrate Computer Science knowledge and skills through lifelong learning process.
PLO7	Ability to lead and work effectively in a team to achieve common goals.
PLO8	Ability to work effectively and adapt to the new cultures of communities, professional fields and environments.
PLO9	Ability to identify business opportunities and develop entrepreneurship mind-set and skills
PLO10	Ability to behave ethically, responsibly, professionally, and with integrity in carrying out responsibilities and making decisions.

COURSE MENU

YEAR 1: SEMESTER 1			
CODE	COURSE NAME	CREDIT	PRE-REQUSITE
SECP1513	*Technology and Information Systems (WBL)	3	
SECJ1013	Programming Technique I	3	
SECR1013	Digital Logic	3	
SECI1013	Discrete Structure	3	
ULRS1012	Value and Identity	2	
TOTAL CREDIT		14	
CUMULATIVE CREDIT		14	
*Remark for students with MUET Band 1-3 must register UHLB1112			

YEAR1: SEMESTER 2			
CODE	COURSE NAME	CREDIT	PRE-REQUSITE
SECJ1023	Programming Technique II	3	SECJ1013
SECV2113	Human Computer Interaction	3	
SECI1143	Probability and Statistical Data Analysis	3	
SECR1033	Computer Organization and Architecture	3	SECR1013
SECP2613	*System Analysis and Design (WBL)	3	
Local Students			
UHMS1182	Appreciation of Ethics and Civilisation	2	
International Students			
UHLM1012	Malaysia Language for Communication 2	2	
TOTAL CREDIT		17	
CUMULATIVE CREDIT		31	

YEAR 2: SEMESTER 1			
CODE	COURSE NAME	CREDIT	PRE-REQUSITE
SECP2523	*Database (WBL)	3	
SECP3204	*Software Engineering (WBL)	4	
SECJ2013	Data Structure and Algorithm	3	SECJ1023
SECR2213	Network Communication	3	
UKQF2XX2	Service Learning & Community Engagement Courses	2	
Elective Courses – Choose 1 (3 credits)			
SECP3723	*System Development Technology (WBL)	3	
SECP2733	*Multimedia Data Modeling (WBL)	3	
TOTAL CREDIT		18	
CUMULATIVE CREDIT		49	

YEAR 2: SEMESTER 2			
CODE	COURSE NAME	CREDIT	PRE-REQUSITE
SECJ2154	Object-Oriented Programming	4	SECJ1023
SECR2043	Operating System	3	
SECD3761	*Technopreneurship Seminar(WBL)	1	
UHLB2122	Professional Communication Skills 1	2	
UHIS1022	Philosophy and Current Issues	2	
Elective Courses – Choose 2 (6 credits)			
SECP2633	Information Retrieval	3	
SECP2753	Data Mining	3	
SECP3713	Database Administration	3	
TOTAL CREDIT		**18**	
CUMULATIVE CREDIT		**67**	

YEAR 3: SEMESTER 1			
CODE	COURSE NAME	CREDIT	PRE-REQUISITE
SECJ3553	Artificial Intelligence	3	
UHLX1112	Foreign Language for Communication	2	
UHLB3132	Professional Communication Skills 2	2	
XXXXxxxx	Free Elective	3	
Elective Courses – Choose 2 (7 credits)			
SECP3744	*Enterprise Systems Design and Modeling (WBL)	4	
SECP3223	Data Analytic Programming	3	
SECP3623	Database Programming		
TOTAL CREDIT		**17**	
CUMULATIVE CREDIT		**84**	

YEAR 3: SEMESTER 2			
CODE	COURSE NAME	CREDIT	PRE-REQUSITE
ULRS3032	Entrepreneurship and Innovation	2	
Elective Courses – Choose 4 (15 credits)			
SECP3133	High Performance Data Processing	3	
SECP3213	Business Intelligence	3	
SECP3843	*Special Topic in Data Engineering (WBL)		
SECP3823	*Knowledge Management Systems (WBL)	3	
SECP3106	*Application Development (WBL)		
SECP3416	*Management Information Systems (WBL)	6	
TOTAL CREDIT		**17**	
CUMULATIVE CREDIT		**101**	

YEAR 4: SEMESTER 1 (Conducted during internship at selected industry)			
CODE	**COURSE NAME**	**CREDIT**	**PRE-REQUSITE**
SECP4114	Professional Development	4	
SECP4124	Professional Practice	4	
SECP4134	Professional Development and Practice Report	4	
SECP4112	Initial Industry Project Proposal	2	
TOTAL CREDIT		**14**	
CUMULATIVE CREDIT		**115**	

YEAR 4: SEMESTER 2 (Conducted during internship at selected industry)			
CODE	**COURSE NAME**	**CREDIT**	**PRE-REQUSITE**
SECP4223	Industrial Integrated Project Proposal	3	
SECP4235	Industrial Integrated Project Development	5	
SECP4234	Industrial Integrated Project Report	4	
TOTAL CREDIT		**12**	
CUMULATIVE CREDIT		**127**	

*Course is conducted in Work-based learning (WBL)

GRADUATION CHECKLIST

To graduate, students must pass all the stated courses in this checklist. It is the responsibility of the students to ensure that all courses are taken and passed. Students who do not complete any of the course are not allowed to graduate.

NO.	CODE	COURSE	CREDIT EARNED (JKD)	CREDIT COUNTED (JKK)	TICK (√) IF PASSED
COMPUTER SCIENCE COURSES					
CORE COURSES (77 CREDITS)					
1	SECP1513	Technology and Information Systems (WBL)	3	3	
2	SECJ1013	Programming Technique I	3	3	
3	SECR1013	Digital Logic	3	3	
4	SECI1013	Discrete Structure	3	3	
5	SECJ1023	Programming Technique II	3	3	
6	SECV2113	Human Computer Interaction	3	3	
7	SECI1143	Probability & Statistical Data Analysis	3	3	
8	SECR1033	Computer Organization and Architecture	3	3	
9	SECP2613	System Analysis and Design (WBL)	3	3	
10	SECP2523	Database (WBL)	3	3	
11	SECP3204	Software Engineering (WBL)	4	4	
12	SECJ2013	Data Structure and Algorithm	3	3	
13	SECR2213	Network Communication	3	3	
14	SECJ2154	Object Oriented Programming	4	3	
15	SECR2043	Operating Systems	3	3	
16	SECD3761	Technopreneurship Seminar(WBL)	1	3	
17	SECJ3553	Artificial Intelligence	3	3	
18	SECP4114	Professional Development	4	4	
19	SECP4124	Professional Practice	4	4	
20	SECP4134	Professional Development and Practice Report	4	4	
21	SECP4112	Initial Industry Project Proposal	2	2	
22	SECP4223	Industrial Integrated Project Proposal	3	3	
23	SECP4235	Industrial Integrated Project Development	5	5	
24	SECP4234	Industrial Integrated Project Report	4	4	
ELECTIVES COURSES (31 CREDITS) – Choose SECP3744, SECP3106 or SECP3416 and 7 other elective courses from the following list.					
25	SECP3723	System Development Technology (WBL)	3	3	
26	SECP2733	Multimedia Data Modeling (WBL)	3	3	

27	SECP2633	Information Retrieval	3	3	
28	SECP2753	Data Mining	3	3	
29	SECP3133	High Performance Data Processing	3	3	
30	SECP3213	Business Intelligence	3	3	
31	SECP3623	Database Programming	3	3	
32	SECP3713	Database Administration	3	3	
33	SECP3223	Data Analytics Programming	3	3	
34	SECP3744	Enterprise System Design and Modeling (WBL)	4	4	
35	SECP3843	Special Topic in Data Engineering (WBL)	3	3	
36	SECP3823	Knowledge Management Systems (WBL)	3	3	
37	SECP3106	Application Development (WBL)	6	6	
38	SECP3416	Management Information System (WBL)	6	6	
TOTAL CREDIT OF COMPUTER SCIENCE COURSES (a)			**108**	**108**	
UNIVERSITY GENERAL COURSES					
Cluster 1: Malaysia Core Value					
For Malaysian Students					
1	UHIS1022	Philosophy and Current Issues	2	2	
2	UHMS1182	Appreciation of Ethics and Civilisation	2	2	
For International Students					
1	UHIS1022	Philosophy and Current Issues	2	2	
	UHMS1182	Appreciation of Ethics and Civilisation			
2	UHLM1012	Malaysia Language for Communication 2	2	2	
Cluster 2: Value and Identity					
1	ULRS1012	Value and Identity	2	2	
Cluster 3: Global Citizen					
1	UKQF2XX2	Service Learning & Community Engagement Courses	2	2	
Cluster 4: Language Skills					
1	UHLB2122	Professional Communication Skills 1	2	2	
2	UHLB3132	Professional Communication Skills 2	2	2	
3	UHLx1112	Foreign Language for Communication	2	2	
Cluster 5: Enterprising Skills					
1	ULRS3032	Entrepreneurship and Innovation	2	2	

Other University Electives					

1	XXXXxxxx	Free Elective	3	3	
TOTAL CREDIT of UNIVERSITY GENERAL COURSES (c)			19	19	
TOTAL CREDIT TO GRADUATE (a + b + c)			127	127	

OTHER COMPULSORY COURSES – PROFESSIONAL SKILLS CERTIFICATE (PSC)
Students are required to enrol and pass FIVE (5) PSC courses, to be eligible to graduate. Enrol the PSC courses as follows:

COMPULSORY PSC COURSES (Enrol All 3 Courses)

1	GLRB0010	Design Thinking for Entrepreneur	
2	GLRM0010	Talent and Competency Management	
3	GLRL0010	English Communication Skills for Graduating Students (ECS)	

ELECTIVE PSC COURSES (Choose Any 2 Courses only)

1	GLRT0010	Data Analytics for Organization	
2	GLRM0020	Professional Ethics and Integrity	
3	GLRT0020	Construction Measurement (Mechanical & Electrical)	
4	GLRT0030	OSHE for Engineering Industry and Laboratory	
5	GLRT0040	OSHE for Construction Industry and Laboratory Works	
6	GLRT0050	Quality Management for Build Environment and Engineering Professionals	
7	GLRT0060	Safety and Health Officer Introductory Course	
8	GLRT0070	Industrial Machinery and Lubrication	

Or any other elective PSC courses offered by UTM iLeague.

Information on PSC Courses: https://ileague.utm.my/utm-professional-skills-certificate-utm-psc/

Online PSC Registration: https://elearnpsc.utmspace.edu.my/

COURSE SYNOPSIS

CORE COURSES

SECI1013 - Discrete Structure
This course introduces students to the principles and applications of discrete structure in the field of computer science. The topics that are covered in this course are set theory, proof techniques, relations, functions, recurrence relations, counting methods, graph theory, trees and finite automata. At the end of the course, the students should be able to use set theory, relations and functions to solve computer science problems, analyze and solve problems using recurrence relations and counting methods, apply graph theory and trees in real world problems and use deterministic finite automata finite state machines to model electronic devices and problems.

SECJ1013 - Programming Technique I
As a fundamental subject, this course equips the students with theory and practice on problem solving techniques by using the structured approach. Students are required to develop programs using C++ programming language, in order to solve simple to moderate problems. The course covers the following: pre-processor directives, constants and variables, data types, input and output statements, control structures: sequential, selection and loop, built-in and user-defined functions, single and two-dimensional arrays, file operations, pointers, and structured data types.

SECR1013 - Digital Logic
Digital electronics is the foundation of all microprocessor-based systems found in computers, robots, automobiles, and industrial control systems. This course introduces the students to digital electronics and provides a broad overview of many important concepts, components, and tools. Students will get up-to-date coverage of digital fundamentals-from basic concepts to programmable logic devices. Laboratory experiments provide hands-on experience with the simulator software, actual devices and circuits studied in the classroom.

SECP1513 - Technology and Information System
As a primer subject, this course will introduce students to information systems and technology (IS/IT) and the emerging trends of IS/IT, as well as its uses in daily life both at home and at work. Various aspects of IS/IT encompassing hardware, software, network, communications, internet, multimedia, graphics, systems applications, 4IR, cloud computing and data analytics will be introduced. Students will be equipped with basic skills in setting up and handling cloud server via practical work in the virtual guided lab, which shall comprise a major part of the study. At the end of the course, student should be able to distinguish basic IS/IT component and applications.

SECJ1023 - Programming Technique II
Pre-requisite: SECJ1013 Programming Technique I
This course presents the concept of object orientation and object-oriented programming (OOP) techniques using the C++ programming language. It equips the students with the theory and practice on problem solving techniques using the object-oriented approach. It emphasizes on the implementation of the OOP concepts including encapsulations,

associations and inheritance. At the end of this course, students should be able to apply the OOP techniques to solve problems.

SECR1033 - Computer Organization and Architecture
Pre-requisite: SECR1013 Digital Logic
This course was designed to give the understanding of basic concept of computer organization and architecture. Topics covered in this subject will be on computer performance, types of data and the representative, arithmetic manipulation, instruction execution, micro programmable control memory, pipelining, memory, input/output and instruction format. At the end of this course, the student should be able to understand the concept of overall computer component and realize the current technology in computer hardware.

SECI1143 - Probability and Statistical Data Analysis
This course is designed to introduce some statistical techniques as tools to analyse the data. In the beginning the students will be exposed with various forms of data. The data represented by the different types of variables are derived from different sources; daily and industrial activities. The analysis begins with the data representation visually. The course will also explore some methods of parameter estimation from different distributions. Further data analysis is conducted by introducing the hypothesis testing. Some models are employed to fit groups of data. At the end of course the students should be able to apply some statistical models in analyzing data using available software.

SECV2113 - Human Computer Interaction
This course will introduce students to human-computer interaction theories and design processes. The emphasis will be on applied user experience (UX) design. The course will present an iterative evaluation-centered UX lifecycle and will introduce a broader notion of user experience, including usability, usefulness, and emotional impact. The lifecycle should be viewed as template intended to be instantiated in many different ways to match the constraints of a particular development project. The UX lifecycle activities we will cover include contextual inquiry and analysis, requirements extraction, design-informing models, design thinking, ideation, sketching, conceptual design, and formative evaluation.

SECP3204 - Software Engineering (WBL)
This course is designed to give students an introduction to an engineering approach in the development of high-quality software systems. It will discuss the important software engineering concepts in the various types of the common software process models. The students will also learn the concepts and techniques used in each software development phase Including requirements engineering, software design and software testing. This course will also expose the students to utilizing object-oriented method (e.g. UML) and tools in analyzing and designing the software. At the end of this course, students are expected to be able to appreciate most of the common software engineering concepts and techniques as well as producing various software artifacts, documentations, and deliverables. This course requires students to collaborate with a selected industry by building a high-quality software system required by the industry. Students are required to apply the most suitable software approach and techniques learned in the course. The industry involved will also contribute to a portion of assessment for the system build.

SECP2523 - Database (WBL)

This course introduces students to the concept of database system and how it can be used in daily human life and profession. The focus of the course is to equip students with knowledge and skills on important steps and techniques used in developing a database, especially in the conceptual and logical database design phase. Among topics covered are database environment, database design, entity relationship diagram, normalization, and structured query language (SQL). Students are taught to use a database management system (DBMS). Students are required to work on a project, i.e., to develop a database application system, for a selected organization. In this project, students are required to work closely with an organization during the process of analysis, designing and implementing the system and to use the learned techniques, DBMS and development tools in the development process. At the end of the course, students shall be able to apply the knowledge of designing and developing a good database system for a real-world problem.

SECP2613 - System Analysis and Design (WBL)

The main focus of this course is to provide a practical approach of systems analysis and designing skills for the students using a structured methodology. Hence, the course enables students to study information system requirements for any system application within an organizational context. The contents are organized in sequence, which are planning, analysis, designing and implementation phases. From the resulting output of the planning and analysis phase shall enable students to form input, output, and interface design. Students are required to work on a project, i.e., to develop a database application system, for a selected organization. In this project, students are required to work closely with the organization during the process of analysis, designing and implementing the system by using the learned techniques. At the end of the course, students shall be able to apply the knowledge of designing and developing a good information system for a real-world problem.

SECJ2013 - Data Structure and Algorithm
Pre-requisite: SECJ1023 Programming Technique II

This course emphasis on data structure concepts theoretically and practically with detail algorithms for each of data structure. Students will learn abstract data type concepts using class and apply the concept in the implementation of data structures. Apart from it, student will learn recursive concept as a programming style and algorithm efficiency analysis with Big O notation. Various sorting and searching techniques will be discussed as data structure operations. Analysis of each algorithm will also be explained. Further, students will be exposed to linear data structures such as linked lists, stack and queue. Non-linear data structures such as tree and binary search tree will be discussed. Along the course, students should be able to implement and apply the theory and concepts of data structure in the assignments and mini project which are conducted in group.

SECR2213 - Network Communications

This course will discuss the basic topics of computer network and data communications. Based on TCP/IP Internet protocol stack, the course will apply top-down approach. Starts with the important and usage of computer network in commonly applications, the approach will go further detail in the technical aspect in data communication. At the end of this course, students will have an understanding and appreciation of how the network works.

SECR2043 - Operating Systems
Pre-requisite: SECR1033 Computer Organization and Architecture
This course covers introduction to operating systems, which serve as an interface between computer hardware and the user. The operating system is responsible for the management and coordination of processes, sharing of limited resources of the computer. Students will be exposed to the techniques and algorithms that may be applied in designing an operating system. Topics covered include process management, concurrency and synchronization, deadlock, memory management, file management, secondary storage management and I/O management. At the end of the course, the student shall have a clear understanding on the general concepts that underlie of an operating system.

SECJ2154 - Object Oriented Programming
Pre-requisite: SECJ1023 Programming Technique II
This course presents the concepts of object orientation and object-oriented programming techniques using Java programming language. It provides students with a thorough look at the basic constructs of the Java programming language such as its basic data types and operations. It also emphasizes on the use of standard Java APIs that allow students to develop text-based and GUI applications. It will also provide the programming techniques on exception handling and input/output files. At the end of this course, students should be able to use the basic constructs in object-oriented programming and utilize the selected Java APIs.

SECD3761 - Technopreneurship Seminar (WBL)
This 1-credit course will involve, among others, with a series of lectures and/or reviewing entrepreneurship/technopreneurship case studies. Lectures may come from invited guest speakers who are successful entrepreneurs/technopreneurs to share their experiences in setting and building their companies.

SECP4114 - Professional Development
Professional Development refers to the placement of a student at an organization for a minimum of TWENTY (20) weeks. This course aims to provide a platform for the students to adapt with the working environment and gain their knowledge and working experience as well as developing their generic skills in a real career life when performing the tasks given by the organization. The students are jointly evaluated by supervisors from the school and the industry coach from the organization. The evaluation is focusing on students' generic skills.

SECP4124 - Professional Practice
Professional Practice refers to the placement of a student at an organization for a minimum of TWENTY (20) weeks. This course aims to provide a platform for the students to apply their knowledge learned in the university and at the workplace in solving organization's problem with the supervision from organization supervisor. It is also intended for the students to experience handling real project in order to produce graduates who are credible, creative and proficient. The students will be evaluated based on their performance by the organization and faculty's supervisor. The focus of the evaluation is based on work performance.

SECP4134 - Professional Development & Practice Report
In Professional Development & Practice Report, students will be evaluated based on four components; 1) technical report, 2) oral presentation, 3) log book and 4) ethics. The aim of

the technical report is to educate the students in producing technical report and able to explain a specific detail on the tasks that have been done during the training. Students need to follow specified format in writing the technical report and submit it within the predetermined date. The students are required to present their training achievement to Professional Development & Practice supervisors (organization and supervisor). Students need to fill in the log book daily for the purpose of close monitoring between the students and supervisors. Student also needs to practice the good ethical values and work conduct throughout the training.

SECP 4112 - Initial Industry Project Proposal
This course is conducted at the industry where students perform their first semester internship. In this course, students are required to propose an initial idea on an industry project that deem to be suitable to be considered as a final year project which will be fully implemented in the second semester of their fourth year. The content of the proposal shall contain the project title, problem background, project objectives, project scopes, project methodology, and proposed solution. Students will present their initial proposal in a presentation session to a panel of examiners, which consists of a member from the industry and lecturers, to validate the proposed topic.

SECP 4223 - Industry Integrated Project Proposal
This course is also conducted at the industry where students perform their second semester internship. This course is an in-depth work based on the initial idea project proposal from SECP4112. Students are required to identify relevant information pertaining to the project needs and requirements, including identifying the objectives, producing project plan, conducting relevant literature reviews, producing the detail requirements of the project, and producing initial output or relevant designs for the project. These works are reported in a written report for the course. Students are also required to discuss their work with their supervisors (from faculty and industry) and report the progress by filling-up a log book throughout the semester. Students will present their proposal in a presentation session to a panel of examiners. Through this course students should acquire the knowledge and skills in project development methodology and the skill of writing an academic report which will be the basis of a final year industry integrated project report.

SECP4235 - Industrial Integrated Project Development
This course is also conducted at the industry where students perform their second semester internship. The objective for the students is to apply the knowledge learned in the university and boost their skills in implementing and completing the project. This course requires student to fully implement the project according to the specified project requirements as proposed in SECP4223. Based on the user and organization requirements, the students need to implement the full project development lifecycle, including coding, executing and/or integrate modules and testing the developed project. Students are required to present the fully develop system to the user, organization and faculty, where their implemented project will be assessed by a panel of examiners.

SECP4234 - Industry Integrated Project Report
This course is also conducted at the industry where students perform their second semester internship. This course requires student to provide a complete report (i.e., a thesis) based on the project completed in SECP4235. The report shall contain the project requirements in full,

with the objectives, problems and scopes are clearly written, the literature review on relevant topics related to projects, including the project methodology, the project designs, the project implementation and development (coding). It shall reflect the project development in full. and fulfil a project successfully at an organization or industry. The full report is considered as the thesis for the student's final year project. The students are also required to consult their supervisors (industry and faculty) in the process of preparing the report, to ensure it fulfill the project developed and adhere to a written undergraduate thesis standard. The report will be assessed by a panel of examiners.

ELECTIVE COURSES

SECP3723 - System Development Technology (WBL)

This course provides fundamental theories and practices of using basic technologies and components for web application developments. It focuses on standard XHTML/HTML for content creation, CSS for content presentation, JavaScript for client-side logics, PHP a server- side languages for business logics and data processing with MySQL database. Furthermore, the course will enable the student to build more powerful web solutions and advance to dynamic, database-enabled, website/intranet programming and applications using the open- source PHP scripting language and MySQL database. The course broadly comprises the fundamentals of programming with PHP, relational database design and operations with MySQL, and web solutions using PHP and MySQL. This course prepares students for the real web development process. This course will also expose students to industry's experiences for two months in web application development through sharing knowledge sessions and work-based learning activities with selected organization.

SECP2733 - Multimedia Data Modeling

With the explosion of digital multimedia information, large amounts of non-traditional forms of data such as text, image, video and audio are available in digital forms.   Retrieval and storage of multimedia data is different from retrieval and storage of structured data. This subject presents a comprehensive introduction to multimedia databases that stores these types of data. The schematic description of a multimedia information retrieval system will be discussed and how its data are stored and retrieved. Storage structure, indexing, retrieval and analysis of text, image, video and audio will be covered. Various methods of pattern recognition to derive high-level description of the data automatic approaches tom derive semantic annotation of the data will be discussed.

SECP2753 - Data Mining

This subject presents a comprehensive introduction to the understanding of knowledge discovery process in databases. Such methodological understanding is important to tackle projects of all sizes. A number of data mining techniques with its algorithms are explained. Students explore into the application of these techniques in both lab and industry. Students could apply the knowledge learnt to solve real world problems.

SECP3713 - Database Administration

This course prepares students with a firm foundation in basic database administration. It focuses on database administration (DBA) skills in general and specific skills needed to manage an enterprise level, large scale, relational database management system such as Oracle. The course looks at concepts underlying a database administration, among which are the database architecture, installation, configuration and operation. Students will also learn how to create an operational database and properly manage the various structures in an effective and efficient manner including performance monitoring, database security, user management, DBMS tuning and backup/recovery techniques. The lesson topics are reinforced with structured hands-on practices. This course prepares students for the corresponding certification examination (such as Oracle Certified Associate exam). This course will also expose students to industry's experiences in administrating databases through sharing knowledge sessions and work-based learning activities with selected organization.

SECP3744 - Enterprise Systems Design and Modeling (WBL)
This subject presents a data management perspective to the Enterprise Information Systems in a contemporary organization. The course will introduce the importance of enterprise information system management, strategic role of information systems in an organization, enterprise system integration, enterprise value system and value chain modelling, view integration and implementation compromises, and inter versus intra enterprise systems. Students will creatively explore real-world industry case study, identify problems and propose enterprise system solutions. This course will expose students to industry's experiences in Enterprise Systems through sharing knowledge sessions and/or work-based learning activities with selected organization. At the end of the semester, student shall be able to plan and manage the development of enterprise data and information systems

SECP3223 - Data Analytic Programming
This course introduces the use of Python specifically for Data Science. Students will learn about powerful ways to store and manipulate data to do data analysis. The course is divided into two parts. In Part 1, students will learn general programming practices and tools. Part 2 will focus more on data analysis, studying statistical techniques, machine learning and presentation of findings.

SECP3133 - High Performance Data Processing
High performance computing/parallel computing is widely used, nowadays, to execute complex systems and computations of complex problems that need to be solved with minimal time as possible. This course introduces the students to architectures of parallel computers, parallel algorithm design and parallel application programming using MPI and OpenMP packages in either C/C++ or Java programming languages. Student will experience hands-on programming practices on cluster computer.

SECP3213 - Business Intelligence
This course focuses on business intelligence to support a wide variety of management tasks in industry. Students learn to create business intelligence solutions, utilizing data mining methods, and applying artificial intelligence techniques for industrial decision support. Students will involve with industrial partners to apply the knowledge learnt to solve real world problems.

SECP3843 - Special Topic in Data Engineering (WBL)
This course presents research and industrial issues pertaining to data engineering, database systems and technologies. Various topics of interests that are directly or indirectly relevant the data engineering tasks, database systems and technologies are explored and discussed. Participation in forums as well as face to face interaction, with researchers and practitioners on these topics are encouraged. Students should then be able to conduct their own investigation and deductions. This course will also expose students to industry's experiences through sharing knowledge sessions and/or work-based learning activities with selected organization.

SECP3823 - Knowledge Management System (WBL)
This subject covers the basic concept of Knowledge Management including the definition and the importance of knowledge management, types of knowledge management systems

(KMS), such as document management systems, decision support systems and group support systems. It focuses on the development and deployment of KMS. Several knowledge managements tools and technologies are introduced and real case studies are discussed. At the end of the course, students shall be able to develop basic KMS.

SECP3106 - Application Development (WBL)

This course provides fundamental theories and practices of using tools and technologies for developing a basic web-based business application. In general, students will learn basic ASP.NET programming language for developing application programs based on the .NET technology framework. Furthermore, students will also be taught on the overview of data access using ASP.NET with SQL Server database technology. These tools and technologies are used in the development and implementation of a fully functional database-driven web application. At the end of the semester, students should have the skill to apply the taught technologies. This is evident through the preparation and documentation of database systems development and the ability to develop a prototype of an information system using programming languages such as ASP.NET and database management systems such as SQL Server. This course prepares students for the real web development process. This course will also expose students to industry's experiences for two months in developing a mobile application through sharing knowledge sessions and work based learning activities with selected organization.