ATTENTION

The content of this book is true and accurate at the time of publication. The Faculty of Electrical Engineering UTM reserves the right to change any information contained herewith.

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UNIVERSITY’S PHILOSOPHY

The divine law of Allah is the foundation for science and technology. UTM strives with total and unified effort to attain excellence in science and technology for universal peace and prosperity in accordance with His will.

VISION

To be recognised as a world-class centre of academic and technological excellence.

MISSION

To be a leader in the development of human capital and innovative technologies that will contribute to the nation’s wealth creation.

MOTTO

“KERANA TUHAN UNTUK MANUSIA”
In the Name of God for Mankind
FACULTY'S

VISION

The Faculty of Electrical Engineering in UTM is committed to be a world-class center of excellence and a leader in teaching and learning within the field of electrical engineering.

MISSION

1. To provide world-class program in teaching and learning within the field of Electrical Engineering.
2. To develop technology and technologists in the field of Electrical Engineering possessing high values and morals; and
3. To spearhead technology knowledge in the field of Electrical engineering.

OBJECTIVES

1. To produce professionals who are responsible to their Creator and the society.
2. To produce professionals who are very well trained, skilled, and efficient through the establishment of excellent academic programs.
3. To establish good university - industry relationship.
4. To develop and establish high quality academic and support personnel.
5. To create an excellent environment for consultancy, research and development activities.

MOTTO

‘The Premier Faculty’
Message Of The Dean

Assalamualaikum wrt. wbt., and Greetings,

It is my pleasure to welcome you to the Faculty of Electrical Engineering, Universiti Teknologi Malaysia. I would also like to express my heartiest congratulation to our new undergraduate students who have been selected to undergo various programs of studies at the Faculty of Electrical Engineering (FKE).

Even though UTM is a Research University, teaching and learning is still the primary focus of FKE. At FKE, we offer three programs of study at undergraduate level and a very broad range of courses in the areas of Power, Electronic, Telecommunication, Instrumentation, Mechatronic, and Control Engineering, for you to specialize from. You may also take courses from other faculties and schools at the University to complete the minor program of your choice. There are also opportunities for you to apply for the many special programs available such as the 5 Excellent Tracks Program (5 ETP), Global Outreach Program (GOP), Study Abroad and Summer Schools Programs. To help you navigate the many activities, services and policies and to help you choose wisely from among the many courses and options available, academic adviser is being assigned to each and every one of you. I strongly encourage you to routinely engage your academic advisor in order to help you identify academic and extra-curricular options that will help you in reaching your future goals.

To all students, and especially our first year students, you will find that FKE is a compelling place with much to offer you, including outstanding faculty, students, staff, and facilities as well as a challenging curriculum, and extensive extra-curricular opportunities for you to continue to develop your intellectual passions and personal talents. We all are intent on making your student learning experience the most challenging, exciting, and rewarding one it can be, and that you graduate from the University as an engineer fully prepared to make a significant contribution to improving the society and world in which we live. However, the extent to which each student takes advantage of the academic, extra-curricular and social opportunities available at the Faculty and University depends, in large measure, on the student’s own initiative.

This handbook is prepared to provide brief information about the faculty, curriculum and syllabus applicable to students of the 2015/2016 session intake. It describes the program and courses offered by the FKE, the semester system and the academic regulations adopted by the University. It is hope that this handbook is able to provide the required information to you on the faculty’s administration, implementation of the programs and courses offered. You can use this guide to plan your studies and as a reference for the program/course structure offered by the Faculty. For the general public, it is hoped that this handbook can serve as a reference with regards to the process of teaching and learning at the faculty. I hope that you will find this handbook informative and helpful. As a student of UTM, you agreed to abide by the University’s policies and you are accountable for your choices. This handbook along with the Universiti Teknologi Malaysia Undergraduate Academic

8 UNIVERSITI TEKNOLOGI MALAYSIA
I hope that you will take many opportunities to become familiar with the contents of both publications whether they are in a print or an online format. It is important to know that the responsibility for understanding and following the University’s and Faculty’s policies and procedures whether it is the Akta Universiti dan Kolej Universiti, 1971 or the requirements for graduation rests entirely with you, the student.

On behalf of the Faculty and staff, I wish to take this opportunity to express my sincere thanks to all parties involved in the publication of this handbook. To all our new students, I wish you success in your academic journey and we look forward to work together with you to ensure that your undergraduate experience at FKE is deeply rewarding. Thank you for choosing FKE, UTM.

Thank you.

Wassalam and regards.

Prof. Dr. Johari Halim Shah Osman
Dean
Faculty of Electrical Engineering.
Email: johari@utm.my
The Faculty Organizational Structure
THE FACULTY IN BRIEF

The Faculty of Electrical Engineering (FKE)
The Faculty of Electrical Engineering (FKE), Universiti Teknologi Malaysia, was established in late 1974. Since 1st June 1995, the faculty commences operation at the main campus of the Universiti Teknologi Malaysia in Skudai, Johor until today.

The faculty has grown to become the largest center of academician and electrical engineering experts in Malaysia with 199 high-caliber academic staff whom are involved in teaching and academic research and 97 dedicated non-academic staff. Figure 1 represents the academic staff distribution based on the position and academic qualification. The faculty is led by the Dean and assisted by two Deputies, four Head of Departments, a Laboratory Manager, five Academic Managers, an Information Technology Manager, Deputy Registrar and an Assistant Registrar.

Covering broad spectrum of electrical engineering, currently the faculty consists of four departments focusing on advanced research and instructional courses in specific areas of activities. The four departments are:

- Department of Electrical Power Engineering (POWER)
- Department of Electronic and Computer Engineering (ECE)
- Department of Communication Engineering (COMM)
- Department of Control and Mechatronics Engineering (CMED)

The faculty has strengths in established area of instrumentation and control engineering, electrical power engineering and energy conversion, telecommunication engineering, electronic engineering and computer engineering. Figure 2 illustrates the distribution of the faculty’s academic staff for the four departments.
Besides teaching and learning activities, the faculty is also active in research and development as well as providing consultancy services in the electrical engineering expertise areas to organization and both government and non-government agencies.

These research and development activities have contributed to the status of UTM as a research university while indirectly supporting Malaysia in forging ahead towards becoming a developed nation. There are currently 9 research groups (RG) under the faculty, which actively contributes to a wide range of electrical and electronics research areas.

<table>
<thead>
<tr>
<th>Department</th>
<th>Research Group</th>
</tr>
</thead>
<tbody>
<tr>
<td>Department of Electrical Power Engineering</td>
<td>Power Electronics and Drives Research Group (PEDG)</td>
</tr>
<tr>
<td></td>
<td>Power Engineering Research Group (PERG)</td>
</tr>
<tr>
<td>Department of Electronic And Computer Engineering</td>
<td>VLSI &amp; Embedded Computing Architecture Design (VeCAD)</td>
</tr>
<tr>
<td></td>
<td>Computational Nanoelectronics (CoNE)</td>
</tr>
<tr>
<td></td>
<td>Biomedical Instrumentation and Electronics (BmIE)</td>
</tr>
<tr>
<td></td>
<td>Digital Signal and Image Processing (DSIP)</td>
</tr>
<tr>
<td></td>
<td>Advanced Microprocessor Research (AMIR)</td>
</tr>
<tr>
<td>Department of Communication Engineering</td>
<td>Sonar Technology and Instrumentation Research Group (STAR)</td>
</tr>
<tr>
<td></td>
<td>Acoustic Research Group (ARG)</td>
</tr>
<tr>
<td>Department of Control &amp; Mechatronics Engineering</td>
<td>Advanced Control</td>
</tr>
</tbody>
</table>
In addition to RG, a number of the faculty’s academic staff are also being affiliated to UTM’s Centre of Excellence (CoE) such as:

- Institute of High Voltage and High Current (IVAT)
- Centre of Energy Systems (CEES)
- Wireless Communication Centre (WCC)
- Centre for Artificial Intelligence and Robotics (CAIRO)
- UTM-MIMOS CoE Telecommunication Technology

These centres are actively involved in research activities leading to the production of high impact research papers at both national and international level. Through research and consultancy work, the staff at the centres managed to secure significant amount of funds through grants and consultation fees.

Department of Electrical Power Engineering (POWER)

The POWER Department consists of 49 academic staff specializing in the fields of power system, energy, power electronics and high voltage. The objective of the department is to become the center of excellence in conveying academic activities, research activities, consultancy, training and education in the field of power engineering. The strength of the department is having most of the academic staff with Ph.D. qualifications and active in research and consultancy activities. This enables the department to run the Bachelor of Engineering (Electrical) program, known as SKEE and the Master of Engineering (Electrical Power) program, denoted as MKEP, and allocates staff as supervisors for postgraduate programs (Master and Doctor of Philosophy degrees) offered by FKE.

The POWER Department has a wide range of research interests which include the following themes:

- Power system analysis and optimization
- Power system protection
- Renewable energy and co-generation systems
- Energy efficiency and conservation
- Restructured electricity market
- Electric and hybrid vehicle system
- Flexible Alternating Current Transmission System (FACTS) devices
- Multilevel inverters
- Photovoltaic power converters for residential buildings
- Direct torque control for induction motor
- Improvement of rotor winding in induction generator
- Application of fuel cell system
- Standardization for domestic electrical appliances
- Electric vehicle battery charger
- High frequency link inverters
- Active power filtering
- Automatic monitoring and earthing system
- Ozone generation and water distillation
- Lightning surge effect on power system
- Insulation coordination
Department of Electronic and Computer Engineering (ECE)

The ECE Department is a result of the combination of Electronic Engineering Department and Microelectronic & Computer Engineering Department, which were merged in November 2012 as part of the restructuring of Faculty of Electrical Engineering. There are 51 academic staff in the department. Fourteen laboratories in the department are equipped with modern facilities and are dedicated for teaching and research activities. Members of the department are involved in teaching and research activities within the nanotechnology, microelectronics, industrial electronics, medical electronics, digital signal processing, digital system design and computer network areas. The department oversees the undergraduate program Bachelor of Engineering (Electrical – Electronics), known as SKEL. At postgraduate level, the department is associated with the Master of Engineering (Computer and Microelectronics System) program, known as MKEH.

Besides teaching, members of the ECE Department are also involved in research and consultancy activities in the following areas:

- Carbon nanotubes; graphene semiconductor
- Biomedical instrumentation
- ECG, EEG and EMG signal processing
- Rehabilitation engineering
- Industrial electronics
- Video and image compression
- Audio, speech, image signal processing and real-time DSP
- Embedded system design, FPGA prototype development
- Multimedia network technology and network-on-chip
- Modeling and detection of faults for IC testing
- Microprocessor and microcontroller system design

The department has close relationship with many multinational electronic companies, such as Intel, Altera, National Instruments and Motorola. These companies visit UTM campus on regular basis for recruitment exercises, and usually are invited to deliver technical talks to FKE students. The companies also provide intern positions to students with excellent competency and academic achievement. Astoundingly, last year (2014), Intel has offered an intern position for 3 months to one of our 1st Year SKEL outstanding students.

Department of Communication Engineering (COMM)

The COMM Department has been recently established in November 2012. The new department is the merger of Telematic and Optical department with Radio Communication Engineering department of which both were established in 1998. This merging allowed both departments to yield qualified and experiences staffs in vast areas of Communication Engineering. All staffs are committed to provide their expertise in teachings, research activities and consultation work. Currently, the department has 58 academic staff comprising of 7 professors, 9 associate professors, 29 senior lecturers, 2 lecturers and 11 tutors. In order to provide the best academic services, the department has 10 laboratories, which are equipped with sophisticated and modern facilities.
Therefore, it is conducive yet challenging for training prospective students especially at postgraduate levels. The department supports undergraduate and postgraduate programs both by taught course and research.

The research opportunities for postgraduate studies include:

- Antenna engineering
- Application development
- Compression technique
- Devices such as HTS/LTCC/micro machine
- Digital communication
- Electromagnetic compatibility (EMC)
- Electromagnetic interference (EMI)
- Encryption
- Free space optic
- IP-based networking
- MEMs-based photonic devices
- Microwave, radio frequency (RF), millimeter wave and terahertz engineering
- Miniaturization and harmonic suppression techniques
- Mobility and resource management
- Network integration
- Network performance and teletraffic
- Noise elimination technique
- Optical network
- Photonics switching and system design
- Sonar and acoustic engineering
- Source coding
- Wireless power transmission and energy harvesting

The department receives substantial research grants from the Malaysian government, telecommunication industry and telecommunication system provider. Due to the excellent reputation in teaching and learning and research, the department has successfully gained international recognition through memorandum of understanding in collaboration with the University of Stellenbosch, South Africa in the field of microwave electronic and radar. On top of that, the department has also forged a good relationship with other academic institutions and industries.

Department of Control and Mechatronics Engineering (CMED)

The CMED Department is one of the largest in this region dedicated to the study of control, instrumentation, mechatronics and robotics engineering. The department, which currently consists of 41 academic staff, provides teaching, research activities and engineering expertise in the related areas. There are 11 laboratories equipped with modern and sophisticated facilities dedicated for teaching and research activities. At the undergraduate level, the department offers Bachelor of Engineering (Electrical - Mechatronics). For postgraduate studies, the department offers Master of Engineering (Mechatronics & Automatic Control) and various attractive and promising research areas for research students leading to Master and Doctor of Philosophy degrees. Currently, there are more than 100 research students actively conducting research within the department. The department’s research activities encompass several broad areas, reflecting the
- Smart sensors and actuators
- Process tomography
- Intelligent machines
- Advanced and intelligent control algorithms
- Process control and its advancements
- Real-time control system
- Robot design and intelligent robot controllers
- Modeling and control of mechatronic systems
- Industrial automations
- Nanotechnology-based mechatronics and robotics

The department also has close collaboration with various universities such as Okayama University of Japan, Imperial College of United Kingdom and others. Besides teaching and research activities, our academic staff also involve in consultancy activities for the local industries. Undergraduate students are also actively involved in several other activities such as Robotic Contest (Robocon) and innovation-related competitions. The university has represented Malaysia in several International Robocon competitions. Students within the department have also visited universities overseas through UTM’s Global Outreach Program and student exchange programs.

The Faculty Latest Achievement and Awards

Staff:
- 2014 Top Research Scientists Malaysia (TRSM) Award: Akademi Sains Malaysia
- Publication Award (Indexed Journal Authors) : Citra Karisma UTM 2014
- Gold Award: Regional Convention on Team Excellence 2014 - Kumpulan Inovasi & Kreatif (KIK)
- Best Performance Award : Kumpulan Inovasi & Kreatif (KIK) IPTA 2014

Students:
- 1st Prize & 2nd Runner-Up : Autonomous Hovercraft Competition (AHC) 2014
- 3rd Prize : Intelligent Home Robotics Challenge 2014
- 1st Prize : ECEX 2014 Biomedical Engineering Projects
- 1st Prize : Innovate Malaysia Excellence Award 2014 (MathWorks Track)
- 3rd Prize : Innovate Malaysia 2014 Design Competition
- 1st Prize : Business Idea in IHL-MSC Malaysia Startup Challenge (i-MSC) 2014
- 1st Prize : MaGiC pitchIN Challenge 2014 - Compact Rehabilitation Robot (CR2)
- 1st Prize & 1st Runner-Up (Innovation Category) : Microsoft Imagine Cup 2014
- 1st Prize (Game Category) : Microsoft Imagine Cup 2014
- Pro-Chancellor Award : UTM 52nd Convocation 2014
- Special Jury Award : UAV Siswa Challenge 2013-2014
Faculty:

- Excellent Faculty Award 2014 by UTM-SPACE
- Vice Chancellor Innovation Award (Consolation) : Citra Karisma UTM 2014
- Academic Quality Award (Consolation) : Citra Karisma UTM 2014

Facilities

Laboratories

The faculty has twenty-one laboratories for teaching and learning purposes, another twenty-eight laboratories for research and development activities, three technical workshops, and a resource center. The laboratories are equipped with an extensive range of state-of-art equipment. The faculty is also equipped with a learning resource center, meeting rooms, multi-purpose rooms, lecture theatres, computing and CAD labs, PCB lab and video conferencing room.

Computing Facilities

Besides the main university’s computing center, Centre for Information & Communication Technology (CICT), the faculty also provides excellent computing facilities for students. Our state-of-art computer system includes multi-users servers supporting powerful PCs in these computing laboratories, which consist of 10 units of SUN workstations, 13 Macintosh units, and more than a hundred personal computers. Good range of software available such as PROTEL, Mc Speech, LABVIEW, CIRCAD, SPICE, Sims script, COMNET III, BONES, MENTOR Graphics CAD tools (Auto logic synthesis, QSIM, Design Architect, IC station for VLSI) and PERISIK. The computer system is also equipped with JARING network for on-line facilities.
Programs Offered

Undergraduate Programs

Starting 2012/2013 academic session, the Faculty offers three (3) undergraduate programs, instead of the current five programs:

1. Bachelor of Engineering (Electrical) - [SKEE] |: UPU Code – TK23
2. Bachelor of Engineering (Electrical-Electronics) - [SKEL] |: UPU Code – TK02

All programs require four (4) years of study and a minimum acquired credits of 135 to 137, depending on the particular program.

Students who register for the Bachelor of Engineering (Electrical) program may concentrate either in the area of electronic engineering, control and instrumentation engineering, power engineering, or telecommunication engineering in their final year (Please refer to Table 1).

Students who register for the Bachelor of Engineering (Electrical - Electronics) program may concentrate their study either in the area of electronic system design engineering, microelectronic engineering, medical electronic engineering, computer engineering or telecommunication engineering (Please refer to Table 1).

All the undergraduate programs offered at the Faculty of Electrical Engineering are accredited and recognized by the Board of Engineers Malaysia (BEM). Graduates from the Bachelor of Engineering programs above may apply to register with the Board of Engineers Malaysia, as graduate engineer in the engineering fields as shown in Table 1.
<table>
<thead>
<tr>
<th>Program registered</th>
<th>Choice of concentration</th>
<th>Degree awarded</th>
<th>Field of registration with BEM</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bachelor of Engineering (Electrical) - [SKEE]</td>
<td>Control and Instrumentation Engineering</td>
<td>Bachelor of Engineering (Electrical)</td>
<td>Electrical Engineer</td>
</tr>
<tr>
<td></td>
<td>Electronic Engineering</td>
<td></td>
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<tr>
<td></td>
<td>Power Engineering</td>
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<tr>
<td></td>
<td>Telecommunication Engineering</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Bachelor of Engineering (Electrical - Electronics) - [SKEL]</td>
<td>Electronic System Design Engineering</td>
<td>Bachelor of Engineering (Electrical - Electronics)</td>
<td>Electronic Engineer</td>
</tr>
<tr>
<td></td>
<td>Microelectronic Engineering</td>
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<td></td>
<td>Medical Electronic Engineering</td>
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<td></td>
</tr>
<tr>
<td></td>
<td>Computer Engineering</td>
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<tr>
<td></td>
<td>Telecommunication Engineering</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Bachelor of Engineering (Electrical - Mechatronics) - [SKEM]</td>
<td>Mechatronic Engineering</td>
<td>Bachelor of Engineering (Electrical - Mechatronics)</td>
<td>Electronic Engineer</td>
</tr>
</tbody>
</table>

**Program Guidelines**

The University adopts the semester system. The academic year is divided into two (2) normal semesters, namely Semester I and Semester II, and a short semester at the end of Semester II. Thus, intake of new undergraduate students is normally made during the semester I of an academic year. The minimum duration of the programs is 4 years (8 semesters). The programs are conducted based on lectures, tutorials and practical sessions.

Students are obliged to take compulsory, University General Courses which are Ethnic Relation, Islamic and Asian Civilization, Management, English Language and Co-curriculum.

Final year students are required to carry out a research or design project in the related field. At the end of each semester of their final year, a report based on the research must be submitted. Students are also required to undergo Industrial Training for 12 weeks either at the private or government sector during the short semester of the third year. This is to equip the future graduates with practical technical knowledge while exposing them to the working environment in the industry.
All the courses offered by the Faculty have credits except for courses, which are approved by the University Senate. One (1) credit is equivalent to 14 hours of lectures or 30 hours of practical sessions (studio/project), in a semester.

All students’ performance and achievements are assessed formally. Normally, every course is assessed based on the coursework, which constitutes not less than 50% of the overall marks, and a final exam paper, which constitutes another 50% of the overall marks. Coursework may be in the form of homework, quiz, test and presentation. Final examination is held at the end of each academic semester. Students’ performance in a course is indicated by the grade obtained. Generally, the passing grade for any course is a ‘D+’. Students who fail a course (obtained a grade ‘D’ and below) are required to repeat the course the following semesters when it is offered. Students may improve the grade of any course with a ‘B-’ or lower once. Subject to the Faculty and University’s Academic Regulation, students may withdraw from a course.

A student must pass all courses specified in his/her program of study and fulfill all the requirements specified for his/her program of study set by the Faculty and University in order to be awarded with the Bachelor degree.

**Admission Requirement**

The student intake for the Bachelor degree programs is divided into 2 groups, which are first year admission and the direct entry admission to the second and upper year.

**Admission Requirement for Candidates from Matriculation Program, Ministry of Education, Malaysia (MOEM) / ‘Sains Asasi’ Program from UM and ‘Asasi’ Program from UiTM.**

**University Entrance Requirement:**
- Pass Sijil Pelajaran Malaysia (SPM) or equivalent with credit (grade C) in Bahasa Melayu/Bahasa Malaysia;
- Pass MOEM’s Matriculation program or UM’s ‘Sains Asasi’ or UiTM’s Asasi program with PNGK of at least 2.00 and also pass all the specific courses;
- Obtained at least a Band 1 in Malaysian University English Test (MUET).

**Program Entrance Requirement:**

a. Obtained at least a PNGK of 3.00 at the Matriculation/‘Asasi’ level;

b. Obtained at least a grade of ‘B’ (3.00) at the Matriculation/‘Asasi’ level in the following three (3) courses:
   i. Mathematics / Engineering Mathematics
   ii. Physics / Engineering Physics / Biology
   iii. Chemistry / Engineering Chemistry

c. Obtained at least a grade of ‘C’ in the following courses at the Sijil Pelajaran Malaysia (SPM) level:
   i. Mathematics
   ii. Physics
d. The candidate who satisfies the requirement in part (b.)(ii.) above using Biology at the Matriculation/Asasi level must obtained at least a grade of ‘3B’/’B + ’ in Physics at the SPM level.
e. The candidates are not color blind or disable so as not to hamper from doing practical work.

Admission Requirement for STPM Candidates

University Entrance Requirement:
- Pass Sijil Pelajaran Malaysia (SPM) or equivalent with good grades;
- Pass with credit in Bahasa Melayu/ Bahasa Malaysia at Sijil Pelajaran Malaysia (SPM) level or equivalent;
- Obtained at least a Band 1 in Malaysian University English Test (MUET);
- Pass 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.

Program Entrance Requirement:

a. Obtained at least a PNGK of 3.00 at the STPM level;
b. Obtained at least grade ‘B’ (NGMP 3.00) in the following three (3) courses:
   i. T Mathematics / Advanced T Mathematics
   ii. Physics / Biology
   iii. Chemistry
c. Obtained at least a grade of ‘C’ in the following courses at the Sijil Pelajaran Malaysia (SPM) level:
   i. Mathematics
   ii. Physics
d. The candidate who satisfies the requirement in part (b.) (ii.) above using Biology at the STPM level must obtained at least a grade of ‘3B’/’B + ‘ in Physics at the SPM level.
e. The candidates are not color blind or disable so as not to hamper from doing practical work.
Admission Requirement for Direct Entry to Second or Upper Year

Program Entrance Requirement:

a. Pass Sijil Pelajaran Malaysia (SPM) or equivalent with credit in Bahasa Melayu/Bahasa Malaysia;
b. 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 Diploma level in Mathematics and Physics.

c. Obtained at least a Band 1 in Malaysian University English Test (MUET);
d. 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;
e. The candidates are not color 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.

Please forward any enquiry to:-
Deputy Dean (Academics)
Faculty of Electrical Engineering
Universiti Teknologi Malaysia
81310 UTM Johor Bahru, JOHOR.

Tel : +(607)5557011
Fax : +(607)5566272
Email : info@fke.utm.my
Bachelor of Engineering (Electrical) - [SKEE]

Introduction

Electrical engineering is a multifaceted discipline that generally deals with the study and the use of electricity, electronics and electromagnetism, which have currently shaped virtually every aspect of our life. It covers a wide range of sub-areas including electronics, control systems, instrumentation, signal processing, telecommunications and power.

The Bachelor of Engineering (Electrical) - (SKEE) is one of the undergraduate programs offered by FKE to prepare graduates for positions as electrical engineers. The program has been designed to emphasize on the understanding and acquisition of basic principles and skills in the field of Electrical Engineering and its sub-areas. The curriculum consists of core and specialized Electrical Engineering courses, related general education and supporting non-technical courses. Furthermore, the students’ exposure to engineering practice is integrated throughout the curriculum through the combinations of industrial training and invited lectures from the industries.

The program also provides the students with the opportunities for analytical, critical and constructive thinking besides communication, team-working and lifelong learning skills in order to prepare them for careers as an electrical engineer in the industries or the public sectors, or continuing education at graduate level.

Program Educational Objectives (PEO)

The educational objectives of the Bachelor of Engineering (Electrical) program are to:

1. Become electrical engineers who are competent, innovative, and productive in addressing customer needs.
2. Grow professionally with proficient soft skills.
3. Demonstrate high standards of ethical conduct, positive attitude, and societal responsibilities.

Program Outcomes (PO)

Students of the Bachelor of Engineering (Electrical) program are expected to have the following outcomes:

1. Ability to apply knowledge of mathematics, science, and electrical engineering to the solution of complex engineering problems.
2. Ability to conduct experiments and researches, perform analysis and interpret data for complex engineering problems.
3. Ability to identify, formulate, investigate and synthesis of information to solve complex engineering problems.

4. Ability to use appropriate techniques, skills, and modern engineering tools, instrumentation, software and hardware necessary for complex engineering practice with an understanding of their limitations.

5. Ability to design solutions for complex system, component, or process within a defined specification that meet specified needs with appropriate consideration for public health and safety, cultural, societal, and environmental considerations.

6. Ability to articulate ideas, communicate effectively, in writing and verbally, on complex engineering activities with the engineering community and with society at large.

7. Ability to function effectively as an individual, and as a member or leader in diverse teams.

8. Ability to recognize the need for, and have the preparation and ability to engage in independent and lifelong learning in the broadest context of technological change.

9. Ability to analyze the impact of global and contemporary issues, the role of engineers in society, including, health, safety, legal and cultural issues and the consequent responsibilities relevant to professional engineering.

10. Ability to understand the impact of professional engineering solutions to societal and environmental contexts and demonstrate knowledge of and need for sustainable development.

11. Ability to execute responsibility professionally and ethically.

12. Ability to demonstrate knowledge and understanding of engineering and management principles to manage projects in multidisciplinary environments.
Program Educational Outcomes (PEO)

- Become electrical engineers who are competent, innovative, and productive in addressing customer needs.
- Grow professionally with proficient soft skills.
- Demonstrate high standards of ethical conduct, positive attitude, and societal responsibilities.

<table>
<thead>
<tr>
<th>POs</th>
<th>PROGRAM OUTCOMES</th>
<th>PEO 1</th>
<th>PEO 2</th>
<th>PEO 3</th>
</tr>
</thead>
<tbody>
<tr>
<td>PO1</td>
<td>Ability to apply knowledge of mathematics, science, and electrical engineering to the solution of complex engineering problems. (C)</td>
<td>✔</td>
<td>✔</td>
<td></td>
</tr>
<tr>
<td>PO2</td>
<td>Ability to conduct experiments and researches, perform analysis and interpret data for complex engineering problems (P)</td>
<td>✔</td>
<td>✔</td>
<td></td>
</tr>
<tr>
<td>PO3</td>
<td>Ability to identify, formulate, investigate and synthesis of information to solve complex engineering problems. (P/CTPS)</td>
<td>✔</td>
<td>✔</td>
<td></td>
</tr>
<tr>
<td>PO4</td>
<td>Ability to use appropriate techniques, skills, and modern engineering tools, instrumentation, software and hardware necessary for complex engineering practice with an understanding of their limitations. (P)</td>
<td>✔</td>
<td>✔</td>
<td></td>
</tr>
<tr>
<td>PO5</td>
<td>Ability to design solutions for complex system, component, or process within a defined specification that meet specified needs with appropriate consideration for public health and safety, cultural, societal, and environmental considerations.(P/CTPS)</td>
<td>✔</td>
<td>✔</td>
<td></td>
</tr>
<tr>
<td>PO6</td>
<td>Ability to articulate ideas, communicate effectively, in writing and verbally, on complex engineering activities with the engineering community and with society at large.(P/CS)</td>
<td>✔</td>
<td>✔</td>
<td></td>
</tr>
<tr>
<td>PO7</td>
<td>Ability to function effectively as an individual, and as a member or leader in diverse teams. (A/LS)</td>
<td>✓</td>
<td>✓</td>
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<tr>
<td>PO8</td>
<td>Ability to recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change. (A/LL)</td>
<td>✓</td>
<td>✓</td>
<td></td>
</tr>
<tr>
<td>PO9</td>
<td>Ability to analyze the impact of global and contemporary issues, the role of engineers in society, including, health, safety, legal and cultural issues and the consequent responsibilities relevant to professional engineering. (A/TS, P/KK)</td>
<td>✓</td>
<td>✓</td>
<td></td>
</tr>
<tr>
<td>PO10</td>
<td>Ability to understand the impact of professional engineering solutions to societal and environmental contexts and demonstrate knowledge of and need for sustainable development. (A/EM)</td>
<td>✓</td>
<td>✓</td>
<td></td>
</tr>
</tbody>
</table>

**PROGRAM OUTCOMES**

| PO11 | Ability to execute responsibility professionally and ethically. | ✓ | ✓ |
| PO12 | Ability to demonstrate knowledge and understanding of engineering and management principles to manage projects in multidisciplinary environments. | ✓ | ✓ |
Program Structure

The number of credits required for graduates to be awarded with the bachelor degree is 136 credits. Total allocation of credits according to classification of courses is as follows:

<table>
<thead>
<tr>
<th>Classification of Courses</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>Electrical Engineering Core</td>
<td>98</td>
</tr>
<tr>
<td>Specialization</td>
<td>18</td>
</tr>
<tr>
<td>University General Studies</td>
<td>12</td>
</tr>
<tr>
<td>English Language</td>
<td>6</td>
</tr>
<tr>
<td>Co-curriculum</td>
<td>2</td>
</tr>
<tr>
<td>Total Credits</td>
<td><strong>136</strong></td>
</tr>
</tbody>
</table>

During the first year, Electrical Engineering fundamentals are taught stressing on courses of Introduction to Electrical Engineering, Programming Techniques, Circuit Theory, Circuit and Systems, Electronic Devices and Digital Electronic, besides reinforcement in Mathematics courses.

During the second year, the Electrical Engineering core modules are emphasized focusing on Electronic Circuits, Signals and Systems, Electronic Instrumentation and Measurement, Basic Power and Electric Machine, Digital Systems and Electromagnetic Field Theory. Reinforcement on Electrical Engineering fields are intensified focus on courses of System Modeling and Analysis, Microprocessor, Communication Principle, Control System Design, Power Electronics and Drives, Power System Engineering, High Voltage Technology, and Power System Analysis in the third year.

Students are required to undergo industrial training at least for a duration of 12 weeks either in the private sector or government sector during a the ‘Short Semester’ in the third year. This is to equip future graduates with practical technical skills besides exposing them to the industrial working environment.

During the final year, students will be given options to choose their specialization in any one of the Electrical Engineering areas, namely, Power Engineering, Control and Instrumentation Engineering, Electronic Engineering or Telecommunication Engineering. Students are required to select five (5) courses in their chosen specialization area to expand their knowledge:
Besides, each student is required to undertake a research or design project related to his/her chosen field of specialization in the final year. The students are required to submit a report based on their project at the end of the final semester.
Career Prospects

Requirement for a professional workforce in the Electrical Engineering field increases each year. This requirement is increasing rapidly with the growth of foreign investment in Malaysia, particularly in electronics and semiconductor industries as well as manufacturing and processing industries.

Generally, graduates with the Bachelor of Engineering (Electrical) degree may find many exciting opportunities in electrical related industry. These include:

- Communication equipment and network providers (TM, CELCOM, MAXIS, TV3, etc.)
- Computers and peripheral device manufacturers (IBM, etc.)
- Consulting engineer firms
- Education and training institutions (Universities, Polytechnics and Colleges)
- Electric energy production companies (TNB and IPPs)
- Manufacturing of component and equipment companies (Panasonic, etc.)
- Power equipment manufacturers
- Research and design organizations (SIRIM, MIMOS, Universities, TNB, etc.)
- Semiconductor chip designers and manufacturers (Texas Inst., Intel, Motorola, etc.)
- Automotive manufacturer and assembly firms
- Biomedical engineering firms
- Consultation firms
- Electronic equipment’s production industries
- Engineering and product development firms
- Food processing factories
- High-technology based firm such as aerospace
- Home appliances (such as washing machines, TV, radio, rice cooker, etc.) manufacturing firms
- Oil and gas companies
- Research and design organizations (SIRIM, Universities, etc.)
- System automation manufacturer firms
Bachelor of Engineering (Electrical-Electronics) - [SKEL]

Introduction

A rapid development in electronics, computer and telecommunication industry is one of the major contributors to the Malaysian economy. Rapid development has enabled the electronic, computer and telecommunication industry to flourish. This means, that more and more competent electronic graduates are required, to meet the growing demand of skilled manpower. The requirements towards professionals in this field, is gradually intensifying and it is predicted that the need will be continued in the next few years.

Electronic Engineering is a vast area of studies and is gradually expanding. Graduates undertaking this program will face a demanding professional career ahead. Various courses are being offered within the program with the intention of preparing graduates with sufficient knowledge in electronic field.

Program Educational Objectives (PEOs)

The educational objectives of the Bachelor of Engineering (Electrical-Electronics) program are to:

1. Become electrical engineers who are competent, innovative, and productive in addressing customer needs.
2. Grow professionally with proficient soft skills.
3. Demonstrate high standards of ethical conduct, positive attitude, and societal responsibilities.

Program Outcomes (POs)

Students of the Bachelor of Engineering (Electrical-Electronics) program are expected to have the following outcomes:

1. Ability to apply knowledge of mathematics, science, and electrical engineering to the solution of complex engineering problems.
2. Ability to conduct experiments and researches, perform analysis and interpret data for complex engineering problems.
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10. Ability to understand the impact of professional engineering solutions to societal and environmental contexts and demonstrate knowledge of and need for sustainable development.

11. Ability to execute responsibility professionally and ethically.

12. Ability to demonstrate knowledge and understanding of engineering and management principles to manage projects in multidisciplinary environments.
Mapping of POs to PEOs

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**PROGRAM OUTCOMES**

| PO11 | Ability to execute responsibility professionally and ethically. | ✓ | ✓ |
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Program Structure

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<td>82</td>
</tr>
<tr>
<td>Specialization</td>
<td>34</td>
</tr>
<tr>
<td>University General Studies</td>
<td>12</td>
</tr>
<tr>
<td>English Language</td>
<td>6</td>
</tr>
<tr>
<td>Co-curriculum</td>
<td>2</td>
</tr>
<tr>
<td><strong>Total Credits</strong></td>
<td><strong>136</strong></td>
</tr>
</tbody>
</table>

For students majoring in this field, within the first three years of the duration of the course, its curriculum is similar to the courses provided for Bachelor of Engineering (Electrical). In the third year, specialized courses specifically for Electronic Engineering are taught, such as the courses on System Modeling and Analysis, Microprocessor, Communication Principle, Semiconductor Material Engineering, Control System Design, Digital Signal Processing, and Electronic Systems.

Students are also obliged to undergo industrial training at least for a duration of 12 weeks either in the private or government sector during the ‘Short Semester’ in the third year. The purpose of this is to equip future graduates with practical and technical skills besides exposing graduates to the industrial working environment.

During the second semester of the third year, students will be given options to choose their specialization in any one of the Electronic Engineering areas, namely, the Electronic System Design Engineering, Microelectronic Engineering, Medical Electronic Engineering, Telecommunication Engineering, or Computer Engineering. In the final year, specialization in Electronics Engineering field is further strengthened. Students are required to select seven (7) courses in their chosen specialization area to expand their knowledge:
Electronic System Design Engineering Option

- CAD with HDL*
- Basic Digital VLSI Design*
- Analog CMOS IC Design
- Advanced Digital Signal Processing
- Digital Image Processing
- Embedded Processor Systems
- IC Testing Techniques

Medical Electronic Engineering Option

- Physiology & Introduction to Medicine*
- Medical Instrumentation*
- Biomedical Material
- Biomedical Signal Processing
- Biosensors & Transducers
- Biosystem Modeling
- Clinical Engineering
- Medical Imaging

Computer Engineering Option

- Computer Architecture And Organization*
- Embedded Processor Systems*
- Artificial Intelligence
- CAD with HDL
- Data Communication & Networks
- Information Security
- Operational System
- Software Engineering

Microelectronic Engineering Option

- Semiconductor Material Engineering*
- Basic Digital VLSI Design*
- IC Testing Techniques
- Microelectronic Device Fabrication & Characterization
- Modeling and Simulation of Microelectronic Devices
- Nanoelectronics
- Nanotechnology and Application
- Semiconductor Device Engineering
- Solid-state Electronic Devices

Telecommunication Engineering Option

- Data Communication and Networks*
- Microwave Engineering*
- Acoustic Engineering
- Antenna Theory And Design
- Coding Of Multimedia Signals
- Digital Communication Systems
- Network Programming
- Optical Communication Systems
- RF Microwave Circuit Design
- Wireless Communication Systems

* Compulsory course for the respective field of option.
Besides that, each student is required to undertake a research or design project related to his/her chosen field of specialization in the final year. The students are required to submit a report based on their project at the end of the final semester.
Career Prospects

Electronic, telecommunication and ICT industry has been identified as one of the potential industrial area for further development in the future. Currently, there is a huge demand for electronic engineer hence the prospect of work for graduates completing this program are potentially high. Besides electronic and telecommunication companies, there are other info-technology-related firms requiring electronic engineering graduates.

Career opportunities for graduates can be found in the following areas:

- Consumer electronic: Manufacturing of products such as TV, radio, DVD/CD/cassette players, cameras, etc. The manufacturers for these products include Philips, Canon, and Sony.

- Electronic component: Manufacturing of integrated / discrete circuit and failure assessment / analysis. Potential employers in this area include Intel, Altera, National Instruments, and Flextronics.

- Telecommunication system: Development and manufacturing of telecommunication system products. Related companies include NEC, Motorola, Texas Instruments, Sapura, and Harris.

- Computer products, network systems and information security: Manufacturing of computer and network systems and related equipment. Involved companies include Hewlett Packard, Fujitsu, and Toshiba.

- Research and Development: Local organizations such as MDeC, MIMOS and SIRIM, as well as multinational companies that have a research center would require research engineers.

- Secondary industry: Industries such as oil refinery, textiles, and food processing where their products depend on electronic systems.

- Service industry: These include hospitals, transportation industries, broadcasting industries, and telecommunication industries where most equipment used are electronic-based. Companies involved in service industry include TM, Celcom, Sapura, MAXIS, TV3, Advancepact, and KTMB.
Bachelor of Engineering (Electrical-Mechatronics) - [SKEM]

Introduction

Mechatronic Engineering is an engineering field which combines engineering fields such as Electronic, Electric, Mechanical, Control, Software, Computer, and Information Technology.

This field has become rapidly increasing and expanding within industries, especially in the manufacturing industry since the significance of micro processing and micro control has recognized its significance in industrial control.

Furthermore, Mechatronic is the technology behind the smart products, which typically includes microprocessor, control system and mechanical field. An engineer equipped with knowledge, experience and specialization in Mechatronic field is a pre-requisite for any up and running industry.

Mechatronic engineer utilizes the use of computer and digital control system for controlling processes within an industry. They combine electrical science, control, mechanical, robotic and manufacturing to fabricate a wide variety of products. These include everyday household, such as washing machine, camera, photocopier machine and car anti-locking brake as well as high-tech computer controlled machines operated in manufacturing and fabrication industries. Regardless of its discipline, an engineer will encounter usage of mechatronic systems at one stage of their working life.

In view of that, this program is offered to equip graduates with a vast knowledge of electronic, microcontrollers, robotic, automation, control engineering, and production engineering areas. Those whose expertise revolves around these areas, are extremely required by the existing industries. Graduates who are highly skilled and capable of narrowing the gap between mechanical, electrical and electronic engineering, will have an immense advantage of employment.

Program Educational Objectives (PEOs)

The educational objectives of the Bachelor of Engineering (Electrical-Mechatronics) program are to:

1. Become electrical engineers who are competent, innovative, and productive in addressing customer needs.
2. Grow professionally with proficient soft skills.
3. Demonstrate high standards of ethical conduct, positive attitude, and societal responsibilities.
Program Outcomes (POs)

Student of the Bachelor of Engineering (Electrical-Mechatronics) program are expected to have the following program outcomes:

1. Ability to apply knowledge of mathematics, science, and electrical engineering to the solution of complex engineering problems.

2. Ability to conduct experiments and researches, perform analysis and interpret data for complex engineering problems.

3. Ability to identify, formulate, investigate and synthesis of information to solve complex engineering problems.

4. Ability to use appropriate techniques, skills, and modern engineering tools, instrumentation, software and hardware necessary for complex engineering practice with an understanding of their limitations.

5. Ability to design solutions for complex system, component, or process within a defined specification that meet specified needs with appropriate consideration for public health and safety, cultural, societal, and environmental considerations.

6. Ability to articulate ideas, communicate effectively, in writing and verbally, on complex engineering activities with the engineering community and with society at large.

7. Ability to function effectively as an individual, and as a member or leader in diverse teams.

8. Ability to recognize the need for, and have the preparation and ability to engage in independent and lifelong learning in the broadest context of technological change.

9. Ability to analyze the impact of global and contemporary issues, the role of engineers in society, including, health, safety, legal and cultural issues and the consequent responsibilities relevant to professional engineering.

10. Ability to understand the impact of professional engineering solutions to societal and environmental contexts and demonstrate knowledge of and need for sustainable development.

11. Ability to execute responsibility professionally and ethically.

12. Ability to demonstrate knowledge and understanding of engineering and management principles to manage projects in multidisciplinary environments.
Program Educational Outcomes (PEOs)

- Become electrical engineers who are competent, innovative, and productive in addressing customer needs.
- Grow professionally with proficient soft skills.
- Demonstrate high standard of ethical conduct, positive attitude, and societal responsibilities.

<table>
<thead>
<tr>
<th>PEs Program Outcomes</th>
</tr>
</thead>
<tbody>
<tr>
<td>PO1</td>
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<tr>
<td>PO2</td>
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<tr>
<td>PO3</td>
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<tr>
<td>PO4</td>
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<td>PO5</td>
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<td>PO6</td>
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<td>PO9</td>
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<td>PO10</td>
</tr>
<tr>
<td>PO11</td>
</tr>
<tr>
<td>PO12</td>
</tr>
</tbody>
</table>
The curriculum for the Bachelor of Engineering (Electrical-Mechatronics) program is almost similar to the curriculum for the Bachelor of Engineering (Electrical) program for the first two years of the program. Electrical Engineering fundamentals are stressed. Courses on Introduction to Electrical Engineering, Programming Techniques, Circuit Theory, Circuit and Systems, Electronic Devices and Digital Electronic are offered besides reinforcement in Mathematics courses. However, mechatronic engineering students are also required to take Engineering Drawing and Engineering Mechanics.

In the second year, the Electrical Engineering core modules are emphasized focusing on Electronic Circuits, Signals and Systems, Electronic Instrumentation and Measurement, Basic Power and Electric Machine, Digital Systems and Electromagnetic Field Theory, similar to the other programs.

Reinforcement on Electrical and Mechatronic Engineering fields are intensified focus on courses of System Modeling and Analysis, Microprocessor, Communication Principle, Hydraulic and Pneumatics, Digital Signal Processing, Electronic Systems and Electrical Motors and Drives, in the third year.

Students are required to undergo industrial training at least for a duration of 12 weeks either in the private sector or government sector during a the ‘Short Semester’ in the third year. This is to equip future graduates with practical technical skills besides exposing them to the industrial working environment.

In the final year, specialization and depth in Mechatronic Engineering field is strengthened. Students are required to take courses on Robotics, and Mechatronic system design. Besides that, students are also required to select three (3) courses from the following to enhance their knowledge:

<table>
<thead>
<tr>
<th>Classification of Courses</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>Electrical &amp; Electronic Engineering Core</td>
<td>75</td>
</tr>
<tr>
<td>Mechatronic Engineering Specialization</td>
<td>43</td>
</tr>
<tr>
<td>University General Studies</td>
<td>12</td>
</tr>
<tr>
<td>English Language</td>
<td>6</td>
</tr>
<tr>
<td>Co-curriculum</td>
<td>2</td>
</tr>
<tr>
<td><strong>Total Credits</strong></td>
<td><strong>138</strong></td>
</tr>
</tbody>
</table>
Mechatronic Engineering Final Year Electives

- Advanced Control Theory
- Advanced Transducers & Sensors
- Artificial Intelligence
- BioMEMs and Microanalytical Systems
- Coding Of Multimedia Signals
- Digital Control Systems
- Embedded Systems
- Industrial Instrumentation and Applications
- Industrial Control Networks
- Machine Vision Systems
- Modern Control Theory
- Nanotechnology and Application
- Power Electronics and Drives
- Software Engineering
- Robot Technology for Automation
- System Identification and Estimation

Besides, each student is required to undertake a research or design project associated to the Mechatronic Engineering area in the final year. The students are required to submit a report based on their project at the end of the final semester.

Career Prospects

Mechanical engineers are employed in virtually every kind of industry. It is envisaged that industrial sector in Malaysia will be rapidly developed due to the increasing demand from escalating market requirements, such as market for electronic and telecommunication equipments as well as investments made by foreign investors. As mechatronic field takes on a much larger role in product development, graduates who are highly skilled in mechatronic engineering will be in high demand. They are involved in generating creative design and development of smart products, and in the production, control, management and sales of the devices and systems needed by society.

In general, graduates undertaking this program will be eligible as an engineer in the following industries:

- Construction and fabrication of vehicle in automotive companies
- Manufacturing of household equipment such as washing machine, television, radio, etc.
- Manufacturing of electronic equipment such as camera, photocopier, etc.
- Food Processing Industry
- Oil and Gas companies
- High Technology firms such as aerospace industry
- Consultant firms
- Engineering and Product Development firms
- Automation Manufacturing System firms
- Biomedical Engineering firms
• Software Development firms
• Research and Development center e.g. High Educational Institute, SIRIM, etc.

On the types of employment, graduates undertaking the program may be employed, among others, as:

- Mechatronic Engineer
- Electrical Engineer
- Electronic Engineer
- Production Engineer
- Quality Control Engineer
- Design Engineer
- Process Engineer
- Maintenance Engineer
- E&M (Electro-Mechanical) Engineer
- Construction/Fabrication Engineer
- Sales Engineer
- Research Officer
- Sales Officer
- Development Officer
- Academician
MAPPING OF FKE PROGRAM OUTCOMES TO MALAYSIAN QUALIFICATIONS FRAMEWORK (MQF) LEARNING OUTCOME DOMAINS

<table>
<thead>
<tr>
<th>POs</th>
<th>Program Outcomes</th>
<th>MQF Learning Outcome Domains</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Knowledge</td>
</tr>
<tr>
<td>PO1</td>
<td>Ability to apply knowledge of mathematics, science, and electrical engineering to the solution of complex engineering problems.</td>
<td>DO1</td>
</tr>
<tr>
<td>PO2</td>
<td>Ability to conduct experiments and researches, perform analysis and interpret data for complex engineering problems.</td>
<td>DO2</td>
</tr>
<tr>
<td>PO3</td>
<td>Ability to identify, formulate, investigate and synthesis of information to solve complex engineering problems.</td>
<td>DO3</td>
</tr>
<tr>
<td>PO4</td>
<td>Ability to use appropriate techniques, skills, and modern engineering tools, instrumentation, software and hardware necessary for complex engineering practice with an understanding of their limitations.</td>
<td>DO4</td>
</tr>
<tr>
<td>PO5</td>
<td>Ability to design solutions for complex system, component, or process within a defined specification that meet specified needs with appropriate consideration for public health and safety, cultural, societal, and environmental considerations.</td>
<td>DO5</td>
</tr>
</tbody>
</table>

- DO1: Knowledge
- DO2: Practical Skills
- DO3: Social Skills & Responsibility
- DO4: Values, Attitudes & Professionalism
- DO5: Communication, Leadership & Team Skills
- DO6: Problem Solving & Scientific Skills
- DO7: Information Management & Life Long Learning Skills
- DO8: Managerial & Entrepreneurial Skills
<table>
<thead>
<tr>
<th>PO6</th>
<th>Ability to articulate ideas, communicate effectively, in writing and verbally, on complex engineering activities with the engineering community and with society at large.</th>
<th>✓</th>
</tr>
</thead>
<tbody>
<tr>
<td>PO7</td>
<td>Ability to function effectively as an individual, and as a member or leader in diverse teams.</td>
<td>✓</td>
</tr>
<tr>
<td>PO8</td>
<td>Ability to recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.</td>
<td>✓</td>
</tr>
<tr>
<td>PO9</td>
<td>Ability to analyze 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.</td>
<td>✓</td>
</tr>
<tr>
<td>PO10</td>
<td>Ability to understand the impact of professional engineering solutions in societal and environmental contexts and demonstrate knowledge of and need for sustainable development.</td>
<td>✓</td>
</tr>
<tr>
<td>PO11</td>
<td>Ability to execute responsibility professionally and ethically.</td>
<td>✓ ✓</td>
</tr>
<tr>
<td>PO12</td>
<td>Ability to demonstrate knowledge and understanding of engineering and management principles to manage projects in multidisciplinary environments.</td>
<td>✓</td>
</tr>
</tbody>
</table>
ACADEMIC REGULATIONS AND GUIDELINES

PART I

TERMS AND DEFINITIONS

In the regulations, unless the context requires a different interpretation.

“Act” refers to the Universities and University Colleges Act 1971 (Amendment 2012).

“Academic Session” refers to the University academic session comprising two regular semesters and a short semester or end of semester break.

“Evaluation” refers to any form of course assessment that is carried out on students for learning achievement measurement.

“Award of Degree” refers to Senate endorsement for students qualified to be awarded their degree.

“Course” refers to subject with a designated code in an academic program.

“Course Grade” refers to grade that has points and; HS (Audit), HL (Pass) and HG (Fail) grades.

“Course Withdrawal (TD)” refers to withdrawal from courses by students within the time specified by the Senate.

“Course Replacement” refers to a provision which allows students to repeat failed courses.

“Credit Counted” refers to the credits considered for the calculation of GPA and CGPA.

“Credit Earned” refers to the total number of credits obtained for courses that a student has passed.

“Credit Exemption” refers to exempted credits given to students based on their prior qualifications recognized by the Senate.

“Credits for Graduation” refers to the total number of credits required to complete a program as approved by the Senate.

“Credits for Conferment of Minor” refers to the total number of credits required to complete a Minor Program as approved by the Senate.

“Credit Transfer” refers to credit granted to students for courses taken at another IHL during their study.

“Dean” refers to the head of a Faculty/School/Institute division that offers academic programs with student enrollment.

“Examination Committee” refers to the committee formed by the faculty to manage academic matters related to examinations and graduation.

“Examination Hall” refers to any space that is utilized to carry out examinations, tests and other forms of assessments.

“Direct Entry Students” refers to students who can be considered for credit exemptions and accepted to enroll into a particular semester based on their prior qualifications.

“Faculty Academic Committee” refers to the committee formed by the faculty responsible for academic affairs.

“Final Examinations” refers to any form of summative assessment of students’ academic performance during the final examination weeks as approved by the Senate.

“Full Time Study” refers to the mode of academic study in which a student has registered for a number of credit not less than the minimum credit allowed for each semester except for students with “Probation Status” (KS) and/or in the final two semesters of their study.

“Grade Replacement” refers to a provision which allows student to repeat courses (grade B- and below) with the faculty’s permission for the purpose of improving academic performance.

“IHL” refers to an institution of higher learning recognised by the University.

“Minimum Credit” refers to the minimum number of credits registered in a semester, which should not be less than TWELVE (12) credits, including courses with HS and HW status, except for students with Probation Status (KS) and/or students in their last two (2) semesters.

“Minor” refers to a set of extra courses taken outside the student’s academic program to broaden their knowledge and skills.

“Practical Course” refers to course that is executed in a laboratory or studio. It includes field work and industrial/
practical training.
“GPA [PNG]” refers to the grade point average (GPA) obtained by a student in a semester.
“CGPA [PNGK]” refers to the cumulative grade point average (CGPA) obtained by a student in all the semesters completed.
“Prerequisites” refers to a prescribed course(s) to be taken/passed before taking a particular course.
“Program” refers to field of study approved by the Senate leading to the award of a degree.
“Regular Duration” refers to the number of semesters specified in the curriculum required for students to complete their studies as determined by the University.
“Regular Semester” refers to semesters I and II (excluding the short semester) with a duration as determined by the Senate for an academic session. Each semester comprises weekly lectures, mid-semester break, revision week and final examination weeks.
“Senate” refers to the Senate of Universiti Teknologi Malaysia.
“Senior Student” refers to those who have undergone and passed a minimum of one semester of study at the University.
“Short Semester” refers to a semester that is carried out during an end-semester break.
“Student” refers to a registered undergraduate student enrolled in a Bachelor Degree program at the University.
“Student’s Faculty” refers to the faculty offering the academic program in which the student is enrolled.
“Student Learning Time” refers to the total number of learning hours related to the teaching learning activities in a course. These include lectures, laboratory work, tutorial, asessment and independent study.
“Study Deferment” refers to status of students who are approved to defer the commencement of their studies or who are suspended by the University.
“Terminated” refers to action taken on students who have not met the passing requirements; or students who have not registered for any course in a semester; or students who have used up the maximum duration of studies; or students who have been expelled by the University under the UniversitiTeknologi Malaysia (Discipline of Students) Rules 1999 or under the Procedure for Program and Course Registrations.
“Twinning Degree Program” refers to a category of academic programs that award two bachelor degrees to a student in a duration of study.
“Faculty” refers to any faculty, school, and institute at the University that offers academic programs with student enrollment.
“University” refers to Universiti Teknologi Malaysia.

**PART II**

**1.0 ACADEMIC SESSION**

1.1 The University academic session comprises two (2) regular semesters and end of semester break. Each semester consists of a minimum of 14 weeks of weekly lectures, mid-semester break, revision week and two (2) to three (3) weeks of final examination.

1.2 Besides the two (2) regular semesters, the University may offer a short semester which is held during the end of academic session break. The duration of a short semester is eight (8) weeks.

1.3 Short semester will not be counted as part of the total duration of an academic program. The guidelines for implementation of the Short Semester are given at the end of this section.

1.4 The Academic Session is as shown in Table 1.
### Table 1: Academic Session*

#### SEMESTER I
- Lectures: 14 weeks
- Mid-Semester Break: 1 week
- Study Week: 1 week
- Final Examination: 3 weeks
- **Total (A)**: 19 weeks

End-Semester Break (B): 4 weeks

#### SEMESTER II
- Lectures: 14 weeks
- Mid-Semester Break: 1 week
- Study Week**: 1 week
- Final Examination: 3 weeks
- **Total**: 19 weeks

End-Academic Session Break (C): 10 weeks OR
End-Semester Break: 1 week

#### SHORT SEMESTER
- Lectures & Examinations: 8 weeks
- End-Semester Break: 1 week
- **Total (D)**: 10 weeks

**TOTAL WEEKS PER ACADEMIC SESSION = 52 weeks**

(i) \[ (B) + [ (C) or (D) ] \]

* Subject to amendments

** There is no allocation of study week for students who will be undergoing industrial training during a short semester

Note :-
The actual implementation dates of the academic session in Table 1 are based on the academic session calendar as determined by the University.
PART III

1.0 PROGRAM REGISTRATION

1.1 Students must register for the program offered on the date stipulated by the University.

1.2 Students who do not abide by Para 1.1 above without valid reasons accepted by the University, the offer will be **ANNULLED**.

1.3 Registration of the program will be done by the University administration for senior students based on the previous semester examinations results.

1.4 Students with Study Deferment status must re-register for the program. Students who fail to register for the program within the specified time can be terminated from their study.

1.5 Senior students given approval to register in a Minor Program will have to register for the program at the student’s Faculty on the date determined by the University. The guidelines for the Minor Program are given at the end of this section.
PART IV

1.0 COURSE REGISTRATION

1.1 Students must register for all the courses every semester.

1.2 Course registration must be done within the pre-registration or registration period.

1.3 Students must register for the course using the right code, section and status (if relevant) with confirmation from the Academic Advisor.

1.4 Course registration statuses (if relevant):

1.4.1 CC – Registration of equivalent courses that are offered in a cross campus program
1.4.2 HS – Registration of courses that are not listed in a program curriculum to acquire extra knowledge
1.4.3 HW – Registration of compulsory courses as set in a program curriculum
1.4.4 MN – Registration of courses that are set in a minor program as offered by the University
1.4.5 UG – Registration of courses that are taken in a previous semester with grade B- or below for the purpose of improving academic achievement. Students are required to obtain permission from the Faculty.
1.4.6 UM – Registration of failed courses that are taken in a previous semester for the purpose of repeating the course.

1.5 The preregistration for students with KS status will be cancelled and the students are required to re-register within the compulsory registration period.

1.6 Students who fail to register for any courses after the registration period will have their study terminated except for reasons accepted by the University.

1.7 Students are responsible for ensuring that there are no mistakes in their course registration record. Amendments can be made within a period as allowed by the university.

1.8 Registration for an Audit Course (HS)

1.8.1 Students with the approval or have been instructed by the Faculty cannot register more than TWO (2) courses with HS status in a semester.
1.8.2 The credits from the HS courses will not be used in the calculation of student’s GPA and CGPA.
1.8.3 Students who registered for HS courses must attend all meetings/lectures and complete all course works.
1.8.4 If Para 1.8.3 is satisfied, HS status will be recorded in the student’s examination slip and transcript.

1.9 Minor Course Registration

1.9.1 A student with the approval of his/her Academic Advisor and the Faculty offering a Minor
Program can register for any of the courses offered as part of the Minor Program.

1.9.2 Students must register for every minor course taken in a semester according to the rules and regulations within the time stipulated.
1.9.3 Minor course grades will be included in the calculation of student’s GPA and CGPA.
1.9.4 Minor courses may not be registered as HS.

1.10 Course Withdrawal [TD]

1.10.1 A student with the approval of his/her Lecturer and Academic Advisor can withdraw from any of his/her registered course.
1.10.2 Students are required to submit application forms to the Faculty no later than the last working day of week EIGHT (8) of a semester.
1.10.3 Approval for withdrawing from a course is subject to the required Minimum Credits EXCEPT with the Dean’s permission.
1.10.4 Withdrawal (TD) status will be recorded in student’s course registration record, examination results slip and transcript.

1.11 Program Fee:

1.11.1 Students are required to settle the program fee by end of the compulsory registration period of a semester.
1.11.2 Students who have not paid all program fees including unpaid accumulated fee are not allowed to register for courses, not allowed to participate in an academic program and can be expelled.

1.12 Guidelines for course registration are given at the end of this section.
PART V
CREDIT SYSTEM

1.0 CREDIT FOR A COURSE

Every course has a credit value to show the importance and type of course.

2.0 CREDIT VALUE

2.1 With the exception of certain cases, the credit value for a course is shown in Table 2:

Table 2: Credit Value

<table>
<thead>
<tr>
<th>Type of Delivery</th>
<th>Credit Value</th>
<th>Total No. of Contact Hours Per Semester</th>
<th>Total No. of Student Learning Time</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lectures</td>
<td>1</td>
<td>14</td>
<td>40</td>
</tr>
<tr>
<td>Laboratory / Studio / Project / Field Work</td>
<td>1</td>
<td>28 - 40</td>
<td>40</td>
</tr>
</tbody>
</table>

3.0 ACADEMIC WORKLOAD FOR EACH SEMESTER

3.1 Students with KB status must register for a minimum of TWELVE (12) credits inclusive of Audit Course [HS] and Compulsory Attendance Course [HW] in a semester with the exception of students who are in the final TWO (2) semesters of their study.

3.2 Students who wish to take more than EIGHTEEN (18) credits have to seek approval from the Dean of the Faculty and would not be allowed to take more than TWENTY-ONE (21) credits in a semester.

3.3 Students with Probation Status [KS] are allowed to take between NINE (9) and THIRTEEN (13) credits only in the following semester.

3.4 Students who wish to register courses in a short semester are allowed to undertake a maximum of EIGHT (8) credits only.

4.0 PROGRAM CREDIT HOURS AND DURATION OF STUDY

4.1 Minimum number of credits for graduation is 120, and is subject to program credits for graduation requirement determined by the Faculty with the approval of the Senate.

4.2 The maximum study duration of an academic program is the normal duration for a program plus an additional 50% of normal semester duration.
4.3 Students must pass all the courses listed in the curriculum for a program of study.

4.4 For direct entry students, the maximum duration of study is determined by the faculty based on approved total number of credit exemptions as given in Table 3.

### Table 3: Credit Exemptions

<table>
<thead>
<tr>
<th>Total No. of Credit Exemptions (CE)</th>
<th>Maximum Duration (Semester)</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt;20</td>
<td>(1.5 x Normal Duration) – 0</td>
</tr>
<tr>
<td>20 – 33</td>
<td>(1.5 x Normal Duration) – 1</td>
</tr>
<tr>
<td>34 - 50</td>
<td>(1.5 x Normal Duration) – 2</td>
</tr>
<tr>
<td>51 - 60</td>
<td>(1.5 x Normal Duration) – 3</td>
</tr>
</tbody>
</table>

4.5 Total credit hours required and duration of study for Minor Program:

4.5.1 Students must pass all the required courses of a Minor Program; and

4.5.2 There will be no addition to the maximum duration of study for students who register for a Minor Program.

4.6 The total number of credits for graduation and maximum study duration for a twinning degree program are as determined by the Faculty that offers the program subject to approval by the Senate.

### 5.0 CREDIT EXEMPTIONS

5.1 Students are given credit exemptions based on the following:

5.1.1 students who have diplomas and degrees endorsed as equivalent by the Senate;

5.1.2 students with KB status who changed their study program from either within the University or from another IHL

5.2 Students who have relevant work experience endorsed by the Faculty can be considered for credit exemption for the industrial/practical training course.

5.3 The limit for credit exemption that can be allowed is not more than 30% (or a percentage endorsed by a relevant professional body) from the total credits for graduation. However, the Faculty may apply for the Senate’s approval for credit exemption of more than 30% with a maximum limit of 50%.

5.4 Application for credit exemptions has to be done when the student applies for the program and it should be done no later than week THREE (3) of the first semester of study.
5.5 Students are not allowed to register for courses which have been given credit exemptions. The registration of courses that have been given exemptions will be cancelled.

5.6 Credit exemptions are not given for any course of a Minor Program.

5.7 Guidelines for credit exemption are given at the end of this section.

6.0 CREDIT TRANSFER

6.1 Students who are undertaking courses under student mobility programs in other IHL’s that are approved by the Senate may apply for credit transfer.

6.2 Courses that are allowed for credit transfer are the ones that are approved by the Faculty before a student enrolls in a mobility program.

6.3 The allowable limit for credit transfer from another IHL is not more than 30% of the total credits for graduation.

6.4 A student is required to register all the courses whose credits are to be transferred to a current semester.

6.5 A student is required to inform the Faculty the grades of all undertaken courses once the results are released by the IHL.

6.6 Guidelines for credit transfers are given at the end of this section.

7.0 CREDIT HOURS FOR FAILED COURSES

7.1 Students must register and repeat all core courses that they have not passed. For the previous failed course, the credit hours and grade point of the previous failed course will not be included in the calculation of the latest CGPA.

7.2 Failed elective courses need not be repeated but the credit hours and the grade point of the courses will be calculated in the GPA and CGPA.

7.3 A student who fails a co-curricular course is required to repeat the same or undertake another co-curricular course. If a student undertakes another co-curricular course, the credit hours of the previously failed co-curricular course will not be excluded.

7.4 Failed minor courses need not be repeated but the credit hours and the grade point of the minor courses will be calculated in the GPA and CGPA.
PART VI

1.0 GRADING SYSTEM

1.1 The performance of a student in a course will be reflected in the grade obtained. The relationship between the marks, grade and grade point is as listed in Table 4.

Table 4: Relationship between Marks, Grade and Grade Points

<table>
<thead>
<tr>
<th>Marks</th>
<th>Grade</th>
<th>Grade Point</th>
</tr>
</thead>
<tbody>
<tr>
<td>90 - 100</td>
<td>A+</td>
<td>4.00</td>
</tr>
<tr>
<td>80 - 89</td>
<td>A</td>
<td>4.00</td>
</tr>
<tr>
<td>75 – 79</td>
<td>A-</td>
<td>3.67</td>
</tr>
<tr>
<td>70 – 74</td>
<td>B+</td>
<td>3.33</td>
</tr>
<tr>
<td>65 – 69</td>
<td>B</td>
<td>3.00</td>
</tr>
<tr>
<td>60 – 64</td>
<td>B-</td>
<td>2.67</td>
</tr>
<tr>
<td>55 – 59</td>
<td>C+</td>
<td>2.33</td>
</tr>
<tr>
<td>50 – 54</td>
<td>C</td>
<td>2.00</td>
</tr>
<tr>
<td>45 – 49</td>
<td>C-</td>
<td>1.67</td>
</tr>
<tr>
<td>40 – 44</td>
<td>D+</td>
<td>1.33</td>
</tr>
<tr>
<td>35 – 39</td>
<td>D</td>
<td>1.00</td>
</tr>
<tr>
<td>30 – 34</td>
<td>D-</td>
<td>0.67</td>
</tr>
<tr>
<td>00 – 29</td>
<td>E</td>
<td>0.00</td>
</tr>
</tbody>
</table>
1.2 Table 5 explains the meaning of each grade that can be obtained by a student for a course.

**Table 5: Course Grade Explanation**

<table>
<thead>
<tr>
<th>Marks</th>
<th>Grade Points</th>
<th>Grade</th>
<th>Explanation</th>
</tr>
</thead>
<tbody>
<tr>
<td>90 - 100</td>
<td>A+</td>
<td>4.00</td>
<td>Demonstrates extraordinary performance that exceeds the highest standards. Course contents are mastered completely. Able to apply obtained knowledge through various approaches, and exhibits good understanding in a wide and complete context.</td>
</tr>
<tr>
<td>80 - 89</td>
<td>A</td>
<td>4.00</td>
<td>Shows excellent performance that satisfies the highest standards. Course contents are mastered very well. Able to apply obtained knowledge through various approaches, and exhibits clear understanding in a complete context.</td>
</tr>
<tr>
<td>75 – 79</td>
<td>A-</td>
<td>3.67</td>
<td>Shows excellent performance that satisfies high standards. Course contents are mastered well. Able to apply obtained knowledge through various approaches, and exhibits clear understanding.</td>
</tr>
<tr>
<td>70 – 74</td>
<td>B+</td>
<td>3.33</td>
<td>Shows very good performance that satisfies high standards. Course contents are mastered with overall understanding of concepts and techniques.</td>
</tr>
<tr>
<td>65 – 69</td>
<td>B</td>
<td>3.00</td>
<td>Shows good performance that satisfies the standards. Course contents are mastered with good understanding of concepts and techniques.</td>
</tr>
<tr>
<td>60 – 64</td>
<td>B-</td>
<td>2.67</td>
<td>Satisfies the standards and shows fair understanding and mastery of course contents. Most of the course contents are mastered.</td>
</tr>
<tr>
<td>55 – 59</td>
<td>C+</td>
<td>2.33</td>
<td>Shows satisfactory understanding of course contents. Fulfills or in some aspects, exceeds basic standards.</td>
</tr>
<tr>
<td>50 – 54</td>
<td>C</td>
<td>2.00</td>
<td>Shows sufficient understanding of course contents and fulfills basic standards.</td>
</tr>
<tr>
<td>45 – 49</td>
<td>C-</td>
<td>1.67</td>
<td>Shows minimum understanding of course contents and in some aspects, does not fulfill basic standards.</td>
</tr>
<tr>
<td>40 – 44</td>
<td>D+</td>
<td>1.33</td>
<td>Shows very minimum understanding of course contents.</td>
</tr>
<tr>
<td>35 – 39</td>
<td>D</td>
<td>1.00</td>
<td>Shows below minimum understanding of course contents. Student fails the course</td>
</tr>
<tr>
<td>30 – 34</td>
<td>D-</td>
<td>0.67</td>
<td>Shows weak understanding of course contents. Student fails the course</td>
</tr>
<tr>
<td>00 – 29</td>
<td>E</td>
<td>0.00</td>
<td>Student does not understand course contents. Student fails the course</td>
</tr>
</tbody>
</table>
1.3 Table 6 explains the meaning of each grade that can be obtained by a student for a practical course.

### Table 6: Practical Course Grade Explanation

<table>
<thead>
<tr>
<th>Marks</th>
<th>Grade Points</th>
<th>Grade</th>
<th>Explanation</th>
</tr>
</thead>
<tbody>
<tr>
<td>90 - 100</td>
<td>A+</td>
<td>4.00</td>
<td>Excellent</td>
</tr>
<tr>
<td>80 - 89</td>
<td>A</td>
<td>4.00</td>
<td></td>
</tr>
<tr>
<td>75 – 79</td>
<td>A-</td>
<td>3.67</td>
<td></td>
</tr>
<tr>
<td>70 – 74</td>
<td>B+</td>
<td>3.33</td>
<td></td>
</tr>
<tr>
<td>65 – 69</td>
<td>B</td>
<td>3.00</td>
<td></td>
</tr>
<tr>
<td>60 – 64</td>
<td>B-</td>
<td>2.67</td>
<td></td>
</tr>
<tr>
<td>55 – 59</td>
<td>C+</td>
<td>2.33</td>
<td></td>
</tr>
<tr>
<td>50 – 54</td>
<td>C</td>
<td>2.00</td>
<td></td>
</tr>
<tr>
<td>45 – 49</td>
<td>C-</td>
<td>1.67</td>
<td></td>
</tr>
<tr>
<td>40 – 44</td>
<td>D+</td>
<td>1.33</td>
<td></td>
</tr>
<tr>
<td>35 – 39</td>
<td>D</td>
<td>1.00</td>
<td></td>
</tr>
<tr>
<td>30 – 34</td>
<td>D-</td>
<td>0.67</td>
<td></td>
</tr>
<tr>
<td>00 – 29</td>
<td>E</td>
<td>0.00</td>
<td></td>
</tr>
</tbody>
</table>

**Excellent**
- Shows excellent knowledge and performance based on the ability to apply theory in practical works
- Executes work movements automatically and spontaneously
- Masters skills that are recognized excellently

**Good**
- Shows good knowledge and performance based on the ability to apply theory in practical works
- Executes work movements in skillful, confident and efficient ways
- Masters skills that are recognized well

**Satisfactory**
- Shows satisfactory knowledge and performance based on the ability to apply theory in practical works
- Executes work movements with minimum guidance
- Masters skills that are recognized satisfactorily

**Weak**
- Shows weak knowledge and performance in applying theory in practical works
- Executes work movements with complete guidance
- Weak in skills mastery

**Fail**
- Fails to show knowledge of applying theory in practical works
- Not able to execute work movements even with guidance
- Fail to master identified skills
1.4 Generally, Grade D+ is the minimum passing grade. However, the passing grade of a course is subject to the requirements of the Faculty with the Senate’s approval.

1.5 Besides the grades listed above, the following grading is also used:

**Table 7: Explanation of Grades without Points**

<table>
<thead>
<tr>
<th>Grade</th>
<th>Explanation</th>
</tr>
</thead>
<tbody>
<tr>
<td>HS (Audit)</td>
<td>Grade given to registered audit courses.</td>
</tr>
<tr>
<td>HL (Pass)</td>
<td>Passing Grade given to course registered with HW status.</td>
</tr>
<tr>
<td>HG (Fail)</td>
<td>Failing Grade given to course registered with HW status.</td>
</tr>
</tbody>
</table>

1.6 Temporary grades i.e. TS (Incomplete) and KM (Incomplete Student Mobility) can be given for student academic record administration purposes.

1.7 The TS grade can be given for courses that are not completed due to:

1.7.1 students who did not sit for final examinations due to illness; or
1.7.2 students who were unable to complete their coursework due to illness; or
1.7.3 other reasons accepted by the Senate

1.8 All TS statuses will be converted to grades before the Special Exam Senate Standing Committee Meeting of a semester after a student completes Para 1.7.

1.9 For a student of a student mobility program that is undertaken outside of UTM, KM status for each course can be given if results are not obtained from the university that offers the courses during the semester that is registered in UTM.

1.10 All KM statuses are required to be converted to grades before the Exam Senate Standing Committee Meeting of the next regular semester.

**PART VII**

**ASSESSMENT**

**1.0 ATTENDANCE**

1.1 Students must attend all forms of scheduled face-to-face learning activities (lectures/practical/studio/field work etc.). If students do not attend these activities, the student will have to inform his/her lecturers immediately and provide reasons for his/her absence.

1.2 Lecturers must report to the Faculty if there are students whose absence for a certain course gets close to 20% of total scheduled face-to-face learning activity hours.
1.3 Once having received a report from the lecturer, the Faculty must give a written warning to the student.

1.4 Students who attend less than 80% of total scheduled face-to-face learning activity hours in a semester, without valid reasons accepted by the university, will not be allowed to attend all forms of subsequent learning activities and sit for any form of assessment. ZERO (0) mark will be awarded for the said courses; or Fail [HG] for compulsory audit courses [HW]; and for courses registered as audit [HS] will not be recorded in the transcript.

1.5 The relevant Faculty will provide a written notification of the decision on action as in Para 1.4 to the student.

2.0 ASSESSMENT SYSTEM

2.1 Ongoing assessment of the course will be done through coursework, final examinations and other forms during the semester of study as determined by the Faculty.

2.2 Assessment for Industrial/Practical Training and Final Year Project are based on formats determined by the Faculty.

2.3 For courses that are assessed based on coursework and final examination, the coursework mark must not be less than 50% of the total marks whereas the final examination mark should not exceed 50% unless approval has been obtained from the Faculty.

2.4 Assessment of courses based on 100% coursework can be implemented with the approval of the Faculty.

2.5 Application for approval of Para 2.4 above by a course coordinator/lecturer should be made before the semester begins.

3.0 FINAL EXAMINATION

The final examination must be carried out during the stipulated time and according to guidelines set by the Senate.

4.0 TERMS AND CONDITIONS FOR FINAL EXAMINATION

4.1 All registered and active students must sit for all the course final examinations determined by the Faculty provided that they have registered for the courses, subject to the Part VII Para 1.0.

4.2 A student may apply for a deferment of examination with medical reasons. The student must obtain a medical certificate (validated by a Hospital Medical Officer or a University Health Centre Medical Officer) before the examination begins and present it to the Dean of the Faculty no later than twenty-four (24) hours after the examination has started, unless with valid reasons that can be accepted by the University.
4.3 A student who falls sick during an examination must be reported to the Chief Invigilator or to any Invigilator for immediate medical checkup arrangements by a Medical Officer. A report by the Medical Officer must be submitted to the Faculty Dean within SEVEN (7) days from the date of the medical checkup by the Medical Officer.

4.4 A student who is involved in a calamity (such as accident, natural disaster, or death of parents or close relatives) may apply for deferment of examination by submitting a written application supported by relevant documents, to the Faculty Dean for a consideration.

4.5 A deferred examination will only be carried out during the special examination period as determined by the University.

5.0 FINAL EXAMINATION CONDUCT

5.1 Students are advised to be at the designated examination hall/room as stipulated in the examination schedule no later than **FIFTEEN (15) minutes** before the examination begins.

5.2 Students with the chief invigilator’s permission are allowed to enter the examination hall/room **FIFTEEN (15) minutes** before the examination begins. Students should enter the room in an orderly manner.

5.3 Students who arrive no later than **THIRTY (30) minutes** after the examination begins will be allowed to sit for the examination but there will be no time extension given for the examination.

5.4 Students who arrive **THIRTY (30) minutes** or more after the examination begins **will not be allowed** to enter the Examination Hall and **will not be allowed** to sit for the examination.

5.5 Students are not allowed to leave the examination hall/room within the first **THIRTY (30) minutes** after the examination begins and **FIFTEEN (15) minutes** before the examination ends. If a student needs to temporarily leave the examination hall/room between the times stated above, he/she will have to seek permission from an invigilator. Students’ names and; exit and entry times will be recorded by the Invigilator.

5.6 Students are required to bring:

5.6.1 course registration slip; and
5.6.2 student matric card or “MyKad”/passport; to the examination hall/room and place these items on the top right hand corner of the student’s table to be checked by the invigilator.

5.7 Students who do not have their course registration slip and student matric card or “MyKad”/passport will not be allowed to take the examination unless written consent is obtained from the examination supervisor.

5.8 Students are not allowed:

5.8.1 to bring into the examination hall/room any books, dictionaries, papers, pictures, notes, equipment with written texts, programmable calculators, communication equipment (mobile/smart phone, tablet or any electronic communication devices) or any other equipment unless
5.8.2 to receive any of the items in Para 5.8.1 from anyone in the examination hall/room.

5.9 Students must adhere to all instructions given by the chief invigilator in the examination hall/room from time to time.

5.10 **FIFTEEN (15) minutes** before the examination begins, students are required to do the following:

5.10.1 fill the attendance slip and the information required on the front page of the answer booklets/scripts; and

5.10.2 read the examination questions without making any notes.

5.11 Students must write their name, matric/“MyKad”/ISID number, course code, section and program as well as other required information on each answer booklet/script and any attachments used.

5.12 Students must read the instructions carefully and follow the printed instructions on the examination question paper and the cover of the answer booklet/script.

5.13 Students must ensure that they are given the correct examination paper and have the required number of pages before answering the examination questions.

5.14 If there are mistakes, students must inform the invigilator immediately.

5.15 Any related examination work (notes, scribbles) must be done in the answer booklet/script. Pages from these answer booklets/scripts should not be torn.

5.16 Used, spoilt or unused answer booklets/scripts cannot be taken out of the examination hall/room.

5.17 Students are not allowed to communicate with other students during the examination.

5.18 Students are not allowed to eat/smoke in the examination hall/room.

5.19 At the end of the examination, students must ensure that their answer booklet/script (except unused answer booklets/scripts and/or scribbles) is organised and tied neatly according to instruction, together with the first copy of the student attendance slip before handing it to the invigilator.

5.20 Students must remain seated after the examination is over and will only be allowed to leave the examination hall/room after being instructed by the chief invigilator.

5.21 Students are not allowed to begin answering the examination questions before the starting time or continue writing after the examination time is over.

5.22 Students must enter and leave the examination hall/room in an orderly manner.

5.23 Students are prohibited from referring to and/or using any references inside or outside the examination hall/room during the examination unless allowed by the chief invigilator.

5.24 Students must not give or receive any assistance from other students or other parties in relation to the
5.25 At the end of the examination, students must return any apparatus or document that is provided for examination purposes (if any) to the invigilator.

5.26 Students who fail to obey any of the final examination rules and regulations will be given a written warning by the Faculty Academic Committee and will be recorded in student’s personal file if found guilty.

6.0 FINAL EXAMINATION GUIDELINES

Guidelines for final examination are given at the end of this section.

7.0 SPECIAL EXAMINATION

7.1 Special Examination can be held for students who are unable to sit for the final examination because of illness as certified by a Hospital Medical Officer or University Health Centre Medical Officer; or for students who are involved in a calamity (such as accident, natural disaster, or; death of parents or close relatives)

7.2 Final semester students who have passed with Good Status [KB] but failed ONE (1) course taken during the last TWO (2) semesters of study, excluding the semester used for Industrial Training, may apply from the Faculty to sit for a special examination for a relevant course. The application must be done within FIVE (5) days after examination results are announced.

7.3 The special examination mark will be used to determine the results of the course as follows:

7.3.1 The special examination mark as in Para 7.1 will be used to replace the final examination marks whereas the coursework marks will be retained.

7.3.2 The special examination mark as in Para 7.2 will be used directly to determine course results, i.e. Pass or Fail, and will not be used in GPA and CGPA calculations. Failed students are required to repeat the course.

7.4 Special Examination will not be held for the following:

7.4.1 courses that have no final examinations; or
7.4.2 students who did not take the final examination without valid reasons acceptable to the university; or
7.4.3 students whose all forms of course attendance is less than 80% of total number of scheduled contact hours of learning activities.

7.5 Special Examination will only be conducted once in a semester unless approved by the Senate.
8.0 EXAMINATION MISCONDUCT

8.1 Students shall not be involved in any of the following examination misconduct:

8.1.1 give/receive/own any electronic, printed or other forms of information that is not allowed during the examination whether it is inside/outside the examination hall unless allowed by the chief invigilator; or

8.1.2 use the obtained information as listed above for the purpose of answering the examination questions;

8.1.3 cheat, attempt to cheat or act in a manner that is construed as cheating during an examination; or

8.1.4 other misconduct as stated by the University (such as making noise, disturbing other students, disrupting the Invigilator from carrying out his duties).

9.0 PENALTY FOR EXAMINATION MISCONDUCT

9.1 If a student has violated the rules and regulations of the examination and is found guilty by the Faculty Examination Committee, the Senate can take any of the following actions:

9.1.1 award ZERO (0) mark for the course (inclusive of coursework); or

9.1.2 award ZERO (0) marks for all the courses registered in that semester.

9.2 Depending on the severity of a student’s offence, the Faculty Academic Committee may suggest for disciplinary actions according to the Universities and University Colleges Act, 1971, Universiti Teknologi Malaysia (Discipline of Students) Rules, 1999.

9.3 Students who have been found to violate the rules and regulations of the examinations for the second time will be taken action upon as in Para 9.1.2 and; will be suggested for disciplinary actions according to the Universities and University Colleges Act, 1971, Universiti Teknologi Malaysia (Discipline of Students) Rules, 1999.

10.0 ANNOUNCEMENT OF COURSE GRADE

10.1 The university will upload the grades of every course online within the stipulated time.

10.2 Students must check the course grades that are obtained.

11.0 CHECKING COURSE GRADE

11.1 If a student feels that there has been a mistake in the obtained grade, the student may contact the lecturer directly within FIVE (5) working days after the final examination week ends.

11.2 If a student is not satisfied with the given grade, the student may check his/her examination answer
script and discuss with the lecturer.

12.0 COURSE GRADE APPEAL

12.1 If the student is still not satisfied with the obtained grade after the examination answer script is checked, the student may proceed with the Course Grade Result Appeal, i.e. an appeal so that the examination answer script is checked again and re-marked by the lecturer. A student is not allowed to do the Course Grade Result Appeal before checking the examination answer script and discussing with the lecturer.

12.2 Students may appeal for any course grade results to the Faculty no later than TEN (10) days after the last day of the final examination week.

12.3 Guidelines for the appeal of course grade are as given at the end of this section.
1.0 ACADEMIC STANDING

1.1 The performance of students is evaluated based on the TWO (2) measurements which are Grade Point Average (GPA) and Cumulative Grade Point Average (CGPA) which are as follows:

\[
\text{GPA} = \frac{\text{Total Grade Point per Semester}}{\text{Total No. of Credits that count per Semester}}
\]

And

\[
\text{CGPA} = \frac{\text{Total Grade Point for all the Semesters}}{\text{Total No. of Credits that count for all the Semesters}}
\]

1.2 The academic standing of a student at the end of every semester is based on the CGPA as in Table 5 below:

**Table 5: Academic Standing**

<table>
<thead>
<tr>
<th>Academic Standing</th>
<th>CGPA</th>
</tr>
</thead>
<tbody>
<tr>
<td>Good Status (GS)[KB]</td>
<td>CGPA (\geq 2.00)</td>
</tr>
<tr>
<td>Probation Status (PS)[KS]</td>
<td>(1.70 \leq \text{CGPA} &lt; 2.00)</td>
</tr>
<tr>
<td>Failed Status (FS)[KG] (Study Terminated)</td>
<td>CGPA &lt; 1.70</td>
</tr>
<tr>
<td>Student Mobility Incomplete Status (IS)[KM]</td>
<td>–</td>
</tr>
</tbody>
</table>

1.3 Students who obtain GPA < 1.00 even with CGPA > 1.70 can continue their studies. However, the Senate may;

1.3.1 defer the student’s education to next semester; or
1.3.2 give Failed Status [KG] and the student’s education will be terminated.

1.4 Students who have THREE (3) Probation Status (PS)[KS] continuously will be given the Failed Status (FS)[KG] and the student will be terminated from his program of study.

1.5 Students who have used up the maximum duration of their study but have not fulfilled the requirements for an award will be given the Failed Status (FS)[KG] and the student will be
terminated from his program of study.

1.6 The academic standing of a student for the short semester will not be accounted for. The grade obtained in that semester will be taken into account for the calculation of the CGPA in the following semester.

1.7 The academic standing of a student who enrolls in the student mobility program outside UTM with Student Mobility Incomplete Status [KM] will not be counted for that semester. The grade obtained in that semester will be counted for CGPA in the Semester I in the next session.

2.0 IMPROVING ACADEMIC PERFORMANCE

2.1 Students are given the chance to improve their grades with the faculty’s approval during their study according to the following conditions:

2.1.1 obtain faculty’s approval;

2.1.2 improve the grade of the course which is B- and below;

2.1.3 allowed to improve only once the grade of the course;

2.1.4 the maximum credits allowed for improving grade is FIFTEEN (15) credits throughout the study program

2.1.5 the better grade between the original and the latest grade will be used in the GPA and CGPA calculation; and

2.1.6 request for improving grade will have to be accompanied with grade improvement registration payment determined by the Senate.

2.2 Students who have completed their studies are NOT allowed to improve the grade of their course.

3.0 ANNOUNCEMENT OF STUDENT ACADEMIC STANDING

3.1 The academic standing of students will be announced through the modes adopted by the university except for the following cases:

3.1.1 students who obtain GPA < 1.00 even though CGPA ≥ 1.70,

3.1.2 students whose examination results are held due to disciplinary or other reasons decided by Senate,

3.1.3 students who have not payed the program fees
PART IX

1.0 DEAN’S LIST

1.1 Students who obtained GPA of 3.67 and above will be awarded the Dean’s List Certificate for that semester with the condition that the student has registered for at least TWELVE (12) credits excluding the Audit Course (AC)[HS], compulsory Audit Course (CA)[HW], Replacement Grade (RG)[UG] and Replacement Course (RC)[UM].

1.2 Students that graduate with CGPA of 3.67 dan above will be awarded Dean’s Award Medal after fulfilling graduation requirements.

1.3 The Dean’s List Certificate and Dean’s List Medal remarked will be noted in the student’s transcript.

PART X

AWARD OF A DEGREE

1.0 CONDITIONS FOR THE AWARD

1.1 Endorsement for the award is done for every regular semester

1.2 Students will only qualify for the award after fulfilling the conditions:

1.2.1 obtain Good Status (GS)[KB];

1.2.2 passed all the required courses;

1.2.3 applied for the award and approved by the faculty; and

1.2.4 other conditions as listed in University rules and procedures

1.3 Students who fulfill items 1.2.1 and 1.2.2 but did not fulfill items 1.2.3 and 1.2.4 will be given Good Status (Programme Completed) [KBTK]

1.4 Conditions for Passing the Minor Program:

1.4.1 Students will have the minor of a program recorded in their transcript after they have:

a. passed all the required courses for the Minor; and

b. apply for the award of Minor Program and is approved by the Faculty offering the Minor Program.

1.4.2 For students who fail to complete the registered minor program, the grade of the minor course taken will be counted in their GPA and CGPA.
PART XI

1.0 DEFERMENT OF STUDY

1.1 Deferment of studies can be done for the following reasons:

1.1.1 health reasons
1.1.2 other than health reasons
1.1.3 GPA < 1.00
1.1.4 Disciplinary action

1.2 Students who have been certified sick by the university medical practitioner or a government Medical Practitioner may request for a deferment of study for the ongoing semester from the Dean of the Faculty.

1.3 The maximum deferment for every application is TWO (2) continuous semesters. If the student requires more than TWO (2) continuous semesters, the case will be referred to the University Medical Panel to decide if the student should be allowed to continue or have his study terminated.

1.4 Students may also apply for deferment due to other reasons besides health. The application must be made before the last working day of week NINE of the semester.

1.5 The semester of the deferment will not be considered as one of the counted semesters for the program duration for the following cases:

1.5.1 the student’s study is deferred by the University due to health reasons
1.5.2 the student’s study is deferred by the University due to GPA < 1.00
1.5.3 the student’s study is deferred by the University due to disciplinary action

1.6 For students who defer their studies as in item 1.4, the semester of the deferment will be considered as one of the counted semesters for the program duration. However, with the endorsement from the Dean, and approval from the Deputy Vice-Chancellor (Academic and Internationalization), the semester requested for the deferment may be excluded from the calculation.
PART XII
1.0 CHANGE OF PROGRAMME OF STUDY

1.1 The University may consider applications from students who would like to change their programme of study in the faculty or to another faculty subject to these conditions:

1.1.1 the change can only be made after completing a minimum of ONE (1) semester of study at the university and latest by the FOURTH (4) semester of study;

1.1.2 the application for change of programme must be made no later than TWO (2) weeks after the results have been announced;

1.1.3 change to another faculty must get the prior approval from the student’s original faculty and the new faculty being requested by the student;

1.1.4 the academic performance of the students must not be Failed Status (FS)[KG];

1.1.5 for a change of program that is similar to the previous one, the academic record of the student will be retained and the study will be considered a continuation;

1.1.6 for a change to a different program, the previous academic record will be closed whereas a new academic record will be created. The maximum study period is subject to the program offered by the faculty and the number of transferred credits given;

1.1.7 The change of programme is only allowed once throughout the student’s study.

PART XIII
1.0 ACADEMIC MISCONDUCT

1.1 Academic misconduct is academic wrongdoing that can be subject to disciplinary action if the student is found guilty. Academic wrongdoing includes cheating, fabrication or forgery, plagiarism, multiple submissions or assisting in conducting academic wrongdoing.

1.1.1 Cheating is defined as:
   a. Using materials, information, or study aids that are not allowed in any matters related to academics;
   b. Changing answers on an already graded document before re-submitting it for re-grading; or
   c. Failure to follow procedures or fixed academic instructions (i.e. examination protocol of sitting at spaced desks or talking during examination)

1.1.2 Fabrication refers to falsifying or creating any information or content in any matter concerning academics, including creating or falsifying research information.
1.1.3 Plagiarism means using the work of others (including phrases, ideas, design or data). Without giving appropriate citation or acknowledgement. This includes:

a. Pretending and claiming a part or the whole of another’s work which has been bought or copied as the student’s own work;

b. Ignoring or failing to acknowledge the actual source of the work; or

c. using others’ work which has been modified but is still recognizable or it is a previously done work of the student himself which is shown as original or new work result of the student.

Unless stated otherwise by the faculty, all work results whether in draft or final format that are required for course fulfillment (including paper work, projects, computer programs, oral presentations or other works) must be the work of the student himself or acknowledged with appropriate citations.

1.1.4 Multiple submissions mean:

a. Resubmitting work that has been previously submitted by the student for counted credit in a similar or same form in a course to fulfill requirement for a second course unless it is with the approval/agreement of the second course’s instructor; or

b. Resubmitting work that has been previously submitted by the student for counted credit in a similar or same form in a course to fulfill requirement for a second course unless it is with the approval/agreement of the both courses’s instructors.

1.1.5 Assisting in the conduct of academic wrongdoing means that the student is in cahoots with other individuals to conducting academic wrongdoing knowingly.

1.1.6 Other Academic Wrongdoings:

Academic wrongdoings other than the above that can be categorized as academic misconduct by the university

1.1 If the student is found to have defied any of the items stated in 1.1 above, after being confirmed by the Faculty’s Academic Committee and proven guilty, the Senate may take any of the following actions:

1.1.1 give ZERO (0) marks for the whole subject’s marks (including course work); or

1.1.2 give ZERO (0) marks for all courses that are registered for that semester.

1.2 Other than item 1.2, the Faculty’s Academic Committee can raise the matter to the UTM Student Disciplinary Committee for disciplinary action according to the Universities and Colleges Act, 1971, Regulations of Universiti Teknologi Malaysia (Student Discipline), 1999 depending on the seriousness of the offence.
1.3 Student who is found to commit offence twice will be subject to item 1.2 and face the UTM Student Disciplinary Committee for disciplinary action in accordance with Universities and Colleges Act, 1971, Regulations of Universiti Teknologi Malaysia (Student Discipline), 1999

PART XIV

1.0 WITHDRAWAL FROM UNIVERSITY

1.1 Application for withdrawal must be made in writing to the Dean of the Faculty.

1.2 The student who is approved for withdrawal from study is required to pay all fees incurred for the ongoing semester.

1.3 The student who is approved for withdrawal from study is responsible towards any implications or actions taken by sponsor if applicable.

PART XV

GENERAL PROVISIONS, ENFORCEMENT AND PRACTICE OF RULES

1.0 GENERAL PROVISIONS

1.1 Any forms of further actions can be taken within the guidelines of this Academic Regulations and Guidelines. All the actions to be carried out must be in accordance with the guidelines. However, the Senate has the right to make changes from time to time as the need arises.

1.2 In case of any conflicting views, the rules stated in the Universities and Colleges Act, 1971 will be adopted.

1.3 Information listed here is accurate at the time of publication of this Academic Regulations and Guidelines.

2.0 IMPLEMENTATION AND USAGE OF THE RULES

This Universiti Teknologi Malaysia Academic Regulations is applicable to students who registered beginning the 2015/2016 Academic Session.
APPENDIX I

SHORT SEMESTER ADMINISTERING GUIDELINES

1.0 Introduction

1.1 The Short Semester is an academic semester offered during the long semester break and it is not counted as part of the period of study required for a program.

1.2 Courses offered during the Short Semester will be based on the decision made by the Faculty Academic Committee.

2.0 Duration of Study

2.1 The Short Semester begins one week after the end of Semester II and will be conducted for EIGHT (8) weeks.

2.2 The duration of the semester will include weekly lectures and all gradings.

2.3 There will be no mid-semester break or study break during this semester.

3.0 Courses Offered

3.1 Any course offered during the Short Semester is subject to approval by the Faculty.

3.2 Priority is given to courses that have a large number of students or have a high number of failures to be offered during the Short Semester subject to approval by the Faculty.

3.3 Maximum number of credits that can be registered by a student is EIGHT (8) credits only.

4.0 Registration of Courses

4.1 Students must register for each course to be taken during the Short Semester according to the procedure and within the time given by the university.

4.2 Students are allowed to withdraw from the courses they have registered.

4.3 Applications for Course Withdrawal (CW) should be done Starting from week THREE (3) and no later than the last working day of week FOUR (4) of the semester. After this date, any application for course withdrawal (CW) will not be accepted.
4.4 The faculty has the right to decide the minimum/maximum number of students who can register in a section for the offered courses.

5.0 Academic Achievements

5.1 Students will receive grades for the courses registered during the Short Semester.

5.2 The results of the final examinations during the Short Semester will be combined with the results of the examinations of the next semester for the purpose of calculating GPA, CGPA and the academic status of the student.

5.3 The existing course grade announcement and grade result appeal procedure will be applied for the Short Semester.

6.0 Fees

6.1 The student will be charged additional fees for enrolling for short semester that includes tuition fees and service fees.

6.2 Mode of Payment – Program Registration

6.2.1 Students must pay all the Short Semester fees that are due before or during registration of the courses for the short semester. Only students who have paid the fees will be allowed to register for the courses.

6.2.2 Students who withdraw (CW) from any course will not be given refunds on their fees.
APPENDIX II

MINOR PROGRAM GUIDELINES

1.0 Minor Program Registration

1.1 Senior students who have been given approval to undergo the Minor Program have to do program registration at the students’ Faculty on the date determined by the university.

1.2 Students who have registered for a minor program are not allowed to change their program.

1.3 Students are not allowed to take more than TWO (2) minor programs throughout their study.

2.0 Minor Program Course Registration

2.1 A student with the approval of his Academic Advisor and the faculty offering the Minor Program can register for any of the courses offered as part of the program.

2.2 A student must register for every Minor course taken during the semester according to the existing rules and procedures within the time given by the respective faculty.

2.3 Courses in the minor program cannot be registered as Audit Course (AC)[HS].

3.0 Minor Program Credits and Duration of Study

3.1 Students must pass all the required courses that are required for the registered minor program.

3.2 The total number of credits for a minor program is determined by the Faculty offering the program and with the approval of the university.

3.3 There will be no addition to the maximum duration of study for students who register for a minor program.

3.0 Minor Program Exemptions and Credit Transfers

Exemptions and credit transfers are not given to any course in any minor program.

4.0 Academic Achievements

5.1 The results for Minor Program Courses will be counted as part of the GPA and CGPA of the student.
5.2 Students who fail a Minor Program course do not need to repeat the course but the credit and grade points will be included in the calculation of GPA and CGPA.

6.0 Awards

Students who are eligible to be awarded the Minor Program as part of their transcript after they have fulfilled the following conditions:

6.1 Conditions for the minor award:

6.1.1 passed all the courses as required for the registered Minor Program;
6.1.2 applied for the minor award and is approved by the awarding faculty.

6.2 Minor award application:

6.2.1 Students who have fulfilled the conditions for the award of a Minor Program will have to apply for the minor award when they apply for their degree award;
6.2.2 Application for the Minor Program award cannot be made after receiving the degree.
6.2.3 Students who do not apply for the Minor Program award during the degree award application will not be given awarded the Minor award.
APPENDIX III

COURSE REGISTRATION GUIDELINES

1.0 Students who have enrolled in a program for the academic session must register for all the courses to be taken in that semester. Students who did not enrol in the program will not be allowed to register for any of the courses.

2.0 Students can only register for the courses offered in a semester according to the terms and conditions set by the student’s faculty. They cannot register for courses that are not offered in that semester.

3.0 Every course taken in a semester must be registered correctly by stating the course code, section number, number of course credits and the status such as Replacement Course (RC)[UM], Replacement Grade (RG)[UG], Audit Course (AC)[HS], Compulsory Audit Course (CAC)[HW] or Minor Course (MC)[MN].

4.0 Any mistakes made during registration of a course may result in the student being given zero (0) marks for the course.

5.0 Any course repeated by a student must be registered as Replacement Course (RC)[UM] or Replacement Grade (RG)[UG]. The course will be classified as follows:

5.1 **RC** is a repeat of a failed course from the previous semester;

5.2 **RG** is a repeat of a passed course with (grade B- and below) aimed at improving the academic performance and with the permission of the faculty.

5.2.1 A fee of RM 50.00 will be charged for every credit and refunds will not be given if the student withdraws from the course.

5.2.2 If the student drops the registered course during the registration correction period, the fees will be fully refunded.

6.0 The original course code must be used for registration purposes as in paragraph 5.0.

7.0 Course Registration can be done online or using the **Course Registration Form (Form UTM.E/3.1 Amendment 2012)**. Students are advised to consult their Academic Advisors before registering for the courses.

8.0 Students are encouraged to do pre-registration for their courses online or using the **Course Registration Form (Form UTM.E/3.1 Amendment 2012)** within the period given by the university.

9.0 Compulsory course registration will be conducted over a period of two (2) working days during the last week before the new semester begins. Registration after this period with the permission from the faculty...
will include a fine of RM50.00.

10.0 Students may make amendments to the previous registration during the first week of the semester. Any changes in the registration made in the second week will incur a fine of **RM50.00 per course up to a maximum of RM300.00**. The amendments include insertion, deletion, change of the course code, section and status by using the **Registration Slip Amendment Form (Borang UTM.E/3.5 Pindaan 2012)**.

11.0 Students should check the course registration slip to ensure that all the information in the slip is accurate. Students should make amendments to correct any errors based on the rules, conditions and time given as stated in paragraphs 9.0 and 10.0 above.

12.0 The official registration slip will be issued to every student by the faculty in week ELEVEN (11) of the semester. The student should obtain the slip from their faculty and bring it during their final examinations.

13.0 Students may withdraw (CW)[TD] from any of the courses registered in the semester. The application to withdraw (CW)[TD] is by using the **Course Withdrawal Form (Form UTM.E/3.2 Amendment 2010)** beginning week THREE (3) until the last working day of week EIGHT (8) in the semester. Request for withdrawals after this date will not be accepted.

14.0 The Course Registration Process shall be done according to the procedures set by the university. Registrations which are not done according to the procedures will be rejected or not be considered.

15.0 If a student fails to perform Course Registration within the time stipulated, except with valid reasons that are accepted by the University, the student’s study will be terminated.
APPENDIX IV

CREDIT EXEMPTIONS AND TRANSFERS
GUIDELINES

1.0 Credit Exemptions

1.1 Credit Exemption is credit which is given exemption during the application process to study for a program based on the results of the related courses. The credit exemptions will be part of the credit requirements for the award based on the qualification (diploma, degree or experience) endorsed by the government.

1.2 A student with Good Status (GS) who changes his program of study within the university or from another institution of higher learning can apply for credit exemptions. The faculty which accepts the student will decide on the course to be given the credit exemptions.

1.3 Credit Exemptions will not be allowed for similar programs which have been completed and degrees that have been awarded in the same field and level by other institutions of higher learning.

1.4 Application for exemption of credits must be done at the student’s faculty and should be completed by week THREE (3) during the first semester of study.

2.0 Credit Transfers

2.1 Credit Transfers is the credit given to students who have taken and passed the equivalent course in another institution of higher learning during his study at the university. The course given the credit transfer should be similar and fulfill the requirements of the relevant curriculum of the university.

2.2 The approved credit transfers will be included in the calculations of the GPA and CGPA.

2.3 Students are not allowed to use the credit transfer facility to study and complete their final semester of study at another institution of higher learning except with explicit permission from the Senate.

2.4 Only students with active registration statuses are allowed to apply for Credit Transfer.

2.5 Application for a credit transfer from a different institutions course must be done ONE (1) semester before enrolling in the credit transfer program.

3.0 Conditions and Management of Credit Exemption and Credit Transfer

3.1 Students may apply for credit exemption and credit transfer for a course according to the terms and
conditions that have been set.

3.2 Passing Grade

3.2.1 The minimum grade to get the credit exemption is Grade C or higher according to the university grading system.

3.2.2 The minimum grade to get the credit transfer is the Passing Grade determined by the Faculty. Courses with Failing Grade will have its registration terminated.

3.3 Credit Value

Courses that are given credit exemptions and credit transfers must be equivalent with the curriculum of the program at the university in terms of calculation of the academic workload and credit value.

3.4 Course Contents and Program Curriculum

3.4.1 The contents of the courses given credit exemptions and credit transfers must be equivalent with the curriculum of the enrolled program. The course contents should be the same or not less than 80% similar to the course offered at the university.

3.4.2 Approvals for credit exemptions and credit transfers will only be given to courses in a program which have been endorsed by the government.

3.4.3 Credit exemptions and credit transfers should not be more than 30% of the total number of credits required for the award of the degree of study. However, the faculty can request from the Senate to increase the percentage higher than 30% to a maximum of 50%.

3.4.4 Courses that have been given credit exemptions and credit transfers will be listed in the academic records of students.

3.4.5 Applications for credit exemptions and credit transfers should be done using Form UTM.E/3.8 Amendment 2010. (Borang UTM.E/3.8 Pindaan 2010)

3.4.6 Approval for credit exemptions and credit transfers will be given by the student’s faculty upon endorsement by the faculty that offered the course.

3.4.7 Approval for Credit Exemptions and Credit Transfers will be given to students in writing.
1.0 Final Examination Supervision

1.1 The supervisor for the final examination is the Dean of the faculty.

1.2 The final examination supervisor is responsible to ensure that the exam is being invigilated strictly and systematically.

1.3 The final examination supervisor should appoint an invigilator (consisting of the academic staff) and assistant invigilator (consisting of support staff).

1.4 The invigilator and the assistant invigilator are answerable to the Supervisor of the Final Examination.

2.0 Monitoring of Final Examination

2.1 The invigilator and the assistant invigilator are responsible for monitoring the examination.

2.2 Unless permission is obtained from the Supervisor of the Examination, at least TWO (2) invigilators must be appointed for a Hall/Examination Room whereby one will be appointed as the Chief Invigilator.

2.3 Responsibilities of the chief invigilator are as follows:

2.3.1 to report for duty with the Supervisor of the Examination or his representative at the faculty office on the day of the examination no later than THIRTY (30) minutes before the examination begins. The chief invigilator will collect the stamped envelop containing the exam questions and list of students’ names taking the examination;

2.3.2 certify the attendance of the invigilator and the assistant invigilator;

2.3.3 instruct the assistant invigilator to put the answer booklets, attendance form and other examination requirements on each student’s table and this should be done no later than FIFTEEN (15) minutes before the examination begins;

2.3.4 instructs students to enter the examination Hall/Room FIFTEEN (15) minutes before the examination begins;

2.3.5 ensure that the attendance of students is noted and recorded carefully;

2.3.6 announce the starting and ending time of the examination. Another announcement for the last
FACULTY OF ELECTRICAL ENGINEERING

FIFTEEN (15) minutes of the examination must also be made;

2.3.7 remind students of the result of misconduct during the examination;

2.3.8 can prevent a student who has broken the rules and regulations for examinations from taking the exam;

2.3.9 if a student is allowed to leave the exam hall/room for a reason and will return to continue the exam, the chief invigilator has to check and ensure that the student is monitored whenever he is outside the exam venue;

2.3.10 report and present proof of the incident of wrong doing and misconducts during examinations immediately to the supervisor of the examination or his representative after the examination is over;

2.3.11 allow students to leave the examination hall/room if they would like to submit their exam scripts/paper earlier than the last FIFTEEN (15) minutes of the exam;

2.3.12 instruct the invigilator and the assistant invigilator to collect the answer booklet or answer scripts after the exam is over while the students are still seated. The unused answer booklet or answer script should be collected separately.

2.3.13 responsible for counting and ensuring the number of answer booklets or scripts collected;

2.3.14 responsible for handing over the answer booklets or scripts to the supervisor of the examination or his representative inclusive of the unanswered or unused answer booklets or scripts;

2.3.15 should not postpone, suspend or cancel any examination without the approval of the supervisor for the examination;

2.3.16 present the attendance form for the invigilator and assistant invigilator to the supervisor of the examination or his representative at the faculty office after the exam is over;

2.3.17 responsible for ensuring that the examination is run smoothly; and

2.3.18 authorised to take any action deemed to be appropriate in managing misconduct during examinations.

2.4 Responsibilities of the Invigilator are as follows:

2.4.1 report for duty to the Chief Invigilator at the examination hall/room THIRTY (30) minutes before the exam begins;

2.4.2 place the exam scripts on the student’s table before students enter the examination hall/room.

2.4.3 ensure that the information listed in the students attendance form is the same as that of their
identity card/passport/matriculation card and course registration slip before collecting the a copy of the student attendance form;

2.4.4 collect the answer booklets/answer scripts after the examination is over while the students are seated. Unanswered or unused answer booklets/answer scripts should be collected separately;

2.4.5 report to the chief invigilator of any incident of going against the rules and regulations; and

2.4.6 carry out other duties as instructed by the chief invigilator.

2.5 Responsibilities of the Assistant Invigilator are as follows:-

2.5.1 report for duty with the supervisor for the examination or his representative at the faculty THIRTY (30) minutes before the exam begins. The assistant invigilator has to report to the chief invigilator at the examination hall/room.

2.5.2 answerable to the chief invigilator and has to do the following:

a. bring all the examination items to the exam venue
b. place the necessary items on the student’s table as instructed by the Chief invigilator.
c. place the exam questions on the student’s table before students enter the examination hall/room.
d. remain in the examination hall for the duration of the exam.
e. assist the invigilator to collect the students’ answer booklets/scripts.
f. return the items to the supervisor of the examination or his representative at the Faculty after the examination is over; and
g. carry out other duties as instructed by the chief invigilator.
APPENDIX VI

COURSE GRADE RESULT APPEAL GUIDELINES

1.0 Students may obtain the Course Grade Appeal (Form UTM.E/5-1) forms at the faculty. The completed course grade appeal forms (4 copies) should be submitted to the bursary according to the following procedure:

1.1 Fees for each course grade appeal is RM50.00;
1.2 Payment forms are available at the faculty;
1.3 Payment can be in cash, money order or postal order. Personal cheques are not accepted; and
1.4 All payments must be made by the students themselves at the bursary. Payments via postage will not be accepted.

2.0 Students will have to submit the appeal forms to the faculty which is offering the course that they are appealing. One set of forms is for the student’s record. Students will have to enclose the payment receipt when they submit the course grade appeal forms.

3.0 If there is an appeal from a student, the faculty will check and remark the examination answer scripts of the student.

4.0 The faculty offering the course has to present a report on the results of the appeal and re-marking to the student’s faculty.

5.0 Following the checking and/or re-marking, the marks will be the ones after the checking/re-marking has been done. If the new marks are lower than the original marks then the original marks is maintained. The faculty offering the course has to update the student’s examination record.

6.0 The student’s faculty has to inform the student of the results of the rechecking/remarking of the script and the appeal.

7.0 The decision of the checking/re-marking is final

Note: The Academic Regulations and Guidelines provided in this Undergraduate Handbook is a translation from the “Peraturan Akademik Program Sarjana Muda Pengajian Sepenuh Masa” as endorsed by the Senate of Universiti Teknologi Malaysia on 17th June 2015. In the event of a conflict between the information given in this Undergraduate Handbook and that in the “Peraturan Akademik Program Sarjana Muda Pengajian Sepenuh Masa”, the latter shall prevail.
THE CURRICULUM

BACHELOR OF ENGINEERING (ELECTRICAL) – SKEE

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## FACULTY OF ELECTRICAL ENGINEERING

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**TOTAL CREDIT HOURS**

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**TOTAL CREDIT HOURS**

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**OVERALL TOTAL CREDIT HOURS**

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# Faculty of Electrical Engineering

## Field Electives

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BACHELOR OF ENGINEERING (ELECTRICAL - ELECTRONICS) – SKEL

FIRST YEAR

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**TOTAL CREDIT HOURS** 16

**OVERALL TOTAL CREDIT HOURS** 136
### Field Electives

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#### MEDICAL ELECTRONICS

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**FIELD ELECTIVES**

**TELECOMMUNICATION ENGINEERING**

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# Bachelor of Engineering (Electrical - Mechatronics) - SKEM

## First Year

### Semester I

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**Total Credit Hours**: 17

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**Total Credit Hours**: 18

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### SECOND YEAR

#### SEMESTER I

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**TOTAL CREDIT HOURS**

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#### SEMESTER II

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**TOTAL CREDIT HOURS**

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## FOURTH YEAR

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**TOTAL CREDIT HOURS**  

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**TOTAL CREDIT HOURS**  

16

**OVERALL TOTAL CREDIT HOURS**  

138
SCSS 4213 : OPERATIONAL SYSTEM

This course equips students with knowledge and skills in overall operations and functions of operating system. The students also will learn several algorithms and data structure needed in designing operating system routines. This includes knowledge in basic components and structure of operating system, process description and control, scheduler, scheduling algorithms, processes and threats, concurrency and synchronization, memory partitioning, paging, segmentation, virtual memory, I/O devices, I/O buffering, disk scheduling, RAID, disk cache, file organization and access, file directories, file sharing, file systems, security threats, and protection. At the completion of this course, student should be able to figure out an internal component of operating computer system.

SCSP 1103 : C PROGRAMMING TECHNIQUES

Data type and operator, control structure, function, arrays and strings, pointer, structure, pre-processor, file input and output, advanced data type.

SKBB 3313 : BIOMEDICAL MATERIAL

Pre-requisite:

This subject provides an introduction to the fundamentals of and recent advances in biomedical materials. It covers a broad spectrum of biomedical materials which include metals, ceramics, polymers and composites. It takes an interdisciplinary approach to describing the chemistry and physics of materials, their biocompatibility, and the consequences of implantation of devices made of these materials into the human body. The subject is also designed to familiarise students with failure of materials through fracture, fatigue, wear and corrosion.
SKEE 1012: INTRODUCTION TO ELECTRICAL ENGINEERING  
*Pre-requisite:*

The course introduces students to the electrical engineering field and to the excitement and creativity in the practice of electrical engineering. The course will also expose students to the team-working environment and prepare students with the university’s lifestyle. Professionals from the various electrical engineering disciplines will be invited to give talks on their experiences, engineering ethics and career opportunities. Projects will be assigned to the group of students and it is expected that at the end of the course, the students will improve their communication (writing and oral) and creative skills.

SKEE 1023: CIRCUIT THEORY  
*Pre-requisite:*

This course introduces students to the basic laws, theorems and methods of DC and AC circuit analysis such as Ohm’s law, Kirchhoff Current and Voltage Laws, Thevenin and Norton theorems, concept of series and parallel circuits etc. Based on these, the students are expected to be able to solve for variables in any given DC and AC electric circuits. The course also provides the student with the basic understanding of operational amplifiers (op-amp) and how nodal analysis can be applied to various types of ideal op-amp circuits. 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 problem in circuit analysis.

SKEE 1043: CIRCUITS AND SYSTEMS  
*Pre-requisite: SKEE 1023 Circuit Theory*

This course introduces students the relevant concepts in dc and ac circuits. Firstly, students are 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. The course is also equipped the students with necessary knowledge related to the ac power calculation, three phase circuits and the analysis of Two-port networks. At the end of the course, the student should be able to apply the theorems and concepts in order to solve and analyze completely with confidence any given linear electric circuit.
SKEE 1063 : ELECTRONIC DEVICES
Pre-requisite : SKEE 1023 Circuit Theory

First course in the field of electronics, consisting of basic electronic devices such as the diode, the bipolar junction transistor, and the field effect transistor. Course content will include the devices' basic structure, biasing and basic applications. 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 basic biasing circuits using data sheet.

SKEE 1223 : DIGITAL ELECTRONICS
Pre-requisite :

This course emphasizes on techniques to design, analyze, plan, and implement complex digital systems using programmable logic, with specific focus on programmable logic devices. 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. With the knowledge learned, the student would be able to analyze the counter and register circuits completely with confidence and design synchronous counters.

SKEE 2073 : SIGNALS AND SYSTEMS
Pre-requisite :

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

*Pre-requisite :*

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 of standardization as the management system of standards and quality. The measurement technique for electrical quantity and analysis of the result according to ISO Guide will be introduced as well. It will examine transducers in order to gain an awareness of what they can do. Transducer operations, characteristic and functions will be discussed.

SKEE 2253 : ELECTRONIC CIRCUITS

*Pre-requisite :* SKEE 1063 Electronic Devices

This course introduces students to some major views and theories in amplifiers and its application. It will examine some key issues in basic definition, construction of analogue amplifiers, operational amplifiers and analogue system with special focus on analysis of transistor amplifiers through small signal equivalent circuits. The course will also provide practice in carrying out a computer simulation and modelling of the amplifier’s circuits using PSPICE or MultiSim software. At the end of the course, the students should be able to apply the theory and be familiar with the parameters and characteristics used to design BJT and FET amplifiers as well as describing operational amplifier performance and applications. Students should be able to recognize and categorize different feedback topologies and do simple analysis on them.
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, analyze, plan, and implement complex digital systems using programmable logic, with specific focus on programmable logic devices. 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.

SKEE 2413 : BASIC POWER AND ELECTRIC MACHINES  
*Pre-requisite: SKEE 1043 Circuits And Systems*

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, and 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*

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 for static and time varying fields in integral and differential forms, and also a time domain analysis of wave propagation.
SKEE 2742 : 2ND YEAR ELECTRONIC DESIGN LABORATORY

*Pre-requisite:*

The course exposes the students to some common electrical components and measurement instruments that can be used in experiments on the electrical and electronic engineering. On the other hand, this teaching laboratory will provide the skill of using electronic devices and measurement instruments to the students. The lab consists of Digital Laboratory and Electrotechnique Laboratory. Experiments cover several topics of basic subjects of digital electronic and electrical engineering such as combinational logic circuits, MSI circuits, adder circuits, decoder circuit, comparator, counter designing, network theorems and resonant circuits.

SKEE 3133 : SYSTEM MODELING AND ANALYSIS

*Pre-requisite: SKEE 2073 Signals and 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, electromechanical and liquid level systems in the transfer function form. Methods of system representation such as block diagram representation and signal flow graphs will be examined. The students will also be exposed to techniques of analysing control systems performance and stability in time domain. Finally, an introduction to the design and analysis of control systems using MATLAB will 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 will be used to improve the transient and steady state performances in time domain using root locus approach. In frequency domain approach, Bode plot method will be utilised. The lead, lag and lead-lag compensators are introduced 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 2253 Electronic Circuits*

This course covers some topics in functional electronic circuits. The circuits are derived from a diverse electronic circuitry existed 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 and 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. 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 bit error rate (BER) will also be covered. Finally, multiplexing, a method to utilize the communication resource efficiently is studied where two techniques will be explored; time-division and frequency-division multiplexing.

**SKEE 3732 : COMMON 3RD YEAR LABORATORY**

*Pre-requisite :*

The purpose of this course is to provide students with practical experience in the use of equipment, experimental data analysis, and to develop basic skill in laboratory report writing. At least 10 experiments from participating third year laboratories such as Control, Basic Communications, Instrumentation, Microprocessor, and Industrial Electronics. The students will also be exposed to the common electrical engineering equipment and measurement techniques. At the end of the course students should be able to develop skills in report writing, improve their communication skills and know how to work in a team.

**SKEE 3742 : SPECIALIZED 3RD YEAR LABORATORY**

*Pre-requisite :*

The purpose of this course is to provide students with practical experience in the use of equipment, experimental data analysis, and to develop basic skill in laboratory report writing. The students will be exposed to the common electrical engineering equipment and measurement techniques. At least 10 experiments from participating third year laboratories such as Basic Power, Basic Machine, Microprocessor and Industrial Electronic. At the end of the course students should be able to develop skills in report writing, improve their communication skills and know how to work in a team.
SKEE 4012 : PROFESSIONAL ENGINEERING PRACTICE  

*Pre-requisite:*  

The purpose of this course is to introduce and expose students to the concepts, theories and the practice of Professional Engineer. With the knowledge learned, the student would be able to apply the principles to real world situations.

SKEE 4113 : MODERN CONTROL THEORY  

*Pre-requisite: SKEE 3143 Control System Design*  

This course introduces students to the modern modelling approach of physical system namely state space. Students are introduced to state space modelling and analysis of several forms of state space representation such as PVF, CF, PF, JCF, CCF and OCF, conversion and similarity transformation. Students are exposed to solution of state space equation, controller and observer design using pole placement method and optimal control system. Introduction to system identification and estimation based on input and output measurement will be included.

SKEE 4153 : DIGITAL CONTROL SYSTEMS  

*Pre-requisite: SKEE 3143 Control System Design*  

This course introduces students the basic principles underlying the analysis, synthesis and design of digital control systems. Students are introduced to sampling theorem and discretization of continuous time system, data reconstructions, z-transform, mathematical modelling of discrete-time and digital systems, time domain and various stability analysis method for discrete-time and digital systems, and on the design of various discrete-time and digital controllers. By adapting the knowledge obtained, students will be able to derive the mathematical model of discrete-time control systems and analyze accurately its stability and the time response, as well as the students will be able to design correctly the suitable digital controller to control the discrete-time systems.
SKEE 4173: INDUSTRIAL PROCESS CONTROL  
Pre-requisite: SKEE 3143 Control System Design

This course provides an introduction to the field of industrial process control. The main focus of the course will be on modelling process systems and on the design and implementation of feedback and feed forward control strategies in single and multiloop systems. The course begins by looking at standard terminology and diagrams commonly used in process industries. Next, a study of how process plants and control elements can be modelled using fundamental laws of physics and chemistry will be looked at. The modelling of process plants using empirical approach will also be presented. Next, the standard PID controller commonly used in industry will be reviewed. To account for common disturbances and problems occurring in process systems, the idea of feed forward, cascade, non-linear and inferential control will be presented. At the end of the course, the multivariable control approach will be introduced to reflect process control ideas commonly present in an actual industrial process plant. This involves looking at the idea of interaction and the use of a centralized advanced controller such as the Model Predictive Controller. The course features extensive use of process simulation tools through group project works.

SKEE 4423: POWER SYSTEM ENGINEERING  
Pre-requisite: SKEE 2413 Basic Power and Electric Machines

This course is designed to introduce the necessary concept and the application of power system protection, protection against overvoltage and circuit breaker in power system. It is expected that the student will learn the general concept of power system protection and transducer. At the end of the course, the student are expected to be able to formulate and do calculation related to over current relay setting, fuses size, distance protection setting, setting of protection of electrical plant and components, protection against overvoltage such as due to lightning etc.
SKEE 4433 : POWER ELECTRONICS AND DRIVES  
*Pre-requisite : SKEE 2413 Basic Power and Electric Machines*

This course introduces students to the fundamentals of power electronics, which include power semiconductor switches, rectifier (AC-DC), choppers (DC-DC), and inverters (DC-AC). Emphasis will be on the power converter operations and analysis of their steady state performances. The course also exposes students to some basic converters design and the selection of suitable converters for certain application. In addition the course covers the operation and selection of converters for DC and AC drive systems. At the end of the course student should be able to critically design power converters using application software.

SKEE 4443 : POWER SYSTEM ANALYSIS  
*Pre-requisite : SKEE 4423 Power System Engineering*

This course introduces students to the applications of power system analysis of a practical power system. Topics include: load flow analysis, symmetrical three-phase faults, symmetrical components, unsymmetrical faults, technical treatment of the general problem of power system stability and its relevance. At the end of the course students are expected to apply the analysis concept in solving the real power system problems.

SKEE 4453 : POWER SYSTEM CONTROL  
*Pre-requisite : SKEE 4423 Power System Engineering*

The course introduces students to the control and operation of a power system and high voltage direct current (HVDC) system. It will discuss the basic principle of SCADA system, the economic operation of power system under regulated/deregulated environment. The discussion focuses on the control strategies that can be used in the power system operation in order to generate and deliver power economically and reliably to the power system customers. The course will also introduce the basic operation of converters in HVDC system. At the end of the course, the students are expected to apply the concepts in analysing the operation of power system and HVDC system.
SKEE 4463 : HIGH VOLTAGE TECHNOLOGY  
*Pre-requisite: SKEE 4423 Power System Engineering*

The students will be exposed to the concept and theory of insulation breakdown and principle of high voltage technology and testing. Phenomena such as lightning and switching are also discussed. At the end of the course are expected to be able to critically and collectively design a component of high voltage system to fulfil certain specification.

SKEE 4613 : HIGH VOLTAGE TESTING AND CALIBRATION  
*Pre-requisite: SKEE 4423 Power System Engineering*

High voltage engineering is an important area in power system. This course introduces and exposes students to the concept and theory of high voltage testing and calibration. Firstly, students are exposed to the generation and measurement of high voltages. Then, the relevant concepts in high voltage testing techniques are taught to the students. The course also equipped the students with necessary knowledge related to the high voltage testing and calibration on power equipments such as transformer, cables and switchgear. At the end of the course, the student should be able to apply the theorems and concepts in conducting high voltage testing and calibration.

SKEE 4633 : ELECTRICAL MACHINES  
*Pre-requisite: SKEE 2413 Basic Power and Electric Machines*

This course introduces students to the fundamentals of electrical machines, which are the synchronous machines, induction machines and DC machines. Students are introduced to their principle of operations, constructions and some analysis on their steady state performances. The course will also cover the fundamentals of Permanent-Magnet Synchronous and Brushless DC Motor that include speed control of the motors. At the end of the course, single-phase induction motors and special motors are discussed. By adapting the knowledge, students will be able to apply the concepts of Permanent Magnet Synchronous Motor, Brushless DC motor, Single-phase induction motor and Special motor to real world applications.
SKEE 4643 : CONTROL AND DESIGN OF POWER ELECTRONICS SYSTEMS  
*Pre-requisite : SKEE 4433 Power Electronics and Drives*

This course covers the knowledge on how to model power electronics converters and design its controller parameters. The course starts with a brief explanation on basic operation of power electronics converters and the necessity of having a feedback control in the system. For controller design, a recap on control theory i.e. open-loop system, closed-loop, phase margin, gain margin and bandwidth will be carried out. Conventional Proportional-Integral (PI) controller design under voltage mode control (VCM) and current mode control (CCM) strategies will be conducted. The course will also introduce the student on the concept and applications of advanced controllers such as Fuzzy logic and Sliding mode control in power electronics converters. At the end of the course, the student should be able to derive the model of power electronics converters, able to design its controller and analyse its performance using simulation.

SKEE 4653 : PHOTOVOLTAIC AND WIND ENERGY SYSTEMS  
*Pre-requisite : SKEE 4433 Power Electronics and Drives*

This course covers the fundamental knowledge on two popular renewable energy systems, namely photovoltaic (PV) and wind energy systems. A brief introduction will be given on the renewable sources of energy. In photovoltaic energy system, the characteristic of PV generation will be described. It follows with the integration of PV array with power electronic converters for energy harvesting. In addition to that, maximum power point tracking which acts as a controller to the PV system will be reviewed. Then, several examples of PV energy system design will be discussed. The PV systems include stand-alone and grid-connected system. At the second stage of the course, wind energy system will be introduced. The general classification of wind turbines, function of generators and speed control of wind turbine will be discussed. Then, the typically used topologies of wind energy system will be described. Students will be given design and simulation assignment that require them to do analysis on the renewable energy system. At the end of the course, the student should be able to understand the fundamental operation and control of PV and wind energy systems.
SKEE 4663 : ELECTRICITY FOR SUSTAINABLE ENERGY  
Pre-requisite : SKEE 4423 Power System Engineering

The course is designed to give an overview of energy system with emphasis in electrical energy as well as understanding of energy supply, demand, energy balance and sustainability. Student would identify various renewable energy and Demand Side Management options and would experience the complexity of making the best choice based on cost benefit analysis. At the end of the course students are expected to be able to apply and critically evaluate renewable resources potential and demand side management options.

SKEE 4673 : ELECTRICAL ENERGY MARKET  
Pre-requisite : SKEE 4443 Power System Analysis

This course introduces the students to the concept of competitive Electrical energy market models. At the beginning of the course, the student will learn the difference between the old monopoly electricity market model and the new competitive electricity market model including the advantage and disadvantages of each model. Then the students will learn some of the electricity market models existed in the world in which emphasis will be given on Pool Market and Bilateral Market Model. Some of the technical issues arisen from the deregulated/competitive electricity market will also be covered in this course. At the end of the course the students are expected to be able to analyze a security cost allocation pricing problem.

SKEE 4683 : POWER SYSTEM DESIGN AND OPERATION  
Pre-requisite : SKEE 4443 Power System Analysis

This course embodies the basic principles and objectives of fundamental of power system analysis. The aim is to instil confidence and understanding of basic concepts of power system analysis that are likely to be encountered in the study and practice of electric power engineering. The course also provide an in-depth understanding of the way the entire electricity network is build, i.e. from generation, then onto transmission and finally onto the distribution network. At the end of the course, the student should be able to apply the theorems and concepts in power system design and operation.
SKEE 4722 : 4TH YEAR CAPSTONE LABORATORY

*Pre-requisite :*

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.

SKEE 4812 : FINAL YEAR PROJECT PART 1

*Pre-requisite :*

The aim of the Final Year Project (FYP) is to give students opportunity to apply the knowledge that they have gained while studying in FKE to solve practical engineering problems. By doing so, it is hoped that the students will gain knowledge and experience in solving problems systematically thus when they graduate, they will be ready to work as reliable and productive engineers. The FYP is spread over two semesters (one year), and this is the first part of the final year project. Student will be assigned a supervisor and project’s topic at the beginning of the semester. Students are expected to do their work independently and their progress will be monitored closely by their supervisor.

SKEE 4824 : FINAL YEAR PROJECT PART 2

*Pre-requisite : SKEE 4812  Final Year Project Part 1*

This is the second part of the final year project. It is a continuation from SKEE 4812. At the end of the semester, student must present his/her project work and submit the project thesis to the faculty.
SKEE 4926: PRACTICAL TRAINING  
**Pre-requisite:**

Students will undergo a practical training lasting for a minimum of 10 weeks at an approved private, government or semi-government agency. The Faculty will release the list of participating agencies. Placement at the respective agency will be initiated by the applications from the students. Approval of the application is at the discretion of the Faculty. Undergraduates are expected to acquire hands on experience not only in the engineering aspects of work, but also to other related matters such as administration, accounting, management, safety, etc. during the industrial training period.

SKEI 3133: INDUSTRIAL INSTRUMENTATIONS AND APPLICATIONS  
**Pre-requisite:** SKEE 2133 Electronic Instrumentation and Measurement

This course presents the principles of industrial instrumentations. Students will be taught about various instruments used for different types of measurement. The course will enable students to understand the process of selecting measuring instruments and final control elements for performing different kinds of applications.

SKEI 4173: ADVANCED TRANSDUCERS & SENSORS  
**Pre-requisite:** SKEI 3133 Industrial Instrumentations And Applications

This course presents information processing systems need sensors to acquire the physical, mechanical and chemical information to be able to function. The reliability of the sensors must be improved and the cost dramatically reduced. This improvement of reliability, together with reduction of cost, can only be achieved with smart sensor systems. These systems combine the functions of sensors and interface, including sensors, signal conditioning, analogue to digital conversion and bus interfacing.
SKEI 4213 : BIOMEDICAL MEASUREMENT AND INSTRUMENTATIONS  
*Pre-requisite: SKEI 3133  Industrial Instrumentations And Applications*

This course is intended to introduce the function of instrumentations and measurement in the medical electronics industry. An overview of biomedical measurement principle, biopotential measurement, biosensor and clinical laboratory instrumentation. Discussion on physiological measurement and biomedical imaging system.

SKEI 4223 : BIOMEMS AND MICROANALYTICAL SYSTEMS  
*Pre-requisite: SKEI 3133  Industrial Instrumentations And Applications*

This course is designed to expose students to the most current revolution of instrumentation into different scale of measurement. Micro devices have involved actively in analytical chemistry measurement, bio analysis and environmental analysis measurement. This course introduces students to the major views and theories micro-analytical instruments and BIOMEMS and its application. It will examine some key principles of measurement and the micro fabrication techniques micro instruments. Students are required to demonstrate competencies in explaining various fabrication techniques and understand the characteristic of micro scale measurement.

SKEI 4233 : NANOTECHNOLOGY AND APPLICATIONS  
*Pre-requisite:*

This course gives the students an introductory knowledge of advanced equipments used in a nano scale world. The exploration into nano world could give great benefits in term of novel real applications to the humankind. Therefore, an understanding about the nature of the nano world is important. In this course, students will be highlighted with concepts, opportunities and issues related to the nano scale world. Then, students will be exposed to the fundamental principles of various equipments used in observing the nanoworld. Next, knowledge related to manipulate, sense and fabricate small objects will be introduced. Finally, various interesting real world applications resulted from research on nanotechnology are
presented to the students. In the end of the course, students are expected to acquire good understanding and able to analyse the fundamental principles of various equipments used in nanoworld. Students must be able to differentiate between various fundamental working principles used by various nano equipments. Furthermore, students should be able to relate various equipments used in nanoworld for various applications. Students must be able to use simulator for simulating various nanoscale phenomena. Last but not least, students are required to demonstrate effective communication skills and teamwork spirit via given assignments.

SKEI 4313 : PLC AND SCADA SYSTEM DESIGN
Pre-requisite : SKEE 3143 Control System Design

The aim of this course is to develop concepts in industrial control engineering which is divided into two parts: Automation using programmable logic controllers (PLC) and Supervisory Control and Data Acquisition (SCADA) system. Fundamental concepts in manufacturing and automation are initially described. Sequential control for automation of control system is then developed using state diagrams and PLC. More advanced control systems using PLC is also studied. This subject also covers the essentials of SCADA and PLC systems, which are often used in close association with each other. Hardware and software used in development of SCADA system are explained. A selection of real implementations is given to illustrate the applications of SCADA and PLC systems in various industrial sectors.

SKEI 4323 : ADVANCED CONTROL THEORY
Pre-requisite : SKEI4113 Modern Control Theory

This course introduces students to the applications of power system analysis of a practical power system. Topics include: load flow analysis, symmetrical three-phase faults, symmetrical components, unsymmetrical faults, technical treatment of the general problem of power system stability and its relevance. At the end of the course students are expected to apply the analysis concept in solving the real power system problems.
SKEI 4343 : SYSTEM IDENTIFICATION AND ESTIMATION  
*Pre-requisite: SKEI 4113 Modern Control Theory*

This course introduces students the alternative modelling approach of physical system namely system identification and estimation. Students are introduced to the preliminary of system identification, estimation and fundamental of systems and signals in time and frequency domain. Students are exposed to non-parametric and parametric system identification. Linear regression, least square estimate, prediction error identification method and realisation algorithm are discussed. Case study and experiment design to obtain data for system identification and parameter estimation are exposed at the end of the lecture. MATLAB software using System Identification Toolbox is utilised throughout the course.

SKEI 4353 : INDUSTRIAL PREDICTIVE CONTROL  
*Pre-requisite: SKEI 4323 Advanced Control Theory*

This course focuses on the formulation and application of predictive control in time invariant systems. The course covers the background of basic idea of predictive control and the formulation of predictive controls using linear model, nonlinear plant. The quadratic cost function along with prediction and control horizons will be taught. The prediction method will be in transfer function and mainly in state space representation. Initially, model identification is applied to obtain good (prediction) models, then a basic formulation of predictive control will be taught. Problem on constrained and unconstrained predictive control, as well as stability issues will be discussed. Finally, a practical case study for industrial control engineering is utilized to enhance the student understanding by applying Matlab MPC toolbox.

SKEI 4363 : INDUSTRIAL CONTROL NETWORKS  
*Pre-requisite: SKEE 3143 Control System Design*

In this course, students are introduced on the protocol and application of control network used in industries. Detail investigation and discussion on the network interfaces which support the protocols will
be covered. The complexity of the network in term of the design, programming and control as the number of nodes increases will also be highlighted. The networking with RS232/422/423/485 and 20mA current loop network will be covered to serve as the basis of the development of the network. Sequentially, the study will encompass on the protocol and application of advance industrial buses such as Fieldbus, Profibus, DeviceNet, LonWorks, Controller Area Network (CAN) and industrial Ethernet network. MATLAB software with Network Toolbox is utilised throughout the course to enhance the students understanding of the course materials.

SKEL 3503 : PHYSIOLOGY & INTRODUCTION TO MEDICINE

*Pre-requisite:*

The objective of this course is to introduce students to the basic of physiology and anatomy and enable them to be competent in medical engineering as well as to fulfill vision and objectives of the faculty and university. This course introduces students to some basic knowledge on physiology and anatomy. The course is designed for students with engineering or technical background. The course prepares students with the knowledge that they need in order for them to interact better with medical practitioners during performing their work or during medical related research.

SKEL 3613 : SEMICONDUCTOR MATERIAL ENGINEERING

*Pre-requisite: SKEE 1063 Electronic Devices*

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 physics 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 : SPECIALIZED 3RD YEAR LABORATORY

Pre-requisite :

The purpose of this course is to provide students with practical experience in the use of equipment, experimental data analysis, and to develop basic skill in laboratory report writing. The students will be exposed to the common electrical engineering equipment and measurement techniques. At least 10 experiments from participating third year laboratories such as Digital Signal Processing, Microprocessor and Industrial Electronic. At the end of the course students should be able to develop skills in report writing, improve their communication skills and know how to work in a team.

SKEL 4213 : SOFTWARE ENGINEERING

Pre-requisite :

This course introduces various issues of system and software engineering. This course attempts to cover a vast field covering all aspects of system and software development work from analysis, design, implementation, operation, maintenance, support, cost, management, and risk analysis. Focus will be given on software development process, programming, testing and maintenance, which are the fundamental aspect of software engineering. Special emphasis will be given to the process of object oriented design as well as the use of UML in the design activities.

SKEL 4223 : DIGITAL SIGNAL PROCESSING 1

Pre-requisite : SKEE 2073 Signals and Systems

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. This is followed by analysis and design of digital filters covers filter basics, analogue filter prototypes and design of IIR filter and FIR filter. At the end of the course is the application of digital signal processing on Multimedia System: Compression technique on audio, image and video.

SKEL 4273 : CAD AND ASIC DESIGN

*Pre-requisite : SKEE 2263  Digital Systems*

This subject aims to develop in students the knowledge and skill necessary to model, design and implement complex digital systems using state-of-the-art CAD tools. Students are introduced with hardware description language in modelling and design of digital systems. Using techniques learned in digital design course, students have to undergo the ensign, model, and analyze complex digital systems. 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 4283 : ANALOG CMOS IC DESIGN

*Pre-requisite : SKEE 2253 Electronic Circuits*

In this course students will be taught the characteristics of MOSFET transistor as a prerequisite of CMOS analogue design. It highlights the nonlinearity as an imperfection which will limit the performance of analogue circuits. The course will then proceed to analyze CMOS single ended as well as differential amplifiers. The advantages and disadvantages between different architectures will be discussed which designers could choose to fit their design requirements. The trademark of analogue 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. Other important sub-modules such as differential amplifier, Op Amps, switch capacitor amplifiers and oscillators 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 theory and applications of digital signal processing. Basic concepts in signal processing will be reviewed that covers continuous and discrete-time signals and systems with the relevant transformations and operations. Random signal principles are presented with, definition of stationarity and ergodicity, correlation and covariance functions and their estimates. 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. Basic constraints in non parametric power spectrum estimation are described with the appropriate solutions. Linear estimation techniques deal with parameter identification and estimation of signals. Linear prediction is used for signal modelling and prediction. The solution is obtained based on the solution to the normal equation and its efficient implementation using the, Levinson-Durbin algorithm. 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 & ORGANIZATION
Pre-requisite : SKEE 2263 Digital Systems

To introduce 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 behaviour 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 2253 Electronic Circuits*

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

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*

This course introduces students to the techniques of testing a circuit and designing a testable 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 & Introduction To Medicine**

This course introduces students to major principles of clinical engineering. The scope of clinical engineering covers pre-market, market and post-market life-cycle of medical devices as well as risk and personnel management. These include 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, standard and regulation for medical devices.

SKEL 4523 : MEDICAL INSTRUMENTATION
**Pre-requisite : SKEE 2133 Electronic Instrumentation and Measurement**

To introduce students to various medical devices and circuits that can be found in hospitals and various medical institutions. This course covers some topics in Biomedical Instrumentation and Measurement. Biomedical Amplifiers, Bridge Amplifiers, Electrodes, ECG circuits and equipment, EEG circuits and equipment, EMG circuits and equipment, Blood Pressure Measurements, Circuits and Equipment, Blood Flow Measurements and Equipment, Respiratory System and its measurements, Intensive Care Unit, Operating Room, and Electro surgery Equipment and its electronic circuits. The function, the behaviour, the characteristics of the biomedical circuits are analysed and the necessary design criteria are derived. Design examples are presented to guide students with the necessary knowledge of how to control the circuit parameters to conform to the desired behaviour 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. Among biomedical signal processing algorithm covers in this course are: Fourier analysis, Fourier transform, data acquisition, digital filter design and discrete Fourier transform. Furthermore, few current approaches on biomedical signal processing techniques were also introduced: instantaneous energy and frequency, short-time Fourier transform, wavelet transform and time-frequency analysis. This course also provides introduction of few pattern recognition techniques which commonly used in automatic classification of biomedical signals.

SKEL 4543 : BIO SYSTEM MODELLING  
Pre-requisite : SKEL 3503  Physiology & 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 modelling 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 homeostasis, 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 modelling of bio system using Matlab/Simulink/LabView software.
SKEL 4553: MEDICAL IMAGING  
*Pre-requisite: SKEL 4223 Digital Signal Processing 1*

A course for introducing and exposing students to the world of medical imaging. It focuses on medical image processing of image obtained from the various imaging modalities such as MRI, ultrasound, CT-scan, nuclear medicine and X-ray.

SKEL 4563: BIOSENSORS AND TRANSDUCERS  
*Pre-requisite: SKEE 2133 Electronic Instrumentation and Measurement*

This course is intended to introduce the function of biosensor and a transducer in the medical electronics industry. An overview of biosensors and an in-depth and quantitative view of device design including fabrication technique. Discussion of the current state of the art biosensor to enable continuation into advanced biosensor design and fabrication. Topics emphasize biomedical, bio-processing, military, environmental, food safety, and bio-security applications.

SKEL 4613: SEMICONDUCTOR DEVICE ENGINEERING  
*Pre-requisite: SKEL 3613 Semiconductor Material Engineering*

The objective of this course is to give 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. This course is designed 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 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.

SKEL 4623: SOLID STATE ELECTRONICS  
**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, including semiconductor lasers and memories. It is a continuation of semiconductor material engineering and electronic device courses. In this course, students 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 GaAs and 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, to explain the required characteristics for opto-electronic devices, semiconductor lasers will be used as an example.

SKEL 4633: ELECTRONIC DEVICE FABRICATION & CHARACTERIZATION  
**Pre-requisite**: SKEL 3613  Semiconductor Material Engineering

The objective of this course is to introduce students to the basics of fabrication and characterization technology of semiconductor devices. The course will focus on the basic physical phenomenon and underlying technologies that involved in each process, and the basic techniques for device characterization. Specifically, students are exposed to two major types of semiconductor growth technologies which are known as Czochralski growth and epitaxy growth technologies. For device fabrication, students are exposed to mainly the top-down approaches which are lithography and dry etching technique applying plasma processing technologies. Electrical and optical characterization as well as physical characterization using microscopy technologies will be described.
SKEL 4643 : NANO ELECTRONICS
Pre-requisite : SKEL 3613

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 & SIMULATION OF MICROELECTRONIC DEVICES
Pre-requisite : SKEL 3613

This course offers an introduction to modelling 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 modelling technique with emphasis on the silicon metal-oxide-semiconductor field-effect-transistor (MOSFET). Examples on modelling 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 4722 : 4TH YEAR CAPSTONE LABORATORY

*Pre-requisite:*

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, flip-flop and memory circuits are also covered. Interconnect issues, when various components are connected together, are elaborated. To gain a better understanding of a complete design, a subsystem design in the form of adder circuits is included.
SKEL 4812 : FINAL YEAR PROJECT PART 1

*Pre-requisite :*

The aim of the Final Year Project (FYP) is to give students opportunity to apply the knowledge that they have gained while studying in FKE to solve practical engineering problems in the area of Electronic Engineering. By doing so, it is hoped that the students will gain knowledge and experience in solving problems systematically thus when they graduate, they will be ready to work as reliable and productive engineers. The FYP is spread over two semesters (one year), and this is the first part of the final year project. Student will be assigned a supervisor and project’s topic at the beginning of the semester. Students are expected to do their work independently and their progress will be monitored closely by their supervisor.

SKEL 4824 : FINAL YEAR PROJECT PART 2

*Pre-requisite : SKEL 4812 Final Year Project Part 1*

This is the second part of the final year project. It is a continuation from SKEE 4812. At the end of the semester, student must present his/her project work and submit the project thesis to the faculty.

SKEL 4926 : PRACTICAL TRAINING

*Pre-requisite :*

Students will undergo a practical training lasting for a minimum of 10 weeks at an approved private, government or semi-government agency. The Faculty will release the list of participating agencies. Placement at the respective agency will be initiated by the applications from the students. Approval of the application is at the discretion of the Faculty. Undergraduates are expected to acquire hands on experience not only in the engineering aspects of work, but also to other related matters such as administration, accounting, management, safety, etc. during the industrial training period.
SKEM 1502: COMPUTER AIDED ENGINEERING DRAWING

Pre-requisite:

This course introduces the use of engineering drawing in an effective way for communicating and integrating with engineering concepts. Such environment will provide a platform where the engineer can share and exchange the information. This information is interpreted using CAD drawing in SolidWorks 2D and 3D drawings. Techniques such as patterns, shelling, planes, ribs, revolve and assembly will be learned in the course. Finally real 3D objects will be developed using 3D printer.

SKEM 1113: ENGINEERING MECHANICS

Pre-requisite:

This course introduces students with the basic principles of engineering mechanics with emphasis on the analysis and application to practical engineering problems. The fundamental knowledge in vectors and the concept of force, mass and weight are reviewed. The force system and equilibrium of particles are covered consecutively. Moment of inertia that includes the centroids, area and moment of inertia are included to equip students with knowledge in static particle and rigid body system. Kinematics and kinetics of both particles and rigid bodies with their governing physical laws are also introduced and analyzed such that the students will gain the ability to apply these basic principles to solve mechanic problem. By following the techniques covered, students will be able to apply the learned methods in formulating mathematical model of dynamic systems involving kinematics and kinetics of the system with some degree of accuracy in the model description.
SKEM 3123 : HYDRAULIC AND PNEUMATIC SYSTEMS  
*Pre-requisite: SKEM 1113 Engineering Mechanics*

This course introduces students to the working principle of hydraulic and pneumatic systems. The hydraulic and pneumatic components and their functions will be described. Students will be taught how to analyze and design hydraulic and pneumatic circuits. Students will also be exposed to the design of electrical control circuits for electrohydraulic and electropneumatic systems. Finally, design and integration of hydraulic and pneumatic control system with PLC will be given.

SKEM 3133 : ELECTRIC MOTOR AND DRIVES  
*Pre-requisite: SKEE 2413 Basic Power and Electric Machines*

Students will be introduced with general information about electric motor and the commonly used power electronic circuits. The drives principles of conventionally DC motor and AC motor such as induction motor, stepping motor, synchronous motor, switched reluctance and brushless motor will be taught. To show the relationship between the theoretical and practical aspects of the subject, the development of modelling, analysis and application of DC and AC electric drives systems will be carried out. Matlab simulation, model validation and transient analysis of electric drive systems will be utilized and discussed.

SKEM 3742 : SPECIALIZED 3RD YEAR LABORATORY  
*Pre-requisite:*

The purpose of this course is to provide students with practical experience in the use of equipment, experimental data analysis, and to develop basic skill in laboratory report writing. The students will be exposed to the common electrical engineering equipment and measurement techniques. At least 10 experiments from participating third year laboratories such as Control, Microprocessor and Industrial Electronic. At the end of the course students should be able to develop skills in report writing, improve their communication skills and know how to work in a team.
SKEM 4133 : MACHINE VISION SYSTEMS

Pre-requisite:

This course introduces students the concepts of machine vision as well as the basic of machine vision design. The students also will be taught the fundamentals of digital image and data structures to help them understand various concepts and algorithms in image processing and image analysis. The students also will learn how to do camera calibration to determine the value of the extrinsic and intrinsic parameters of the camera for use in the 3-D reconstruction and recognition. Further, the students will learn shape representation and description which will be used in object recognition. Students also will learn image understanding, an internal image model that represents the machine vision’s concept about the processed image of the world. It is the process of actually interpreting the regions or objects in the image to figure out what is actually happening in the image. To conclude the course, the four case studies on machine vision applications will be presented to the students. By completing this course the student will be able to understand machine vision problems and apply the learned methods in term of design and implementation of the method to solve the problems.

SKEM 4143 : ROBOTICS

Pre-requisite: SSCE 1993 Differential Equations

This course introduces students the basic principles underlying the design, analysis and synthesis of robotic systems. Students are introduced to various classifications and types of industrial robots, methods of deriving and analyzing robot kinematics, inverse kinematics, and dynamic model, as well as on the design of robot trajectory planning. Students are also introduced to the various robot sensors and vision systems. By adapting the knowledge obtained, students will be able to derive and analyze accurately the forward kinematics, the inverse kinematics, and the dynamics for various industrial robots, as well as the students will be able to design correctly the robot’s trajectory.
SKEM 4153 : ROBOT TECHNOLOGY FOR AUTOMATION  
*Pre-requisite:* SKEM 4143 Robotics

This course introduces students to the main aspects of the key technologies in the design and installation of robotic systems, automated work cells and computer integrated manufacturing systems, work cell support systems, robot and system integration, as well as safety design in robot applications. This course is practical and design oriented, giving emphasis on the design of robotic work cell installations in industrial set-ups.

SKEM 4173 : ARTIFICIAL INTELLIGENCE  
*Pre-requisite:* 

This course introduces students to the fundamentals of two techniques of artificial intelligence (AI), namely, fuzzy logic and neural networks. Both techniques have been successfully applied by many industries in consumer products and industrial systems. Fuzzy logic offers flexibility in developing rule-based systems using natural language type of rules. Neural networks on the other hand, have strong generalization and discriminant properties and offer a simple way of developing system models and function approximation. They are highly applicable for many pattern recognition applications. This course gives the students appropriate knowledge and skills to develop, design and analyze effectively these two AI techniques for practical problems with some degree of accuracy. The students will also be given a hands-on programming experience in developing fuzzy logic and neural networks system to effectively solve real-world problems.

SKEM 4223 : EMBEDDED SYSTEM  
*Pre-requisite:* SKEE 3223 Microprocessor

This course introduces the principles and applications of microcontroller. The topics emphasized are microcontroller architecture, software programming using assembly language and C language. The content also covers internal peripherals such as parallel input and output, analogue to digital converter, timer and
counter. The student will learn technique and circuit to interface microcontroller with other devices in embedded system.

**SKEM 4333 : MECHATRONIC SYSTEM DESIGN**

*Pre-requisite:*

This course introduces the pertinent aspects of mechatronics including system modelling, simulation, sensors, actuation, real-time computer interfacing and control, needed to develop a good understanding of the basic principles used in mechatronic system design. This course tries to balance between theoretical and practical aspects, and hardware implementation is emphasized. A case-study, based on problem-solving approach through demonstrations and lab exercises, is used throughout the course. From the material covered, the students will be able to analyze and select the appropriate sensors, actuators and interface, and design the PID control and its digital implementation accurately.

**SKEM 4722 : 4TH YEAR CAPSTONE LABORATORY**

*Pre-requisite:*

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.
SKEM 4812 : FINAL YEAR PROJECT PART 1

Pre-requisite:

The aim of the Final Year Project (FYP) is to give students opportunity to apply the knowledge that they have gained while studying in FKE to solve practical engineering problems in the area of Mechatronic Engineering. By doing so, it is hoped that the students will gain knowledge and experience in solving problems systematically thus when they graduate, they will be ready to work as reliable and productive engineers. The FYP is spread over two semesters (one year), and this is the first part of the final year project. Student will be assigned a supervisor and project’s topic at the beginning of the semester. Students are expected to do their work independently and their progress will be monitored closely by their supervisor.

SKEM 4824 : FINAL YEAR PROJECT PART 2

Pre-requisite: SKEM 4812 Final Year Project Part 1

This is the second part of the final year project. It is a continuation from SKEE 4812. At the end of the semester, student must present his/her project work and submit the project thesis to the faculty.

SKEM 4926 : PRACTICAL TRAINING

Pre-requisite:

Students will undergo a practical training lasting for a minimum of 10 weeks at an approved private, government or semi-government agency. The Faculty will release the list of participating agencies. Placement at the respective agency will be initiated by the applications from the students. Approval of the application is at the discretion of the Faculty. Undergraduates are expected to acquire hands on experience not only in the engineering aspects of work, but also to other related matters such as administration, accounting, management, safety, etc. during the industrial training period.
SKET 3573 : MICROWAVE ENGINEERING
*Pre-requisite : SKEE 3533 Communication Principles*

To introduce the transmission line theory, scattering parameters, Smith chart, and impedance matching. Microwave 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, and filters. Students are supposed to be able to describe and apply the microwave component principles in a given microwave communication system and industrial microwave heating.

SKET 3583 : DIGITAL COMMUNICATION SYSTEMS
*Pre-requisite : SKEE 3533 Communication Principles*

This course discusses the basic principles that underline the analysis and design of digital communication systems. Main topics to be covered are basic information theory, source coding, baseband signalling, digital modulation, optimum demodulation and detection methods in AWGN channel, the evaluation of the error rate performance, the channel bandwidth requirements and error control coding. Brief discussions on spread spectrum and multiple access techniques in particular CDMA are also being included. Finally, the communication system trade off is highlight in designing a digital communication system.

SKET 3623 : DATA COMMUNICATION & NETWORKS
*Pre-requisite : SKEE 3533 Communication Principles*

This course will 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.
SKET 4523 : OPTICAL COMMUNICATION SYSTEMS

*Pre-requisite : SKEE 3533 Communication Principles*

The contents of this subject focus towards the introduction to optical communication system and design of optical communication link. The first part covers the historical perspective of optical communication system and the advantages of it. This is then followed by type of optical fibre, propagation of light in optical fibre, transmission characteristic of optical fibre and the fabrication of optical fibres. The next section covers the various optical devices like optical sources, optical detector, couplers, optical amplifiers, optical switches, wave division multiplexers and connectors. The last section covers the design of fibre optic link.

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 mobile radio communication includes mobile radio propagation, multiple access, cellular concept and modern wireless communication systems. Meanwhile, orbital mechanics, satellite sub-systems, link budget and satellite applications will be covered in satellite communication systems. At the end of this course, student should be able to describe the concept and operation of cellular radio system and satellite communication system.

SKET 4543 : RF MICROWAVE CIRCUIT DESIGN

*Pre-requisite : SKET 3573 Microwave Engineering*

This course introduces students to the theory and principles of designing RF circuit in communication electronics system. The RF circuits involve with filters, amplifiers, oscillators, mixers and detectors. The
system block diagram is also discussed such as transmitter and receiver function characteristics. Students are expected to be able to design and apply the RF circuit principle in a given communication systems.

SKET 4593 : ACOUSTIC ENGINEERING

*Pre-requisite : SKEE 3533 Communication Principles*

This course introduces students with the basic concepts, theories and applications in acoustics with emphasis in noise control in enclosed rooms and outdoor and sound system design. The fundamental knowledge of sound waves, its characteristics, generation, propagation and attenuation are reviewed. The representation of sound quantity in decibel in terms of its pressure, density and power are emphasized both in theories and practical applications. Monopole and dipole are two types of sound that will be discussed in this course. A-weighted equivalent continuous sound pressure level for outdoor noise, Noise Criteria and Noise Rating for noise in room are among the noise descriptors to be discussed in this course. Enclosed room designs for optimum acoustics are also introduced and analyzed such that the students will gain the ability to apply the basic principles of sound and to solve room acoustics problems. Public address system design is an additional topic covered in the course to give students more exposure of knowledge and design opportunity. It is hoped that the students will have good understanding and sufficient analysis and design ability in acoustic engineering.

SKET 4613 : ANTENNA THEORY AND DESIGN

*Pre-requisite : SKET 3573  Microwave Engineering*

This course introduces students to the concept of designing an antenna operating at microwave band. The fundamental on antenna theory form the derivations of transmission line and wave theory will be introduced. Emphasis is given on the broadband antenna employing arrays and active integrated antenna. Finally, the antenna measurement system is introduced as a measure on the workable designed antenna performance. Students are required to apply the microwave antenna properties and concepts on designing a workable antenna in a given wireless scenario by employing simulation software.
SKMU 2113 : ENGINEERING SCIENCE

Pre-requisite:

Thermodynamics is a basic science that deals with energy. This course introduces students to the basic principles of thermodynamics. It will discuss basic concepts and introduces the various forms of energy and energy transfer as well as properties of pure substances. A general relation for the conservation of energy principle will be developed and applied to closed systems and extended to open systems. The second law of thermodynamics will be introduced and applied to cycles and cyclic devices.

SSCE 1693 : ENGINEERING MATHEMATICS I

Pre-requisite:

This is a first course in Engineering Mathematics. It covers topics including differentiation and integration which focus on hyperbolic and inverse functions. Improper integrals are also studied. Vectors and matrices including basic operations, solving related problems in 3 dimensions are discussed. In addition, vector spaces, eigenvalues and eigenvectors are introduced. Sketching of polar graphs is discussed. This course also covers complex numbers, function of complex variable, series and power series.

SSCE 1793 : DIFFERENTIAL EQUATIONS

Pre-requisite:

This is an introductory course on differential equations. Topics include first order ordinary differential equations (ODEs), linear second order ODEs with constant coefficients up to fourth order, the Laplace transform and its inverse, Fourier series, and partial differential equations (PDEs). Students will learn how to classify and solve first order ODEs, use the techniques of undetermined coefficients, variation of parameters and the Laplace transform to solve ODEs with specified initial and boundary conditions, and
SKET 4623 : NETWORK PROGRAMMING
Pre-requisite : SKET 3583 Digital Communication Systems

The objective of this course is to introduce students to the basic of network programming, Java applications and Applets. This course will provide the student with a basic understanding of object-oriented design and programming. It will also provide an introduction to the Java language. The module will cover topics such as object modelling techniques including classes, object abstraction, class methods, and inheritance. By the end of the module students should have an understanding of how Java Applications and Applets can be constructed and some basics in Internet concepts such as HTML constructs.

SKET 4633 : CODING OF MULTIMEDIA SIGNALS
Pre-requisite :

This course is an introduction to the coding and processing of digital multimedia signals. It covers current techniques for processing, storage and delivery of media such as audio, images, and video. This requires an in-depth understanding of digital signal processing for 1D signals, as well as the extensions to 2D and 3D cases. The emphasis will be on the theoretical basis as well as efficient implementations. Key components studied in details are digital filters, transforms, quantizes, bit allocators, entropy coders, motion estimation and compensation algorithms. Current and future audio/image/video compression standards and formats such as MP3, JPEG, JPEG2000, MPEG family, H.263, H.264... are frequently used as illustrations

SHAS 4542 : ENGINEERING MANAGEMENT
Pre-requisite :

Management and manager, organization, leader and leadership theory, motivation and motivation theory, business, decision making, financial account, capital investment, project management, quality management and ISO9000.
use the technique of separation of variables to solve linear second order PDEs and the method of d’Alembert to solve wave equation.

SSCE 1993 : ENGINEERING MATHEMATICS II  
Pre-requisite:

This course is about multivariable calculus of real and vector-valued functions. The basic theory of partial derivatives and multiple integrals of real functions with their applications are discussed. This theory is extended to vector valued functions to describe motion in space, directional derivatives, gradient, divergence and curl, line integrals, surface integrals and volume integral. Related theorems, namely Green’s Theorem, Stokes’ Theorem and Gauss Divergence Theorem and their applications are discussed.

SSCE 2193 : ENGINEERING STATISTICS  
Pre-requisite:

This course begins with basic statistics, elementary probability theory and properties of probability distributions. Introduction to sampling distribution, point and interval estimation of parameters and hypothesis testing are also covered. Simple linear regression and one-way analysis of variance are also taught in this course. Students are taught on how to use and incorporate statistical tools and software for solving engineering statistics problem through a group assignment.

SSCE 2393 : NUMERICAL METHODS  
Pre-requisite:

This course discusses problem solving using numerical methods that involve non-linear equations, systems of linear equation, interpolation and curve fitting, numerical differentiation and numerical integration, eigenvalue problems, ordinary differential equations and partial differential equations.
ULAB 1112 : ENGLISH FOR ACADEMIC COMMUNICATION

This course prepares students for the skills needed to perform academic tasks such as extracting information from texts taken from different sources, producing academic assignments, listening to lectures, presenting ideas orally and exchanging views. It emphasises on various skills such as reading academic texts, identifying main ideas, making and expanding notes into coherent writing. At the end of the course, students should be able to apply the skills in an academic setting when communicating in both oral and written discourse.

ULAB 2112 : ADVANCED ENGLISH FOR ACADEMIC COMMUNICATION

This subject prepares students for advanced academic communication in English with emphasis on oral communication skills. Students will be assigned projects that require them to look for and extract relevant information from various sources. In the process of completing the projects assigned, students will put into practice various skills developed in the earlier subject as well as skills in collecting data through interviews and questionnaire survey, integrating and presenting information (in oral and written form), time management and group interaction. The various oral activities such as presenting a proposal of the project, giving a briefing on the progress of the report and presenting the completed report are designed to build students’ oral communication skills and confidence in expressing themselves, i.e. skills that are much needed in their studies and career.

ULAB 3112 : ENGLISH FOR CAREER SEARCH

This course exposes students to effective strategies to secure a job upon graduation. Students will be taught job-hunting skills, which include conducting a job search to gather information related to their field of work, producing a portfolio, designing and writing their curriculum vitae and job application letters as well as preparing for and attending job interviews. The activities will be geared towards reflecting upon themselves, namely on their strengths, competencies, skills and qualifications for job-hunting purposes.
ULAB 3122: ENGLISH FOR WORKPLACE COMMUNICATION

This course aims to introduce and expose students to the basic principles of communication at the workplace. Students will be given the opportunities to practice effective meeting and discussion skills in formal and informal communicative events and read and write appropriate workplace related documents. Students will also be exposed to situations where they learn to function as individuals and team members and interact verbally and nonverbally with appropriate language, style and gestures.

ULAB 3132: READING FOR SPECIFIC PURPOSES

The aim of this course is to introduce students to texts of different genres and rhetorical structures, namely, literature and science-based texts. Students are taught to deal with two main areas of reading: reading for academic purposes and reading for appreciating literary texts. In reading for academic purposes, students are exposed to authentic texts drawn from journals, research articles and magazines. They are taught how to select, assess, discuss and respond critically to issues related to the texts. They are required to extract the holistic ideas of the theme and react to them in terms of expressing agreement or disagreement, stating advantages or disadvantages of the ideas stated and making inferential opinion and justification. In appreciating literary texts, students are taught to evaluate and analyse some literary texts. In both reading for academic purposes and literary appreciation, the texts serve as stimulus and context for language learning.

ULAB 3142: WRITING FOR SPECIFIC PURPOSES

The course focuses on writing for specific purposes, in particular, technical writing that students are expected to produce. Students will be introduced to elements of effective writing and techniques of gathering technical information about products, services or work related information using letters, memorandums, and e-mails for writing reports to a target audience for a specific purpose. In addition, students will be exposed to proper language usage and acceptable writing standards.
ULAB 3152: EFFECTIVE ORAL COMMUNICATION SKILLS

Pre-requisite: ULAB 1112 (English for Academic Communication)
ULAB 2112 (Advanced English for Academic Communication)

The course focuses on the techniques of producing good spoken discourse which include public communication such as impromptu and public speeches, group discussion and negotiation. Aspects of sound and speech production will be introduced to improve intelligibility and communicability. Basic principles of oral communication and the importance of non-verbal communication will be introduced for effective communication. Students will have substantial practice in oral communication through in-class tasks and activities. These tasks and activities will enhance students’ confidence in using English for academic and professional purposes.

UICI 1012: ISLAMIC CIVILIZATION AND ASIAN CIVILIZATION

The course familiarize students with the Islamic and Asian Civilization. It discusses on the science of civilization that embraces an introductory to the science of civilization, the interactions of various civilizations (Malay, China and India) Islam in Malay Civilization and its role in establishing the Malaysian civilization, Contemporary issues on the Islamic and Asian Civilization, Islam Hadhari and nation-building. At the end of the course, student will be extensively exposed to the history, principles, value and fundamental aspects of the civilizational studies in Malaysia as well as to strengthen the integrity of Malaysian as citizen of a multi-racial country which has a high tolerance towards others. Throughout the learning process, some aspects of generis skills namely team working, communication skills and ethics will be emphasized.

UICI 2022: SCIENCE, TECHNOLOGY AND MANKIND

This course discusses the philosophy of knowledge in terms of its definitions, concepts, theories, history, culture, knowledge, and transfer of knowledge. It is also discussed about the science in terms of its concepts, history, cosmology, and Islamic view of learning science, methodology of Islamic science, the comparisons between Islamic science and Western science, as well as modern science and the divine.
This course discusses the philosophy of knowledge in terms of its definitions, concepts, theories, history, culture, knowledge, and transfer of knowledge. It is also discussed about the science in terms of its concepts, history, cosmology, and Islamic view of learning science, methodology of Islamic science, the comparisons between Islamic science and Western science, as well as modern science and the divine.

Next discussion is about technology in terms of its concepts, historical development, solutions to technology issues, as well as technology and divinity. This course also discussed about the human; the concept and theory, the creation of man, the human role, the stages of human life, the glory factors, ethics, values, and purpose of human creation.

**UICI 3032 - ISLAM AND CURRENT ISSUES**

The course acquaints student with various topics on current issues and the Islamic approaches to overcome the problems and the challenges. The topic comprise discussions on globalization, clash of Eastern and Western civilizations, moral decadency, ethical issues in science and technology, economic issues, development and environmental issues, postmodernism, governance and administration, issues that challenge the credibility of Islam, as well as fundamentalism and extremism. issues pertaining to the ethic relations and ethnic chauvinism and the current challenges of Muslim people will also be discussed. At the end of the course, student will be able to explain the Islamic views pertaining to current issues and able to provide answers and alternatives to the problems by referring to the Islamic principles. They are also able to work in team and equip themselves with communication and problem solving skills.

**UICI 3042 - ISLAMIC INSTITUTIONS**

The course exposes students to the comprehensiveness of Islam via its distinctive institutions. It discusses on various institutions including family, social, education, economics, legislative and jurisdiction, enforcement and politics. The discussion will be focused on the concepts of family: Its internalizing and implementation, the concept of society and the social responsibility, Islamic philosophy and educational system, concepts of Islamic economics, insurance and banking, the concept and characteristics of law and legislation, the position of Islamic law in the Malaysian constitution, witness, allegation, evidence and demonstration, wilayah al-quadha’, wilayah al-Hisbah and al-Mazalim, and the concepts of Islamic politics and its dominion. At the end of the course, students are able to understand the concepts and the roles of
various Islamic institutions which can be an alternative solution to overcome the problem of Ummah. Students are also able to work in team and equipped with communication and problem solving skills.

**UHAS 1172 - MALAYSIA DINAMICS**

This course covers multi discipline in social science inclusive of sociology, political science, history and international affairs. This course contributes value added to the students with highly personality, social science skill and patriotism.

**UHAS 2122 - CRITICAL AND CREATIVE THINKING**

The aim of the course is to develop students’ understanding of the concept, theory and practice of critical and creative thinking. Attention is on critical and creative thinking techniques as well as obstacles of both thinking methods. Both thinking methods help students to make decisions or solve problems whether in groups or individually.

**UHAS 3012 : ENTREPRENEURSHIP AND ENTERPRISE DEVELOPMENT**

This course is designed to expose students to the concept of entrepreneurship and entrepreneurs and the skills needed to prepare a good business plan. In addition to exposing the students to the characteristics of successful entrepreneurs, various skills to successfully run and manage entrepreneurial ventures, technique of identifying, evaluating and choosing business opportunities, procedures to form a business, planning, funding and business supports available in Malaysia will also be discussed. Finally, students will be guided to prepare a business plan after they have learned the fundamentals of a good business plan (following a chosen model). In general, the focus is on instilling entrepreneurial features among the students and developing the required skills to manage a business enterprise.
THE FACULTY ADMINISTRATORS

Dean
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Fax: 07-558 7849

GENERAL OFFICE
Tel.: 07-55 57236 / 57235 / 57015
THE FACULTY STANDING COMMITTEE

Audit Committee
- Internal Audit Unit

Administrative Committee
- Human Resource Management Working Committee
- Human Resource Development Working Committee
- Occupational Health and Safety Working Committee (OSHE)
- Laboratory Management Working Committee
- Facility Management/ Infra Working Committee
- IT Working Committee
- Alumni Committee
- Welfare and Recreation Working Committee
- Professional Qualification Program Development Working Committee
- Faculty Selection Committee
- Quotation Selection Committee
- Quotation Opening Committee
- Company Selection Committee
- Technical Specification Examiner Committee
- Technical Quotation Committee

Examination Committee
- Postgraduate Studies Working Committee
- Undergraduate Studies Working Committee
- Undergraduate Final Year Project Working Committee
- Student Practical Training Working Committee
- Development and Student Activity Working Committee
- Promotional and External Relation Working Committee
- Timetable Working Committee
- First Year Experience (FYE) Working Committee
- How To Get Yourself Employed (HTGYE) Working Committee
- Harvard Business School (HBS) Working Committee

Academic Committee
- Research & Innovation Committee
- Information Technology & Publication Working Committee
- Seminar Working Committee

Quality Committee
- Document and CQI Unit
- Complaint and Feedback Unit
## ACADEMIC COORDINATORS FOR LABORATORY/WORKSHOP/STORE

### Teaching Laboratory

<table>
<thead>
<tr>
<th>No.</th>
<th>Laboratory</th>
<th>Academic Coordinators</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Basic Electronics</td>
<td>Mr. Ismail Ariffin</td>
</tr>
<tr>
<td>2.</td>
<td>Advanced Electronics Lab</td>
<td>Dr. Norlaili Mat Safri</td>
</tr>
<tr>
<td>3.</td>
<td>Electrotechnics</td>
<td>Dr. Md Pauzi Abdullah</td>
</tr>
<tr>
<td>4.</td>
<td>Basic Microwave</td>
<td>Dr. Mohd Fairuz Mohd Yusof</td>
</tr>
<tr>
<td>5.</td>
<td>Digital</td>
<td>Dr. Mohd Afzan Othman</td>
</tr>
<tr>
<td>6.</td>
<td>Instrumentation</td>
<td>Mr. Mohd Shukri Abdul Manaf</td>
</tr>
<tr>
<td>7.</td>
<td>Process Control</td>
<td>Assoc. Prof. Dr. Norhaliza Abdul Wahab</td>
</tr>
<tr>
<td>8.</td>
<td>Engineering Control</td>
<td>Dr. Shahdan Sudin</td>
</tr>
<tr>
<td>9.</td>
<td>Basic Power</td>
<td>Ms. Zaniah Muda</td>
</tr>
<tr>
<td>10.</td>
<td>Advanced Power System</td>
<td>Dr. Rasyidah Mohd Idris</td>
</tr>
<tr>
<td>11.</td>
<td>Basic Machine</td>
<td>Dr. Mohd Junaidi Abdul Aziz</td>
</tr>
<tr>
<td>12.</td>
<td>Microprocessor</td>
<td>Mr. Zuraimi Yahya</td>
</tr>
<tr>
<td>13.</td>
<td>Simulation</td>
<td>Dr. Anita Ahmad</td>
</tr>
<tr>
<td>14.</td>
<td>Basic Communication</td>
<td>Dr. Nik Noordini Nik Abdul Malik</td>
</tr>
<tr>
<td>15.</td>
<td>Optical Communication</td>
<td>Dr. Yusri Md. Yunos</td>
</tr>
<tr>
<td>16.</td>
<td>Digital Communication</td>
<td>Dr. Kamaluddin Mohd Yusof</td>
</tr>
<tr>
<td>17.</td>
<td>Robotics</td>
<td>Assoc. Prof. Dr. Mohamad Noh Ahmad @ Mohd Sanif</td>
</tr>
<tr>
<td>18.</td>
<td>VLSI System Design</td>
<td>Mr. Izam Kamisian</td>
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<tr>
<td>19.</td>
<td>Power Electronics</td>
<td>Assoc. Prof. Dr. Awang Jusoh</td>
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<tr>
<td>20.</td>
<td>Mechatronics</td>
<td>Dr. Salinda Buyamin</td>
</tr>
<tr>
<td>21.</td>
<td>High Voltage</td>
<td>Assoc. Prof. Dr. Zolkafle Buntat</td>
</tr>
<tr>
<td>No.</td>
<td>Laboratory</td>
<td>Academic Coordinators</td>
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<tr>
<td>1</td>
<td>Acoustics</td>
<td>Ir. Dr. Mokhtar Harun</td>
</tr>
<tr>
<td>2</td>
<td>VeCAD</td>
<td>Prof. Dr. Mohamed Khalil Mohd Hani</td>
</tr>
<tr>
<td>3</td>
<td>Power Electronics (R&amp;D) I</td>
<td>Assoc. Prof. Dr. Awang Jusoh</td>
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<tr>
<td>4</td>
<td>Advanced Microwave</td>
<td>Prof. Dr. Mohd Kamal Rahim</td>
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<tr>
<td>5</td>
<td>FMS</td>
<td>Assoc. Prof. Dr. Abdul Rashid Hussin</td>
</tr>
<tr>
<td>6</td>
<td>Industrial Power</td>
<td>Dr. Ahmad Safawi Mokhtar</td>
</tr>
<tr>
<td>7</td>
<td>Advanced Machine</td>
<td>Dr. Mohd Junaidi Abdul Aziz</td>
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<tr>
<td>8</td>
<td>Microelectronics</td>
<td>Prof. Dr. Abu Khari A’ain</td>
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<tr>
<td>9</td>
<td>Photonics Research</td>
<td>Dr. Muhammad Yusof Mohd Nor</td>
</tr>
<tr>
<td>10</td>
<td>Photonics Simulation</td>
<td>Dr. Norhafizah Ngajikin</td>
</tr>
<tr>
<td>11</td>
<td>Sensor &amp; Actuator</td>
<td>Dr. Leow Pei Ling</td>
</tr>
<tr>
<td>12</td>
<td>Energy System</td>
<td>Prof. Ir. Dr. Abdullah Asuaimi Mohd Zin</td>
</tr>
<tr>
<td>13</td>
<td>Radar</td>
<td>Dr. Nor Hisham Hj. Khamis</td>
</tr>
<tr>
<td>14</td>
<td>Nanoelectronics</td>
<td>Dr. Suhaila Isaak</td>
</tr>
<tr>
<td>15</td>
<td>Advanced Microprocessor (AMIR)</td>
<td>Assoc. Prof. Dr. Muhammad Nasir Ibrahim</td>
</tr>
<tr>
<td>16</td>
<td>Mobile Robot</td>
<td>Ir. Dr. M. Kumaresen Danapalasingam</td>
</tr>
<tr>
<td>17</td>
<td>Digital Signal Processing (DSP)</td>
<td>Assoc. Prof. Dr. Ahmad Zuri Sha’ameri</td>
</tr>
<tr>
<td>18</td>
<td>Computer Vision, Video, &amp; Image Processing (CvviP)</td>
<td>Assoc. Prof. Dr. Syed Abdul Rahman b. Syed Abu Bakar</td>
</tr>
<tr>
<td>19</td>
<td>Power System Simulation</td>
<td>Dr. Mohd Fadli Rahmat</td>
</tr>
<tr>
<td>20</td>
<td>Electrophysiology</td>
<td>Assoc. Prof. Dr. Rubita Sudirman</td>
</tr>
<tr>
<td>21</td>
<td>Bio-electronics</td>
<td>Dr. Puspa Inayat Khalid</td>
</tr>
<tr>
<td>22</td>
<td>Power Electronics (R &amp; D) II</td>
<td>Assoc. Prof. Dr. Awang Jusoh</td>
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<tr>
<td>23</td>
<td>Photonics Fabrication</td>
<td>Dr. Ahmad Sharmi Abdullah</td>
</tr>
<tr>
<td>24</td>
<td>Photonics Characterization</td>
<td>Dr. Asrul Izam Azmi</td>
</tr>
<tr>
<td>25</td>
<td>Electric Vehicle</td>
<td>Assoc. Prof. Dr. Nik Rumzi Nik Idris</td>
</tr>
<tr>
<td>26</td>
<td>Computational Nanoelectronic</td>
<td>Prof. Dr. Razali Ismail</td>
</tr>
<tr>
<td>27</td>
<td>Micronano Mechatronics</td>
<td>Dr. Mohd Ridzuan Ahmad</td>
</tr>
</tbody>
</table>
28. Engineering Control (R & D) : Dr. Herman Wahid  
29. Advanced Power (R & D) : Dr. Mohd Hafiz Habibuddin

### General Services Laboratory/Workshop/Store

<table>
<thead>
<tr>
<th>No.</th>
<th>Laboratory/Workshop</th>
<th>Academic Coordinators</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>PCB/Electrical Process</td>
<td>Mr. Camallil Omar</td>
</tr>
<tr>
<td>2.</td>
<td>Electrical Practice</td>
<td>Laboratory Management Unit</td>
</tr>
<tr>
<td>3.</td>
<td>Electronics</td>
<td>Laboratory Management Unit</td>
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<tr>
<td>4.</td>
<td>Automation</td>
<td>Dr. Lim Cheng Siong</td>
</tr>
<tr>
<td>5.</td>
<td>Store</td>
<td>Mr. Abdul Hamid Ahmad</td>
</tr>
<tr>
<td>7.</td>
<td>Computer System II</td>
<td>Dr. Usman Ullah Sheikh Izzat Ullah Sheikh</td>
</tr>
</tbody>
</table>

### Centre of Excellence Laboratory

<table>
<thead>
<tr>
<th>No.</th>
<th>Laboratory/Workshop</th>
<th>Academic Coordinators</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>High Voltage Calibration</td>
<td>Assoc. Prof. Dr Zolkafle Buntat</td>
</tr>
<tr>
<td>2.</td>
<td>High Voltage Testing</td>
<td>Assoc. Prof. Dr Zolkafle Buntat</td>
</tr>
<tr>
<td>3.</td>
<td>WCC Anechoic Chamber</td>
<td>Prof. Dr. Tharek Abdul Rahman</td>
</tr>
<tr>
<td>4.</td>
<td>WCC Mobile Lab</td>
<td>Prof. Dr. Tharek Abdul Rahman</td>
</tr>
<tr>
<td>5.</td>
<td>Generation</td>
<td>Dr. Hasimah Abdul Rahman</td>
</tr>
<tr>
<td>6.</td>
<td>Power System Measurement and Monitoring</td>
<td>Dr. Dalila Mat Said</td>
</tr>
<tr>
<td>7.</td>
<td>Demand Side Management</td>
<td>Assoc. Prof. Dr. Mohammad Yusri Hassan</td>
</tr>
<tr>
<td>8.</td>
<td>Illumination</td>
<td>Dr. Hasimah Abdul Rahman</td>
</tr>
<tr>
<td>9.</td>
<td>UTM-MIMOS</td>
<td>Assoc. Prof. Dr. Sharifah Hafizah Syed Ariffin</td>
</tr>
<tr>
<td>No.</td>
<td>Year</td>
<td>Course Coordinators</td>
</tr>
<tr>
<td>-----</td>
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<td>----------------------------------------</td>
</tr>
<tr>
<td>1.</td>
<td>Second Year</td>
<td>Mr. Ismail Ariffin</td>
</tr>
<tr>
<td>2.</td>
<td>Third Year</td>
<td>Dr. Mohd Rodhi Sahid</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Dr. Eileen Su Lee Ming</td>
</tr>
<tr>
<td>3.</td>
<td>Fourth Year</td>
<td>Dr. Norzanah Rosmin (POWER)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Dr. Nor Hafizah Ngajikin (COMM)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Dr. Lim Cheng Siong (CMED)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Mdm. Norhafizah Ramli (ECE)</td>
</tr>
</tbody>
</table>
LIST OF IAP BY PROGRAM

1. Ir. Sazali P. Abdul Karim  
   Senior Technical Expert  
   (Protection System Analysis)  
   Tenaga Nasional Berhad

2. Mr. Md. Ridzuan Md. Yusof  
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   Project Management & Strategic Initiatives  
   Perusahaan Automobil Nasional Sdn. Bhd.

3. Mdm. Zaiton Fakeh  
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   Green Procurement & Procurement,  
   Hitachi Electronics Products (M) Sdn. Bhd.

4. Dr. Izhar Che Mee  
   Director  
   Enterprise Heartbeat MSC Sdn Bhd

5. Ir. M. Faudzi M Yasir  
   Petroleum Nasional Berhad

6. Ir. Amirul Mukminin b. Omar  
   Senior Assistant Director, Electricity  
   Cawangan Kejuruteraan Elektrik JKR Johor

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   Resident Engineer, M&E  
   DPI Konsult S/B

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   Deputy General Manager  

2. Dr. Khairil Osman  
   Head of Instruments  
   Shell Refining Company,  
   (Federation of Malaya)Berhad.

3. Mr. Amran Abdul Manaf  
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   NDK Quartz (M) Sdn. Bhd.
1. Mr. SK Fong  
Vice President of R&D  
Altera Corporation

2. Dr. Teh Eong Yap  
CPU / SOC Design Engineering Operation Manager  
Intel Microelectronics (M) Sdn. Bhd.

3. Mr. Ko Ah Kim  
Engineering Design Manager  
Client CPU Design,  
Intel Microelectronics (M) Sdn. Bhd.

4. Ir. Dr. Syed Mustafa Kamal  
Deputy Director (Biomedical) at Engineering Services,  
Ministry of Health Malaysia

5. Mr. Teoh Swee Aun  
Senior Group Manager  
Engineering Design Services  

6. Mr. Fam Fook Teng  
Distinguished Member of Technical Staff,  
Global Technology Development Group  
Motorola Technology Sdn. Bhd.

7. Dr. Leow Cheah Wei  
Head of Product Technical  
Techsource Systems Sdn Bhd

8. Dr. Mohd Jaya Abdullah  
Manager  
Telekom Malaysia
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DEPARTMENT OF ELECTRICAL POWER ENGINEERING

HEAD OF DEPARTMENT

Assoc. Prof. Dr. Azhar Khairuddin, B. Sc. (LSU, USA), M. Eng. (Electrical), Ph. D. (Electrical Engineering) (UTM), MIEEE.

PROFESSOR


Yg. Bhg. Dato’ Prof. Dr. Ahmad Darus, B. Sc., M. Sc. (Electrical Power Engineering), Ph. D. (High Voltage Engineering) (Strathclyde, UK), MIEEE, MCIGRE, SMP.

Prof. Ir. Dr. Abdullah Asuhaimi Mohd. Zin, B. Sc. (Electrical) (Gadjah Mada, Indonesia), M. Sc. (Electrical Power) (Strathclyde, UK), Ph. D. (Power System) (UMIST, UK), P. Eng., C. Eng., MIEM, MIET, SMIEEE.

Prof. Ir. Dr. Abdul Halim Mohamed Yatim, B. Sc. (Electrical & Electronics Engineering) (Portsmouth Polytechnic, UK), M. Sc. (Power Electronics), Ph. D. (Power Electronics) (Bradford, UK), P. Eng., SMIEEE, FIEM.

Prof. Dr. Zainal Salam, B. Sc. (California, USA), M. Eng. (Electrical) (UTM), Ph. D. (Power Electronics) (Birmingham, UK), MIEEE.

Prof. Dr. Zulkurnain Abd. Malek, B. Eng. (Electrical & Computer System) (Monash, Australia), M. Sc. (Electrical & Electromagnetic) (Wales, UK), Ph. D. (High Voltage) (Cardiff, UK), MIEEE, MCIGRE.

ASSOCIATE PROFESSOR

Assoc. Prof. Dr. Nik Rumzi Nik Idris, B. Eng. (Electrical) (Wollonggong, Australia), M. Sc. (Power Electronics) (Bradford, UK), Ph. D. (Electrical Engineering) (UTM), SMIEEE.
Assoc. Prof. Dr. Naziha Ahmad Azli, B. Sc. (Electrical Engineering) (Univ. of Miami, USA), M. Eng. (Electrical), Ph. D. (Electrical Engineering) (UTM), MIEEE.

Assoc. Prof. Engr. Dr. Mohammad Yusri Hassan, B. Eng. (Electrical & Electronics) (Strathclyde, UK), M. Eng. (Electrical-Power) (UTM), Ph. D. (Power System Economics) (Strathclyde, UK), C. Eng., MIET, MIEEE, CEM, MEPA.

Assoc. Prof. Dr. Mohd. Muhridza Yaacob, B. Sc. (Strathclyde, UK), M. Eng. (Electrical), Ph. D. (Electrical Engineering) (UTM).

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