Bachelor of Engineering (Electrical-Electronics)

BACHELOR OF ENGINEERING (ELECTRICAL-ELECTRONICS) PROGRAMME SPECIFICATIONS

The Bachelor of Engineering (Electrical-Electronics) is offered either on a full-time or part-time basis. The full-time programme is offered only at the UTM Main Campus in Johor Bahru while the part-time programme is offered at various learning centres throughout Malaysia. 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 offered on full-time basis and is based on a 2-Semester per academic session. Generally, students are expected to undertake courses equivalent to between fifteen (15) to eighteen (18) credit hours per semester. Assessment is based on courseworks and final examinations given throughout the semester.

General Information

1. Awarding Institution			Universiti Teknologi Malaysia	
2. Teaching Institution			Universiti Teknologi Malaysia	
3. Programme Name			Bachelor of Engineering (Electrical - Electronics)	
4. Final Award			Bachelor of Engineering (Electrical - Electronics)	
5. Programme Code			SKEL	
6. Professional or Statutory Body of Accreditation			Board of Engineers Malaysia (BEM)	
7. Language(s) of Instruction			English and Bahasa Melayu	
8. Mode of Study (Conventional, distance learning, etc)			Conventional	
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 Maximum : 6 yrs	
Type of Semester	No. of Semesters		No of Weeks/Semester	
	Full Time	Part Time	Full Tme	Part Time
Normal	8	-	18	-
Short	4	-	10	-

Course Classification

Bachelor of Engineering (Electrical - Electronics) - SKEL

No.	Classification	Credit Hours	Percentage
i.	University Courses a) General b) Language c) Entrepreneurship d) Co-Curriculum	23 8 2 3	26.3%

ii.	Faculty/Programme Core	77	56.2%
iii.	Programme Electives	24	17.5%
	Total	**137**	**100%**
A	Engineering Courses a) Lecture/Project/Laboratory b) Workshop/Field/Design Studio c) Industrial Training d) Final Year Project	 89 0 6 6	73.7%
Total Credit Hours for Part A		**101**	
B	Related Courses a) Applied Science/Mathematic/Computer b) Management/Law/Humanities/Ethics/Economy c) Language d) Co-Curriculum	 15 10 8 3	26.3%
Total Credit Hours for Part B		**36**	
Total Credit Hours for Part A and B		**137**	100%
Total Credit Hours to Graduate		**137 credit hours**	

Award Requirements

To graduate, students must:

- Attain a total of not less than 137 credit hours (SKEL) with a minimum CGPA of 2.0.
- Complete Professional Skills Certificates (PSC).

Entry Requirements

The student intake for the Bachelor degree programmes is divided into two

groups, which are first year admission and the direct entry admission to the second and upper year.

Admission Requirement for Candidates from Matriculation Programme, Ministry of Education, Malaysia (MOEM) / 'Sains Asasi' Programme from UM and 'Asasi' Programme from UiTM.

University Entrance Requirement:

- Passed the Sijil Pelajaran Malaysia (SPM) or equivalent with credit (grade C) in Bahasa Melayu/Bahasa Malaysia;
- Passed the MOEM's Matriculation programme or UM's 'Sains Asasi' or UiTM's Asasi programme with PNGK of at least 2.00 and also pass all the specific courses;

Programme Entrance Requirement:

c. Obtained at least a PNGK of 2.80 at the Matriculation/'Asasi' level;

AND

d. Obtained at least a grade of 'B' (3.00) at the Matriculation/'Asasi' level in the following two (2) courses:

   i. Mathematics / Engineering Mathematics

   ii. Physics / Engineering Physics

   OR

   Obtained at least a grade of 'B' (3.00) in Mathematics and 'B+' (3.33) at the Matriculation/'Asasi' level in the following two (2) courses:

   iii. Chemistry / Engineering Chemistry

   iv. Biology

AND

c. Obtained at least a grade of 'C' in the following courses at the SPM level:

   i. Mathematics

   ii. Physics

   OR

   The candidates who satisfy the requirement in part (b.) above using Biology and Chemistry / Engineering Chemistry at the Matriculation level need to obtain at least a grade of 'B+' for the Physics subject at the SPM level.

AND

e. The candidates are not colour blind or disable so as not to hamper from doing practical work.

Admission Requirement for STPM Candidates

University Entrance Requirement:

- Passed the Sijil Pelajaran Malaysia (SPM) or equivalent with good grades;
- Passed with credit in Bahasa Melayu/ Bahasa Malaysia at Sijil Pelajaran Malaysia (SPM) level or equivalent;
- Passed the Sijil Tinggi Pengajian Malaysia (STPM) or equivalent in a single sitting with at least:

  i. Grade '**C**' (NGMP 2.00) in General Studies/ General Paper;

  AND

  ii. Grade '**C**' (NGMP 2.00) in two (2) other courses.

Programme Entrance Requirement:

f. Obtained at least a PNGK of 2.80 at the STPM level

AND

g. Obtained at least a grade of 'B' (NGMP 3.00) at the STPM level in the following two (2) courses:

   i. Mathematics T / Further Mathematics

   ii. Physics

   OR

   Obtained at least a grade of 'B' (NGMP 3.00) in Mathematics T and a grade of 'B+' (NGMP 3.33) at the STPM level in the following two (2) courses:

   i. Chemistry

   ii. Biology

AND

h. Obtained at least a grade of 'C' in the following courses at the Sijil Pelajaran Malaysia (SPM) level:

   i. Mathematics

   ii. Physics

OR

The candidates who satisfy the requirement in part (b.) above using Biology and Chemistry at the STPM level must obtain at least a grade of 'B+' for the Physics subject at the SPM level.

AND

i. The candidates should satisfy Band 2 MUET.

AND

j. The candidates are not colour blind or disable so as not to hamper from doing practical work.

Admission Requirement for Direct Entry (Diploma / Equivalent) Candidates

University Entrance Requirement:

- Passed the Sijil Pelajaran Malaysia (SPM) or equivalent with credit in Bahasa Melayu/ Bahasa Malaysia;
- Passed the Diploma or equivalent programme recognized by the Government and approved by the Senate of UTM

  OR

  Passed the STPM for the year 2015 or before with at least:

  i. Grade '**C**' (NGMP 2.00) in General Studies/ General Paper;

  AND

  ii. Grade '**C**' (NGMP 2.00) in two (2) other courses.

  OR

  Passed the MOEM's Matriculation programme or UM's 'Sains Asasi' or UiTM's Asasi programme for the year 2015 or before with PNGK of at least 2.00 and also pass all the specific courses;

Programme Entrance Requirement:

e. Holds a Diploma in Electrical Engineering (Power / Communication / Electronics / Mechatronics) from UTM or Public Institute of Higher Learning (IPTA) or Private Institute of Higher Learning (IPTS) or equivalent with PNGK of at least 3.00;

AND

f. Obtained at least a grade of 'C' in the following courses at the Sijil Pelajaran Malaysia (SPM) level:

i. Mathematics

ii. Physics

OR

Obtained at least a grade of 'B' at the Diploma level in any of the Mathematics and Physics subjects.

g. Obtained at least a Band 2 in Malaysian University English Test (MUET);

h. The candidates are not colour blind or disable so as not to hamper from doing practical work.

Subject to the University's Academic Regulation, credit exemption will be given to direct entry students after registration according to the grade of the courses obtained and the courses are recognized by the Faculty and University. The actual year of entry and duration of study are subject to credit exemptions approved by the University.

Programme Educational Objectives (PEO)

After having exposed to 3 to 5 years working experience, our graduates should become professionals who demonstrate the following competencies:

Code	Intended Educational Objectives
PEO1	Become Electronic Engineers who are competent, innovative, and productive in addressing customer needs.
PEO2	Grow professionally with proficient soft skills.
PEO3	Demonstrate high standards of ethical conduct, positive attitude, and societal responsibilities.

Programme Learning Outcomes (PLO)

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

Code	Programme Learning Outcomes
PLO1	Ability to apply knowledge of mathematics, science and electrical/electronic engineering to the solution of complex engineering problems.
PLO2	Ability to perform research-based analysis, conduct experiments and interpret data for complex engineering problems.
PLO3	Ability to identify, formulate, conduct research literature to analyse complex engineering problems using engineering knowledge.
PLO4	Ability to apply engineering practice and use modern engineering, and IT tools for complex engineering problem with an understanding the limitations of the technology.
PLO5	Ability to design solutions for complex engineering problems and design systems and processes that meet specified needs with appropriate consideration for public health and safety, culture, society, and environment.
PLO6	Ability to articulate ideas, communicate effectively, in writing and verbally, on complex engineering activities with the engineering community and with society at large.
PLO7	Ability to function effectively as an individual, as a member or as a leader in diverse teams.
PLO8	Ability to recognise the need for, and have the preparation and

	ability to engage in independent and life-long learning in the broadest context of technological change.
PLO9	Ability to comprehend the impact of global and contemporary issues, the role of engineers on society including, health, safety, legal and cultural issues, and the consequent responsibilities relevant to professional engineering practices and engineering problems.
PLO10	Ability to comprehend and evaluate the sustainability and impact of professional engineering work in the solutions of complex engineering problems in societal and environmental contexts.
PLO11	Ability to grasp and execute responsibility professionally and ethically in professional engineering practices.
PLO12	Ability to demonstrate knowledge and understanding of engineering and management principles, and economic decision-making to manage projects in multidisciplinary environments.

PROFESSIONAL SKILLS CERTIFICATE (PSC)

Students are given a chance to enrol in certificate programmes offered by the Centres of Excellence in the University and the School of Professional and Continuing Education (SPACE) during semester breaks

1. How to Get Yourself Employed (HTGYE)
2. ISO 9001: 2008 Quality Management System Requirement (ISO)
3. Occupational Safety and Health Awareness (OSHA)
4. How to Manage Your Personal Finance (HTMYPF)
5. Test of English Communication Skills for Graduating Students (TECS):
   (i) TECS 1001 (Paper I – Oral Interaction)
   (ii) TECS 1002 (Paper II - Writing)

COURSE MENU

Bachelor of Engineering (Electrical - Electronics) - SKEL

YEAR 1: SEMESTER 1			
Code	**Course**	**Credit**	**Pre-requisite**
SKEE 1012	Introduction to Electrical Engineering	2	
SKEE 1013	Electrical Circuit Analysis	3	
SKAB 1022	Introduction to Scientific Engineering	2	
SSCE 1693	Engineering Mathematics I	3	
UHAK 1012	Graduate Success Attributes	2	
ULAB 1122	Academic English Skills	2	
UHAS 1172	Malaysian Dynamics (Local Students)	2	
UHAK 1022	Malaysian Studies (Arts, Custom, and Belief of Malaysians) (International Students)	2	
	TOTAL CREDIT	16	
	CUMULATIVE CREDITS	16	

YEAR 1: SEMESTER 2			
Code	**Course**	**Credit**	**Pre-requisite**
SCSP 1103	C Programming Techniques	3	
SKEE 1073	Electronic Devices and Circuits	3	SKEE 1013
SKEE 1223	Digital Electronics	3	
SSCE 1793	Differential Equations	3	
SKMU 2113	Engineering Science	3	
UICI 1012	Islamic and Asia Civilizations (Local Students)	2	
ULAM 1012	Malay Language for Communication 2 (International Students)		
	TOTAL CREDIT	17	
	CUMULATIVE CREDITS	33	

YEAR 2: SEMESTER 1			
Code	**Course**	**Credit**	**Pre-requisite**
SKEE 2073	Signal and Systems	3	
SKEE 2133	Electronic Instrumentation and Measurement	3	

SKEE 2423	Fundamentals of Electrical Power Systems	3	SKEE 1013
SSCE 1993	Engineering Mathematics II	3	SSCE 1693
ULAB 2122	Advanced Academic English Skills	2	
UKQ# 2##2	Elective of Co-Curricular Service Learning	2	
	TOTAL CREDIT	16	
	CUMULATIVE CREDITS	49	

YEAR 2: SEMESTER 2			
Code	**Course**	**Credit**	**Pre-requisite**
SKEE 2263	Digital Systems	3	SKEE 1223
SKEE 2523	Electromagnetic Field Theory	3	SSCE 1993
SKEE 2742	2nd Year Electronic Design Laboratory	2	
SKEE 3263	Electronic Systems	3	SKEE 1073
SSCE 2193	Engineering Statistics	3	
UHAK 1032	Introduction to Entrepreneurship	2	
	TOTAL CREDIT	16	
	CUMULATIVE CREDITS	65	

YEAR 3: SEMESTER 1			
Code	**Course**	**Credit**	**Pre-requisite**
SKEE 3133	System Modelling and Analysis	3	SKEE 2073
SKEE 3223	Microprocessor	3	SKEE 1223
SKEE 3533	Communication Principles	3	SKEE 2073
SKEE 3732	Common 3rd Year Laboratory	2	
SSCE 2393	Numerical Methods	3	
ULA* 1112	Elective of Foreign Language	2	
UKQ 3001	Extra Curricular Experiential Learning (ExCEL)	1	
	TOTAL CREDIT	17	
	CUMULATIVE CREDITS	82	

YEAR 3: SEMESTER 2			
Code	**Course**	**Credit**	**Pre-requisite**
SKEE 3143	Control System Design	3	SKEE 3133
SKEL 3742	Specialized 3rd Year Laboratory	2	
SKEL 4223	Digital Signal Processing I	3	SKEE 2073

SKE* ***3	Field Core 1	3	
SKE* ***3	Field Core 2	3	
ULAB 3162	English for Professional Purpose	2	
	TOTAL CREDIT	16	
	CUMULATIVE CREDITS	98	

YEAR 3: SEMESTER 3			
Code	**Course**	**Credit**	**Pre-requisite**
SKEL 4926	Practical Training	6	
	TOTAL CREDIT	6	
	CUMULATIVE CREDITS	104	

YEAR 4: SEMESTER 1			
Code	**Course**	**Credit**	**Pre-requisite**
SHAS 4542	Engineering Management	2	
SKEL 4723	Capstone Project	3	
SKEL 4812	Final Year Project Part I	2	
SKE* ***3	Field Elective 1	3	

SKE* ***3	Field Elective 2	3	
SKE* ***3	Field Elective 3	3	
	TOTAL CREDIT	16	
	CUMULATIVE CREDITS	120	

YEAR 4: SEMESTER 2			
Code	**Course**	**Credit**	**Pre-requisite**
SKEE 4012	Professional Engineering Practice	2	
SKEL 4824	Final Year Project Part II	4	SKEL 4812
SKE* ***3	Field Elective 4	3	
SKE* ***3	Field Elective 5	3	
SKE* ***3	Field Elective 6	3	
UICL 2302	Science and Technology Thinking	2	
	TOTAL CREDIT	17	
	CUMULATIVE CREDITS	137	

Elective Courses

1. Electronic System Design

Field Core	Course	Credit	Pre-requisite
SKEL 4273	CAD with HDL	2	SKEE 2263
SKEL 4743	Basic Digital VLSI Design	3	SKEE 2263

Field Elective	Course	Credit	Pre-requisite
SKEL 4283	Analog CMOS IC Design	3	SKEE 1073
SKEL 4293	Advanced Digital Signal Processing	3	SKEL 4223
SKEL 4333	Computer Architecture and Organization	3	SKEE 2263
SKEL 4363	Digital Image Processing	3	SKEL 4223
SKEL 4373	IC Testing Techniques	3	SKEE 2263 SKEL 4283
SKEL 4663	Embedded Processor System	3	SKEE 3223 SCSP 1103
SKEL 4673	DSP Architectures	3	

2. Microelectronics

Field Core	Course	Credit	Pre-requisite
SKEL 3613	Semiconductor Material Engineering	3	SKEE 1073

SKEL 4743	Basic Digital VLSI Design	3	SKEE 2263

Field Elective	Course	Credit	Pre-requisite
SKEI 4233	Nanotechnology and Application	3	
SKEL 4283	Analog CMOS IC Design	3	SKEE 1073
SKEL 4373	IC Testing Techniques	3	SKEE 2263 SKEL 4283
SKEL 4613	Semiconductor Device Engineering	3	SKEL 3613
SKEL 4623	Solid-State Electronic Devices	3	SKEL 3613
SKEL 4633	Microelectronic Device Fabrication and Characterization	3	SKEL 3613
SKEL 4643	Nanoelectronics	3	
SKEL 4653	Modelling and Simulation of Microelectronic Devices	3	

3. Computer Engineering

Field Core	Course	Credit	Pre-requisite
SKEL 4333	Computer Architecture and Organization	3	SKEE 2263
SKEL 4663	Embedded Processor System	3	SKEE 3223 SCSP 1103

Field Elective	Course	Credit	Pre-requisite
SCSR 2043	Operating System	3	SCSP 1103
SKEL 4213	Software Engineering	3	SCSP 1103
SKEL 4273	CAD with HDL	3	SKEE 2263
SKEL 4343	Information Security	3	SKEE 1223
SKEL 4673	DSP Architectures	3	SKEE 2263
SKEM 4173	Artificial Intelligence	3	
SKET 3623	Data Communication and Networks	3	SKEE 3533

4. Medical Electronics

Field Core	Course	Credit	Pre-requisite
SKEL 3503	Physiology and Introduction to Medicine	3	
SKEL 4523	Medical Instrumentation	3	SKEE 2133

Field Elective	Course	Credit	Pre-requisite
SKBB 3313	Biomedical Material	3	
SKEL 4273	CAD with HDL	3	SKEE 2263

SKEL 4513	Clinical Engineering	3	SKEL 3503
SKEL 4533	Biomedical Signal Processing	3	SKEL 4223
SKEL 4543	Biosystem Modelling	3	SKEL 3503
SKEL 4553	Medical Imaging	3	SKEL 4223
SKEL 4563	Biosensors and Transducers	3	SKEE 2133
SKEL 4573	Rehabilitation Engineering	3	

5. Telecommunication Engineering

Field Core	Course	Credit	Pre-requisite
SKET 3573	Microwave Engineering	3	SKEE 3533
SKET 3623	Data Communication and Networks	3	SKEE 3533

Field Elective	Course	Credit	Pre-requisite
SKET 3583	Digital Communication System	3	SKEE 3533
SKET 4523	Optical Communication Systems	3	SKEE 3533
SKET 4533	Wireless Communication Systems	3	SKET 3573
SKET 4543	RF Microwave Circuit Design	3	SKET 3573
SKET 4593	Acoustic Engineering	3	SKEE 3533

SKET 4613	Antenna Theory and Design	3	SKET 3573
SKET 4623	Network Programming	3	SKET 3623
SKET 4633	Coding of Multimedia Signals	3	SKET 3583
SKET 4643	Optical Materials and Sensors	3	SKET 4523
SKET 4653	Measurement and Characterization of Optical Devices	3	SKET 4523
SKET 4663	Optical Network	3	SKET 4523

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.

Bachelor of Engineering (Electrical - Electronics) - SKEL

NO.	CODE	COURSE	CREDIT EARNED (JKD)	CREDIT COUNTED (JKK)	TICK (√) IF PASSED
BACHELOR OF ENGINEERING (ELECTRICAL - ELECTRONICS)					
1	SCSP 1103	C Programming Techniques	3	3	
2	SHAS 4542	Engineering Management	2	2	
3	SKEE 1012	Introduction to Electrical Engineering	2	2	
4	SKEE 1013	Electrical Circuit Analysis	3	3	
5	SKEE 1022	Introduction to Scientific Programming	2	2	
6	SKEE 1073	Electronic Devices and Circuits	3	3	
7	SKEE 1223	Digital Electronics	3	3	
8	SKEE 2073	Signal and Systems	3	3	

9	SKEE 2133	Electronic Instrumentation & Measurement	3	3	
10	SKEE 2263	Digital Systems	3	3	
11	SKEE 2423	Fundamentals of Electrical Power Systems	3	3	
12	SKEE 2523	Electromagnetic Field Theory	3	3	
13	SKEE 2742	2nd year Electronic Design Lab	2	2	
14	SKEE 3133	System Modelling & Analysis	3	3	
15	SKEE 3143	Control System Design	3	3	
16	SKEE 3223	Microprocessor	3	3	
17	SKEE 3263	Electronic System	3	3	
18	SKEE 3533	Communication Principles	3	3	
19	SKEE 3732	Common 3rd year Laboratory	2	2	
20	SKEE 4012	Professional Engineering Practice	2	2	
21	SKEL 3742	Specialized 3rd year Laboratory	2	2	
22	SKEL 4223	Digital Signal Processing I	3	3	
23	SKEL 4723	Capstone Project	3	3	

24	SKEL 4812	Final Year Project Part I	2	2	
25	SKEL 4824	Final Year Project Part II	4	4	
26	SKEL 4926	Practical Training	6	HL	
27	SKMU 2113	Engineering Science	3	3	
28	SKE* ***3	Field Core 1	3	3	
29	SKE* ***3	Field Core 2	3	3	
30	SKE* 4**3	Field Elective 1	3	3	
31	SKE* 4**3	Field Elective 2	3	3	
32	SKE* 4**3	Field Elective 3	3	3	
33	SKE* 4**3	Field Elective 4	3	3	
34	SKE* 4**3	Field Elective 5	3	3	
35	SKE* ***3	Field Elective 6	3	3	
		TOTAL CREDIT OF ENGINEERING COURSES (a)	**101**	**95**	
MATHEMATICS COURSES (Faculty of Science)					
1	SSCE 1693	Engineering Mathematics I	3	3	

2	SSCE 1793	Differential Equations	3	3	
3	SSCE 1993	Engineering Mathematics II	3	3	
4	SSCE 2193	Engineering Statistics	3	3	
5	SSCE 2393	Numerical Methods	3	3	
		TOTAL CREDIT OF MATHEMATICS COURSES (b)	**15**	**15**	
UNIVERSITY GENERAL COURSES					
Kluster 1: Penghayatan Falsafah, Nilai & Sejarah (Faculty of Social Sciences and Humanities)					
1	UHAS 1172	Malaysia Dynamics (Local Students)	2	2	
	UHAK 1022	Malaysian Studies (Arts, Custom, and Belief of Malaysians)(International Students)			
2	UICI 1012	Islamic and Asia Civilizations (Local Students)	2	2	
	ULAM 1012	Malay Language for Communication 2 (International Students)			
Kluster 2: Kemahiran Insaniah (Soft Skills)					
1	UHAK 1012	Graduate Success Attributes	2	2	

2	UHAK 1032	Introduction to Entrepreneurship	2	2	
Kluster 3: Perluasan Ilmu					
1	UICL 2302	The Thought of Science and Technology	2	2	
Kluster 4: Kurikulum Pembelajaran Servis					
1	UKQ# 2##2	Co-Curriculum & Service Learning	2	2	
2	UKQ 3001	Extracurricular Experiential Learning	1	1	
Kluster 5: Kemahiran Bahasa (Language Skill) (Language Academy, Faculty of Social Sciences and Humanities)					
1	ULAB 1122	Academic English Skills	2	2	
2	ULAB 2122	Advanced Academic English Skills	2	2	
3	ULAB 3162	English for Professional Purposes	2	2	
4	ULAX 1122	Elective Of Foreign Language	2	2	
		TOTAL CREDIT of UNIVERSITY GENERAL COURSES (c)	**21**	**21**	
		TOTAL CREDIT TO GRADUATE (a + b + c)	**137**	**131**	
OTHER COMPULSORY COURSES					

Professional Skills Certificate (PSC) (UTMSPACE/ School)			
1	GLL 1001	How to Get Your Self Employed	
2	GLL 1029	ISO 9001:2008 Quality Management System Requirement	
3	GLL 1040	Occupational Safety, Health and Environment	
4	GLL 1041	How to Manage Your Personal Finance	
Test of English Communication Skill (TECS) (Language Academy, Faculty of Social Sciences and Humanities)			
1	TECS 1001	Oral Interaction	
2	TECS 1002	Writing	

COURSE SYNOPSIS

SKEE 1012 : INTRODUCTION TO ELECTRICAL ENGINEERING

This course serves as a general introduction to electrical engineering programmes offered by the School of Electrical Engineering (SEE), Universiti Teknologi Malaysia (UTM). Students undertaking this course will be exposed to attributes of electrical engineers from both academic and practical points of view. Soft skills and knowledge that are necessary in the engineering world will be introduced to the students. The students will have a clearer understanding on the responsibilities of electrical engineers to the society. By exploring contemporary issues, the students would be able to suggest sustainable solutions to the mankind and its environment.

SKEE 1013 : ELECTRICAL CIRCUIT ANALYSIS

This course introduces students to the basic laws, methods of analysis and theorems for direct current, DC and alternating current, AC circuit, such as, Ohms Law, Kirchhoff's Current and Voltage Laws, Mesh and Nodal Analysis and Thevenin's and Norton's Theorems. Based on these, the students are expected to be able to solve for variables in any given DC and AC electric circuits. The students also exposed to the steady-state electrical circuit. Afterwards, the relevant concepts in transient circuit analysis for first and second order circuit are taught to the students. With the knowledge learned, the student would be able to apply the basic laws, theorem and methods of analysis for solving completely with confidence various problems in circuit analysis.

SKEE 1022 : INTRODUCTION TO SCIENTIFIC PROGRAMMING

This course introduces the fundamentals of scientific programming languages and techniques used by engineers to solve engineering problems. Students will be introduced to common scientific programming languages and their comparative advantages and disadvantages. Emphasis is placed on fundamentals of programming, program design, verification and visualization. The goal is to provide the students with the skills in scientific computing, tools, techniques that can be used to solve their own engineering problems. Students will learn to implement algorithms using high level programming language (e.g. MATLAB, Mathematica, FORTRAN). The programming skills acquired in this course will allow students to go beyond what is available in pre-packaged analysis tools, and code their own custom data processing, analysis and visualization for any engineering

problem.

SKEE 1073 : ELECTRONIC DEVICES & CIRCUITS
Pre-requisite: SKEE 1013 Electrical Circuit Analysis

This course provides introduction to the basic operating principles and applications of discrete electronic devices and circuits. The course content starts with the fundamental solid-state principles and continues the discussions with the constructions and characteristics of diode, Bipolar Junction Transistor (BJT) and Enhancement Metal Oxide
Semiconductor Field Effect Transistor (E-MOSFET). The application of diodes focuses on the basic power supply circuits whereas the applications of the transistors focus on the small-signal amplifier. The course content ends with an introduction to the operating principles of an ideal operational amplifier (op-amp) and discussion about op-amp circuits, performance and applications. To help the students understand the behaviour of the electronic devices and predict the behaviour of the electronic circuits, this course makes use of Multisim simulation software. The goal of this course is to develop excellent understanding of the devices operation for students to be applied in analogue and digital circuit design.

SKEE 1223 : DIGITAL ELECTRONICS

This course teaches the fundamental principles of digital systems. From the signal concepts and the importance of numbers systems and codes, it then proceeds to logic gates, their relationship to Boolean algebra and the integration of gates to form complex circuits. The course emphasizes on techniques to design, analyse, plan, and implement simple digital systems using gates and MSI circuits. Simulation software Quartus II version 13 will also be introduced to facilitate learning process.

SKEE 2073 : SIGNALS AND SYSTEMS

This course introduces the students the fundamental ideas of signals and system analysis. The signal representations in both time and frequency domains and their effects on systems will be explored. Specifically, the topics covered in the course include basic properties of continuous-time and discrete-time signals, the processing of signals by linear time-invariant (LTI) systems, Fourier series, Fourier and Laplace transforms. Important concepts such as impulse response, frequency response and system transfer functions as well as techniques of filtering and filter design,

modulation, and sampling, are discussed and illustrated. This course will serve as a central building block for students in studying information processing in many engineering fields such as control systems, digital signal processing, communications, circuit design, etc.

SKEE 2133 : ELECTRONIC INSTRUMENTATION AND MEASUREMENT

This course introduces students some of the metrological terminologies used in experimental methods, concept of metrology and its application. The course will also provide understanding the concept electrical measurement quantity using analogue and digital instruments. The interfaces of the instruments with embedded sensors and also the quality of the signals acquired are introduced. Besides that, this course also introduces the type of electrical noise and the ways to reduce noise and interference. Finally, the fundamental principle of transducers, transducer operations, characteristic and functions will be discussed. P&ID diagram also introduces to cover the basic process of the system.

SKEE 2263 : DIGITAL SYSTEMS
Pre-requisite: SKEE 1223 Digital Electronics

This course is a continuation from basic digital logic techniques course. The objective of the course is to introduce students to basic techniques to design and implement complex digital systems It emphasizes on techniques to design, analyse, plan, and implement complex digital systems using programmable logic. To facilitate learning process, computer-aided design (CAD) software is used throughout the course. Actual environment problems and solutions are provided.

SKEE 2423 : FUNDAMENTALS OF ELECTRICAL POWER SYSTEMS
Pre-requisite: SKEE 1013 Electrical Circuit Analysis

This course introduces fundamental concepts of electric machines and power system. Students should be able to identify components of the system from the course and describe their basic operations from the course having electromagnetic and circuit concepts learned in previous fundamental courses. These fundamental concepts are further elaborated in applications of electric machines - transformers, direct current machines, synchronous machines and induction machines, power in ac circuits, three-phase system, power system component modeling and analysis. At the end of the course, the students are expected to critically analyze the power

system comprising of generation, transmission, and distribution components.

SKEE 2523 : ELECTROMAGNETIC FIELD THEORY
Pre-requisite: SSCE 1993 Engineering Mathematics 2

This course introduces students to some major views and theories in the area of electrostatic, magnetostatic and electromagnetic fields. This elementary electromagnetic field theory is summarized in Maxwell's equations. It is assumed that students already have appropriate mathematical background including multivariable calculus and some familiarity with the basic concepts typically covered in an introductory circuit theory course such as resistance, capacitance and inductance.

SKEE 2742 : 2ND YEAR ELECTRONIC DESIGN LABORATORY

All students will attend three second year laboratories which are the Electrotechnic, Basic Electronic and Digital Electronic Labs. The students will attend a three hour lab per week. The students are expected to complete four experiment topics for each lab in a direct of four week duration. Thus, the student will perform altogether 12 experiments in a semester. All experiments in the laboratories are emphasized on design case for a given complex engineering problem or project. The students will use software simulation tools to assist in their design tasks.

SKEE 3133 : SYSTEM MODELING AND ANALYSIS
Pre-requisite: SKEE 2073 Signals & Systems

This course introduces the students to the fundamental ideas and definitions of control systems, open loop and close loop control systems, transfer functions and transient and steady state responses. Students will be taught how to obtain mathematical models of actual physical systems such as electrical, mechanical and electromechanical systems in the transfer function form. Methods of system representation such as block diagram representation and signal flow graphs will be discussed. The students will also be exposed to techniques of analysing control systems performance and stability in time and frequency domains. Finally, an introduction to the design and analysis of control systems using MATLAB will also be given.

SKEE 3143 : CONTROL SYSTEM DESIGN
Pre-requisite: SKEE 3133 System Modeling and Analysis

The course begins with the root locus designs using root locus procedures and MATLAB. Then, PID controller will be designed using root locus approach. The PID controller and lead-lag compensator will be used to improve the transient and steady state performances in time domain using root locus approach. In frequency domain approach, the Bode plot method will be utilised. The lead, lag and lead-lag compensators are used in improving the performance of the control system using the frequency domain approach. Finally, applications of control engineering in various fields will be studied.

SKEE 3223 : MICROPROCESSOR
Pre-requisite: SKEE 1223 Digital Electronics

This course introduces the principles and applications of microprocessors. Topics emphasized are processor architecture, assembly and HLL language and fundamentals of interfacing in a microprocessor-based embedded system. This course emphasizes on the understanding the fundamentals of microprocessor operation, writing coherent and error-free assembly and HLL language programs, and designing basic interfacing circuits. With the knowledge learned, the student would be able to design microprocessor-based systems using assembly language and HLL programs completely with confidence.

SKEE 3263 : ELECTRONIC SYSTEMS
Pre-requisite: SKEE 1073 Electronic Devices and Circuits

This course covers some topics in functional electronic circuits. The circuits are derived from a diverse electronic circuitry that exists in many electronic instrumentation. The function, the behaviour and the characteristics of the functional circuits are analysed. Design examples are presented to guide students with the necessary knowledge of how to design the functional electronic circuits based on certain predetermined specifications.

SKEE 3533 COMMUNICATION PRINCIPLES
Pre-requisite: SKEE 2073 Signals & Systems

This course introduces the students the basic principles of communication system. The fundamental concepts of analogue modulation in particular

amplitude and frequency modulations will be strongly emphasized. Topics include types of modulated waveforms, transmitter and receiver structures, and noise performance. The two most significant limitations on the performance of a communications system; bandwidth and noise will be discussed. The concept of sampling, quantization and line coding techniques in rendering an information signal to be compatible with a digital system are explained prior to the study of coded pulse modulation and pulse code modulation (PCM). The waveforms and spectral analysis of bandpass digital modulations are introduced. The system performance in terms of SNR and bit error rate (BER) will also be covered. Finally, multiplexing, a method to utilize the communication resource efficiently is studied where two main multiplexing techniques will be explored; time-division and frequency-division multiplexing.

SKEE 3732 : COMMON THIRD YEAR LABORATORY

Third Year Laboratory is a required course for third year students in Bachelor of Engineering degree program. This course requires students to conduct twelve experiments in six different laboratories (Basic Power, Basic Machine, Basic Communication, Instrumentation, Microprocessor and Basic Control). The students are grouped into 3-4 students. Each week, they are required to conduct an experiment in the lab within 3 hours. Each group will submit only one short report at the end of each lab session. Each student is assigned to write only one long report based on one experiment that they have conducted for this course. This long report should be submitted within a week after the student performed the assigned experiment.

SKEE 4012 : PROFESSIONAL ENGINEERING PRACTICE

This course introduces and exposes the students to the concepts, theories and the practice of Professional Engineer. It highlights to the students profession of engineering, relevant acts and regulations, engineering code of ethics, engineers' roles and responsibilities, engineering ethics, the impact of the work of engineer on society, and knowledge to cater the needs for sustainable development. In terms of knowledge of accreditation of engineering programme and the internationalization of engineers, elements of EAC and Washington are also discussed. Based on this knowledge, the students will work on projects to analyze real engineering issues and cases, both individually and in groups.

SKEI 4233: NANOTECHNOLOGY AND APPLICATION

In this course, students will be presented with concepts, opportunities and issues related to the nanoscale world. Students will be exposed to the fundamental principles of various equipment used in observing the nanoworld. Next, knowledge related to manipulation, characterization and fabrication of micro and nano objects will be discussed. Then, students will be exposed to the analysis of microfluidic device using finite element analysis (FEA) tool. Finally, students will be exposed to the design and development of microfluidic device using photolithography technique. In the end of the course, students are expected to acquire good understanding and able to analyse the fundamental principles of various equipment used in nanoworld. Students must be able to differentiate between various fundamental working principles used by various nano equipment. Furthermore, students should be able to use FEA and microfabrication tools to design and develop microfluidic device.

SKEL 3503: Physiology and Introduction to Medicine

The course is designed for students with engineering and technical background as an introduction to the basics of anatomy and physiology. The course aims to prepare students with the basic knowledge for better interaction with medical practitioners when performing medical-related work or collaborative research.

SKEL 3613: Semiconductor Material Engineering
Pre-requisite: SKEE 1073 Electronic Devices and Circuits

The purpose of this course is to provide a basis for understanding the characteristics, operation, and limitations of semiconductor devices. In order to gain this understanding, it is essential to have a thorough knowledge of the basic physics and operation of the semiconductor material. The goal of this course is to bring together crystal structures, quantum mechanics, quantum theory for solids, semiconductor material physics, and fundamental of PN structures. All of these basic components are vital for students to understand the operation of present day and future electronic devices.

SKEL 3742 : SPECIALISED 3RD YEAR LAB

3rd Year Laboratory is a required course for third year students in Bachelor

of Engineering degree program. This course requires students to conduct four experiments in four different laboratories related to the chosen elective/specialization. The offered electives are Medical Electronics, Computer, Telecommunication, Microelectronics and Electronic System Design. The laboratories involved are Optical Communication, Microprocessor, Bioelectronics, Digital Communication, Microwave, VLSI and Advanced Electronics labs. This laboratory is conducted as a Project Based approach. The students are grouped into 3-4 students, and they will be given problems to solve that require them to conduct experiments in-lab and out-of-lab within three weeks. The students are required to solve the given project as a team, design suitable experimental procedures and conduct the experiments, present the problem solutions and submit a report following the IEEE standard journal format.

SKEL 4213: Software Engineering
Pre-requisite: SCSP 1103 C Programming Techniques

This course introduces various issues of system and software engineering. Focus is on software development process, program design, collaborative development and testing, which are the fundamental aspects of software engineering. Special emphasis will be given to object-oriented analysis and design (OOAD) as well as the use of UML in the design activities.

SKEL 4223: Digital Signal Processing 1
Pre-requisite: SKEE 2073 Signal and System

This course introduces concepts in digital signal processing. Continuous-time signals and systems will be reviewed. Consecutively, introduction to digital signal processing, basic idea, benefits and applications are presented. Discrete-time signals and systems are described based on signal definition, periodicity, stability, causality, convolution, difference equations, infinite impulse response (IIR), finite impulse response (FIR) and signal flow graphs. Spectrum representation of discrete-time signals will cover sampling theorem, the discrete-time Fourier transform (DTFT) and its properties, and Discrete Fourier Transform (DFT). Another domain presented is Z-transform which consists of topics on derivations, region of convergence, transformation properties, poles and zeros, and inverse z-transform. At the end of the course, analysis and design of digital filters covers filter basics, analog filter prototypes and design of IIR filter and FIR filter.

SKEL 4273: CAD with HDL
Pre-requisite: SKEE 2263 Digital Systems

This course introduces students to the use of computer-aided-design (CAD) tools and hardware description language (HDL) for the design of complex digital systems. Students will use CAD tools to model, design, analyze, synthesize, implement, and verify systems that are specified using the Register Transfer Level (RTL) methodology. Systems verification methods using scripts and testbenches will be introduced. Memory controller design and interfacing will be covered, including the use of RAMs, ROMs, Fifos, and external memory.

SKEL 4283: Analog CMOS IC Design
Pre-requisite: SKEE 1073 Electronic Devices and Circuits

In this course students will be taught the characteristics of MOSFET transistor as a prerequisite of CMOS analog design. It highlights the nonlinearity as an imperfection, which will limit the performance of analog circuits. The course will then proceed to analyse CMOS single ended as well as differential amplifiers. The trademark of analog design, which is the design challenge to fulfil design matrix, will be highlighted. Students will be guided on design principles to meet design specifications with acceptable accuracy. Op Amp design will be addressed towards the end of the course.

SKEL 4293: Advanced Digital Signal Processing
Pre-requisite: SKEL 4223 Digital Signal Processing 1

This course introduces students to advanced concepts in digital signal processing. Random variables are introduced starting with probability, random variables, probability density function and its operation. Random signal principles are presented with, definition of stationarity and ergodicity, correlation and covariance. The power spectrum of signals is defined together with the relationship with to the correlation function. Linear systems with random inputs are defined in terms of autocorrelation and cross correlation function and power spectrum. Optimum filtering techniques such as matched filter and wiener filter are presented with examples of applications. Linear estimation techniques deal with parameter identification and estimation of signals. Linear prediction is used for signal modelling and prediction. Towards the end of the course, signal analysis and representation techniques for time-varying signals are presented such as the short-time Fourier transform, Gabor transform and wavelet transform.

SKEL 4333: Computer Architecture and Organization
Pre-requisite: SKEE 2263 Digital Systems

This course introduces students to the fundamental principles of computer architecture and its organization, emphasizing basic hardware/software components and functional architectures of computers. Computer organization and architecture is concerned with the structure and behavior of the various functional modules of the computer; and how they interact to provide the processing needs of the user. In particular, this course covers computer systems ranging from PCs through multiprocessors with respect to hardware design and instruction set architecture. This includes main memory, caches, central processing unit, and pipelines.

SKEL 4343: Information Security
Pre-requisite: SKEE 1223 Digital Electronics

This course covers the basic principles and techniques used to protect information. The area covered begins with description of the various structure of communication systems in practice today, security architecture and models, issues related to legislation and ethics, and physical security. Consequently, the course will cover areas applicable to electronic and communication security with description of the various types of cipher systems followed by its use in authentication. Finally, applications in telecommunication, network and the internet are demonstrated.

SKEL 4363: Digital Image Processing
Pre-requisite: SKEL 4223 Digital Signal Processing 1

This course introduces students to introductory and intermediate levels of image processing techniques. The area of coverage would be the digitization process as a mean to acquire the digital image. Next would be the enhancement and restoration processes which are to improve the quality of the image for next stage processing. Both the spatial domain and frequency domain approaches will be covered. The next stage would be the segmentation process. This is an important step towards advanced level processing. Finally the topic of compression and coding will be covered. MATLAB will be used extensively for better understanding. By adapting this knowledge, students will be able to develop essential technical skills in solving real-world problems involving image processing with some degree of accuracy.

SKEL 4373: IC Testing Techniques
Pre-requisite: SKEE 2263 Digital Systems; SKEL 4283 Analog CMOS IC Design

This course introduces students to the techniques of testing a digital circuit and designing a testable digital circuit. Several fault models including single stuck-at fault model will be analyzed in details. Fault simulation methods are covered as well in this course. Test pattern generation and design-for-testability are also introduced to students. In order to facilitate learning process, computer-aided design (CAD) software is used throughout the course. Some practical or almost actual environment problems and solutions are provided.

SKEL 4513: Clinical Engineering
Pre-requisite: SKEL 3503 Physiology and Introduction to Medicine

The course introduces major principles of clinical engineering which includes pre-market, market and post-market life-cycle of medical devices, as well as risk and personnel management and also the underlying principles involved in the measurement of certain physiological parameters from some of the complex organ system. Course content focuses on procurement planning, incident investigation, equipment management, productivity, cost effectiveness, information systems integration, and patient safety activities. Students will also be exposed to the related law, standards and regulations for medical devices.

SKEL 4523: Medical Instrumentation
Pre-requisite: SKEE 2133 Electronic Instrumentation and Measurement

This course introduces students to various medical devices that can be found in hospitals and medical institutions. The course also includes discussions on circuits and features for ECG and EEG systems, blood pressure measurements, blood flow measurements, intensive care unit, operating room and elctrosurgery. The function behaviour and characteristics of the biomedical equipment are analysed and the necessary design criteria are discussed. Amplifier design examples are presented to guide students with necessary knowledge of how to control the circuit parameters for behaviours and characteristics so that the circuits can perform to the best of their intended functions.

SKEL 4533: Biomedical Signal Processing
Pre-requisite: SKEL 4223 Digital Signal Processing 1

Manual analyses of biomedical signals has many limitations and very subjective. Therefore, computer analysis of these signals is essential since it can provide accurate and permanent record of diagnosis as well as quantitative measurement. Hence, this course presents methods of digital signal processing for biomedical signals. The course will discuss the fundamental and current approach of biomedical signal processing, the removal of artifacts from biomedical signals, the time domain and frequency domain characterization of the biomedical signals, as well as an introduction to analysis of nonstationary and multicomponent biomedical signals. To complete the biomedical signal processing, an introduction to pattern classification for decision making is also introduced.

SKEL 4543: Bio System Modelling
Pre-requisite: SKEL 3503 Physiology and Introduction to Medicine

The objective of this course is to introduce students to the mathematical model, methods and their biological application, and model of subsystem in human body. This course introduces students to some major views and theories in modeling the subsystem in human body. It is almost impossible to cover all subsystems in human body. As guidance, topics may include: the maintenance of cell homeotasis, excitation and conduction in nerve fibres, synaptic transmission and the neuromuscular junction, properties of muscles, the lung - physical and mechanical aspects of respiration, volume and composition of body fluids - the kidney, the cardiovascular systems, the heart as a pump, neural control of the heart and circulation, and the autonomic nervous system. The course will also provide practice in carrying out a computer simulation and modeling of bio system using Octave/Scilab/Matlab/Simulink/LabView software.

SKEL 4553: Medical Imaging
Pre-requisite: SKEL 4223 Digital Signal Processing 1

This course introduces and exposes the students to the world of medical imaging technologies. Besides the basic principles, signal and systems, the course is also focusing into some medical image processing and analyses on the image obtained from the various imaging modalities such as X- Ray, CT- Scan , MRI, Nuclear Medicine and Ultrasound.

SKEL 4563: Biosensors and Transducers
Pre-requisite: SKEE 2133 Electronic Instrumentation and Measurement

This course is intended to provide a broad introduction to the field of biosensor and transducer in the bioelectronic industry. Fundamental applications of biosensor theory are discussed, including birecognition, transduction and signal acquisition/processing. Design and fabrication of different types of biosensor are explored, ranging from electrochemical to optical system. Discussions on the current state of the art biosensor technology to enable continuation into advanced/future biosensor and the applications in biomedical, bioenvironmental, food safety and biosecurity are given.

SKEL 4573: Rehabilitation Engineering

Principles and applications of rehabilitative assessment and therapy, with special focus on the use of technology to enhance access and consideration of the continuum of rehab care as an optimization problem. Overview of sensorimotor systems, as related to human performance and usability analysis. Models for access engineering and telerehabilitation, with focus on accessible design strategies, telemonitoring and teletherapy, and wireless and augmentative communication technologies. Rehabilitation biomechanics of interfaces for seated mobility and for manipulation tasks. Innovations in assessment and intervention strategies for neurorehabilitation.

SKEL 4613: Semiconductor Device Engineering
Pre-requisite: SKEL 3613 Semiconductor Material Engineering

The objective of this course is to provide students the physical principles underlying semiconductor device operation and the application of these principles to specific devices. Semiconductors form the basis of most modern electronics systems. It also provide a basis for understanding the characteristics, operation, and limitations of semiconductor devices. It is essential to have a thorough knowledge of the physics of the semiconductor material. The goal is to bring together quantum mechanics, the quantum theory of solids, semiconductor material physics and semiconductor device physics. All of these components are vital to the understanding of both the operation of present day devices and any future development in the field.

By adapting this knowledge, students will be able to develop the required technical skills in solving problems that arise from scaling down of semiconductor devices and in designing new device structures to overcome the challenges. This course is a continuation to Semiconductor Material Engineering course and focuses more on basic and advanced devices.

SKEL 4623: Solid-State Electronic Devices
Pre-requisite: SKEL 3613 Semiconductor Material Engineering

The objective of this course is to introduce students to the basics of semiconductor hetero-structures and their applications for electronic devices. This is a continuation of semiconductor material engineering and electronic device courses. In this course, student will be exposed to the basic theories of hetero-structures and their applications for electronic and opto-electronic devices including memories. Specifically, students are exposed to the major types of gallium arsenide (GaAs) and gallium nitride (GaN)-alloyed semiconductors, their physical properties and their structures which make them suitable for electronic and opto-electronic devices. Heterojunction bipolar transistors and modulation-doped field effect transistors will be used to describe the basic characteristics needed for electronic device operation. Then, semiconductor lasers will be used as an example to explain the required characteristics for opto-electronic devices.

SKEL 4633: Microelectronic Device Fabrication and Characterization
Pre-requisite: SKEL 3613 Semiconductor Material Engineering

The objective of this course is to introduce students to the basics of semiconductor fabrication and characterization techniques that are relevant for micro devices in the field of electronics. The course will focus on the basic physical phenomenon and underlying technologies that involved in each fabrication process, with an emphasis on modern silicon-based micro device process flow. For device fabrication, students are exposed to mainly the top-down approaches which include wafer preparation, pattern transfer and doping technologies. For device characterization, basic electrical and optical techniques as well as physical characterization using microscopy technologies will be described.

SKEL 4643: Nanoelectronics

The purpose of this course is to provide a basis for understanding

nanotechnology as enabling sciences and technology in the field of nanoelectronics. In order to gain insight of this course, it is vital to have a thorough knowledge in basic materials science and solid state physics. The goal of this course is to bring together crystal structures, quantum mechanics, fundamental quantum mechanics expression, molecular electronics, quantum wells, 2-D electron gas and high electron mobility transistors (HEMT), resonant tunnelling, ballistic transistors and optical devices. All of these quantum devices are significant for students to comprehend the theoretical and practical challenges in designing such devices in order to prolong the scaling of present devices into the future.

SKEL 4653: Modelling and Simulation of Microelectronic Devices

This course offers an introduction to modeling and simulation of microelectronic devices. Today, computer-aided design has become an affordable and in fact necessary tool for designing contemporary devices.

The purpose of this course is to provide fundamental device modeling techniques with emphasis on the silicon metal-oxide-semiconductor field-effect-transistor (MOSFET). Examples on modeling carbon-based materials such as carbon nanotubes and graphene are also explored. There are discussions on crystal structure of solid, quantum system, carrier transport properties in 3D, 2D and 1D system. The goal of this course is to provide fundamental concepts and basic tools for transistor-level simulation that can be enhanced for circuit simulation.

SKEL 4663: Embedded Processor System

Pre-requisite: SKEE 3223 Microprocessor; SCSP 1103 C Programming Techniques

This course is about microprocessors in embedded systems. This course extends the students' knowledge of microprocessors by investigating embedded systems design and state-of-the-art 32-bit embedded processors. The student will be familiarized with problems associated with producing hardware and software in high-level language. The topics covered include high-level programming for SoC, achieving high-performance in embedded systems through multi-threading over multi-core processors, code optimization, power management and operating system fundamentals. This course has a strong emphasis on hands-on hardware/software development, whereby the student will have to develop a solution on the test development board.

SKEL 4673: DSP Architectures
Pre-requisite: SKEE 2263 Digital Systems

This course introduces students to hardware implementation of digital signal processing (DSP) algorithms. DSP applications typically require high performance at tight space and power constraints. The requirements are best met by implementing DSP algorithms on application specific integrated circuits (ASIC) or field-programmable gate arrays (FPGA). This course exposes students to the modeling of common DSP algorithms, mapping of algorithms to hardware, various architectural styles and implementation issues.

SKEL 4723 : CAPSTONE PROJECT

The course provides students with the opportunity to integrate technical knowledge and generic skills attained in the earlier years. This is to be achieved within the context of an engineering project conducted in a small team (typically three or four students) under the supervision of an academic staff and with optional of industry partner as advisor. Topics supplementing this course that include project management tools and practices, organizational structures, engineering standards as well as the social and environmental responsibility of professional engineers are covered in the Professional Ethics and/or Engineering Management courses offered prior to or concurrent with the course.

SKEL 4743: Basic Digital VLSI Design
Pre-requisite: SKEE 2263 Digital Systems

The objective of this course is to introduce students to basic techniques to design and implement digital VLSI system. This course introduces students to VLSI technology. A historical perspective on the evolution of integrated circuit technology is covered. Important issues when designing a VLSI circuit are discussed. MOS transistors are studied in detail, including their characteristics, structure, switch-level behaviour, and current equation. SPICE model of a MOS transistor is also described. The simplest circuit, an inverter, is studied in detail. Its voltage-transfer characteristic, noise margin and how to control the inversion point is investigated. How an IC is fabricated is described. Fabrication processes are elaborated. Layout, design rules and stick diagram are explained. This course teaches how to design circuits. Several logic families will be introduced. Advantages and disadvantages of each logic design style are explained. Delay and power performance of each logic family is also compared. Latch and flip-flop circuits are also covered. Interconnect issues, when various components

are connected, are elaborated.

SKEL 4812: FINAL YEAR PROJECT 1

The aim of the Final Year Project 1 (FYP1) is to provide students the opportunity to demonstrate their knowledge learned at the FKE through the design and implementation of an engineering project. Students are exposed to identify and formulate research literature in understanding research problems. The final year project proposal will include the concept of sustainable development and project cost estimation. This will help students to learn important skills in solving practical engineering problems by applying a systematic design approach.

SKEL 4824: FINAL YEAR PROJECT 2
Pre-requisite: SKEL 4812 Final Year Project 1

The aim of the Final Year Project 2 (FYP2) is to provide students the opportunity to explore and implement creative and innovative knowledge to solve practical science, mathematical and engineering societal problems. Students are exposed to project management planning and execution. With these skills, it is hoped that the students will gain knowledge and experience in planning, designing and solving problems systematically thus when they graduate, they will be ready to work as reliable and productive engineers.

SKEM 4173: ARTIFICIAL INTELLIGENCE

Artificial intelligence (AI) involves the development of algorithms derived from human and animal intelligence that have capabilities such as learning, reasoning, generalization, adaptation, reproduction, etc. Nowadays, these techniques are getting popular due to the large number of successful reports of implementations. AI techniques have also made their way into many domestic and industrial products and provided solutions to many difficult engineering problems. In this course, students are exposed to several AI techniques i.e. Artificial Neural Network (ANN), Fuzzy Logic, Genetic Algorithm (GA) and Particle Swarm Optimization (PSO), and how they are used as a stand-alone approach or in any combination of the methods in solving engineering and non-engineering problems.

SKET 3573: Microwave Engineering
Pre-requisite: SKEE 3533 Communication Principles

To introduce the basic theory of Microwave Engineering, such as transmission line theory, scattering parameters, Smith Chart, and impedance matching. Fundamental microwave devices, such as waveguides and resonators are explained. The students are also introduced to passive and active microwave components such as terminations, couplers, power dividers/combiners, circulators, amplifiers, oscillators, travelling wave tubes, filters, and microwave solid-state devices. Fundamentals in microwave instruments and measurement techniques are introduced.

SKET 3583: Digital Communication System
Pre-requisite: SKEE 3533 Communication Principles

This course provides an introduction to fundamental concepts in digital communication system. Main topics to be covered are baseband pulse transmission, signal space analysis, digital modulation/demodulation, channel coding, source coding, detection methods and evaluation in AWGN channel. Fundamentals on error control coding is also included. Finally, the system trade-off in designing a digital communication system is explored.

SKET 3623: Data Communication and Network
Pre-requisite: SKEE 3533 Communication Principles

The objective of the subject is to enhance the students' knowledge on data communication and computer networks. It explains the basic process of data communication, protocol, interfacing and inter-working between computer networks and switching components in telecommunication system. At the end of the course, the students should be able to understand the system used in representation, distribution, transmission and reception of data in data communication network.

SKET 4533: Wireless Communication Systems
Pre-requisite: SKET 3573 Microwave Engineering

This course introduces students the concept and principle of mobile radio communication and satellite communication system. Topics covered include mobile radio propagation, multiple access, cellular concept, modern wireless communication systems and satellite communication systems.

SKET 4543: RF Microwave Circuit Design
Pre-requisite: SKET 3573 Microwave Engineering

This course introduces students to the concept of designing RF/Microwave circuit in wireless communication system such as filters, amplifiers, oscillators and mixers. The design of the RF/Microwave circuit is based on the discrete components and the S-parameter of the component. The system block diagram is also discussed such as transmitter and receiver function and noise in communication system. The filter design is based on the lump component and the resposnse of the filter such as Butterworth and Chebyshev response. The matching concept is discussed further in the RF/Microwave amplifier and oscillator design using Smith chart. The analysis of the different mixer is also discussed in this subject.Simulation software CST will also introduced to facilitate learning process.

SKET 4593: Acoustic Engineering
Pre-requisite: SKET 3533 Communication Principles

This course embodies the basic principles of fundamentals of acoustics engineering. The aim is mainly to instil confidence and apply the basic concepts, theories and applications in acoustics, noise control, room acoustics and sound system design. The course provides an in depth understanding of the characteristics, propagations, transmission and attenuation of sound waves. Further, noise criteria and control of interfering noise, sound absorption and reflection shall follow. The last part of the course cover on good room acoustics and sound system design for an enclosed room. At the end of the course, the students shall be able to apply the acoustics engineering fundamentals and concept in designing enclosed room for optimum acoustics and sound system.

SKET 4613: Antenna Theory and Design
Pre-requisite: SKET 3573 Microwave Engineering

This course introduces students the concept of antenna, theory and design in telecommunication system. The basic antenna properties such as gain, polarization, directivity, efficiency, and radiation pattern for various types of antenna will be discussed. Several antennas with specific characteristic will be designed using simulation software and analysed. Finally, the antenna measurement setup is introduced and discussed.

SKET 4623: Network Programming
Pre-requisite: SKET 3623 Data Communication and Networks

The objective of this course is to introduce students to the basic of network programming, in the networking implementations. This course will provide the students with understanding of socket programming to interconnect computers in network. The module will cover topics such as treads, input-output streams, handling errors and exceptions in socket programming. By the end of the module, students should have an understanding of interfacing between client and server.

SKET 4633: Coding of Multimedia Signals
Pre-requisite: SKET 3583 Digital Communication System

This course is an introduction to the coding and processing of digital multimedia signals. It covers current techniques for coding of multimedia signals such as audio, images, and video. Current video compression standards and formats will be discussed and introduced in this course. It focuses on the challenges of mobile video communication and provides methods in solving the issues.

SKET 4643: Optical Materials and Sensors
Pre-requisite: SKET 4523 Optical Communication System

The aim of this course is to introduce students to the theories, concepts, instrumentation and device design for optical sensors. At the beginning, the course prepares students with essential knowledge of materials including the intrinsic dielectric and magnetic properties. The topics are established from the well known Maxwell's equations. Afterward, it explores various forms of optical waveguides, their important parameters and methods of analysis. The course then introduces students to various characterization instrumentations for optical waveguides. Finally, students are exposed to the design process of optical sensing devices for specific sensing applications.

SKET 4653: Measurement and Characterization of Optical Devices
Pre-requisite: SKET 4523 Optical Communication System

Measurement and characterization of optical devices is essential for developing and characterizing today's photonic devices and fiber optic

systems. This course brings together the fundamental principles with the latest techniques as a complete resource for the optical and communications engineer developing future optical devices and fiber optic systems. It covers the description and fundamental operation of passive and active devices required for the implementation of optical communication system. The main aspect covered will be the thorough understanding of the various performance parameters and specifications of these devices. The instrumentation covered will be Optical Spectrum analyser (OSA), Power Meter, Tunable Laser Source (TLS), Optical time-domain Reflectometer (OTDR) and optical attenuators. Measurement standards and test procedures adopted by the relevant authorities will also be covered.

SKET 4663: Optical Network
Pre-requisite: SKET 4523 Optical Communication System

The course on Optical Network covers the basic aspects of optical networking, which is the key for today's high-speed data transportation technology. The course introduces several important optical network components (e.g. optical transmitters, detectors, amplifiers, multiplexers, filters, couplers, isolators, wavelength converters and cross-connects) that support the provisioning of high-speed light paths between optical nodes. The course also highlights approaches for ensuring the survivability of provisioned light paths and methods for analysing the topological properties of optical networks.