UTM
UNIVERSITI TEKNOLOGI MALAYSIA

POSTGRADUATE HANDBOOK

MASTERS AND DOCTORAL DEGREES

Academic Session: 2017/2018
www.fke.utm.my/postgraduate

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 without prior notice.

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UNIVERSITI TEKNOLOGI MALAYSIA

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 OF ELECTRICAL ENGINEERING

VISION

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

MISSION

1. To provide world-class programme 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.

MESSAGE FROM THE DEAN

Assalamualaikum wrt. wbt., and Greetings,
First of all, I would like to express my heartiest congratulation to our postgraduate students who have been selected to undergo various postgraduate programs of studies at the Faculty of Electrical Engineering (FKE). It is my pleasure indeed to welcome you to FKE, Universiti Teknologi Malaysia.

Even though UTM is a Research University, teaching and learning is still one of the primary focuses of FKE. At FKE, we offer six programs of study at postgraduate level in diverse areas of Power Engineering, Electronics, Telecommunication, Instrumentation, Mechatronics, and Control Engineering, for you to specialize from. All our postgraduate programs are accredited by the Malaysian Qualification Agency.

To all students, and especially our new postgraduate 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 and enhance 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, with the Industrial Revolution 4.0 in mind, you graduate from the University fully prepared to make a significant contribution to improving the society and a 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, the postgraduate program and courses offered by the FKE, the curriculum and syllabus, applicable to students of the 2017/2018 academic session intake. It also briefly describes the semester system and the academic regulations adopted by the University. It is hoped 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 postgraduate level 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 Rules of Graduate Studies contain important information that all FKE students are expected to be familiar with and adhere to. 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 University and University art , 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 postgraduate handbook. To all our new postgraduate students, I wish you success in your academic journey and we look forward to work together with you to ensure that your postgraduate experience at FKE is deeply rewarding. Thank you for choosing FKE, UTM.

Thank you.
Wassalam and regards.

Prof. Johari Halim Shah Osman
Dean
Faculty of Electrical Engineering

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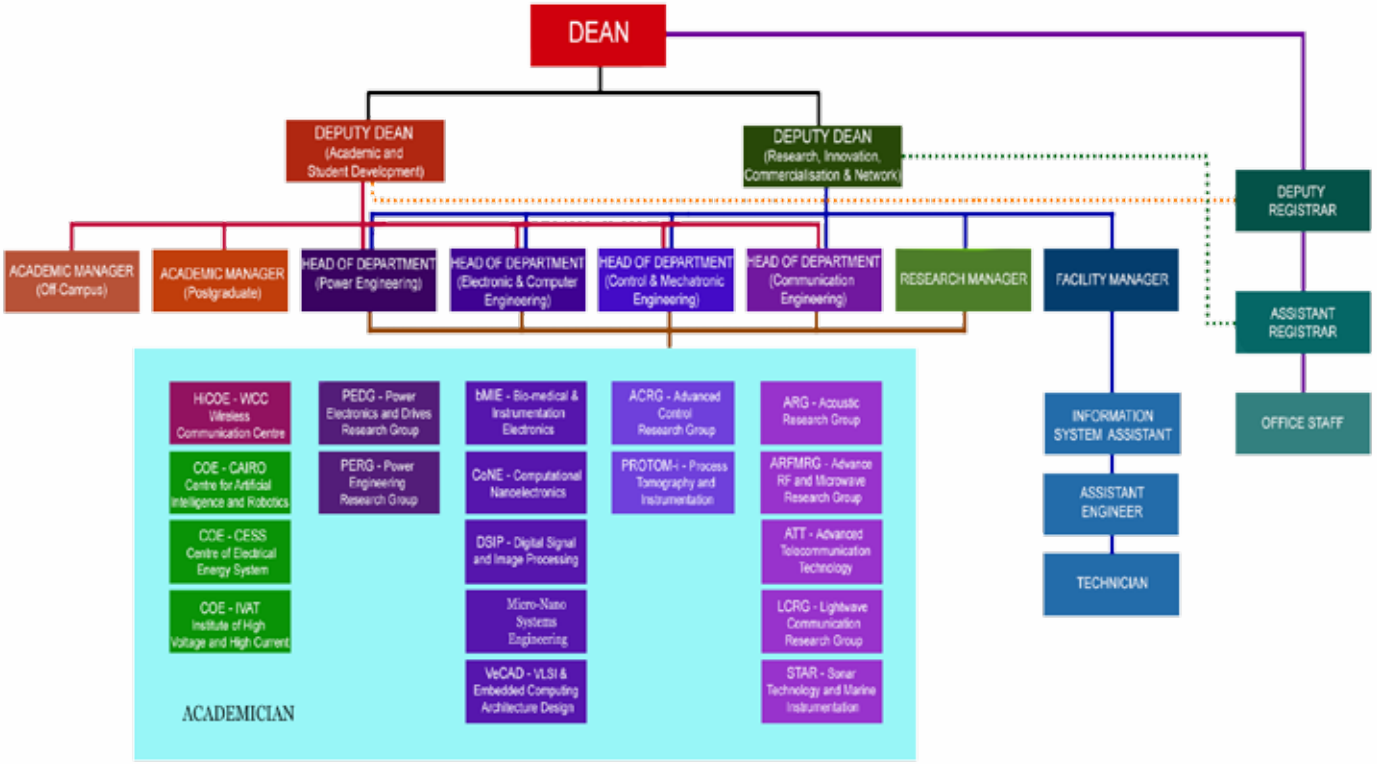
1.0 ABOUT FACULTY OF ELECTRICAL ENGINEERING

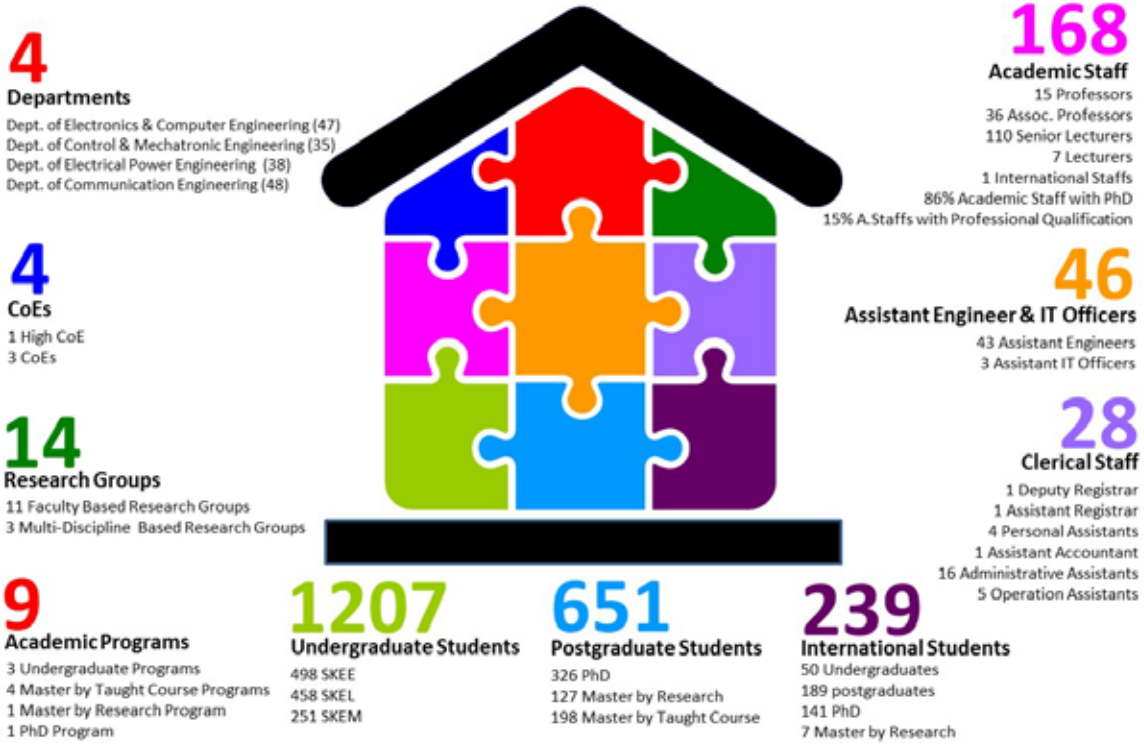
THE FACULTY ORGANIZATIONAL STRUCTURE



1.0 ABOUT FACULTY OF ELECTRICAL ENGINEERING

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

FKE at a glance



Note: Information is accurate as of 31st August 2017

The faculty has strength in established area of instrumentation and control engineering, electrical power engineering and energy conversion, telecommunication engineering, electronic engineering and computer engineering.

Academic staff based on departments

These development and research activities which include high impact publications, research grants, consultancy and commercialization, 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 12 and 2 research groups (RG) under the faculty and Research Alliance (RA) respectively, which actively contribute to a wide range of electrical and electronics research areas. The list of RGs is as follows:

- Power Electronics and Drives Research Group (PEDG)
- Power Engineering Research Group (PERG)
- VLSI & Embedded Computing Architecture Design (VeCAD)
- Computational Nanoelectronics (CoNE)
- Biomedical Instrumentation and Electronics (BmIE)
- Digital Signal and Image Processing (DSIP)
- Sonar Technology and Instrumentation Research Group (STAR)
- Acoustic Research Group (ARG)
- Advance RF and Microwave Research Group (ARFMRG)
- Lightwave Communication Research Group (LCRG)
- Advanced Telecommunication Technology (ATT)
- Advanced Control Research Group (ACRG)
- Process Tomography Research Group and Instrumentation (PROTOM-i) – Innovative Engineering Research Alliance
- Micro-Nano Systems Engineering (MNSE) – Frontier Materials Research Alliance

In addition to RG, a number of the faculty's academic staff is 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)

In 2014, Wireless Communication Centre (WCC) was awarded by the Ministry of Education as a national HiCOE in recognition of its importance and achievements, and what it can contribute in the future.

1.1 DEPARTMENT OF ELECTRICAL POWER ENGINEERING (POWER)

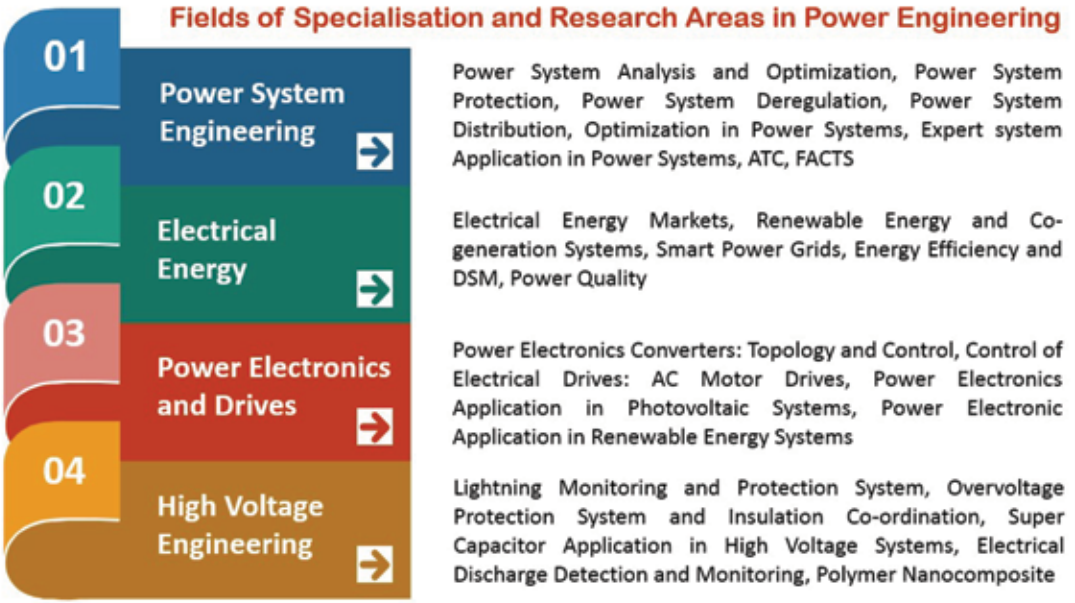
The POWER department consists of 38 academic staff specializing in the fields of power systems, energy, power electronics and high voltage engineering. The department's aims are to provide regional standard quality programmes of undergraduate and postgraduate education; to be a research active unit advancing the knowledge of engineering and science; and to serve the community and industry as an agent of technological, educational innovation and advancement.

The department's vision is to be a world-class centre of excellence and leader in teaching and learning as well as research and consultancy within the field of electrical engineering through focused activities and excellence of its faculty, staff, graduates and facilities.

The strength of the department is having most of the academic staff with Ph.D. qualifications in a broad area of electrical power engineering as well as active in research and consultancy activities. The department runs Bachelor Degree in Electrical Engineering (SKEE) and Master in Engineering (Electrical Power) taught course programme (MKEP). Besides these programmes, the department also supports Master of Philosophy in Electrical Engineering (MKEE) and Ph.D. in Electrical Engineering (PKEE) research programmes.

The SKEE programme 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 nontechnical courses. The MKEP programme is an advanced degree programme to cater for graduates and professionals who are seeking and updating greater knowledge of current technology and techniques in electrical power engineering. It is designed to develop competent electrical power systems professionals and the potential of tomorrow's leaders in the power industry.

The POWER Department has a wide range of research interests which include the following areas;



There are four research units in the department comprising of two Centres of Excellence (Institute of High Voltage and High Current, IVAT and Centre of Electrical Energy, CEES) and two Research Groups (Power Engineering Research Group, PERG and Power Electronics and Drives Research Group, PEDG). High Voltage Laboratory of IVAT became the first institution in the country to be accredited to conduct high voltage testing and calibration according to MS ISO/IEC 17025.

In recent years, the research units of the department have grown their expertise through involvement in carrying out research projects and consultancies for industries and government agencies. The department also has close collaboration with the local and foreign universities and industries such as University of Southampton, Uppsala University, University of Sydney, Shibaura Institute of Technology, USM, UTHM, UNSRI, TNBR, Proton, Behr Bircher Cellpack, Ausgrid and others.

1.2 DEPARTMENT OF ELECTRONIC AND COMPUTER ENGINEERING (ECE)

The ECE Department is a result of a restructuring exercise of the Faculty of Electrical Engineering in November 2012 that merges the departments of Electronic Engineering with Microelectronic & Computer Engineering. This department offers a conducive and stimulating environment for studying electronics and computer engineering. To that end, the department is responsible for the running and execution of the Bachelor of Engineering (Electrical – Electronics) undergraduate program and the Master of Engineering (Computer and Microelectronics System) postgraduate degree taught work program offered by the Faculty of Electrical Engineering. Our lecturers also supervise Ph.D. candidates specializing in electronics and computing. Currently, we have 47 lecturers who are dedicated to excellence in research and teaching in analog electronics, digital systems, microelectronics and computer engineering.

The ECE Department has a wide range of research interests which include the following areas;

The department also has close relationships 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. Our goal is to prepare students to become capable engineers and technology leaders with high academic achievement and excellent real-world core competencies in the high-technology disciplines of electronics and computer engineering.

1.3 DEPARTMENT OF COMMUNICATION ENGINEERING (COMM)

COMM was established in November 2012. The department is the merger of Telematic and Optical Department with Radio Communication Engineering Department, both were established in 1998. The merger synergized staff of both panels, enhancing their strength and expertise yielding qualified and experienced staff in the field of Communication Engineering. COMM's staffs are committed to share their expertise in teaching, research activities and consultation works.

Currently, COMM has 48 academic staff. The department has 10 laboratories, which are equipped with sophisticated and modern facilities. They are conducive for training prospective undergraduate students, and met the demand of postgraduate level. The department supports undergraduate and also postgraduate programmes, either by taught course or research.

The research opportunities for postgraduate studies include:

- Next Generation Broadband Network – 5G system
- Sonar and Acoustic Engineering
- Antenna design: wearable antenna, metamaterial antenna, UHF antenna, reconfigurable antenna, array antenna
- Radio propagation and RF Design: RF electromagnetic propagation, RFID, passive and active devices such as amplifier, mixer, oscillator, RF Transceiver and the specific absorption rate (SAR)
- Internet-of-Everything (IoE) solutions
- Pervasive networks and networks computing & security: Cognitive Radio Networks, Software Define Radio, Wireless Sensor Network
- Optical Communication Devices based on MEMS, Polymer, Sol-gel derived material
- Optical Communication Systems: Radio Over Fiber (RoF), Free-Space Optics, Optoelectronics Circuit System
- Optical Communication Network: Photonics Physical Layer, Routing and Transport System, Optical Bandwidth Management
- Optical Sensors
- Radar Technology
- Microwave & Satellite Communication System
- Metamaterial devices
- Electromagnetic compatibility (EMC)
- Electromagnetic interference (EMI)

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 for 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.

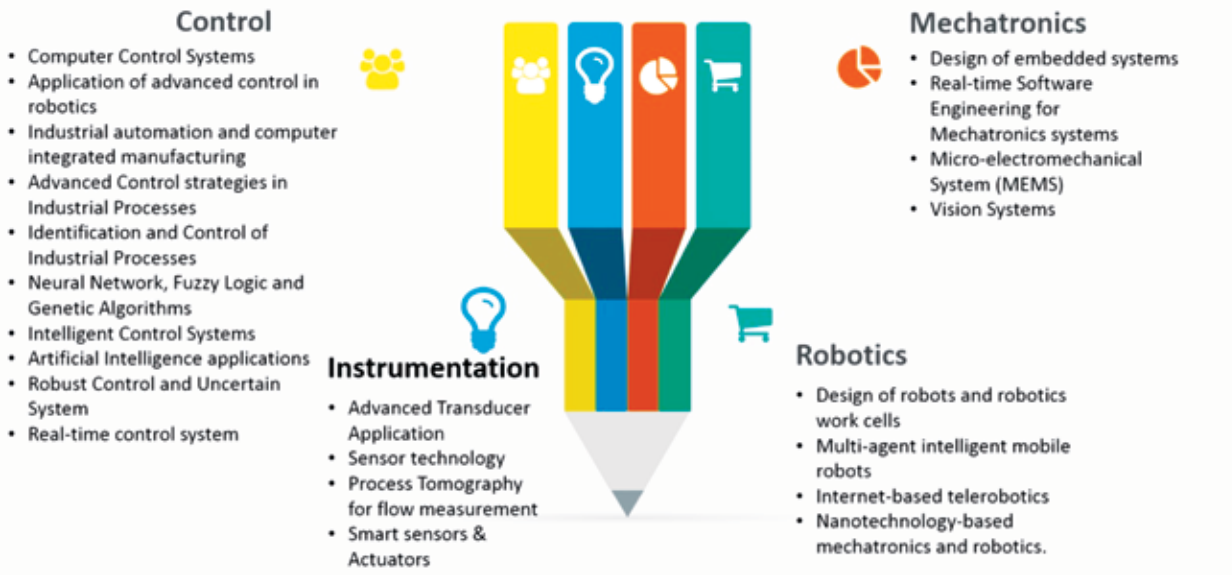
1.4 DEPARTMENT OF CONTROL AND MECHATRONICS ENGINEERING (CMED)

CMED has a strong local and international reputation as a premier undergraduate (UG) and postgraduate (PG) education institution, dedicated to the study of control, instrumentation, mechatronics and robotics engineering. At the undergraduate level, the department offers Bachelor of Engineering (Electrical - Mechatronics), also known as the SKEM programme. For postgraduate study, the department offers Master of Engineering (Mechatronics & Automatic Control) and various attractive and promising research areas for program students leading to Master and Doctor of Philosophy degrees. In recent years, our department has advanced its reputation with strong and competitive graduate programmes including our Master Double Degree taught course programme with University of Burgundy, France and a outstanding undergraduate programme. Currently, more than 200 students are enrolled in the programmes, that produce highly trained control and mechatronics engineers in industries nationally and internationally, as well as good researchers. Our graduate students are also highly prepared for placements as lecturers and researchers at competitive universities.

In 2017, CMED continues to enhance its cutting-edge technology undergraduate courses via the introduction of the 21th Century Curriculum to cater for the Industrial Revolution 4.0 (IR 4.0). This new curriculum manifests the Three SKEM Technical DNA; 1) Competent in Embedded System Design, 2) System Designers with Good Computing Skills and 3) Good System Integrator in Robotics and Automation, with the implementation of 21st Century skills and New Academia Learning Innovation (NALI). This helps to ensure our students are prepared to make significant contributions in emerging technologies based on cyber-physical systems, as a way forward for IR 4.0.

The department, which currently consists of 36 academic staff, are actively involved in research activities that encompass several broad areas, reflecting the multi-disciplinary nature of the control and mechatronics field.

Fields of Specialisation and Research Areas in Control and Mechatronics Engineering Department



The department has close collaborations 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 local industries. Undergraduate students are actively involved in several other activities such as the Robotic Contest (Robocon) and innovation related competitions. The university has represented Malaysia in several International Robocon competitions. Students within the department have also visited overseas universities through the UTM's Global Outreach Programme and student exchange programmes.

2.0 POSTGRADUATE STUDIES

2.0 POSTGRADUATE STUDIES

Faculty of Electrical Engineering offer world-class postgraduate programme. With modern facilities and a team of leading academics, we offer a highly supportive and vibrant environment for postgraduate study. Students with postgraduate degree could benefit by:

- **Improved career prospects:**
  The knowledge and skills acquired at a very high level should help you stand out amongst those who have not obtained a postgraduate qualification and the course should help you develop the necessary skills in your field of work. Securing a good graduate job and promotion is more likely, and the possibility of attracting a higher salary is increased.

- **Investment in own personal development:**
  Postgraduate degree helps in developing skills that will support your daily life, such as time management, researching, presentation, and writing skills.

- **Fulfilling the requirements for the 4th Industrial Revolution needed by industry:**
  Industry 4.0 is now a globally accepted concept that is affecting almost every industry across the world and is rapidly transforming how businesses operate.

We pride ourselves on providing the most relevant education and experience. Drawing on our world leading research and taking advice from our industry partners, we tailor our postgraduate courses to meet the needs of employers and industry as a whole. We are committed to providing education in an environment in which knowledge and understanding are created as well as passed on. FKE postgraduate programmes are in either one of two modes of study – research or taught course, as listed below.

PROGRAM	PROGRAM CODE	TYPE OF STUDY	NORMAL DURATION
Ph.D. in Electrical Engineering	PKEE	Research	3 years
M. Phil. in Electrical Engineering	MKEE	Research	2 years
M. Eng. (Computer and Microelectronics Systems)	MKEH	Taught Course	1.5 years
M. Eng. (Electronics and Telecommunication)	MKEL	Taught Course	1.5 years
M. Eng. (Mechatronics and Automatic Control)	MKEM	Taught Course	1.5 years
M. Eng. (Electrical Power)	MKEP	Taught Course	1.5 years

For working professionals, we also offer off-campus classes option (termed PESISIR) at UTM and other off-campus centres. Classes are on weekends and are fully taught by our graduate faculties. The program fee is affordable and competitive to fulfil industry needs.

2.1 ADMISSION REQUIREMENT

The minimum entry requirement for an admission to an FKE Master program is	• A bachelor degree in Electrical Engineering or equivalent with a minimum CGPA of 3.0/4.0 from tertiary institution recognized by UTM and Board of Engineers ; OR • A final year student currently undertaking a Bachelor degree program Electrical Engineering or equivalent at UTM can be offered conditional admission to a Master program; OR • Applicants who did not meet the above mentioned requirement with sufficient years of related experience may be considered.
The minimum entry requirement for an admission to the FKE Doctor of Philosophy program is	• A Master degree in Electrical Engineering or equivalent from UTM or other higher learning institution recognized by the Senate; OR • Currently undertaking a Master degree program in Electrical Engineering or equivalent at UTM with the approval of the Senate; OR • A candidate who has a degree in Electrical Engineering or equivalent from UTM with CGPA≥ 3.67 may be considered for a direct entry into a Doctor of Philosophy program subject to approval by the Faculty.
An International student candidate is required to have a minimum qualification of the Test of English as a Foreign Language (TOEFL) of 550 or International English Language Test System (IELTS) of band 6.0.	• Exemption may be given to those who originate from countries whose native language is English or who graduated from English-speaking countries. • Those who do not meet the minimum requirement must attend and pass the Intensive English Program before they are allowed to proceed with their respective programs of study.

2.2 DOCTOR OF PHILOSOPHY PROGRAM

Degrees granted:
Ph.D. in Electrical Engineering [Program code: PKEE]

The Doctor of Philosophy (Ph.D.) at Faculty of Electrical Engineering was introduced to complement existing research master's program. This program is a multi-disciplinary research award degree for those who already hold a master degree (in of electrical engineering or equivalent) and would like to expand and upgrade their knowledge.

This program produces human capital, which is not only intellectual and competent in modern and advanced technology but also versatile and capable of handling problems in real-life situations. Successful completion of the program will prove that candidates have successfully gone through comprehensive and rigorous research training. The Ph.D. thesis is expected to make a major contribution to the discipline by way of new knowledge.

The degree is awarded based on a comprehensive oral examination (viva voce) of the thesis submitted by the candidate on the completion of study. Prospective graduate students should prepare themselves adequately, both in the fundamental subject matter necessary for advanced work and other branches of learning, so they may conduct quality research and successfully complete their programs.

Program Educational Objective (PEO)

PEO1 To produce Ph.D. graduates with multidisciplinary knowledge needed for designing, integrating and optimizing solutions in Electrical Engineering fields including electronics, communication, mechatronics, power, instrumentation and control.

PEO2 To produce Ph.D. graduates who are able to generate new knowledge, idea and techniques in Electrical Engineering fields.

PEO3 To produce Ph.D. graduates who are able to function in R&D research team and innovative industrial ventures.

PEO4 To produce Ph.D. graduates who are able to consistently perform their responsibilities ethically and professionally.

Program Learning Outcomes (PLO)

PLO1 Attain systematic comprehension and in-depth understanding in specialized knowledge on theories, methods and applications related to electrical power, Instrumentation, control and Telecommunication field.

PLO2 Able to demonstrate proficiency with scholarly strength in analyzing and solving problems through relevant analytical methods, simulations, experiments and independent research

PLO3 Able to synthesize original research that has broadened engineering knowledge through design and development.

PLO4 Able to plan and perform research undertakings responsibly, professionally and ethically.

PLO5 Able to communicate, and express knowledge and ideas effectively.

PLO6 Able to continue life-long learning and apply technology for the betterment of humanity.

Program Duration

The Doctor of Philosophy degree normally takes 3.5 years (7 semesters) with the maximum duration of 8 years (16 semesters). Ph.D. students are supervised by a graduate faculty members or a panel of supervisors. Co-supervisors may be appointed from the industry. The progress of a candidate is assessed through research progress reports submitted at the end of each semester.

M.Phil.-to-Ph.D. Conversion

First class Bachelor Graduates (CGPA ≥ 3.70/4.00) may apply for fast-track Ph.D. M.Phil. students may also apply for conversion to Ph.D. program when they have demonstrated excellent achievement in Master-level research and the project can be extended in scope for Ph.D.-level research (terms & conditions apply).

Program Structure

Ph.D. students are required to register and pass the following courses

- Research Methodology course (course code UKEP0010), to be taken once during study. Students are advised to take this course in the first semester of study.
- One University Elective Course (course code U*** ***3), to be taken once during study.
- Research (course code PKEE **00), to be taken every semester until the submission of thesis. The progress of a candidate in any particular semester is assessed through research progress reports submitted at the end of each semester. It is important for the students to know that the submission of the progress report needs to be done by the student themselves via GSMS website http://spsapp3.utm.my:8080/gsmsv4/.

Thesis Submission and Examination

In the 3rd semester, Ph.D. students will undergo the first stage evaluation process. The objective of this evaluation process is to assist and ensure the research they are conducting is in the right direction and eventually meet the expectation of the research program. Students will receive a copy of the panel report containing suggestion and recommendation that will guide and improve the undertaken work.

At the end of study, students will submit thesis for the purpose of oral examination. Prior to submission of the thesis for the oral examination (viva), students must submit the Notice for Thesis Submission at least 3 months in advance. This is to ensure that approved internal and external examiners have been appointed by the university before the oral examination can take place. Failure to do so may delay the viva process.

2.3 MASTER OF PHILOSOPHY PROGRAM

Degrees granted:
M.Phil. in Electrical Engineering [Program code: MKEE]

The Master of Philosophy (M.Phil.) offered at FKE is a research degree program for those holding a Bachelor's degree in Electrical Engineering of equivalent field who would like to expand and upgrade their knowledge. This multidisciplinary program assists candidates to develop skills in high level analysis and presentation, as well as integrate academic and professional concerns. Successful completion of the program will indicate that candidates have successfully completed a course of research training. The M.Phil.thesis is expected to make an invaluable contribution of to existing body of knowledge in the field.

The degree is awarded based on a comprehensive oral examination (viva voce) of the thesis submitted by the candidate on the completion of study. Prospective graduate students should prepare themselves adequately, both in the fundamental subject matter necessary for advanced work and other branches of learning, so they may conduct quality research and successfully complete their programs.

Program Educational Objective (PEO)

PEO1 To produce Master graduates with multidisciplinary knowledge needed for designing, integrating and optimizing solutions in Electrical Engineering fields including electronics, communication, mechatronics, power, instrumentation and control.

PEO2 To produce Master graduates who are able to generate new knowledge, idea and techniques in Electrical Engineering fields.

PEO3 To produce Master graduates who are able to function in R&D research team and innovative industrial ventures.

PEO4 To produce Master graduates who are able to consistently perform their responsibilities ethically and professionally.

Program Learning Outcomes (PLO)

PLO1 Attain comprehension in specialized knowledge on theories, methods and applications related to electrical power, Instrumentation, control and Telecommunication field.

PLO2 Able to demonstrate in-depth proficiency in analyzing and solving problems through relevant analytical methods, simulations, experiments and independent research

PLO3 Able to synthesize engineering knowledge through design and development.

PLO4 Able to plan and perform research undertakings responsibly, professionally and ethically.

PLO5 Able to communicate, and express knowledge and ideas effectively.

PLO6 Able to continue life-long learning and apply technology for the betterment of humanity.

Program Duration

The Master of Philosophy program normally takes 2 years (4 semesters) with the maximum durationof 4 years (8 semesters). M.Phil. students are supervised by a graduate faculty members or a panel of supervisors. Co-supervisors may be appointed from the industry. The progress of a candidate is assessed through research progress reports submitted at the end of each semester.

Program Structure

M.Phil. students are required to register and pass the following courses

- Research Methodology course (course code UKEP0010), to be taken once during study. Students are advised to take this course in the first semester of study.
- One University Elective Course (course code U*** ***3), to be taken once during study.
- Research (course code MKEE **00), to be taken every semester until the submission of thesis. The progress of a candidate in any particular semester is assessed through research progress reports submitted at the end of each semester. It is important for the students to know that the submission of the progress report needs to be done by the student themselves via GSMS website http://spsapp3.utm.my:8080/gsmsv4/.

Thesis Submission and Examination

In the 2nd semester of the Masters' program, research students will undergo the first stage evaluation process. The objective of this evaluation process is to assist and ensure the research they are conducting is in the right direction and eventually meet the expectation of the research program. Students will receive a copy of the panel report containing suggestion and recommendation that will guide and improve the undertaken work.

At the end of study, students will submit thesis for the purpose of oral examination. Prior to submission of the thesis for the oral examination (viva), students must submit the Notice for Thesis Submission at least 3 months in advanced. This is to ensure that approved internal and external examiners have been appointed by the university before the oral examination can take place. Failure to do so may delay the viva process.

2.4 MASTER OF ENGINEERING BY TAUGHT COURSE

Degrees granted:

- M. Eng. (Computer and Microelectronic Systems) - [Program code MKEH]
- M. Eng. (Mechatronics and Automatic Control) - [Program code MKEM]
- M. Eng. (Electronics and Telecommunication) - [Program code MKEL]
- M. Eng. (Electrical Power) - [Program code MKEP]

Faculty of Electrical Engineering offer Master programs by taught course that provide students to study in one of our four specialized Masters programs. At FKE, we offer a range of specialized courses founded on a unified philosophy of engineering teaching, which ensures the breadth of technical knowledge demanded of a professional engineer. Our curricular are in-line with industry needs.

Mode of Study:
Graduate students can pursue an on-campus or off-campus taught course program. On-campus taught course programs are offered at UTM's main campus in Johor Bahru. Select off-campus programs are available at the UTM Kuala Lumpur campus or other centres.

- On-campus (PERDANA): The on-campus study requires a minimum duration of 1.5 years (three semesters). The class sessions take place during weekdays. International students on study visa can only register for this mode of study.

- Off-campus (PESISIR) : Off-campus study normally takes 2 years (4 normal semesters and one 8-week short semester) to complete. Classes are scheduled on weekends to suit working professionals. Expatriates on working visa and permanent residents may register in this mode of study.

Teaching Methods: A taught module takes the following forms: formal lectures, tutorials, assignment and/or laboratory work as well as industrial exposure. Each 3-credit module is delivered in 42 hours of lectures. Teaching/learning is student-centred; hence it should be complemented with adequate self-study and self-learning by the students.

Assessment and Grading: Students' progress is assessed (continuously) throughout the semester by coursework assessment components and a final examination for each course. The coursework components may consist of set written assignments, practical work/lab assignments, and short tests. Passing mark for each taught course is 60% or equivalent to B-. Any failed core course must be repeated with that same course, while failed elective course can be replaced with another elective course approved by the Postgraduate office.

Students must obtain at least 2.67 *cumulative grade point* average (CGPA) or equivalently a B- average for each semester to continue the study. For a Masters degree to be awarded, candidates must complete a minimum of 43 credits and achieve a final CGPA$_E$ of 3.00. Table IV in the appendix shows the academic standing and students' status.

Students may also register a course under *HS* (attendance only). In order for this module to appear in the transcript, students' attendance must be at least 80% and fulfill other coursework requirements.

Master Project: Students must undertake a 10-credit master's project. This 1 year (2-semester) project will be supervised by a graduate faculty member of FKE. Towards the end of the 1st semester, students will defend their project proposal. At the end of the project in the second semester, students must defend their Masters project and a comprehensive project report must be submitted. The Masters project could be industry-related although must still meet academic requirements, defined by the academic supervisor. An industry co-supervisor may be appointed from persons with appropriate academic standing or experience, subject to approval of the Faculty's Academic Committee.

2.4.1 OFF-CAMPUS (PESISIR) MODE OF STUDY

Our off-campus programs offer flexible solutions for working engineers and professionals to advance their career through our industry-driven curricula. All of our Masters programs are accredited by the Malaysian Qualification Agency (MQA).

Courses taught by Universiti Teknologi Malaysia faculty members at our PESISIR centres. The fees are affordable and competitive. Our PESISIR program can be completed within 2 years (four normal semesters and one short semester). Classes are conducted on Saturday and Sunday at all study centres.

- Johor Bahru : Universiti Teknologi Malaysia Main Campus
- Kuala Lumpur : Universiti Teknologi Malaysia City Campus
- Pulau Pinang : Penang Skills Development Centre
- Kuching : Technology College Sarawak

Programs	Study Centers			
	Johor Bahru	Kuala Lumpur	Pulau Pinang	Kuching
MKEH	–	–	MKEHA1BPA	–
MKEL	MKELA1BJA	MKELA1BKA	–	–
MKEM	–	MKEMA1BKA	–	–
MKEP	MKEPA1BJA	MKEPA1BKA	–	MKEPA1BQA

* Other programs maybe offered in other centres depending on demands.

2.5 CURRICULAR OF TAUGHT COURSE PROGRAMS

2.5.1 MASTER OF ENGINEERING (COMPUTER AND MICROELECTRONIC SYSTEMS)

The program is an advanced degree program that exposes and updates students to cutting-edge technologies and techniques in computer engineering, IC microchip design, microelectronics system and advanced electronics in next generation technologies. With the ever increasing demand in digital devices, semiconductor based companies are facing the challenges of producing higher performance, cost effective, but smaller microchips. This program covers both the theoretical and practical aspects of computer engineering and microelectronics system. It is designed especially for engineers to complement their industrial expertise and enhance their knowledge skills. This program was formed from our close collaboration with our industry partners (such as Intel). The curriculum and some of the courses were developed based on the technical needs for upskilling and advancing the knowledge of their engineers.

Program Educational Objective (PEO)

PEO1 To produce Master graduates with multidisciplinary knowledge needed for designing, integrating and optimizing solutions in Electrical Engineering fields including electronics.

PEO2 To produce Master graduates who are able to generate new knowledge, idea and techniques in Electrical Engineering fields.

PEO3 To produce Master graduates who are able to function in R&D research team and innovative industrial ventures.

PEO4 To produce Master graduates who are able to consistently perform their responsibilities ethically and professionally.

Program Learning Outcomes (PLO)

PLO1 Attain specialized knowledge on theories, methods and applications related to computer and microelectronic field.

PLO2 Able to demonstrate proficiency in analyzing and solving problems through relevant analytical methods, simulations, experiments and independent research

PLO3 Able to synthesize engineering knowledge through design and development.

PLO4 Able to plan and perform research undertakings responsibly, professionally and ethically.

PLO5 Able to communicate, and express knowledge and ideas effectively.

PLO6 Able to continue life-long learning and apply technology for the betterment of humanity.

Program Structure

Degree : **M. Eng. (Computer and Microelectronic Systems)**
Specialization : **Computer Engineering, Microelectronics & IC Design**
Program : **MKEH**
Total Credit : **43 credits**

		credit
Compulsory courses (6 credits)		
UHx xxxx	*Non-technical subject*	3
MKEU 0013	Introduction to Research Methodology in Electrical Engineering	3
Core Courses (12 credits)		
MKEL 1113	Nano-electronic Devices	3
MKEL 1123	Advanced Microprocessor Systems	3
MKEL 1173	Advanced Digital System Design	3
MKEL 1193	Analog CMOS Design	3
Elective Courses – Choose 4 courses (12 credits)		
MKEL 1133	Integrated Circuit Testing	3
MKEL 1143	Advanced Digital Signal Processing	3
MKEL 1163	VLSI Circuits & Design	3
MKEL 1183	Advanced Computer Architecture	3
MKEL 1223	Random Process	3
MKEL 1233	Image Processing	3
MKEL 1243	Software Engineering	3
MKEL 1253	Speech Processing	3
MKEL 1263	Special Topic in Electronic Eng.	3
MKEL 1273	VLSI Design Automation	3
MKEL 1283	Hardware Software Co-Design	3
Masters Research Project (10 credits)		
MKEH 1814	Research Project Proposal	4
MKEH 1826	Research Project Thesis	6
Free Elective Course (3 credits)		
(From MKEH/MKEP/MKEM/MKEL)		3

2.5.2 MASTER OF ENGINEERING (ELECTRONICS AND TELECOMMUNICATION)

This is an advanced degree program that exposes and updates students to the cutting-edge technology and techniques in electronics and telecommunication engineering, advanced electronics in IC/microchip design, and communication and computer networks. This course covers all the major aspects of electronics and telecommunications and their applications to the design of electronics or telecommunication systems. Students will also acquire expertise in the use of computer packages available in these areas. Furthermore, opportunities exist for outstanding students on this program to continue with research leading to a Ph.D. degree.

Program Educational Objective (PEO)

PEO1 To produce Master graduates with multidisciplinary knowledge needed for designing, integrating and optimizing solutions in Electronic & Telecommunication fields.

PEO2 To produce Master graduates who are able to function in R&D research team and innovative industrial ventures.

PEO3 To produce Master graduates who are able to function in R&D research team and innovative industrial ventures.

PEO4 To produce Master graduates who are able to consistently perform their responsibilities ethically and professionally.

Program Learning Outcomes (PLO)

PLO1 Attain specialized knowledge on theories, methods and applications related to Electronic & Telecommunication field.

PLO2 Able to demonstrate proficiency in analyzing and solving problems through relevant analytical methods, simulations, experiments and independent research.

PLO3 Able to synthesize engineering knowledge through design and development.

PLO4 Able to plan and perform research undertakings responsibly, professionally and ethically.

PLO5 Able to communicate, and express knowledge and ideas effectively.

PLO6 Able to continue life-long learning and apply technology for the betterment of humanity.

Program Structure

Degree : **M. Eng (Electronic & Telecommunication)**
Specialization : **Electronics and Telecommunications Engineering**
Program : **MKEL**
Total Credit : **43 credits**

Compulsory courses (6 credits)		***credit***
UHx xxxx	*Non-technical subject*	3
MKEU 0013	Introduction to Research Methodology in Electrical Engineering	3
Core Courses (12 credits)		
MKEL 1123	Advanced Microprocessor Systems	3
MKET 1313	Communications & Computer Networks	3
MKET 1413	Advanced Digital Communication	3
MKEL 1173	Advanced Digital System Design	3
Elective Courses – Choose 4 courses (12 credits)		
MKEL 1113	Nano-electronic Devices	3
MKEL 1133	Integrated Circuit Testing	3
MKEL 1143	Advanced Digital Signal Processing	3
MKEL 1163	VLSI Circuits & Design	3
MKEL 1183	Advanced Computer Architecture	3
MKEL 1223	Random Process	3
MKEL 1233	Image Processing	3
MKEL 1243	Software Engineering	3
MKEL 1253	Speech Processing	3
MKET 1323	Broadband Multimedia Networks	3
MKET 1333	Optical Communications	3
MKET 1373	Sonar and Acoustic Engineering	3
MKET 1383	Satellite Communication	3
MKET 1393	Network Modelling & Performance	3
MKET 1423	Wireless Communication Systems	3
MKET 1433	RF/Microwave & Antenna Design	3
MKET 1463	Advanced Communication Electronics	3
MKET 1483	Optical Networks ad Devices	3
MKEL 1263	Special Topic in Electronic Eng.	3
MKET 1453	Special Topic in Telecommunication Eng.	3
Masters Project (10 credits)		
MKEL 1814	Research Project Proposal	4
MKEL 1826	Research Project Thesis	6
Free Elective Course (3 credits)		
(From MKEL/MKEP/MKEM/MKEH)		3

2.5.3 MASTER OF ENGINEERING (MECHATRONICS & AUTOMATIC CONTROL)

Mechatronics and Control Engineering is a multi-disciplinary subject, with applications across a wide range of industrial sectors. The M.Eng. (Mechatronics and Automatic Control) program aims to equip graduates, with both the theoretical and the practical skills necessary to apply modern control techniques to a wide range of industrial problems and/or embark on further research. This program covers all the major aspects of control theory and mechatronics including adaptive and robust control, artificial intelligence, process control, industrial instrumentation, robotics and control applications in mechatronic systems and its application to the design of control systems. Students will also acquire expertise in the use of computer packages for control design. Outstanding students on this program may continue with research leading to a Ph.D..

Option for double-degree:
This program also offers option for double-degree mode with University of Burgundy (UoB), where upon completing an extra semester in UoB, students are eligible for conferment two Master degrees from UTM and UoB. This study option takes a minimum of 4 semesters to complete.

- Semesters 1 and 2 in UTM
- Semester 3 in UoB
- Semester 4 in either UTM or UoB

This study option would require students to apply for admission to UoB themselves. Students have to complete the first two semesters of study in UTM, followed by one semester in UoB. The final semester can be done either in UTM or UoB. For further details, please consult the Postgraduate Office.

Program Learning Outcomes (PLO)

PEO1 To produce postgraduates with multidisciplinary knowledge needed for designing, integrating and optimizing solutions, central to modern control and mechatronic engineering systems.

PEO2 To produce postgraduates who are able to generate new knowledge, idea and technique in control and mechatronic engineering.

PEO3 To produce postgraduates who are able to function in R&D research team and innovative industrial ventures.

PEO4 To produce postgraduates who are able to consistently perform their responsibilities ethically and professionally.

Program Learning Outcomes (PLO)

PLO1 Attain advanced knowledge on theories, methods and applications in control and mechatronic engineering field.

PLO2 Able to demonstrate proficiency in relevant analytical methods, simulations, and/or experiments to perform research.

PLO3 Able to critically solve problems and apply engineering knowledge in design and development.

PLO4 Able to plan and perform research undertakings responsibly, professionally and ethically.

PLO5 Able to communicate, and express knowledge and ideas effectively.

PLO6 Able to continue life-long learning and apply technology for the betterment of humanity.

Program Structure

Degree : **M. Eng. (Mechatronics & Automatic Control)**
Specialization : **Control Engineering, Mechatronics & Robotics**
Program : **MKEM**
Total Credit : **43 credits**

Compulsory courses (6 credits)		***credit***
UHx xxxx	*Non-technical subject*	3
MKEU 0013	Introduction to Research Methodology in Electrical Engineering	3
Core Courses (12 credits)		
MKEM 1753	Advanced Instrumentation & Measurement	3
MKEM 1833	Linear System Theory	3
MKEM 1853	Discrete-Time Systems & Computer Control	3
MKEM 1863	Design of Microprocessor-Based Mechatronic Systems	3
Elective Courses – Choose 4 courses (12 credits)		
MKEM 1713	Artificial Intelligence	3
MKEM 1723	Advanced Process Control	3
MKEM 1733	Adaptive & Self-Tuning Control	3
MKEM 1743	Modelling & Simulation of Dynamical Systems	3
MKEM 1763	System Identification & Estimation	3
MKEM 1773	Multivariable and Optimal Control System	3
MKEM 1783	Nonlinear and Robust Control Systems	3
MKEM 1793	Industrial Automation	3
MKEM 1823	Advanced Robotics	3
MKEM 1843	Advanced Digital Control	3
MKEM 1873	Real-Time Control System Design	3
MKEM 1883	Autonomous Mobile Robotics	3
MKEM 1913	Mechatronics Design	3
MKEM 1923	Sensor and Actuator	3
Master Project (10 credits)		
MKEM 1814	Research Project Proposal	4
MKEM 1826	Research Project Thesis	6
Free Elective Course (3 credits)		
(From MKEM/MKEL/MKEP/MKEH)		3

2.5.4 MASTER OF ENGINEERING (ELECTRICAL POWER)

The program is an advanced degree program to cater for graduates and professionals who are seeking and updating greater knowledge of current technology and techniques in electrical power, energy conversion, and high voltage engineering. The Master of Engineering (Electrical Power) offers high-level graduate program with strong foundations in theory, to equip student with the skills necessary to grasp and develop new technologies and trends in the electrical engineering field. It is designed to develop competent electrical power system professionals and the potentials of tomorrow's leaders in the power industry. The program prepares students to make an immediate contribution to the workplace and become leaders in the industry. Outstanding students can have the opportunities to further their studies leading to a Ph.D. degree.

Opportunity for BEM Electrical Engineering conversion
This program also provides opportunity for prospective students who currently registered as graduate engineers with BEM under the electronics category to convert to electrical category (terms and conditions apply, subject to approval from BEM).

Program Educational Objective (PEO)

PEO1 To produce Master graduates with multidisciplinary knowledge needed for designing, integrating and optimizing solutions central to modern power engineering systems.

PEO2 To produce Master graduates who are able to generate new knowledge, idea and techniques in Electrical Power Engineering field.

PEO3 To produce Master graduates who are able to function in R&D research team and innovative industrial ventures.

PEO4 To produce Master graduates who are able to consistently perform their responsibilities ethically and professionally.

Program Learning Outcomes (PLO)

PLO1 Attain specialized knowledge on theories, methods and applications related to Electrical Power Engineering.

PLO2 Able to demonstrate proficiency in relevant analytical methods, simulations, and/or experiments to perform research.

PLO3 Able to synthesize engineering knowledge through design and development.

PLO4 Able to plan and perform research undertakings responsibly, professionally and ethically.

PLO5 Able to communicate, and express knowledge and ideas effectively.

PLO6 Able to continue life-long learning and apply technology for the betterment of humanity.

Program Structure

Degree : **M. Eng. (Electrical Power)**
Specialization : **Electrical Power Engineering**
Program : **MKEP**
Total Credit : **43 credits**

Compulsory courses (6 credits)		***credit***
UHx xxxx	*Non-technical subject*	3
MKEU 0013	Introduction to Research Methodology in Electrical Engineering	3
Core Courses (12 credits)		
MKEP 1533	Power Electronics System	3
MKEP 1553	High Voltage Insulation & Coordination	3
MKEP 1603	Power System Analysis & Computational Method	3
MKEP 1633	Power System Devices & Apparatus	3
Elective Courses – Choose 4 courses (12 credits)		
MKEP 1513	Electronic Power Conversion	3
MKEP 1523	Electrical Drives	3
MKEP 1543	Advanced High Voltage Technology	3
MKEP 1563	Power Quality	3
MKEP 1613	Power System Control	3
MKEP 1623	Power Transmission & Security	3
MKEP 1643	Lightning Protection & Grounding System	3
MKEP 1653	Integrated Resource Planning in Energy Sector	3
MKEP 1663	Special Topic in Power Engineering	3
MKEP 1673	Power System Protection	3
MKEP 1683	Alternative Energy Technology System	3
Master Project (10 credits)		
MKEP 1814	Research Project Proposal	4
MKEP 1826	Research Project Thesis	6
Free Elective Course (3 credits)		
(From MKEM/MKEL/MKEP/MKEH)		3

3.0 STUDENT SUPPORT & SERVICES

3.0 STUDENT SUPPORTS & SERVICES

Universiti Teknologi Malaysia offers support services and facilities to cater the students learning needs and comfort during their years in UTM, including those with special needs. The Faculty has its own website (http://www.fke.utm.my/) and Facebook (Faculty of Electrical Engineering UTM Johor Bahru) account. The website is frequently managed to assist the student with registration, final year project, class timetable, important dates on every semester, and another source of information related to academics. The Facebook account is used for informal sharing of advice, resources and news updates.

3.1 LEARNING FACILITIES

The Faculty provides students with:

- Access to appropriate work space
- Laboratory access and technical support where appropriate
- Access to computing facility, including computer laboratories and online systems
- Appropriate library and other academic support services
- Opportunities to meet and build networking with other students, academicians and industries
- Opportunity to apply for funding to support training opportunities and for attending conferences and other relevant events, including fieldwork.

The faculty is also equipped with a learning resource centre, meeting rooms, multi-purpose rooms, lecture theatres, computing and computer-aided design laboratories, printed-circuit board and device fabrication laboratories, video conferencing room, prayer rooms and cafeteria.

Laboratories: The faculty has 22 laboratories for teaching and learning purposes, another 33 laboratories for research and development activities, two technical workshops, and a resource centre. The laboratories are equipped with extensive range of state-of-art equipment.

The research laboratories are as follow.

1. Acoustics
2. VeCAD
3. Power Electronics (R&D) I
4. Advanced Microwave and Antenna Lab
5. FMS
6. Industrial Power
7. Advanced Machines
8. Microelectronics
9. Photonics Research
10. Photonics Simulation
11. UTM-MIMOS
12. Sensor & Actuator
13. Energy System
14. Radar
15. Nano-electronics
16. Advanced Microprocessor (AMIR)
17. Mobile Robot
18. Digital Signal Processing (DSP)
19. Computer Vision, Video, & Image Processing (CvviP)
20. Power System Simulation
21. Electrophysiology
22. Bio-electronic
23. Power Electronics (R&D) II
24. Photonics Fabrication

25. Photonics Characterization
26. Electric Vehicle
27. Generation
28. Power System Measurement and Monitoring
29. Energy Management
30. Illumination
31. High Voltage Testing and Calibration
32. Computational Nano-electronic
33. Micro-nano Mechatronics
34. Wireless Communication Centre (WCC)
35. Control (R&D)

Computing Facilities:
Besides the main University Computing Centre, the faculty also provides modern computing facilities for students. There are two general-purpose computer laboratories suitable for conducting computer-related and programming courses. In terms of computing research facilities, the faculty provides access to industry-strength tools for design, simulation, and verification of electrical and electronic systems such as Synopsys, Matlab, Labview, and Microwave Office. Some of these facilities (hardware and software) were donated by our industry partners such as MIMOS, Intel, and Altera. FKE also provides faculty-wide wireless connection to staff and students to provide 24-7 access is provided through secure virtual private network https://vpn.utm.my. The University also provides university-based emails to students, plagiarism detection software, and access to thousands of renowned journals from top publishers and from various institutions through the UTM Library.

Library:
UTM library is equipped with 24/7 study areas, discussion rooms, multimedia rooms, theatres, computers, printing & photocopying facilities. UTM Library aims to support you by providing:

- Access to the information and resources you need
- Training to enable you to make the best use of them
- Specialist guidance in areas directly relevant to you as a researcher and the research lifecycle.

Details of library services can be accessed at http://library.utm.my including information on academic and research support, loans and borrowing, opening hours and resources.

Online System for students
UTM has academic information management systems for academic management, managing course grades and record keeping. These systems are managed by the UTM Academic Management Division. Student can register for courses and access their semester grades through http://pendaftaran.utm.my/sps.

Graduate Study Management Systems (GSMS):
All postgraduate research students are required to register and manage a Graduate Study Management Systems (GSMS) whilst they are studying here. GSMS software was developed by the School of Graduate Studies, Universiti Teknologi Malaysia (SPSUTM) to improve the operational efficiency of postgraduate management. http://spsapp3.utm.my:8080/gsmsv4/index.jsp

Email:
All new students are required to register with @live.utm.my domain. All email will be sent to **@live.utm.my** email address and to contact students when necessary.

E-learning UTM:
The Faculty also fully utilize the online facility in the teaching and learning process.In which, students are able to access the teaching material and online quizzes or assignment through the e-learning facility, anytime and anywhere. Please visit the website http://elearning.utm.my for more details.

3.2 STUDENT ACADEMIC AFFAIRS

Many of the services are provided by different units under the Office of Student Affairs and the detailed services provided by this office can be viewed on its website http://www.utm.my/studentaffairs/.

Scholarship:
Students who require financial aid may refer to the Student Service and Facility Unit of the Office of Student Affairs. Several types of financial aids are available to those who are eligible. Generally, there are four categories of financial aids – scholarship, loan, one-off grant, or loan from university fund.

Language Assistance:
The Academy offers courses to meet the language and communicative needs of UTM students. The UTM Language Academy offers courses to meet the language and communicative needs of UTM students, the public and working professional. Various services and facilities are available at the academy such as academic language courses, foreign languages, professional communication and training programmes, IELTS testing and training. The Academy also provides excellent learning facilities like Digital Language Labs, MyLinE (online resources for learning in English), Japanese-Language Proficiency Test (JLPT) and Test of English Communication Skills for Graduating Students (TECS). UTM, through the Language Academy offer Intensive English Program to prepare international students with the language skills and the cultural adjustment needed to succeed in both undergraduate and postgraduate programs at the university level. In addition, the program seeks to assist individuals with improvement of their English skills for business or personal needs. Please visit the website at http://languageacademy.utm.my/ for more details.

Seminar and Guest Lectures:
FKE UTM seminar series where routine talks are given by current postgraduates and staff recently graduated with Ph.D.. Occasionally, special talks are also being conducted where the speakers are from industry and visiting academics. Details of the previous and upcoming events can be found at the following website, http://www.fke.utm.my/.

3.3 STUDENT ACTIVITIES

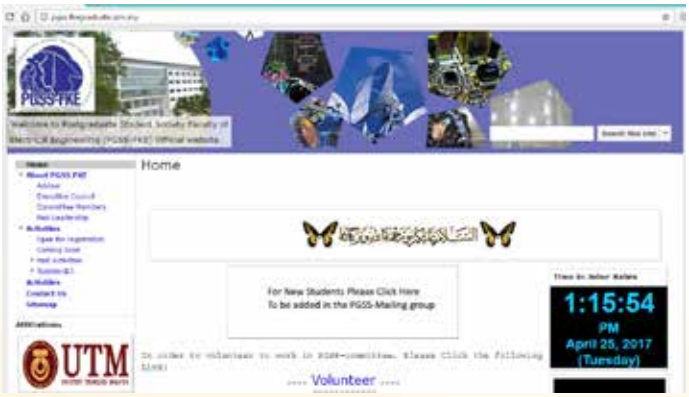
Student co-curricular activities are managed by several different units. Other co-curricular activities on-campus including those in residential colleges are supervised by the Office of Student Affairs under the Office of Deputy Vice Chancellor (Student Affairs and Alumni). Activities that relate to outside community are coordinated by University Social Responsibility (USR) section of Director of Corporate Affairs Office.

UTM has established Senate Standing Committee on Student Development under the chairmanship of Deputy Vice Chancellor (Student Affairs and Alumni) to strategically plan, oversee, coordinate and evaluate students' development and activities (especially those related to soft-skills). International Students Centre under Deputy Vice Chancellor (Student Affairs and Alumni) coordinates international student co-curricular activities. UTM also have Postgraduate Student Society (PGSS) which also responsible for student co-curricular activities.

PGSS-FKE: The PGSS-FKE committee is headed by a student representative. The PGSS-FKE regularly conducts student-oriented events, knowledge sharing, conferences and the dissemination of any upcoming events. The faculty will conduct a meeting with the PGSS-FKE committee once a year to get feedback and comments from students. Further information can be access http://pgss.fkegraduate.utm.my/ or visit the Facebook account (Postgraduate Student Society FKE UTM - PGSS FKE).

IEEE Student Branch: All undergraduate and postgraduates are also welcomed to become a member of UTM IEEE Student Branch. More information from the UTM IEEE Student Branch (http://ewh.ieee.org/sb/malaysia/utm/) or Facebook account (UTM IEEE Student Branch).

Other non-academic co-curricular activities: The co-curricular activities are designed to develop the student's generic skills such as leadership, teamwork, communication and professional ethics. The courses offered are managed by the General Courses and Co-curricular centre. To attract the interest of students, a variety of courses are offered and they are categorized into main modules such as Sports and Character Building, Personal and Social Development, Arts and Culture, and Special Programmes.



3.4 OTHER FACILITIES

All the necessary facilities and amenities are readily available within the campus and its vicinity for the convenience of the students.

Accommodation:
UTM has sufficient rooms and lodging for students on-campus. Students Affairs Office provides 10 residential colleges that can accommodate up to 14,774 single students and 301 family housing units. All students can Further information can be accessed here.(http://www.utm.my/studentaffairs/unit-perumahan-dan-kolej-kediaman/).

Health Centre:
Student health service is provided by the University for the students, the staff and local community. The centre provides general medical services, accident treatment, minor surgery, temporary ward services, a pharmaceutical and a dental clinic. The centre opens from 8.00 a.m. to 10.00 p.m. from Sunday to Thursday, and from 8.30 a.m. to 12.30 p.m. on Friday and Saturday. The centre also provides a 24-hour emergency call. Further information can be found at http://www.utm.my/healthcentre/.

Sport and Recreational Centre:
For sports and cultural activities, two units are responsible in providing the services. They are Sports Unit and Culture Unit. The Sports Unit caters to the sports and recreational needs not just for students but also for the whole University community. Among the facilities are Sport Complex, Aquatic Centre, Open fields and courtyards, and multi-purpose halls.

Counselling Services:
Counselling Centre provides services to student based on the following objectives. First to build and strengthen self-potential through psychology and counseling approach; and second to enhance self-quality from cognitive, affective and behavioural aspects. Please visit the website at http://www.utm.my/counsellingcentre/ for more details.

Transport services:
UTM also provide regular bus services within the campus. Access for public transportation to UTM is also available for students staying outside campus. Main bus station and train service are in Johor Bahru, 15 km away. Express bus ticket counters for long-distance bus services are also available on-campus. The Senai International Airport is approximately 20 km from UTM.

Shopping:
UTM is located near Taman Universiti and other housing areas. There are two shopping centres, AEON (JUSCO) and GIANT are just around 3km from UTM. Other commercial premises, petrol stations, post offices, and banks are within short distance from UTM.

Leisure:
There are a lot of attractions nearby and within the vicinity of UTM.

- **LEGOLAND:** Opening end 2012, LEGOLAND Malaysia is 76 acres of adventure geared with family fun. It is packed full of more than 40 rides, shows and attractions.
- **Johor Premium Outlet (JPO):** Designer and name brand outlet stores with great savings yeararound.
- **Iskandar Malaysia:** Iskandar Malaysia continues to evolve, there has been an increase for the range of integrated parks, open space systems.
- **Danga Bay:** Danga Bay Integrated Waterfront City is one of the most exciting areas of development within Iskandar Malaysia. The site is accessible via a comprehensive network of main roads, International Airports, cargo hubs and seaports.
- **Desaru:** Located on the eastern tip of the Malay Peninsula, has clean sandy white beaches and it is popular with tourists as well as locals.
- **Kota Tinggi Waterfall:** The beautiful waterfalls of Malaysia. Descriptions of the falls, visited by our team, can be found by using the menu at the top.
- **Sultan Abu Bakar Mosque:** The state mosque of Johor, Malaysia. Located along Jalan Skudai, Johor Bahru, the mosque was constructed between 1892 and 1900.
- **Bukit Layang-Layang:** Pasir Gudang Kite Museum or Muzium Layang-Layang Pasir Gudang is the first of it's kind in Malaysia. Built as an appreciation towards the contribution of Malaysian and International kite flyers.

3.5 UTM INTERNATIONAL

UTM has long participated in a wide variety of collaborative relationships with universities, other institutions and individuals in many countries. (http://www.utm.my/international/). UTM International Degree Program (UTM-IDP) is a Bachelor Degree Program offered by Universiti Teknologi Malaysia (UTM) for Malaysian and international students. The program provides opportunities for the students to experience a world class teaching and learning environment. UTM-UDP offers Global Outreach Program (GOP) to allow students to have global educational experience and enhance their academic opportunities.

International Student Centre (ISC): The goal of the UTM International Student Centre (UTM ISC) is to provide services that promote and support international education at the university. The centre provides services to over 5000 international students from over 50 countries. All members of the university community and international students are welcome to come to the UTM ISC and meet in a relaxed and informal atmosphere. ISC staff has special expertise and offers a wide range of services and programs to help students establish a support network, improve their spoken English and effectively deal with psychological and emotional stress. Other services have been also managed by ISC including immigration matters, student welfare, insurance matters, and student society. The UTM ISC is located at S19 building, Universiti Teknologi Malaysia Johor Bahru.

Outbound Mobility Programs and Inbound Mobility Programs: Through the UTM ISC students may also look into opportunities for student mobility; or to be involved in international programs for inbound and outbound students as follows:

- Long-Term Programs
- Study Abroad and Exchange Program
- Research Internship Program
- ASEAN International Mobility for Students (AIMS)
- Short-Term Programs
- UTM Global Outreach Program
- International Invitation Program
- Summer School Program

Please visit the website at http://isc.utm.my for more details

4.0 PROGRAM ADMINISTRATION

4.0 PROGRAM ADMINISTRATION

4.1 THE FACULTY ADMINISTRATORS

1. Prof. Dr. Johari Halim Shah Osman
   Dean
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   (Academic and Student Development)

3. Professor Dr. Mohamad Kamal A. Rahim
   Deputy Dean
   (Research, Innovation, Network and Community)

4. Professor Ir. Dr. Mohammad Yusri Hassan
   Professor in Power Engineering

5. Professor Dr. Zulkurnain Malek
   Professor in Power Engineering

6. Professor Dr. Mohamed Khalil Hani
   Professor in Electronic and Computer Engineering

7. Professor Dr. Razali Ismail
   Professor in Electronic and Computer Engineering

8. Professor Ir. Dr. Abu Bakar Mohammad
   Professor in Communication Engineering

9. Assoc. Prof. Dr. Norazan Mohd Kassim
   Associate Professor in Communication Engineering

10. Professor Dr. Yahaya Md Sam
    Professor in Control and Mechatronic Engineering

11. Assoc. Prof. Dr. Rosbi Mamat
    Associate Professor in Control and Mechatronic Engineering

12. Assoc. Prof. Dr. Nor Hisham Khamis
    Head, Dept. of Communication Engineering

13. Assoc. Prof. Dr. Mohamed Afendi Mohamed Piah
    Head, Dept. of Power Engineering

14. Assoc. Prof. Ir. Dr. Norhaliza Abdul Wahab
    Head, Dept. of Control and Mechatronic Engineering

15. Assoc. Prof. Dr. Norlaili Mat Safri
    Head, Dept. of Electronic & Computer Engineering

16. Assoc. Prof. Dr. Muhammad Nadzir Marsono
    Postgraduate Academic Manager

17. Assoc. Prof. Ir. Dr. Rubita Sudirman
    Head of Department Off-Campus Programmes

18. Mr. Azri Hohad
    Deputy Registrar

4.3 INDUSTRY ADVISORY PANEL

1. Ir. Sazali P. Abdul Karim
   Technical Consultant,
   ACEI Systems Sdn. Bhd.

2. Dr. Izhar Che Mee
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   Enterprise Heartbeat MSC Sdn. Bhd.

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

4. Dr. Mohd Jaya Abdullah
   Manager, Unit Data PJ2,
   Telekom Malaysia.

5. Ir. Mohd Fadil Abu Samah
   Resident Engineer, M&E
   DPI Konsult S/B

6. Mr. Md. Ridzuan Md. Yusof
   Head of Technology and Innovation Strategy,
   Project Management & Strategic Initiatives
   Perusahaan Automobil Nasional Sdn. Bhd.

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

8. Mr. Abidullah Mohd Omar
   Deputy General Manager
   Perodua Manufacturing Sdn. Bhd.

9. Dr. Khairil Osman
   General Manager Engineering,
   Pure Integrity Sdn. Bhd.

10. Mr. Amran Abdul Manaf
    Director,
    NDK Quartz (M) Sdn. Bhd.

11. Mdm. Hjh. Zaiton Fakeh
    Manager of Engineering Centre,
    Green Procurement & Procurement,
    Hitachi Electronics Products (M) Sdn. Bhd.

12. Mr. SK Fong
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13. Dr. Teh Eong Yap
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14. Mr. Ko Ah Kim
    Engineering Design Manager,
    Client CPU Design,
    Intel Microelectronics (M) Sdn. Bhd.

15. Ir. Dr. Syed Mustafa Kamal
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16. Mr. Teoh Swee Aun
    Senior Group Manager,
    Engineering Design Services,
    National Instruments Malaysia Sdn. Bhd.

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

18. Mr. Elman bin Mustafa El Bakri
    Senior Manager, Healthcare Engineering Services
    KPJ Healthcare Berhad

19. Mr. Wan Roz Wan Hussein
    Technical Director
    RF Communications

20. Dr. Mazlan bin Abbas
    CEO and Co-Founder
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5.0 FKE GRADUATE FACULTY

5.0 FKE GRADUATE FACULTY

This section provides profile summary of all graduate faculty members. Complete research profiles can be viewed through the **PURE UTM Portal** *https://pure.utm.my/en/organisations/faculty-of-electrical-engineering-fke*

5.1 DEPARTMENT OF ELECTRICAL POWER ENGINEERING

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Assoc. Prof . Dr. Mohamed Afendi Mohamed Piah
B. Eng. (Electrical) (UTM), M. Sc. (Power Systems) (Strathclyde University, UK), Ph. D. (Electrical Engineering) (UTM), MIEEE, MIET.
High Voltage Insulation Diagnostic and Co-Ordination, Partial Discharge and Surface Tracking Phenomena, Polymer Insulating Mat

PROFESSOR

Prof. Ir. Dr. Abdul Halim Mohamed Yatim
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Renewable/Clean Energy, Energy Storage, Electric Vehicle, Motor Drives, Utility Application, Power Electronics Converters

Prof. Ir. Dr. Mohammad Yusri Hassan
B. Eng. (Electrical & Electronics) (Strathclyde, UK), M. Eng. (Electrical-Power) (UTM), Ph. D. (Power System Economics) (Strathclyde, UK), P. Eng, C. Eng., REEM, CEM, MIET, MIEEE, MEPA, Gred IEM.
Power system Economics, Transmission Pricing,,
Electricity Energy Markets, Energy Efficiency

Prof. Ir. Dr. Mohd. Wazir Mustafa
B. Eng. (Electrical & Electronics), M. Sc. (Electrical Power Engineering), Ph. D. (Electrical Power Engineering) (Strathclyde, UK), P. Eng., MIEEE, MIEM.
Power System analysis, HVDC System, FACTS, Microwave power transmission, Deregulated Power System

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AC Motor Control, Utility Application, High Voltage Equipment, Solar Energy, System Power Electronic Converters, Power Electronic Simulations

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High Voltage Systems, Overvoltage Protection System & Insulation Coordination, Measurement Techniques, High Voltage Surge Arrestors, Magnetic Engineering

ASSOCIATE PROFESSOR

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DC-DC Converter Power, Electric Vehicle, DC Drive

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Deregulated Power System, Large Scale Power System Simulation

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Renewable Energy, Solar Photovoltaic Installation and Application, Optimal Design of GCPV and SAPV, Micro-grid EMS, Energy Management and Energy Efficiency Technologies and Applications

Assoc. Prof. Dr. Naziha Ahmad Azli
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Power Converters Static Application

Assoc. Prof. Dr. Nik Rumzi Nik Idris,
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AC Motor Drives, Power Electronic Converters and Simulation

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Electrical Discharges, Ozone Generation & Application In Industries I.E. Water Treatment, Agriculture, Medical Treatment & Food Processing

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Power Quality, Power System Analysis

Dr. Dalila Mat Said
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Power Quality and Power System Measurement and Monitoring

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Distributed Generation, Electric Vehicle, Meta-Heuristic Optimization Technique, Renewable Energy and Voltage Stability Index

Dr. Lau Kwan Yiew
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High Voltage Engineering, Dielectric Materials, Renewable Energy Systems

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Distributed Generation, Meta-Heuristic Optimization, Renewable Energy

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Power Systems Analysis, Deregulated Electricity Market, Demand Side Management

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Power System Analysis, Operation, Stability and Control; Distributed Generation and Smart Grids

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High Voltage Insulation, Partial Discharge Measurement and Detection, Nanodielectrics

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Lightning Physics, EMC, DSP (Wavelet)

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AC Motor Drives, Power Electronics Converter and Applications

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Lightning Characterization, Electromagnetic Field & Radio Frequency Emission

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Deregulated Power System, Available Transfer Capability, FACTS Devices

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Power System Deregulation, Application of AI in power system and Power Tracing

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Power Electronics, Fuzzy Logic Control Applications to Power Electronics, MPPT, Photovoltaic and Electric Vehicle

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Power Electronics for Renewable Energy Applications, Solar/PV System

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High Voltage / Current Generation, Power Equipment Diagnosis (Surge Arrester) and Energy Storage Technology (Supercapacitor)

Dr. Zuraimy Adzis
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EMC & EMI in High Voltage Systems, Lightning, Electrical Safety and Forensics, Sustainability

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Analog IC Design & Test, Fault modelling, Design for Test

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Prof. Dr. Razali Ismail
B. Sc. (Electrical & Electronic), M. Sc. (Modern Electronics)
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MIEEE.
Modelling and Simulation of Nanoelectronic Devices

ASSOCIATE PROFESSOR

Assoc. Prof. Dr. Ahmad Zuri Sha'ameri
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Signal Theory, Signal Processing for Communication and Radar, Signal Analysis and Classification, Information Security

Assoc. Prof. Dr. Azli Yahya
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Power Electronics, Machine Control, Microcontroller, Electrical Discharge Machining

Assoc. Prof. Muhammad Mun'im Ahmad Zabidi
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Embedded Systems, Many-Core System-On-Chip, Network-On-Chip, Specialized Computer Architectures, VLSI Design, Network Processing and Internetworking, Network Algorithmics, Network Processor Architectures

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Medical Electronics, Cell Analysis

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Wireless Network-on-Chip, Low Power and Energy Management in Network-on-Chip

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Digital Signal Processing, Image Processing

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Gait Analysis, Medical Electronics, Rehabilitation Engineering

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Design for Testability, Built-in Self-Test, High Level Verification

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Device Physics and Variability in Scaled Transistors, Variability And Reliability In Pmosfets, Device Improvement by Collaboration with Circuit Design

Dr. Ooi Chia Yee (seconded to MJIIT)
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Rehabilitation Engineering

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VLSI Design, Digital System Design, Combinatorial Optimization

Dr. Shaharin Fadzli Abd. Rahman
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Semiconductor Device and Carbon Material Growth

Dr. Suhaila Isaak
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Photonic Device Fabrication, VLSI, Photon Imaging, Integrated Circuit Design

Dr. Suhana Mohamed Sultan
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Nanotechnology in Environmental Sensing, Carbon-based and Semiconductor Nanomaterials Device Fabrication and Characterization, Heterojunction Barrier Engineering for Sensing Applications

Dr. Usman Ullah Sheikh Izzat Ullah Sheikh
B. Eng. (Electrical – Mechatronics), M. Eng. (Electrical - Telecommunications), Ph. D. (Electrical Engineering) (UTM), MIEEE, Grad. IEM, MIET.
Digital Signal Processing, Computer Vision, Machine Learning, Embedded Systems, Software

Dr. Yusmeeraz Yusof
B. Sc. (Electronic & Electrical Engineering), M. Sc. (Intergrated Design Engineering) (Keio Univ., Japan), Ph. D. (Electrical Engineering & Computer Science) (Nagoya, Japan).
IC Design, Microelectronics, Biosensor, DNA Chip

Dr. Zaharah Johari
B. Eng. (Electrical - Electronics), M. Eng. (Electrical), Ph. D. (Electrical Engineering) (UTM).
Modelling and Simulation of Nanoelectronic Devices

Dr. Zaid Omar
B. Eng. (Computer) (UTM), M. Sc. (Data Communications) (Sheffield, UK), Ph. D. (Electrical Engineering) (Imperial College London, UK), MIEEE.
Image Processing, Computational Vision, Agent-Based Modelling

5.3 DEPARTMENT OF COMMUNICATION ENGINEERING

HEAD OF DEPARTMENT

Assoc. Prof. Dr. Nor Hisham Haji Khamis
B. Sc. E. E. (Electrical) (Evansville, USA), M. Eng. Sc. E. E. (Communications) (UNSW, Australia), Ph.D. (Electrical Engineering) (UTM), MIEEE.
RF and Microwave Engineering, Antenna and Propagation Studies

PROFESSOR

Prof. Ir. Dr. Abu Bakar Mohammad
B. Sc. (Electrical & Electronic Engineering) (Strathclyde, UK), M. Sc. (Digital System) (Hatfield, UK), Ph. D. (Fibre Optic Video System) (Bradford, UK), P. Eng, MIEM.Photonics Technology (Photonics Switching and WDM Systems),
Unguided Optical Fiber Comm. & Radio Over Fiber, MEMS

Prof. Ir. Dr. Abu Sahmah Mohd Supa'at
B. Eng. (Electrical-Communication), M. Eng. (Electrical – Optical Communication), Ph. D. (Electrical- Photonic Switching) (UTM), P. Eng., MIEEE, MIEM.
Integrated Optics, Optical Sensors, Photonics Devices and Networks

Prof. Dr. Mazlina Esa
B. Eng. (Electrical) (Hons.) (UTM), M. Sc. (Radio Frequency Engineering) (Bradford, UK), Ph. D. (Electronic & Electrical Engineering) (Birmingham, UK), SMIEEE.
Antennas, Microwave/RF, Superconducting passive devices, Wireless Networking, Wireless power transmission, Terrahertz/Pentahertz, Engineering Education, Broadcasting

Prof. Dr. Mohamad Kamal A Rahim
B. Sc. (Electrical & Electronics Engineering) (University of Strathclyde, UK), Master Eng. Sc (Electrical Engineering) (UNSW, Australia), Ph. D. (Electrical Engineering) (University of Birmingham, UK), SMIEEE, MIET.
Active and Passive Antennas, RF /Microwave Design and Wireless technology Active and Passive Antenna, textile and dielectric Antenna, Smart Antenna, RF and Microwave Circuit Design, Metamaterial, Electromagnetic Band Gap, Artificial Magnetic Conductor, High Impedance Surface, Frequency Selective Surfaces

Prof. Dr. Sevia Mahdaliza Idrus Sutan Nameh
B. Eng. (Electrical), M. Eng. (Engineering Management) (UTM), Ph. D. (Optical Communication System) (Warwick, UK).
Optical Communication Systems; Radio over Fiber; Optoelectronics; and Telecommunication Engineering Management

Prof. Dr. Tharek Abdul Rahman
B. Sc. (Strathclyde, UK), M. Sc. (Electrical Engineering) (UMIST, UK), Ph. D. (Communication) (Bristol, UK).
Wireless Communications, Mobile Radio Propagation, RF Communications. Satellite Communication, Mobile Broadband

ASSOCIATE PROFESSOR

Assoc. Prof. Dr. Jafri Din
B. Sc. (Electrical Engineering) (Tri-State, USA), Ph. D. (Electrical Engineering) (UTM), MIEEE.
Radiowave Propagation, Satellite Propagation, High Altitude Platform Station (HAPS)

Assoc. Prof. Dr. Mohamad Ngasri Dimon
B. Sc. (Electrical Engineering - Telecommunications) (USL), M. Eng. (Electrical), Ph. D. (UTM).
Acoustics Engineering, Numerical Modelling using Boundary Element Method, Room Acoustics Modelling, Audio System Design, Acoustic Material Development

Assoc. Prof. Dr. Mohd. Haniff Ibrahim
B. Eng. (Electrical-Telecommunication) (UM), M. Eng. (Electrical) (UTM), Ph. D. (Electrical *Engineering – Polymer Optical Devices) (UTM), MIEM.*
Polymer Based Photonic Devices, Optical Devices Simulation, Fabrication and Characterization, Electromagnetic Field Theory

Assoc. Prof. Dr. Norazan Mohd. Kassim
B. Sc. (Electrical & Electronic) (Cardiff, UK),
Ph. D. (Silicon Waveguides) (Nottingham, UK).
Electromagnetic Field Theory, Optical Devices: Simulation, Fabrication & Measurement, Optical Communications

Assoc. Prof. Dr. Norhudah Seman
B. Eng. (Electrical - Telecommunications) (UTM), M. Eng. (Radio Frequency & Microwave Communications),
Ph. D. (Electrical - Microwave Engineering) (Univ. of Queensland, Australia).
Multi-Port Network And System, RF And Microwave Engineering, Wireless Communication

Assoc. Prof. Dr. Razali Ngah
B. Eng. (Electtrical) (UTM), M. Sc. (RF Communication Engineering) (Bradford, UK),Ph. D. (Photonic Network) (Northumbria, UK).
Photonic Network, RF Design, Radio over Fiber and Wireless Technology

Assoc. Prof. Ir. Dr. Sharifah Hafizah Syed Ariffin
B. Eng. (Hons) (Electronic & Communication) (London, UK), M. Eng. (Telecommunications) (UTM), Ph. D. (Telecommunications) (Queen Mary Univ. of London, UK).
Wired and Wireless Network Performance, Handoff and Mobility Management in UltraDense Network, Heterogeneous Wireless System, Vehicular Communication Network, Cloud based Precision System, Ubiquitous Computing and IoE

Assoc. Prof. Dr. Sharifah Kamilah Syed Yusof
B. Sc. (Electrical Engineering) (Washington DC, USA),
M. Eng. (Electrical), Ph. D. (ElectricalEngineering) (UTM).
Wireless Broadband Communications Systems, OFDM-based System, Space-Time MIMO Systems, Cognitive- Radio Networks

Assoc. Prof. Ir. Dr. Sharul Kamal Abdul Rahim
B. Sc. (Electrical Engineering) (Tennessee, USA),
M. Eng. (Electrical-Communication) (UTM), Ph. D. (Wireless Communication System) (Birmingham, UK),
P. Eng., MIEM, MIEEE.
Smart Antenna System, Beamforming Network, RF and Microwave Engineering, Propagation, RFID

SENIOR LECTURER / LECTURER

Dr. Ahmad Sharmi Abdullah
B. Eng. (Electrical - Power), M. Eng. (Electronics & Telecommunications), Ph. D. (Electrical Engineering) (UTM).
Optical Telecommunication Devices, Sol-Gel Synthesis, Sol-Gel Materials, Optical Device Applications

Dr. Ahmad Shahidan Abdullah
B. Eng. (Electrical – Telecommunications), Ph. D. (Electrical Engineering) (UTM).
Sensor Networks, Source Coding and Security, Channel Coding, Network Coding

Dr. Arnidza Ramli
B. Eng. (Electrical - Telecommunications), M. Eng. (Electrical – Electronics & Telecommunications), Ph. D. (Optical Communication) (UTM).
Optical Communication, Optical-Wireless Access Network, Green Networking

Dr. Asrul Izam Azmi
B. Eng. (Electrical - Telecommunications), M. Eng. (Electrical - Electronics & Telecommunications)
(UTM), Ph. D. (Electrical-Fibre Optic Sensor) (UNSW, Australia).
Optical Sensor, Fiber Lasers, Fiber Grating

Dr. Farid Zubir
B. Eng. (Electrical - Telecommunications), M. Eng. (Electrical) (UTM), Ph. D. (Communication Engineering) (Birmingham, UK).
Power Amplifiers, RF & Microwave Transmitters, Reflectarrays

Dr. Kamaludin Mohamad Yusof
B. Eng. (Electrical - Electronics), M. Eng. (Electrical) (UTM), Ph. D. (Computing & Electronic Systems) (Essex University, UK).
Ranging Technique, Signal Propagation, Localization, Wireless Sensor Networks, Cognitive Radio

Dr. Leow Chee Yen
B. Eng. (Computer) (UTM), Ph. D. (Wireless Communication) (Imperial College London, UK).
Long Term Evolution, Cooperative Communication, MIMO and Beamforming, Physical Layer Security, Convex Optimisation, Communications and Information Theory

Dr. Marwan Hadri Azmi
B. Eng. (Electrical - Telecommunications) (UTM), M. Sc. (Communication & Signal Processing) (Imperial College, UK), Ph. D. (Electrical Engineering) (UNSW, Australia).
Iterative Decoder, Graph based Codes, Cooperative Communications, Spectrum Sensing in Cognitive Radios, Information and Coding Theory

Dr. Mohamad Rijal Hamid
B. Eng. (Electrical), M. Eng. (Electrical) (UTM), Ph. D. (Electronic & Electrical Engineering) (Univ. of Birmingham, UK).
Antenna Design, Reconfigurable Antenna, Filter Design

Dr. Mohd Adib bin Sarijari
B. Eng. (Electrical - Telecommunications), M. Eng. (Electrical - Electronics & Telecommunications) (UTM), Ph. D. (Signal Processing & Telecommunication) (Univ. of Rennes, France).
Cognitive Radio, Home Area Networks, Wireless Sensor Networks, Software Defined Radio, Smart Home and Smart City

Dr. Mohd Fairus Mohd Yusoff
B. Eng. (Electrical - Telecommunications), M. Eng. (Electrical - Electronics & Telecommunications) (UTM), Ph. D. (Signal Processing & Telecommunication) (Univ. of Rennes, France).
Antenna Design, Folded Reflectarray Antenna, RF Filter Design

Dr. Mohd Haizal Jamaluddin
B. Eng. (Electrical - Telecommunications), M. Eng. (Electrical - Electronics & Telecommunications) (UTM), Ph. D. (Signal Processing Telecommunication) (University of Rennes, France).
Antenna Design, Millimeter Waves Antenna, Dielectric Resonator Antenna, Reflectarray Antenna, RF and Microwave Design

Dr. Mohd Rashidi Salim
B. Eng. (Electrical – Mechatronics), M. Eng. (Electrical – Electronics & Telecommunications), Ph.D. (Electrical Engineering) (UTM), MIEEE, MIEM.
Spectroscopic Sensors, Optical Fibre Sensors and Optical Communication System

Ir. Dr. Mokhtar Harun
B. Electrical Eng. (Gannon Univ., USA), M. Sc. (Engineering Science) (Univ. of Teledo, USA), Ph. D. (Electrical Engineering) (UTM), P. Eng., MIEM.
Acoustic Engineering, Noise Control, Building Acoustic

Dr. Muhammad Al Farabi Muhammad Iqbal
B. Eng. (Electrical Engineering), M. Eng. (Electrical – Electronics & Telecommunications) (UTM), Ph.D. (Optical Networks) (TU Delft).
Optical Networks, Routing, Network Resilience

Dr. Muhammad Ariff Baharudin,
B. Eng. (Electrical - Mechatronics), M. Eng. (Electrical – Electronics & Telecommunications) (UTM), M. Eng. (Electrical Engineering & Computer Science), Ph. D. (Functional Control System - Mobile Networks) (Shibaura Institute of Technology, Japan), MIEEE.
Mobile Communications, Wireless Sensor Networks, Network Protocols

Dr. Muhammad Yusof Mohd Noor
B. Eng. (Electrical - Telecommunications),
M. Eng. (Electrical – Electronics & Telecommunications) (UTM), Ph. D. (Electrical Engineering) (UNSW, Australia).
Optical Fiber Sensors, Multi Mode Interference Structure, Photonic Crystal Fibers

Dr. Nadiatulhuda Zulkifli
B. Eng. (Electrical - Telecommunications) (UTM), M. Sc. (Computer & Information Network), Ph. D. (Electronic Systems Engineering) (Essex Univ., UK), MIEEE, MOSA.
Optical Communication and Networking, Cross-Layer Network Protocols

Dr. Nik Noordini Nik Abd. Malik
B. Eng. (Electrical - Telecommunications) (UTM), M. Eng. (Radio Frequency / Microwave Communication) (Univ. of Queensland, Australia), Ph. D. (Electrical Engineering) (UTM).
Wireless Sensor Network, Meta-heuristics algorithm, Array Antenna

Dr. Noor Asmawati Samsuri
B. Eng. (Electrical - Telecommunications) (UTM), M. Sc. (Digital Communication Systems), Ph. D. (Electrical & *Electronics Engineering) (Loughborough, UK), MIEEE.*
Wearable Antenna, Antenna Interaction with Human and Metallic Items, Implantable Antenna for Medical Telemetry, Specific Absorption Rate (SAR)

Dr. Noor Asniza Murad
B. Eng. (Electrical - Telecommunications), M. Eng. (Electrical-Telecommunication) (UTM), Ph. D. (Electronic & Electrical Engineering) (Birmingham Univ. UK), MIEEE, MIET.
Antenna and Beamforming, Coupler, Butler Matrix, RF Microwave and Millimeterwave Devices

Dr. Norhafizah Ngajikin
B. Eng. (Electrical - Telecommunications), M. Eng. (Electrical), Ph. D. (Electrical Engineering) (UTM).
Optical MEMS, Optical Sensor

Dr. Nurul Mu'azzah Abdul Latiff
B. Eng. (Electrical -Telecommunications) (UTM), M. Sc. (Communication & Signal Processing), Ph. D. (Wireless Communication) (Newcastle Univ., UK), MIEEE, MIET.
Wireless Sensor Networks, Mobile Ad Hoc Networks, Optimization and Bio-Inspired Algorithms, Cognitive Radio, Internet of Things

Dr. Nurzal Effiyana Ghazali
B. Eng. (Electrical - Telecommunications), M. Eng. (Electrical - Electronics & Telecommunications) (UTM), M. Eng. (Electrical Engineering & Computer Science) (Shibaura Institute of Technology, Japan), Ph. D. (Electrical Engineering) (UTM), Grad. Eng., MIEICE, MIEEE.
Mobile Computing, Mobility Management in WiFi, 3G, 4G and 5G, Network Communication Protocol, Wireless Communication, Multi-Criteria Decision Making, Ubiquitous Network and Sport Monitoring System

Dr. Omar Abdul Aziz
B. Eng. (Electronics) (UTP), M. Eng. (Electrical – Electronics & Telecommunications), Ph. D. (Electrical Engineering) (UTM).
Wireless Signal Wave and Communication Link Modelling

Dr. Osman Ayop
B. Eng. (Electrical - Telecommunications), M. Eng. (Electrical), Ph. D. (Electrical Engineering) (UTM), MIEEE.
Metamaterials, Antennas and Propagation

Dr. Rashidah @ Siti Saedah Arsat
B. Eng. (Electrical Electronics) (USM), M. Sc. (Digital Communication Systems) (Loughborough, UK), Ph. D. (Communication) (RMIT, Australia).
Surface Acoustic Wave Device, Nanotechnology, Gas Sensor, Microwave Sensor

Dr. Rozeha A. Rashid
B. Sc. (Electronic Engineering) (Michigan Ann Arbor, USA),
M. Eng. (Electrical - Telecommunication) (UTM),
Ph. D. (Electrical Engineering) (UTM).
Cognitive Radio Network, Wireless Sensor Network, Internet-of-Things

Dr. You Kok Yeow
B. Sc. (Physics) (UKM), M. Sc. (Microwave),
Ph. D. (Wave Propagation) (UPM).
Analytical and Numerical Analysis of Wave Propagation, Microwave Sensors for Agriculture Applications

Dr. Yusri Md. Yunos
B. Sc. (Computer Engineering Communication) (USM),
M. Eng. (Electrical), Ph.D. (Electrical Engineering) (UTM).
Optical Communication, Process Tomography, Optical Sensors

5.4 DEPARTMENT OF CONTROL AND MECHATRONICS ENGINEERING

HEAD OF DEPARTMENT

Assoc. Prof. Ir. Dr. Norhaliza Abdul Wahab
B. Eng. (Electrical - Control & Instrumentation),
M. Eng. (Electrical) (UTM), Ph. D. (Control)
(Univ. of Strathclyde, UK). P.Eng.
Neural Network Model Predictive Control, Multivariable Control, Optimization, Industrial Process Control, Membrane Bioreactor Wastewater System

PROFESSOR

Prof. Dr. Johari Halim Shah Osman
B. Sc. (Physic), M. Sc. (Electrical Engineering) (Southern Ill., USA), Ph. D. (Control - Robotics) (City Univ., UK). *Robotics, Robust Control of Uncertain System, Large Scale Systems, Adv. robot control, Adaptive Control Techniques, Decentralized & Hierarchical Control*

Prof. Dr. Mohd. Fua'ad Rahmat
B. E. Eng. (UTM), M. Sc. (Control System) (Sheffield, UK),
Ph. D. (Electronic Instrumentation) (Sheffield Hallam, UK),
SMIEEE, SMICSM.
System Identification, Parameter Estimation, Process Tomography, Process Control Instrumentation, Hydraulic and Pneumatic Actuator System, Flow Measurement & Instrumentation

Prof. Dr. Ruzairi Abd. Rahim (seconded to UTHM)
B. Eng. (Electronic System & Control Engineering)
(Sheffield City Polytechnic, UK), Ph. D. (Instrumentation)
(Sheffield Hallam, UK), MIEEE, SMICSM.
Flow Measurement & Instrumentation, Process Tomography, Advanced Sensor Application

Prof. Dr. Yahaya Md. Sam
B. E. Eng. (UTM), M. Sc. (Control Systems) (Sheffield, UK),
Ph. D. (Electrical Engineering) (UTM), MIEEE.
Sliding Mode Control, Robust Control of Uncertain System, Automotive Control and Active Suspension System

ASSOCIATE PROFESSOR

Assoc. Prof. Dr. Abdul Rashid Husain
B. Eng. (Electrical) (The Ohio State Univ., USA), M. Sc. (Mechatronics) (Newcastle Upontyne, UK), Ph. D. (Electrical Engineering) (UTM).
Sliding Mode Control and Robust Control for Nonlinear Dynamic System, Active Magnetic Bearing System, Linear Matrix Inequality (LMI) for Control, Real-time and Network Control System

Assoc. Prof. Ir. Dr. Ahmad 'Athif Mohd Faudzi
B. Eng. (Computer), M. Eng. (Electrical -Mechatronics & Automatic Control) (UTM), Ph. D. (System Integration) (Okayama Univ., Japan), P. Eng.
System Integration, Intelligent Actuators, Mechatronics and Control, Microcontroller and Embedded System

Assoc. Prof. Ir. Dr. Hazlina Selamat
B. Eng. (Electrical & Electronics) (Imperial College, UK), M. Eng. (Electrical), Ph. D. (Electrical Engineering) (UTM), P. Eng., MIEM.
Control Engineering, Adaptive Control, Railway Vehicle Suspension System, System Identification

Assoc. Prof. Ir. Dr. Herlina Abdul Rahim
B. Eng. (Electrical – Control & Instrumentation), M. Eng. (Electrical), (UTM), Ph. D. (Control) (UiTM), P. Eng., C. Eng., SMIEEE.
Sensor Technologies, Medical Engineering, System Identification

Assoc. Prof. Ir. Dr. Mohd Ridzuan Ahmad
B. Eng. (Electrical - Mechatronics), M. Eng. (Electrical) (UTM), Ph. D. (Micro-Nano Systems Engineering) (Nagoya Univ., Japan), P. Eng, C. Eng, SMIEEE, MIEM, MIET.
Micro-Nano Systems Engineering, Micro-Nano Devices, Single Cell Analysis, Multi-Agent Robotics System

Assoc. Prof. Dr. Rosbi Mamat
B. Sc. (Microelectronics & Comp. Eng.) (Wales – UK) (M. Sc. (Control Systems), Ph. D. (Control Engineering) (Univ. of Sheffield, UK).
Process Control, Intelligent Control, Real Time Embedded System, Hardware & Software CoDesign of Mechatronics Systems, Robot Controller Design

Assoc. Prof. Dr. Sallehuddin Ibrahim
B. Eng. (Electrical Engineering) (London, UK), M. Sc. (Instrumentation Design) (UMIST, UK), Ph. D. (Instrumentation & Proccess Tomography) (Sheffield Hallam, UK).
Flow Measurement, Process Tomography, Optical Sensors

Assoc. Prof. Dr. Sharum Shah b. Abdullah (seconded to MJIIT)
B. Sc. (Elect. Eng.)(McGill), M. Sc. (Control System) (Sheffield), Ph.D. (Control) (Imperial College of Science, Technology & Medicine).
Intelligent Control, Neural Networks, Fuzzy Logic, Genetic Algorithms

Assoc. Prof. Dr. Zaharuddin Mohamed
B. Eng. (Electrical, Electronic & System Engineering) (UKM), M. Sc. (Control System), Ph. D. (Control Engineering) (Sheffield Univ., UK).
Control of Flexible Structures, Vibration Control, Command Shaping Control

Assoc. Prof. Hj. Zamani Md. Zain
B. Sc. (Loughborough, UK), M. Sc. (Control) (Sheffield, UK).
Process Control, AI Applications, Network-Based Management Software

SENIOR LECTURER / LECTURER

Dr. Anita Ahmad
B. Eng. (Electrical - Control & Instrumentation), M. Eng. (Electrical) (UTM), Ph. D. (Bioengineering) (Univ. of Leicester, UK).
Electrophysiological Data Processing, Image Reconstruction, Control and Instrumentation

Dr. Fatimah Sham Ismail
B. Sc. (Physics) (UKM), M. Sc. (Physics Instrumentation), Ph. D. (Electrical Engineering – AI Optimization) (UTM).
Optimization, Artificial Intelligence and Process Control

Dr. Herman Wahid
B. Eng. (Electrical - Control & Instrumentation), M. Eng. (Mechatronic & Automatic Control) (UTM), Ph. D. (Engineering – Computational Intelligence) (Univ. of Technology Sydney, Australia)
Neural networks, Metamodelling, Environmental Measurement and Instrumentation, Modelling and Controller Design

Dr. Khairul Hamimah Abas
B. E. Eng. (Electrical & Electronic), M. Eng. (Automation & Mechatronic Control) (UTM), Ph. D. (Electronic & Bioinformatic) (Meiji Univ., Japan).
Image Processing, Face Identification, Infrared Imagery Analysis

Ir. Dr. Kumeresan A. Danapalasingam
B. Eng. (Electrical - Mechatronics), M. Eng. (Electrical - Mechatronics & Automatic Control) (UTM), Ph. D. (Unmanned Aerial Vehicle) (Aalborg University, Denmark), P. Eng., MIEEE, MIET.
Control Engineering, Robotics, Artificial Intelligence, Machine Learning

Dr. Leow Pei Ling
B. Eng. (Electrical - Control & Instrumentation), M. Eng. (Electrical - Mechatronics & Automatic Control) (UTM), Ph. D. (Bio Instrumentation and Bio Sensor) (Imperial College London, UK).
Instrumentation, Biosensors and Electrochemical Detections

Dr. Lim Cheng Siong
B. Eng. (Electrical - Mechatronics), M. Eng. (Electrical), Ph. D. (Electrical Engineering) (UTM).
Emergency Medical Services, Embedded System, Telerobotics and Multi-Agent Robotics System

Dr. Mohamad Amir Shamsudin
B. Eng. (Electrical - Mechatronics), M. Eng. (Control), Ph. D. (Electrical Engineering) (UTM).
Autonomous Robotics, Surveillance Vehicle, Nonlinear System Modelling and Control, Soft Computing Optimization Technique

Dr. Mohamad Hafis Izran Ishak
B. Eng. (Electrical - Mechatronics), M. Eng. (Electrical - Mechatronics & Automatic Control) (UTM), Ph. D. (Advanced Mechatronics) (Loughborough Univ., UK), MIEEE
Human Adaptive Mechatronics, Human Machine System, Advanced Mechatronics

Dr. Mohamad Shukri Zainal Abidin
B. Eng. (Electrical - Mechatronics), M. Eng. (Electrical) (UTM), Ph. D. (Precision Agriculture) (Tokyo Univ. of Agriculture and Technology, Japan).
Precision Agriculture, Water-saving Agricultural System, Intelligent Control, Fault Detection and Diagnostic, Mechatronics and Automation System, Embedded System

Ir. Dr. Mohamed Sultan Mohamed Ali
B. Eng. (Electrical – Mechatronics), M. Eng. (Mechatronic & Automatic Control) (UTM), Ph. D. (Microelectromechanical Systems) (Univ. of British Columbia, Canada), P. Eng, C. Eng, SMIEEE, MIEM, MIET.
Microelectromechanical System (MEMS), Micro and Nanofabrication Technologies, Microactuators, Micro Sensors, Wireless Micro devices, Smart Materials, Nanostructured Devices, Power Harvesting

Dr. Mohd. Amri Md. Yunus
B. Eng. (Electrical - Control & Instrumentation), M. Eng. (Electrical) (UTM), Ph. D. (Electrical Engineering) (Massey Univ., New Zealand), MIEEE.
Optical Tomography, Environmental Measurement and Instrumentation

Dr. Mohd Ariffanan Mohd Basri
B. Eng. (Electrical - Mechatronics), M. Eng. (Mechatronics & Automatic Control) (UTM), Ph. D. (Electrical Engineering) (UTM).
Adaptive & Robust Control, Applied Soft Computing, Applied Artificial Intelligence, Unmanned Vehicle, Mobile Robot, Microactuator

Dr. Nurul Adilla Mohd. Subha
B. Eng. (Electrical - Control & Instrumentation), M. Eng. (Electrical - Mechatronics & Automatic Control) (UTM), Ph. D. (Networked Control System) (University of South Wales, UK).
Network Control Systems / Multi-agents Systems

Dr. Salinda Buyamin
B. Eng. (Electrical) (Univ. of Toledo, USA), M. Sc. (Automation & Control), Ph. D. (Control of Electrical Drives) (Newcastle Upon Tyne, UK).
Control, Machines and Drives, Optimization, Sensorless, Estimation

Dr. Shafishuhaza Sahlan
M. Eng. (Control System) (Sheffield, UK), Ph. D. (Control) (Univ. of Western Australia).
Control Systems Engineering Algorithm, Model Reduction Techniques

Dr. Shahdan Sudin
B. Eng. (Electrical Engineering) (Univ. of Wollongong, Australia), M. Eng. (Electrical) (UTM), Ph. D. (Convoy Dynamics & Control) (Univ. of Manchester, UK).
Cooperative Vehicle, Vehicle Convey Dynamic and Control

Dr. Sophan Wahyudi Nawawi
B. Eng. (Electrical), M. Eng. (Electrical), Ph. D. (Electrical Engineering) (UTM).
Applied Control Engineering, Robot Control

Dr. Yeong Che Fai
B. Eng. (Electrical - Mechatronics), M. Eng. (Electrical) (UTM), Ph. D. (Bioengineering) (Imperial College London, UK).
Rehabilitation Robotics, Real-time Systems, Autonomous Robot and Motor Learning

6.0 COURSE SYNOPSES

6.0 COURSE SYNOPSES

MKEL 1113 Nano-electronic 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. This course is a continuation to Microelectronics at the undergraduate level and introduces advanced device concepts.

MKEL 1123 Advanced Microprocessor System
This course is about microprocessors in embedded systems. This course extends the students' knowledge of microprocessors by investigating embedded systems design and state-of-the-art 32-bit embedded processors. The student will be familiarized with problems associated with producinghardware and software in high-level language and assembly language for embedded systems. The topics covered include high-level and assembly language programming for embeddedmicroprocessors, memory and peripherals for embedded systems, system development, and achieving high-performance in embedded systems.

MKEL 1133 Integrated Circuit Testing
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 the learning process, computer-aided design (CAD) software is used throughout the course. Some practical or almost actual environment problems and solutions are provided.

MKEL 1143 Advanced Digital Signal Processing
This course introduces students to advanced concepts in digital signal processing. Basic concepts in signal processing will be first reviewed that covers continuous and discrete-time signals and systems with the relevant transformations and operations. Random signal principles are presented with the 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. Towards the end of the course, signal analysis and representation techniques for timevarying signals are presented such as the short-time Fourier transform, Gabor transform, and wavelet transform.

MKEL 1153 CAD for Electronic Design
This course introduces students to the use of computer-aided-design (CAD) tools and hardware description language (HDL) to analyse, synthesize, and verify complex digital systems. Students'understanding in this design methodology is enhanced with individual/group assignments.

MKEL 1163 VLSI Circuits & Design
In this course, students learn about VLSI design, with emphasis on designing circuits to meet certain performance criteria. Important issues when designing a VLSI circuit are discussed. MOS transistors are reviewed, including their characteristics, structure, switch-level behaviour, and current equation. SPICE model of MOS transistors is also described. The inverter circuit is studied in detail. This course emphasizes circuit design for speed and power performances. Factors that affect speed are explained. Logical effort concept is introduced to explain how to design a fast circuit. Similarly, the effect of input signal transitions on power dissipation is explained.

MKEL 1173 Advanced Digital Design
This course is designed for students to learn and be able to design and verify complex digital synchronous systems – towards becoming an RTL digital hardware designer in the industry. This is a course that goes beyond the introductory course on digital basic principles and techniques. This course introduces digital circuit modelling with hardware description languages (HDLs), which is the key technique to the modern design of integrated circuits (ICs). The technique involves a CAD approach in which a high-level, text-based, abstract description of the circuit is created, then synthesized to a hardware implementation on a selected technology, and finally verified for its functionality and tiing.

MKEL 1183 Advanced Computer Architecture

This course covers hardware structure of a modern programmable computer, including the basic laws underlying performance evaluation. Students will learn design of control and data path hardware for RISC processor, how to make machine instructions execute simultaneously through pipelining and parallel execution, and how to design fast memory and storage systems.

MKEL 1193 Analog CMOS Design

In this course, students will be taught the characteristics of MOSFET transistor as a prerequisite of CMOS analog design. It highlights the nonlinearity as an imperfection that will limit the performance of analog circuits. The course will then proceed to analyse 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 analog design, which is the design challenge to fulfil design matrix, will be highlighted. Students will be guided on design principles to meet design specifications with acceptable accuracy. Other important sub-modules such as differential amplifier, op amps, and switch capacitor amplifiers will be addressed towards the end of the course.

MKEL 1223 Random Process

This course introduces students to the concepts in random processing. This course introduces students to the introductory level of random variables and random process. In the beginning, students will be introduced to the concept of probability and its axioms, Bayes theorem, combinations, and permutations. Then the concept of random variable which includes probability density and cumulative functions will be given. This topic will be extended to operations on random variable such as expectation and moments. The topic of multiple random variables which consists of joint distribution and joint density along with conditional distribution and density will be discussed next. This topic will also include operations on multiple random variables. Finally, the topic on random process from the perspective of both the temporal and spectral domains will be given. This topic will cover wide sense stationary, ergodicity and independence, correlation functions, power density spectrum and cross-power density spectrum.

MKEL 1233 Image Processing

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. Another important topic that will also be discussed is the morphological processing. Wavelet transform and multi-resolution analysis have been pivotal in many image processing applications and thus the introduction to this area will be given. Finally, the topic of compression and coding will be covered. MATLAB will be used extensively for better understanding.

MKEL 1243 Software Engineering

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. Focuses 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.

MKEL 1253 Speech Processing

This course introduces students to introductory and intermediate levels of speech processing techniques. The area of coverage would be speech production mechanism, classification of speech, sounds, nature of speech signal, models of speech production, speech signal processing: the purpose of speech processing, digital models of speech signal, digital processing of speech signals, Significance, short time analysis. Next would be the time domain parameters of speech, methods for extracting the parameters, zero crossings, auto correlation function, pitch estimation. The next stage would be the short time Fourier analysis, filter bank analysis, spectrographic analysis, format extraction, pitch extraction, analysis – synthesis systems. Another important topic that will also be discussed is the formulation of linear prediction problem in time domain, solution of normal equations, interpretation of linear prediction in auto correlation and spectral domains. MATLAB will be used extensively for better understanding.

MKEL 1263 Special Topic in Electronic Engineering
The aim of the Special Topic course is to provide a mechanism for one-off topic to be offered by any graduate faculty or visiting professor. The topic of any Special Topic course has to be vetted and endorsed by the Faculty's Academic Committee.

MKEL 1273 VLSI Design Automation
In this course, students learn about computing methodologies and algorithms for VLSI design automation. The course covers fundamental techniques in VLSI physical design automation flow; from system partitioning and chip floorplanning; placement and routing with global, detailed and specialized techniques, to timing closure. Students will also explore, study, and implement some of the advanced techniques used in EDA tools.

MKEL 1283 Hardware and Software Co-Design
The course covers the design and development aspects of heterogeneous (hardware/software) digital systems. This course explores the process involved in defining system specification and how design space exploration can be done. Special focus is given on design quality and cost estimation, partitioning source description into different implementation domains, target code generation, interface synthesis and co-verification.

MKEM 1713 Artificial Intelligence
This course offers insights to the students into understanding 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 offers basic understanding of these two AI techniques and their applications in the real world. The course also includes hands-on experiments and programming of fuzzy logic and neural networks concepts.

MKEM 1723 Advanced Process Control
The advanced process control course deals with the implementation of control strategies in industrial process control. The course begins with the modelling of dynamic process models using theoretical and empirical modelling principals. Next, the control system design is presented including the dynamic behaviour and stability of closed cloop control systems. Following that, the two standard control types of feedback and feed-forward are discussed and control tuning of its parameters will be studied. In enhancing performance of the system, advanced control techniques are utilized. At the end of the course, several case studies related to real plantwide control is introduced to reflect process control ideas commonly present in an actual process. By combining the knowledge obtained, students will be able to conceptually design various types of controller for single input single output and multivariable process systems.

MKEM 1733 Adaptive & Self-Tuning Control
This course introduces the students to adaptive and self-tuning control. The students will firstly learn the real-time parameter estimation technique, which will provide them with the key concepts required to understand many aspects of adaptive and self-tuning control. The students will then be exposed to the main techniques in Self-Tuning Control (STC), in particular the Pole Assignment and Minimum Variance Control. For the adaptive control, the students will be exploring the Model Reference Adaptive Control (MRAC) design using Gradient Approach/MIT Rule and Lyapunov method. Finally, some practical issues on implementation, applications and perspectives of adaptive and self-tuning control will be discussed.

MKEM 1743 Modelling and Simulation of Dynamical Systems
This course focuses on modelling and simulation of dynamic systems. The course covers techniques for modelling of various physical systems involving linear and nonlinear systems such as mechanical, electrical and mechatronic systems. Solution and analysis of control system response based on time and frequency responses will be taught. Numerical solution techniques of differential equations using Euler's method and Runge-Kutta are introduced. Finally, several aspects for the development of simulation models using Matlab are discussed. Several case studies and an actual system will be used to enhance the student understanding.

MKEM 1753 Advanced Instrumentation & Measurement
This course is an introduction to the advanced instrumentation and measurement. The course covers the techniques for sensing technology, electronic interfacing and signal conditioning circuits. Also, applications at a higher hierarchical level are included, such as self-testing, auto calibration, data evaluation and identification. Key components studied in details are a review of powerful measurement techniques and basic principles and typical problems of sensor elements, detailed up-to-date reviews of the features of temperature sensors, displacement sensors, flow sensors, level sensors, position sensors, motion sensors and biometrics. Special topic in Flow Measurement Techniques use Process Tomography applications.

MKEM 1763 System Identification & Parameter Estimation
This course is an introduction to the system identification and parameter estimation. The course covers an introduction to system identification, acquiring and pre-processing data, nonparametric model estimation methods, parametric model estimation methods, partially known estimation methods, model estimation methods in closed loop systems, recursive model estimation methods, analyzing, validating, and converting models and system identification case study. This requires an in-depth understanding of control system engineering, modern control system and digital control system. The emphasis will be on the theoretical basis as well as practical implementations. Key components studied in details are time response analysis, frequency response analysis, correlation analysis, power spectrum density analysis, model structure, parametric model, parameter estimation method, test signals and model validation methods.

MKEM 1773 Multivariable & Optimal Control Systems
This course introduces the students to the concept of multivariable and optimal control systems. Topics include: stability, observability, controllability and effect of interaction on multivariable systems; Analysis on MIMO performance through loop pairing, controller tuning and decoupling for static and dynamic control system; Introduce an optimal controller design concept for finite and infinite linear quadratic regulator (LQR) and Linear Quadratic Tracking (LQT) systems; Continuous and discrete time optimal control systems and constrained and unconstrained optimal control systems. The assignment for the course will be based on computer-aided (MATLAB®) design problems.

MKEM 1783 Nonlinear and Robust Control Systems
This course covers the analysis and design of nonlinear control systems using Lyapunov theory. The contents of the course include properties of solutions of nonlinear dynamical systems (with special emphasis on planar systems), Lyapunov stability analysis techniques, effects of perturbations, input output stability, feedback linearization, controllability, observability, and nonlinear control design tools for stabilization.

MKEM 1793 Industrial Automation
This course focusses on two main topics in industrial automation which are discrete event systems (DES) and industrial control networks (ICN). In the former topic, the students will be introduced to the characteristics of DES and how it differs from the classical systems. The students will also learn about timed and untimed models of DES. Finally, the queueing theory will be discussed as a method of analysis and performance evaluation. In the latter topic, the students will be introduced to the characteristics of ICN. The students will be exposed to the fieldbus protocol. Finally, the students will have an experience to design an ICN system using DeviceNet protocol.

MKEM 1823 Advanced Robotics
This is a graduate level course on robotic systems. The course covers various advanced control techniques for controlling robot manipulator systems. This requires an in-depth understanding of stability analysis methods based on Lyapunov stability theory, mathematical modelling of complete robot manipulator dynamic model inclusive of actuators dynamics and various advanced control concepts developed for the control of robot manipulators. The emphasis will be on the theoretical basis as well as efficient implementations and design. Key components studied in details are stability analysis method using Lyapunov second method for nonlinear systems, integrated robot modelling based on state-space method, various advanced controller design for robot manipulator control based on centralized and decentralized approaches.

MKEM 1833 Linear System Theory
This course is an introduction to the linear system theory. It is intended to be a fundamental course in graduate studies in control engineering field. Since it is a vast field, the discussion will be limited to the conventional approaches of state-space equations and the polynomial fraction method of transfer matrices. By adapting this knowledge, students will able to 1) construct the optimized realizations, 2) develop the correct partitioned model, 3) design the state observer, and, 4) design the state feedback controller using pole-placement technique.

MKEM 1843 Advanced Digital Control
This is a level course on digital control systems. The course covers current techniques for analysing and designing digital controllers for discrete-time and digital control systems. This requires an indepth understanding of digital stability analysis methods and currents topics on digital controller design. The emphasis will be on the theoretical basis as well as efficient implementations. Key components studied in details are stability analysis method using classical and modern approaches for digital control systems, discrete-time and digital controller design using classical and state-space approaches, various advanced controller design for discrete-time and digital control system such as variable structure approach and adaptive model reference approaches.

MKEM 1853 Discrete-time Systems & Computer Control
This course is an introduction to the discrete-time and digital control systems. The course covers the conversion of analog signals and system into their discrete and digital counterparts. The emphasis will be on the theoretical basis as well as efficient implementations. Key components studied in details are the sampling process and theorem, hold devices, the z-transforms and its applications, modelling of discrete-time systems using classical and modern approaches, time domain performance specifications for discrete-time system, practical realization of discrete-time and digital system transfer function in various form, and effects of quantization errors.

MKEM 1863 Design of Microprocessor-Based Mechatronic Systems
This course covers the applications of microprocessor or microcontroller in mechatronics systems. Details of microcontroller architecture and its internal peripherals are covered. Design of interface to mechatronics system utilizing the internal peripherals and programming of their operations using C language are emphasized.

MKEM 1873 Real-Time Control System Design
This course covers the hardware and software aspects for real-time implementation of control system. Multi-tasking requirements and issues for real-time control are addressed. Case studies of different design and implementation techniques will be used to enhance students understanding of the course.

MKEM 1883 Autonomous Mobile Robotics
This course gives the students an in-depth treatment of main aspects of autonomous mobile robotics namely mechanism & locomotion, intelligence in mobile robotics and sensor fusion for autonomous decision-making capability. The course delivery is not limited to lectures, tutorials only but as well personal reading, research based assignments on frontier knowledge materials and actual Doctoral experimental research carried out in UTM's mobile robotics laboratory. This course blends knowledge derived in-house with actual physical world autonomous mobile robotics, hence providing the unique experiential learning geared towards carrying out research.

MKEM 1913 Mechatronics Design
This course introduces mechatronics as an integrated design approach with the synergistic combination of mechanical, electronics, control and computer engineering. It provides insight into advantages and challenges of mechatronics design approach. The course introduces the various aspects in mechatronics design including physical system modelling, simulation, sensors and actuators selection, computer interfacing and real-time control implementation. This course tries to balance between theoretical and practical aspects, and hardware implementation is emphasized. Laboratory based case-study and problem-solving approach of real systems are used throughout the course.

MKEM 1923 Sensor and Actuator
This course introduces the working principle of sensor and actuators and its application in mechatronics systems. This course covers the fundamental of sensors and actuators, the details of its functionality, the characteristic, the fabrication and materials used, numerical study and the system integration of sensors and actuators in mechatronics system. Various case studies are introduced and discussed during classes to help further understanding of the diversity of mechatronics system in multidisciplinary fields.

MKEM 1793 Industrial Automation
This course focusses on two main topics in industrial automation which are discrete event systems (DES) and industrial control networks (ICN). In the former topic, the students will be introduced to the characteristics of DES and how it differs from the classical systems. The students will also learn about timed and untimed models of DES. Finally, the queueing theory will be discussed as a method of analysis and performance evaluation. In the latter topic, the students will be introduced to the characteristics of ICN. The students will be exposed to the fieldbus protocol. Finally, the students will have an experience to design an ICN system using DeviceNet protocol.

MKEP 1513 Electronic Power Conversion

This course basically relates to static power converters applications. It begins with the introduction of basic control concepts in the context of power electronic systems. Key definitions and concepts from feedback system theory are revisited for discussion related to regulation problem and feedback requirement of power converters. Models for control design are briefly introduced at the end of this topic. The next topic covered by the course is UPS system, which include UPS classification, applications, converter topologies and control methods. Active power filtering is also highlighted in this course. Some background on harmonics sources and effects are discussed followed by the mitigation methods. Active power filter classifications, concepts and control methods are covered quite extensively in this course. Finally, some industrial and residential applications of power converters are dealt with for a complete picture on static applications of power converters.

MKEP 1523 Electrical Drives

The course introduces students to the fundamentals of electrical drives. The basics of electrical drives, such as the fundamental torque equations, main components of electrical drives, various characteristics of load and motors as well as multi-quadrant operations of electrical drives are covered in the introduction section of the course. The analysis and controller design of typical power electronic converters used in the electrical drives are studied with the help of MATLAB/SIMULINK simulation package. Specific examples of controller design for DC drives are presented. The scalar control using the constant V/Hz for induction motor drives based on steady-state per-phase equivalent circuit is discussed. These include the slip-compensation, current controlled, open loop and closed loop structures of constant V/Hz scheme. Finally, the dynamic modelling of induction machine is introduced. Using the dynamic model, the high-performance induction motor control schemes such as the field-oriented control and the direct torque control are presented and analyse using MATLAB/SIMULINK.

MKEP 1533 Power Electronics System

This course provides an understanding of the principles of power electronic conversion systems and the ability to design power converters for certain applications. The topics covered are: 1. Concepts and prospects of power electronic systems: power switches, switching methods, drivers and losses in power electronics system. 2. ac-to dc conversion: rectifier with different loads, performance criteria, line distortion, effects of line inductance/ overlap. 3. dc to dc conversion: non-isolated topologies- Buck, Boost, Buck-boost, CCM, DCM operation, non-idealities, isolated topologies- Flyback, Full- Bridge, switched-mode power supply, converter control. 4. dc to ac conversion: single-phase, threephase, harmonics, square wave, PWM inverters, harmonics elimination PWM and multilevel inverter topologies. The focus is the design of power converters for specific applications such as utility, domestic appliance, electric vehicle and industrial applications.

MKEP 1543 Advanced High Voltage Technology

There have been a number of key advances in the area of high voltage technology. This course reviews basic as well as recent reconsideration related to partial discharges and their measurement, overvoltages and insulation coordination on transmission networks, zinc oxide surge arresters, and SF6 insulation systems and their monitoring. The course also reviews various numerical analyses of electrical fields in high voltage equipment, optical measurements and monitoring in high voltage environments, and pulsed power principles and applications. The student is expected to be able to critically apply key advances in high voltage technology to solve problems in power engineering and to design the insulation coordination for a given transmission network.

MKEP 1553 High Voltage Insulation & Coordination

This course provides an understanding of high voltage phenomena, and to present the concepts of high voltage insulation in power systems networks. The first part of the course stresses on the phenomena of conduction and breakdown in insulation materials in order to provide the students with a firm knowledge on high voltage phenomena and insulation technology. The second part of the course covers the introduction to dielectric properties of materials, diagnostic testing of insulation and insulation coordination. By adapting this knowledge, students will be able to develop essential technical skills in solving real-world problems involving insulation characteristics with some degree of acceptable conditions. The student will use software to solve engineering problems related to high voltage engineering applications.

MKEP 1563 Power Quality

The power quality course deals with the understanding of electrical power quality and its effect on power system performance. The course begins with the fundamental concepts on power quality. Next, the different power quality issues, their sources and effects and different related standards are presented. For each type of disturbances, case-study examples and concepts are provided. Following that, the solution of the problem is discussed in order to understand and maximize the available benefits. At the end of the course, the measurement technique is introduced to expose an idea commonly present in the actual system. By combining the knowledge obtained, students will be able to conduct power quality measurement, analysis the data and suggest suitable mitigation for different types of the power quality problem.

MKEP 1603 Power System Analysis & Computational Methods

This reviews basic Power Network Concepts, Power Transmission Lines Transformer and generator and their respective parameters and equivalent circuit models. Students will be taught how to formulate rigorously power system network model and Bus admittance matrix and to appreciate all assumptions made. The application of Bus admittance matrix to Fault Analysis and the application of symmetrical sequence components to unbalanced fault analysis is will be covered. Further application of the power system network model and numerical techniques will be used to solve Power Flow analysis using Newton-Raphson Method and the Decoupled Load Flow. The student is expected to write and develop basic fault analysis and load flow analysis program. The programs will be tested with IEEE test systems with the aim to achieve results comparable with commercial software. Commercial grade professional software will be used to design simple and practical reactive power and voltage control. The concept of Multi-machine transient stability analysis will be covered in the course, in order to understand large scale power system response to any power disturbance.

MKEP 1613 Power System Control

The main goal of this course is to provide students with an overview of the engineering matter involved in designing, operating and controlling the power generation and transmission of a large-scale, interconnected power system. The objective is to provide knowledge on the importance of the different systems, the functionality they provide, the data used and exchanged as well as the development of these systems. At the conclusion of the course, students should be able to design and simulate a typical power system and analyze with the help of MATLAB/SIMULINK or Power World simulation packages. By adapting this knowledge, students will be able to develop essential technical skills in solving real problems in power system control by following the IEC standard or at least Malaysian Standard.

MKEP 1623 Power System Transmission and Security

This course is divided into 2 parts: The first part introduces students to power systems transmission system while the second part introduces students to power systems security. In the first part, it will cover the power transmission in details ranging from transmission line modelling to transmission line design. Key issues such as transmission losses in determining the economic dispatch of power system will be covered. In the second part, it will cover the issue of power system security in which the concentration will be given involving transmission system security. The concept of contingency analysis, N-1 security will be discussed. Then the issue of congestion management and allocation in deregulated electricity market will be covered in this course.

MKEP 1633 Power System Devices & Apparatus

This course introduces students to relevant apparatuses and devices in the operation of power system engineering. It will initially involve discussions on features and characteristics of power system devices such as synchronous machines, transmission lines, and transformers. Then, the dynamic aspects of the devices will be discussed. With the knowledge gathered, students are expected to be able to propose a design and perform relevant analysis on power system configurations consisting of the devices and apparatuses discussed in the course. Available computer packages such as MATLAB or PowerWorld can be used for better understanding of the relevant concepts related to the course. By integrating the knowledge, the students will be able to develop essential technical skills related to design and operation of power system.

MKEP 1643 Lightning Protection and Grounding System

This course will cover the following areas: lightning phenomena; earth performance under lightning current as well as under short-circuit condition; lightning related damages, lightning parameters, lightning surge propagation in transmission lines, lightning effects on human being and animals, principle of lightning protection based on IEC standard, lightning protection for building structures, lightning protection of transmission line and shielding failure, interaction of lightning with low voltage; and introduction to earthing systems: resistance value; measurement of soil resistivity and earth resistance value, step potential, touch potential and transfer potential, soil characteristics under impulse condition, transmission-line tower earthing installation, computer network earthing, design of AC substation earthing system.

MKEP 1653 Integrated Resource Planning in Energy Sector
This course is designed to give an overview understanding of energy supply, demand, energy balance and sustainability issues. It covers the assessment of past, current and future energy system and provides the analytical framework and assessment methodologies needed to promote Integrated Recourse Planning (IRP) in electricity sector. IRP is the process of selecting an electric resources mix on the basis of comparing the benefits and costs of demand and supply resources. By adapting this knowledge, student will be able to develop essential technical skill in solving real-world problem ofproviding electricity at lowest possible economic, social and environmental cost.

MKEP 1663 Special Topic in Power Engineering
The aim of the Special Topic course is to provide a mechanism for one-off topic to be offered by any graduate faculty or visiting professor. The topic of any Special Topic course has to be vetted and endorsed by the Faculty's Academic Committee.

MKEP 1673 Power System Protection
This course introduces students to some major views, theories and applications in the area of power system protection. It will examine some key issues in overcurrent protection with special focus in IDMT relay application in power system network. The course will also discuss on distance, differential and load shedding protection. The students will also be taught with the topic related to power system fault diagnostic. The students are expected able to evaluate the performance of power system protection. By mastering this knowledge, students will be able to interpret various causes of fault in power system.

MKEP 1683 Alternative Energy Technology Systems
This course provides in depth coverage of alternative energy technology (AET) systems that includes solar/photovoltaics (PV) energy, wind energy, fuel cells, microturbines etc. Emphasis will be placed on the energy flow, power management, hybridization, energy conversion and control, storage element, testing and integration with the utility grid. In addition, various storage devices for the incorporation of AET system and the associated power electronic converters will be discussed and analyzed. This course also covers the design, simulation and analysis of several AET system applications. With these fundamental exposures, students should be able to design simple AET systems for the application of distributed generation, grid connected systems, rural electrification and electric/hybrid vehicles.

MKET 1313 Communication & Computer Networks
This course will enhance the students' knowledge on communication and computer network. It explains the advance concept of network layers, protocols, interfacing and inter-working between computer networks and network devices in telecommunication systems. The students will be taught with the various possible techniques to understand the modern networks for wired and wireless services.

MKET 1323 Broadband Multimedia Networks
This course introduces the basics of multimedia communication systems and services. Students will be familiarized with the underlying theory, concepts and principles of multimedia communication system and the practicality in the current and future IP based network. The topics include the introduction to the concept of multimedia communication model and elements of multimedia communication systems. An overview of the recent trend in multimedia communication system development will be given. The students will be given a comprehensive understanding on multimedia processing in communication, distributed multimedia systems, multimedia communication standards and multimedia communications across networks. The emphasis will be on multimedia communication on next generation IP based network. Finally the students will be exposed with the various multimedia applications including VOIP, VOD, IPTV etc.

MKET 1333 Optical Communications
The aim of this course is to introduce the theories, concepts and design of optical communication systems. The course begins with introduction to the basic principles of optical fiber communication systems. This is achieved by providing knowledge about passive and active components of optical communication system and how these components are integrated into optical communication systems. It will emphasize the physical properties and operation of components that comprise optical systems. The next section covers basic knowledge for designing the optical communication systems and verification of fibre optic link for wide area and local area networks. The basic elements of optical network operation will also be described. The course is concluded with highlighting recent advances in optical communications. The material will cover a broad number of topics to allow the student to understand the underlying principles of the field and to be prepared for more detailed study in the form of advanced courses and/or research.

MKET 1343 Coding of Multimedia Signal
This course is an introduction to the coding and processing of digital multimedia. The course 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, quantizers, 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.

MKET 1353 Multimedia Communication and System & Services
This course introduces the basics of multimedia communication systems and services. Students will be familiarized with the underlying theory, concepts and principles of multimedia communication system and the practicality in the current and future IP based network. The topics include the introduction to the concept of multimedia communication model and elements of multimedia communication systems. An overview of the recent trend in multimedia communication system development will be given. The students will be given a comprehensive understanding on multimedia processing in communication, distributed multimedia systems, multimedia communication standards and multimedia communications across networks. The emphasis will be on multimedia communication on next generation IP based network. Finally the students will be exposed with the various multimedia applications including VOIP, VOD, IPTV etc.

MKET 1363 Secured Digital Communications
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.

MKET 1373 Sonar & Acoustic Engineering
This course introduces students to the fundamentals and characteristics of sound waves in air and water, and to sources of ambient noise. The students will be introduced to concepts and criteria of room acoustics, and to perform design for a safe and optimum acoustics, both indoor and outdoor. Then the concept of sonar, such as field of application, transducer technology, sonar equations and processing will be emphasized. The discussion will be extended to detail the characteristics and operations of passive and active sonar.

MKET 1383 Satellite Communication
This course introduces students to introductory and advanced level of satellite communication. In the beginning students will be introduced to the concept of satellite communication systems. Then the orbit mechanic concepts include look angle and orbit determination. This topic will be extended to the satellite subsystems, link design and propagation effects. The topic of satellite system will include VSATS, satellite broadcasting for TV and radio and Global Position System.

MKET 1393 Network Modelling & Performance
Network simulation modelling is important in estimating the performance of a particular network. This course introduces the students to the techniques in network modelling using Markov chain and discrete event simulation. Students will be exposed to the probability and random processes in network modelling. Students are will learn the technique to construct transition matric of Markov Chain and calculate the Markov chains at steady state. The students will also learn queuing analysis and telecommunication system.

MKET 1413 Advanced Digital Communications
This course provides fundamental concepts in the analysis and design of digital communication system. Main topics to be covered are introduction to information theory, signal space analysis, digital modulation/demodulation over AWGN channel, baseband transmission over bandlimited, channel coding, error control coding. Finally, the system trade-off in designing a digital communication system in AWGN channel is explored.

MKET 1423 Wireless Communications System
This course introduces students to introductory and advanced level of wireless communication. In the beginning students will be introduced to the concept of wireless communication systems. Then the cellular concepts which include frequency reuse and cell splitting. This topic will be extended to the interference issues, system capacity, trunking and grade of service. The topic of mobile propagation will include large scale and small scale mobile propagation follows by different multiple access techniques used in wireless communication systems. Finally different wireless systems and standards will also be covered.

MKET 1433 RF/Microwave & Antenna Design
This course introduces students to the concept and advanced level of RF /Microwave passive and antenna design. In the beginning students will be introduced to the concept of transmission line and S Parameter in RF/ Microwave Engineering. The concept of Smith chart will also be discussed. Then the design of each passive component such as matching network, coupler, divider and resonator will be introduced. The properties and the analysis of the antenna will be introduced in the next section. The design of dipole, monopole and planar type of antenna will be discussed.

MKET 1443 Electromagnetic Compatibility
To understand different electromagnetic Interference problems occurring in Intersystem and in inter system and their possible mitigation techniques in Electronic design.

MKET 1453 Special Topic in Telecommunication Engineering
The aim of the Special Topic course is to provide a mechanism for one-off topic to be offered by any graduate faculty or visiting professor. The topic of any Special Topic course has to be vetted and endorsed by the Faculty's Academic Committee.

MKET 1463 Advanced Communications Electronics
This course introduces students to concept and advanced level of RF communication electronics design especially on active devices concept. In the beginning students will be introduced to the concept of transmitter and receiver in communications system. The design parameter for transmitter and receiver will be discussed. Then the design of each component will be introduced such as amplifiers, oscillators and mixers. The example of the circuit design such as amplifier will be using RFsimulator. The analysis of the design will be discussed in the assignment given to the group of students.

MKET 1473 Radar & Communication Based System
This course introduces students to radar principles and the basic radar communication systems. At the start, students will be introduced to the principles of radar technology and the basic scanning methods. Then radar targets and radar cross section (RCS) are introduced, followed by tracking, tracking errors, and tracking algorithm. Next, will be the radar transmitters and receivers. Components which are important for a radar system are discussed, which include radar antennas.Propagation of radio waves will be given an overview to emphasis the effects on a radar signal. This topic will be extended to radar clutters and interference. Then, the processing of radar signal signals is treated. Lastly, various radar communication systems will be described.

MKET 1483 Optical Network and Devices
This course offers students the essential aspects of optical networking which is the key for today's high speed data transportation technology. It commences with the underlying fibre optic link design and the basic optical components needed of point-to-point links and interchange nodes. The basic principles of operation of optical transmitters, detectors, amplifiers, multiplexers, filters, couplers, isolators, wavelength converters and optical cross connects will be described. The remainder of this course will emphasis on the transport/ networking protocols that are run on optical layer such as SONET/SDH, IP, ATM, Storage Area Networks and Gigabit Ethernet. Other topics that will be covered include network design, control and management, and network deployment in various network domains from access to metro and core networks.

MKEU 0013 Introduction to Research Methodology in Electrical Engineering
This course covers the general principles of Research Methodology that are applicable to any discipline. It discusses the fundamental process in conducting an academic research. The theoretical and practical aspects of preparing a research proposal presented. Amongst topics that will be covered are the introduction to research and its philosophy, problem formulation and research objective, literature review, research methodology and design, data collection procedures, data analysis, research proposal and thesis preparation and research management.

7.0 EXCERPT FROM THE UNIVERSITI TEKNOLOGI MALAYSIA POSTGRADUATE STUDIES ACADEMIC REGULATIONS

7.0 EXCERPT FROM THE UNIVERSITI TEKNOLOGI MALAYSIA POSTGRADUATE STUDIES ACADEMIC REGULATIONS

This excerpt shall be read with the UTM Graduate Studies Rules and Regulations, which is accessible from the following link http://sps.utm.my/wp-content/uploads/2016/07/PERATURAN-AKADEMIK-PENGAJIANSISWAZAH-20160524-14072016.pdf

In the case of discrepancy, the Universiti Teknologi Malaysia Postgraduate Studies Academic Regulations supersedes this excerpt.

Item 1: Name and Objectives of the Regulations

(1) Name of the Regulations:
The Universiti Teknologi Malaysia Postgraduate Studies Academic Regulations are applicable to all students who register for postgraduate programs at doctoral degree, master's degree, postgraduate diploma, and postgraduate certificate levels

(2) Objectives of the Regulations:
(a) To provide guidelines for the faculties in planning and implementing innovative and quality postgraduate programs at doctoral degree, master's degree, postgraduate diploma, and postgraduate certificate levels.
(b) To provide guidelines for students in planning and pursuing their postgraduate studies at UTM.

Item 2: Definitions

Please refer the comprehensive terminologies in the *Universiti Teknologi Malaysia Postgraduate Studies Academic Regulations.*

- UTM or University refers to Universiti Teknologi Malaysia.
- Senate refers to Senate of Universiti Teknologi Malaysia.
- School of Graduate Studies (SPS) is a centre to manage and coordinate university's postgraduate programs.
- FKE or Faculty refers to Faculty of Electrical Engineering
- Senate Standing Committee for Postgraduate Studies (JKTSPS) is a committee formed by the University Senate to discuss and recommend to the Senate, matters related to regulations, proposal of new programmes, improvement of curriculum, examination results and students' appeal.
- University Postgraduate Studies Academic Committee (JAPSU) is a committee formed under the School of Graduate Studies to coordinate postgraduate academic and examination matters.
- Academic Committee (JKA) is a committee formed in FKE to plan and monitor postgraduate studies and to verify examination results at the faculty level to JKTS.
- A Graduate Faculty is a member of academic staff who has a doctoral degree or is at least an Associate Professor.
- A Main Supervisor is a Graduate Faculty appointed by University to lead supervision of a research student.
- Co-Supervisor is an individual appointed by the faculty or University to co-supervise a student's research. A co-supervisor may be appointed among the experts from within or outside the University.
- Degree refers to an award conferred by the University to a student who has fulfilled the requirements for the award of a Master or a doctoral degree or equivalent.
- Normal Semester comprises 14 weeks of lectures.
- Short Semester comprises 8 weeks of lectures at the end of Semester II and is not included in the calculation of duration of study.
- Normal Duration of Study is the number of semesters or years in which a student will be able to complete his/her study.
- Course is a subject that is offered by the University and may consist of one or more modules.
- GPA refers to Grade Point Average, the average grade point obtained for a particular semester.
- CGPA refers to Cumulative Grade Point Average, the average point obtained cumulatively for all the semesters completed by the student.
- MM is a "Satisfactory" grade evaluation for research.
- TM is an "Unsatisfactory" grade evaluation for research.
- GG is a "Fail" grade evaluation for research.

- KB (Good Pass) refers to an academic achievement obtained by a postgraduate student who obtained CGPA ≥ 3.00 for Taught Course or MM for research.
- KS (Conditional Pass) refers to an academic achievement obtained by a postgraduate student who obtained 2.67 ≤ PNGK < 3.00 for Taught Course or TM for research.
- KG (Fail) refers to an academic achievement obtained by postgraduate students who obtained CGPA ≤ 2.67 for TaughtCourse or GG or two consecutive TM for Research.
- Credits refer to the total hours of students' effort required to achieve the learning outcomes of a course or program which includes classroom interaction, practical and laboratory training, fieldwork as well as independent learning and preparation for examination and so on. One credit is equivalent to 40 hours of Student Learning Time (SLT).
- KD (Credit Obtained) refers to the number of credits obtained for courses taken successfully.
- KK (Credit Count) refers to the number of credits taken into account in the computation of GPA and CGPA.
- Conferment Credit refers to the number of total credits specified by the curriculum of the program that a student must obtain as a condition for an award.
- *Credit Transfer refers to the credit given for an equivalent course taken at a recognised Institution of Higher Learning during the postgraduate study period in UTM.*
- Credit Exemption is given for an equivalent course taken from a recognised institution prior to registration of the program at UTM.
- HW is a registration status of a course which is stipulated by the faculty and is subjected to normal assessment. The assessment result is given a grade of HL (Pass) or HG (Fail). The credit obtained for a HW course is included in the Credit Obtained (KD) but not in the Credit Count (KK). A student who fails must repeat and pass the course.
- HS is a registration status of a course which is assessed based on attendance only. The course registration is recorded in the transcript if the student's attendance is at least 80% of the total contact hours.
- KGDS refers to an academic achievement obtained by postgraduate students with KG status in the first semester and given an opportunity to re-register.
- Examination is any form of assessment to evaluate the academic achievement of a student.
- Master Project Report is an academic writing submitted by the student as a partial fulfilment for an award of a Master degree by taught course.
- Thesis is an academic document submitted by a student in fulfilment of the requirements for the award of a research degree.
- Oral Examination (viva voce) is an assessment session in which the student is required to present and defend his/her thesis to the Panel of Examiners.
- Panel for Oral Examination is a panel appointed by the University to conduct oral examination (viva voce) for Masters by Research, or doctoral degree programs.
- Internal Examiner is a Graduate Faculty appointed by the Faculty or University to a examine Masters' or doctoral thesis, and is also a member of the Panel for Oral Examination.
- External Examiner is an expert other than UTM staff appointed by the University to examine a thesis of Masters or doctoral degree student, and is also a member of the Panel for Oral Examination.
- Plagiarism refers to using another person's ideas, words or work without proper acknowledgement of the original source.
- External Program is a postgraduate program that is implemented outside office hours or outside the university.

Item 3: Entry Requirements

(1) Candidates must meet the general entry requirements of UTM and specific entry requirements of the program.

(2) UTM general requirements are as follows:

(a) The minimum entry requirements for admission to a Master is

(i) A bachelor degree from UTM, or any other institution of higher learning approved by the Senate; OR

(ii) A student currently undertaking a Bachelor degree program at UTM and duly ascertained by the faculty can be considered to extend his/her study directly into a postgraduate program.

(b) Doctor of Philosophy Degree Programs

(i) Master degree from UTM or other higher learning institution recognized by the Senate; OR

(ii) Currently undertaking a Master degree program at UTM with the approval of the Senate.

(iii) A candidate who has a Bachelor degree qualification with CGPA≥ 3.67 may be considered for a direct entry into a Doctor of Philosophy program.

(3) An International student candidate is required to have a minimum qualification of the Test of English as a Foreign Language (TOEFL) of 550 or International English Language Test System (IELTS) of band 6.0 or Malaysian Universities English Test (MUET) of band 4.0. Exemption may be given to those who originate from countries whose native language is English or who graduated from English-speaking countries. Those who do not meet the minimum requirement must attend and pass the Intensive English Program before they are allowed to proceed with their respective programs of study.

Item 4: Application and Offer of Study Program

(1) Application Process

(a) Application must be submitted by using an application mechanism approved by UTM;

(b) An application that is incomplete or does not fulfil the conditions will not be considered.

(2) Offer of Program

The offer and implementation of a study program may take into account the number of candidates who will register into the program.

Item 5: Program Registration

(1) A student candidate is required to register for a program of study and fulfil other requirements stated in the offer letter.

(2) Students are required to continuously register as a student and pay the student fees according to the conditions and dates determined by the University until such a time when the final examination results are released.

(3) Students who are given the status of a Failing Dismissed (KG) may apply for re-admission. Students may apply for credit exemption for courses taken and passed from the previous program (refer to Item..).

Item 6: Enrolment and Duration of Studies

(1) A student is required to complete his/her study within the duration prescribed as in Table I.

Table I : Duration of Studies

Degree	Minimum registered semester	Maximum registered semester
Master	2	8
Doctoral	6	16

(2) In the case of a research student (Master or Doctoral) whose supervisor is transferred to UTM and/or if the student has obtained a written approval on the transfer of the research from the previous institution of higher learning, the minimum duration of the study will be determined by the Senate

(3) The maximum duration as given in Table I do not include the duration taken by a candidate tofulfill the pre-requisite for entry requirements of the study program.

(4) A Research student who has submitted the thesis for examination will be given “Examination” status. The maximum duration for “Examination” status is three (3) semesters or eighteen (18) months. If a student fails to resubmit the corrected version of the thesis within this duration, the student will be considered as “Fail”.

(5) Research students must meet the publication requirement before be allowed to submit thesis for examination.

(a) A master by research candidate may submit his/her thesis for viva-voce provided that he/she produced at least one (1) accepted or published publication from journal article, conference proceeding or book chapter.

b) A doctoral candidate may submit his/her thesis for viva-voce provided that he/she produced at least one (1) refereed article or (2) indexed conference proceedings accepted or published in SCOPUS/ERA & WOS index.

Item 7: Change of Program of Study, Type of Registration, and Mode of Study

(1) A student who intends to change to another academic program must apply to the School of Graduate Studies with the consent of the Faculty. The change can only be made after the first semester of study and only once during the duration of study. Student's academic status must not be KG. The change is subject to approval by the University.
(2) A student can apply to convert to another mode of study from taught to research or vice-versa. The change must take place before the last one semester of study and can be made only once during the duration of study.
(3) Conversion of more than once will only be considered in reasonable circumstances with the consent of the faculty.

Item 9: Registration of Courses

(1) A student must register his/her courses every semester within the specified dates determined by the University. Those who fail to register without acceptable reasons will be terminated. He/she can apply for reinstatement no later than two (2) semesters after the termination, subject to the available remaining period of study. Otherwise, he/she has to re-apply for admission as a new student.
(2) As part of the graduation requirements, students are required to take any compulsory university courses from the list offered by FKE or any academic division of the University.
   (a) As part of the graduation requirements, international students are encouraged to take either
      (i) Malay Language; OR
      (ii) Malaysian Culture.
   (b) Exemption may be given to those who have already fulfilled such requirement prior to registration of their respective programmes of study.
(3) Late registration fee will be imposed upon registration of courses after the closing date of the course registration.

Item 10: Correction of Course Registration

(1) A student is responsible to verify the registration of the courses and make correction within the prescribed period as stated in the UTM Academic Calendar.
(2) A student may insert and/or delete a course within the prescribed duration.

Item 11: Withdrawal (TD) of a Course and Program

(1) A student may withdraw (TD) any course registered in the current semester within the prescribed duration subject to the minimum credits requirement.
(2) A student who withdraws (TD) all of the courses will be given a deferment of the study subject to the deferment regulation.
(3) A student may withdraw (TD) from study subject to faculty and University approval. Students who have withdrawn from the graduate program can apply for admission to a graduate program or any other graduate program at UTM. Students can apply for credit exemption for courses taken and passed from the previous program.

Item 12: Attendance

(1) A student is required to attend all classes scheduled for the course including those courses with the status of HW and HS. A student whose attendance is less than 80% will be barred from the final examination. The registration for HS course will be removed if the attendance is less than 80%.

Item 13: Academic Load

(1) A student must register a minimum of one (1) course in the normal semester.
(2) A student may register a maximum of twenty (20) credits in the normal semester and maximum of ten (10) credits in short semester.
(3) A student taking off-campus program (PESISIR) may register a maximum of twelve (12) credits in the normal semester and six (6) credits in short semester.

(4) Subject to approval by the University, a student in the final semester of the normal duration of study may be exempted from Clauses 13(2) and 13(3).
(5) Exemption of the maximum credit limit to a student, who is not in the final semester of the normal duration of study, will only be considered subject to approval by the faculty.

Item 14: Credit Exemption and Transfer

(1) A course is deemed similar to the one offered in FKE with a minimum of 80% similarity in content, depth, and complexity. Applicants need to provide proofs including course outlines, examination questions, transcripts or any other documents determined by the Faculty.
(2) A student may apply for Credit Exemption in the first semester of his/her study by submitting relevant documents. Only courses equivalent to those at UTM with minimum equivalent grade of B will be considered for Credit Exemption.Credit Exemption will only be included in the Credit Obtained.
(3) A student may apply for Credit Transfer by submitting relevant documents during the period of study. Only courses equivalent to those at UTM (minimum of 80% similarity in contents and complexity) with a minimum grade of B- will be considered for Credit Transfer. Credit Transfer obtained will be included in the Credit Count and Credit Obtained.
(4) The maximum total Credit Exemption and/or Credit Transfer is 50% of the total maximum credits for the taught course components of the study program.
(5) The duration of study for a student who is given Credit Exemption and/or Credit Transfer will be determined by the University.

Item 15: Thesis//Master Project Report

(1) Thesis/ master project report must follow the guidelines prescribed in the UTM Thesis Manual and other requirements specified by the Faculty.
(2) A thesis submitted for examination must be approved by the supervisor.
(3) For master by research and doctoral (research) programs:
   (a) A student should submit Notice for Submission of Thesis approved by the supervisor at least three (3) months prior to submission of the thesis for examination, or three (3) months before expiry of the maximum study duration.
   (b) A student should submit his/her thesis for examination within the maximum duration of study. Only a registered (active) student is allowed to submit his/her thesis for examination.
   (c) The final date for submission of thesis for examination is the last working day of the examination week of the semester.
   (d) After the oral examination and fulfilment of all specified requirements, a doctoral or a master student by research is required to submit bound and digital copies of thesis according to the specified number of copies and submission date determined by the University. Taking into consideration the evaluation of the thesis and the recommendation of the Panel for Oral Examination, the examination results of a thesis will be verified by JKTS for endorsement by the Senate.
(4) University will not accept a thesis that has been submitted in any form for the purpose of examination either to UTM or any other institutions of higher learning.
(5) A doctoral thesis shall not exceed 300 pages excluding appendices. Master thesis/ Master project report shall not exceed 200 pages excluding appendices.
(6) A thesis/ Master project report may either be written in Bahasa Melayu or English.
(7) All thesis/dissertations/master project reports are the property of the University.

Item 16: Student Advice and Supervision

(1) Supervisor, Main Supervisor and Co-supervisor
   (a) A research student will be supervised by supervisor(s) appointed by the faculty.
   (b) The university has the right to appoint or change student's supervisor(s) upon recommendation by the faculty.
   (c) A student may request for a change of supervisor(s) by providing acceptable reasons to the faculty.

(d) The Main Supervisor should play a greater role in supervision than the Co-supervisor, who is appointed to assist the Main Supervisor.
(e) A student is required to submit a Progress Report within the stipulated period to the faculty every normal semester. A student who fails to submit his/her progress report may be given a TM or GG result.

(2) The Supervisor or the main supervisor must be a Graduate Faculty who is a full-time staff of the University.
(a) A Graduate Faculty who is seconded to another university / institution or retired or a qualified individual from other institutions may only be appointed as a co-supervisor
(b) If a main supervisor is a contract lecturer, a co-supervisor must be appointed.

Item 17: Evaluation

(1) Evaluation may consist of the following:
(a) Course examination;
(b) Evaluation of thesis/ master project report;
(c) Oral examination (viva voce);
(d) Special examination;
(e) Other modes of evaluation.

(2) Final examination may be used as part of evaluation for taught course programs.

(3) Evaluation for a master and doctoral student by research shall include:
(a) Evaluation of Research Proposal; a student is required to present a research proposal for evaluation purposes within the duration specified by the University, failing which the student may be given a TM status.
(b) Semesterly evaluation by the supervisor;
(c) Thesis examination by the Internal and External Examiners;
(d) Oral defence of thesis to a Panel of Examiners;
(e) Course evaluation

(4) Special examination
(a) Special examination can be considered in the following cases:
(i) A student who is unable to sit for the final examination due to illness certified by a medical officer of the university or the government hospital; OR
(ii) A student in the final semester and who failed ONE (1) course; OR
(iii) Any other reasons accepted by University
(b) Special examination cannot be considered in the following cases:
(i) Course with NO final examination; OR
(ii) A student who does not sit for the final examination without any acceptable reason by the University; OR
(iii) A student who is prohibited from sitting for the final examination

(5) Students who obtained Conditional Pass are not qualified to sit for a Special Examination (Graduation).

(6) Students who passed Special Examination (Graduation) will be given minimum marks (60), which is B- grade.

(7) Oral defence of thesis by a student cannot be held more than twice.

(8) Thesis examination for Doctoral and Master degree programs should be made according to the criteria set for the program as approved by the Senate.

Item 18: Conversion of registration status from Master to Doctor of Philosophy

(1) A master student by research is allowed to apply for conversion to a doctoral program upon achieving excellent research work and recommended by the evaluation panel. Application must be made between 9 months to 18 months from the date of registration in the program.

Item 19: Thesis Examiners and Oral Examination Panel

(1) The Panel for Oral Examination for doctoral or Master by research thesis are appointed by the University.

(2) Master by research program
(a) Thesis examiners should consist of at least one Internal and one External Examiner.
(b) Thesis examiners for UTM's staff should consist of at least one Internal and two External Examiners.

(c) The Oral Examination Panel consists of a Chairman, Internal Examiner(s), and External Examiner(s). Supervisor is required to attend the oral examination session. Based on the reports by the examiners, the Faculty may determine whether the External Examiner should be present at the oral examination.

(3) Doctor of Philosophy Program

(a) The Examiners for Ph.D. Thesis must consist of at least one Internal and one External Examiner;

(b) The Thesis Examiners for UTM's staff shall consist of at least one Internal and two External Examiners.

(c) The Thesis Examiners for Industrial Doctoral shall consist of Internal and two External Examiners -- one from the academia and the other from industry.

(d) The Oral Examination Panel consists of a Chairman, Internal Examiner(s), and External Examiner(s). Supervisor is required to attend the oral examination session. Under certain circumstances, University can decide whether the Oral Examination is to proceed without the presence of the External Examiner.

(4) Thesis Examiners are required to submit to the Faculty the examination reports within the stipulated duration.

(5) The result of the examination by the Examiners and Panel of Oral Examination must be presented and endorsed by University Senate Standing Committee for Postgraduate Studies before the Senate Meeting.

Item 20: Grading System

(1) The relationship between marks, grade, points, and achievement levels of a course is given in Table II.

(2) Other grades are also used as follows:

(a) HL/HG -- Pass/Fail for courses with the status of HW.

(b) For a course with HS status, the course registration record will appear in the student's transcript if the student's attendance is more than 80%.

(c) TD -- Withdrawal (TD) of a registered course.

(d) MM/TM/GG -- Satisfactory (MM)/ Unsatisfactory(TM)/ Fail (GG) grade for a research course.

(3) Incomplete Course Status (TS)

(a) The TS status is given to an incomplete course in the final assessment based on reasons acceptable to the University.

(b) A student who obtained the TS status for any course is required to sit for a Special Assessment within a prescribed duration.

Table II: The relationship between the Marks, Grade, Points, and Achievement Level

Score	Grade	Grade Point	Level of Achievement
90 - 100	A+	4.00	Excellent Pass
80 - 89	A	4.00	
75 - 79	A-	3.67	
70 - 74	B+	3.33	Good Pass
65 - 69	B	3.00	
60 - 64	B-	2.67	Pass
55 - 59	C+	2.33	Fail
50 - 54	C	2.00	
45 - 49	C-	1.67	
40 - 44	D+	1.33	
35 - 39	D	1.00	
30 – 34	D-	0.67	
0 – 29	E	0	

Item 21: Academic Standing

(1) The student's academic standing is determined according to the type of study:

(a) Taught Course -- determined by CGPA;

(b) Research — determined by research grade.

(2) The academic standing for Taught Course programs is determined at end of Normal Semester by CGPA as indicated in Table III.

(3) The academic standing for Research programs is determined at the end of Normal Semester using the research grade as shown in Table IV.

Table III: The Academic Standing for Postgraduate Studies for Full Research

Academic Standing	Research Grade	Condition to Proceed with Study	Award of Degree
Good Pass (KB)	Satisfactory (MM)	Qualified	Qualified
Conditional Pass (KS)	Unsatisfactory (TM)	Qualified	Not Qualified
Fail (KG)	Fail (GG)	Terminated	Not Qualified

Table IV: The Academic Standing for Postgraduate Studies for Taught Course Program

Academic Standing	Taught Course	Condition to Proceed with Study	Award of Degree
Good Pass (KB)	CGPA≥3.00	Qualified	Qualified
Conditional Pass (KS)	2.67≤CGPA<3.00	Qualified	Not Qualified
Fail (KG)	CGPA<2.67	Terminated	Not Qualified

(4) A student in Research program who obtained Conditional Pass (KS) for two (2) consecutive semesters will be terminated.
(5) A Taught Course student who obtained KS status must achieve KB status before the end of maximum duration of study to qualify for the degree award.
(6) With the approval of the faculty, a taught course student is allowed to repeat the course with the grade B- to improve the grade. The course repeated must be registered with UG status. The better grade is considered for the computation GPA and CGPA.
(7) A student must redeem the failed core or compulsory course for graduation. The course must be registered with a status of UM. The course grade will only change if the student passes with a better grade. The better grade is considered for the computation GPA and CGPA.
(8) A student may redeem any failed elective course with another elective course. The new elective course must be registered with a status of UM. The better grade is considered for the computation GPA and CGPA.
(9) A student can only re-register if his/her academic status is KG in the first (1) semester. A student is allowed re-register (KGDS) only once in the same program throughout his/her study.
(10) Students who have completed their period of study but did not meet the requirements for the award will be given the status of a Failing (KG) and will be dismissed from the study.

Item 22: Appeal of Assessment Results

(1) Course Assessment
A student is allowed to appeal to the faculty towards any course assessment decision within the timeframe with certain fee. Only marks from the re-marking will be counted.
(2) Research Assessment
A research student is allowed to appeal via the faculty towards any research assessment decision including oral examination within the timeframe with certain fee.
(3) Any appeal on the final results of academic status must be submitted not later than two (2) weeks after the Senate meeting.

Item 23: Total Credits for Graduation

(1) A student must pass all the courses specified in the program curriculum.
(2) The minimum credits required for graduation at postgraduate degree/diploma/certificate are shown in Table V.

Table V: The Minimum Credits for Graduation in Postgraduate Studies

Awards	Minimum Credits for Graduation
Master Program	40
Doctoral Program	No Credits for graduation

Item 24: Conferment of a Postgraduate Degree/Diploma/ Certificate

(1) A student is only qualified to be awarded a postgraduate degree after fulfilling the following conditions:
(a) Obtained the total Credits for Graduation as determined by the curriculum of the program with academic standing of Good Pass (KB);
(b) Pass all the courses required by the program and pass thesis examination (if required);
(c) Paid all fees;
(d) Fulfilled other requirements as specified;
(e) A taught course, or taught course and research student who withdraws from the program may apply for a lower award if he/she has fulfilled the minimum credits as in Table IV;
(f) A doctoral degree student who fails to be awarded the intended degree may be awarded a Master degree if the minimum requirements for the lower degree have been fulfilled and endorsed by the thesis examiners.
(g) Approval date for postgraduate research student is defined as
(i) The viva date if there are no corrections of thesis.
(ii) If there are corrections, the approval date is the first submission date of corrected thesis verified by examiner(s)/supervisor.
(iii) If further corrections are required, the date is the date the corrected thesis is verified examiner(s)/supervisor.

I Item 25: Deferment, Suspension and Termination

(1) A student may apply for deferment of study due to health reasons by submitting a medical report certified by a Medical Officer recognised by the University. In such a case the deferment will not be taken into account in the duration of study. A similar status of deferment may be granted to a student due to reasons of interest to the University or the Nation.

(2) A student may apply for deferment of study due to reasons other than those stated in Item 25(1). Such deferment will be taken into account in the duration of study. Deferment of more than two (2) consecutive semesters is not allowed. A student who fails to register after deferment of two (2) consecutive semesters may be terminated.

(3) A student who has been granted a deferment will not be qualified to use any facilities provided by the University.

(4) International students on student pass would need to leave the country, to cancel the student pass, or any other actions specified by the Malaysia Immigration authority.

(5) A student who violates the University rules and regulations may be terminated or suspended from the study for a certainperiod of time. In this case, the suspended period is taken into account in the study duration unless decided otherwise by the University.

tem 26: Plagiarism

(1) Plagiarism in academic includes producing thesis, dissertation, project report, article, coursework and research findings without acknowledging or referring to the original sources and claiming as one's own work. It involves the submission of the whole or part of the work towards a degree.

(2) A student who committed plagiarism will be penalized based upon decision made by the Faculty Academic Committee.

Item 27: Examination Misconduct

(1) A student is suspected of misconduct during examination if:
   (a) Giving, receiving or possessing notes or some other materials in various forms relevant to the course during the examination inside and outside of exam hall; OR
   (b) Using the information stated above for the purpose of answering examination questions; OR
   (c) Cheating or attempting to cheat or behaving inappropriately during examination; OR
   (d) Other misconduct as defined by the University.

(2) If the student is found guilty of misconduct by the Faculty Academic Committee and pending the approval of the Senate, the student can be penalized as follow:
   (a) Receive a ZERO (0) mark for the examination; OR
   (b) Receive a ZERO (0) mark for the course; OR
   (c) Receive a ZERO (0) mark for all registered courses for the semester; OR
   (d) Suspended from study for a duration specified by the Senate.

(3) Disciplinary actions as stipulated in the Universities and University Colleges Act 1971, Universiti Teknologi Malaysia (Discipline of Students) Rules 1999, may be taken again student who violate the regulations.

Item 28: General Provisions

(1) University reserves the right to take any action if a student is found to have provided false information.

(2) Any appeal related to these Regulations should be submitted to the School of Graduate Studies via the faculty. If necessary, the appeal will be forwarded for consideration and approval of the Senate.

(3) Further modes of implementation can be carried out under these Regulations. All modes of implementation and procedure must be adhered to. However, it is the prerogative of the Senate to make any amendment(s), as and when it is deemed necessary.

(4) In the event of any dispute, these Postgraduate Academic Regulations will be adhered to.

(5) The Senate reserves the right to make any decision which is not necessarily subjected to these Regulations.

7.0 ACADEMIC CALENDER FOR 2017/2018

7.0 ACADEMIC CALENDAR FOR 2017/2018

The official UTM Academic Calendar at http://www.utm.my/academic/calendar/

DATE	PROGRAMME	PUBLIC & SCHOOL HOLIDAY
SEMESTER 1 2017/2018		
5 – 7 Sept 2017	Registration of new students	
5 – 8 Sept. 2017	Student orientation Week	
7 – 22 Sept. 2017	Course registration period (2 weeks)	16 Sept. 2017: Malaysia Day 22 Sept. 2017: Maal Hijrah 1439
10 Sept – 12 Oct. 2017	Lecture Semester 1 (First Half) (5 weeks)	
15 – 19 Oct. 2017	Mid-Semester Break for Semester 1	18 Oct. 2017: Deepavali
22 Oct. – 22 Dec. 2017	Lectures Semester 1 (9 weeks)	26 Oct. 2017: Hol Almarhum Sultan Iskandar 1 Dec. 2017: Birthday of Prophet Muhammad S.A.W. 24 No. – 31 December 2017:Year-End School Break
28 – 21 Oct. 2017	UTM 59th Convocation Ceremony	
24 – 28 Dec. 2017	Revision Week	25 Dec. 2017: Christmas
2 – 18 Jan. 2018	Final Examination for Semester 1 (3 weeks)	
21 Jan. -8 Feb. 2018	Final Break for Semester 1	31 Jan. 2018: Thaipusam
19 Feb. – 1 March 2018	Special Examination period for Semester 1	
SEMESTER 2 2017/2018		
7 – 8 Feb. 2018	Registration of new students	
8 – 23 Feb. 2017	Course registration period (2 weeks)	
11 Feb. - 29 March 2018	Lecture Semester 2 (First Half) (7 weeks)	16 – 17 Feb. Chinese New Year (18 Feb. 2018 CNY replacement holiday) 23 March 2018:Birthday of His Majesty the Sultan of Johor (25 March replacement holiday)
1 – 5 April 2018	Mid-Semester Break for Semester 2	
8 April – 24 May 2018	Lectures Semester 1 (7 weeks)	1 May 2018: Labour Day 17 May 2018: First Day of Ramadan

28 – 29 Apr. 2018	UTM 60th Convocation Ceremony	
25 – 29 May 2018	Revision Week	29 May 2018: Wesak Day
30 May – 14 June 2018	Final Examination for Semester 1 (3 weeks)	2 June 2018: Birthday of His Majesty Seri Paduka Baginda Yang Di-Pertuan Agong 15 – 16 June 2018: Eid Al- Fitri
17 June – 30 Aug. 2018	Final Break for Semester 2	31 Aug. 2018: National Day
15 – 26 July Mar. 2018	Special Examination period for Semester 2	
SHORT SEMESTER 2017/2018		
17 – 21 June 2018	Final Break for Short Semester	
20 – 21 June 2018	Course registration	
24 June – 16 Aug. 2018	Lectures Short Semester (8 weeks)	
19 – 30 Aug. 2018	Final Break for Short Semester	

CONTACTS/ENQUIRIES

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