UTHM
Universiti Tun Hussein Onn Malaysia

# ACADEMIC PROFORMA

## 2026/2027



## BACHELOR OF

## ELECTRONIC ENGINEERING (ROBOTICS AND ARTIFICIAL INTELLIGENCE SYSTEMS) WITH HONOURS (BEA)




FACULTY OF
ELECTRICAL & ELECTRONIC ENGINEERING
UNIVERSITI TUN HUSSEIN ONN MALAYSIA
86400, PARIT RAJA,
BATU PAHAT,
JOHOR.



https://cad.uthm.edu.my
+607 453 7302
+607 453 6334(faks)
cad@uthm.edu.my

Information contained in this proforma is true at the time of printing and the University has the right to make any amendment according to needs.

All rights reserved. No part of this proforma may be reproduced in any form or by any means, electronic, photocopying, recording, visual, or otherwise, without prior written permission of the Vice Chancellor of Universiti Tun Hussein Onn Malaysia.

© Centre for Academic Development and Excellence
Universiti Tun Hussein Onn Malaysia
August 2026

## Contents


Foreword by the Vice Chancellor 4
Foreword by the Deputy Vice Chancellor (Academic and International) 5
Foreword by the Dean, Faculty of Electrical and Electronic Engineering 6
Vision of the University 7
Mission of the University 7
Education Philosophy of University 7
Logo of the University 7
Chancellor and Pro-Chancellors 8
Board of Directors of University 11
Members of Senate 12
Faculty of Electrical and Electronic Engineering 15
  Faculty Background 15
Quality Objectives 16
Organizational Chart 17
External Advisors 18
Faculty Staff Directory 19
Programme Information 36
  Programme Overview 36
  Programme Educational Objectives (PEO) 38
  Programme Learning Outcomes (PLO) 38
  Study Plan 39
  Synopsis of the University Courses 45
  Synopsis of the Core Mathematics Courses 48
  Synopsis of the Core Faculty Courses 50
  Synopsis of the Core Programme Courses 52
  Synopsis of the Specialisation Courses (Compulsory) 60
  Synopsis of the Specialisation Courses (Elective Course I - Elective Specialisation) 66
  Synopsis of the Specialisation Courses (Elective Course II – Master Integration) 70
  Synopsis of the Specialisation Courses (Elective Course III – General) 72
Career and Further Education Prospect 78
Further Education Pathway 79

## Foreword by The Vice Chancellor




**Assalammualaikum Warahmatullahi Wabarakatuh and greetings.**

I would like to extend my warmest congratulations and a heartfelt welcome to all new students of Universiti Tun Hussein Onn Malaysia (UTHM).

Your decision to join UTHM marks the beginning of an important and meaningful journey. We are honoured by the trust you have placed in our university, and we are committed to supporting you throughout your studies.

At UTHM, education is not only about gaining knowledge and earning a qualification. We want you to develop the skills, values and confidence needed to face the challenges of a rapidly changing world. Our academic programmes are continuously improved to provide quality learning experiences, nurturing critical thinking, and prepare you to contribute to society and the nation.

UTHM also places strong emphasis on research and innovation. Through research, we seek to develop practical and sustainable solutions to economic, social and environmental challenges. As students, you will have opportunities to learn, explore new ideas and participate in activities that connect your knowledge with real-world needs.

Beyond the classroom, UTHM encourages students to engage with the community and work with different stakeholders. These experiences will help you develop leadership, teamwork, communication and problem-solving skills while allowing you to make a positive contribution to society.

We also believe that good governance, integrity, responsibility and ethical values are essential in building a strong and trusted university. These values guide the way we teach, conduct research, serve the community and manage the university.

Our vision is to build a sustainable and resilient future through quality education, impactful research, meaningful community engagement and responsible governance. We hope that your time at UTHM will not only help you achieve academic success but also shape you into responsible, capable and future-ready graduates.

Once again, I warmly welcome all of you to the UTHM family. Make the most of every opportunity, learn from your experiences, build meaningful relationships and enjoy your journey with us.
I wish you every success in your studies and in all your future endeavours.

**Welcome to UTHM, and I wish you a rewarding and memorable academic journey.**
**Thank you.**

*"With Wisdom, We Explore"*

Best wishes.

Vice-Chancellor
Universiti Tun Hussein Onn Malaysia

## Foreword by The Deputy Vice Chancellor (Academic and International)




Assalamualaikum Warahmatullahi Wabarakatuh and Greetings,

Congratulations and a warm welcome to all new students who have chosen Universiti Tun Hussein Onn Malaysia (UTHM) as their destination for higher education in pursuit of academic excellence and personal development. UTHM remains fully committed to providing a holistic, high-quality, and industry-relevant educational experience that meets current global challenges and future demands.

I would also like to express my sincere appreciation to the Centre for Academic Development and TVET (CAD), the faculties, and all parties involved in the publication of this programme proforma book. This publication serves not only as an important reference for students and stakeholders, but also reflects the university's commitment towards transparency, quality assurance, and effective academic programme delivery.

In line with the aspirations of the Ministry of Higher Education Malaysia and the university's direction towards becoming a *Global Technopreneur University 2030 (GTU2030)*, UTHM continues to strengthen its position as a global technical university in sustainable technology and transportation. TVET-based education, flexible learning approaches, digitalisation initiatives, and strong industry collaboration remain the key pillars in producing competent, professional, and globally competitive graduates.

Alhamdulillah, UTHM has achieved numerous accomplishments and recognitions at both national and international levels. These include recognition in the QS World University Rankings, Times Higher Education (THE) Rankings, UI GreenMetric, and various ratings related to sustainability, research, and TVET education. UTHM has also been recognised as a UNESCO TVET Chair, a UNESCO-UNEVOC International Centre for TVET, and one of Malaysia's leading TVET institutions in transportation technology. These achievements reflect the university's continuous commitment to advancing technical education and impactful innovation.

Currently, UTHM offers more than 114 academic programmes across diploma, bachelor's degree, master's degree, and doctoral levels, all accredited by the Malaysian Qualifications Agency (MQA) and relevant professional bodies. Supported by qualified academic and professional staff, the university continues to strengthen its educational ecosystem through centres of excellence, teaching factories, industrial laboratories, research centres, and strategic international collaborations.

Beyond academic excellence, UTHM also provides a conducive and comprehensive campus environment to support students' holistic development. Modern facilities, sports complexes, libraries, residential colleges, and inclusive learning environments contribute significantly towards nurturing balanced and well-rounded graduates.

In conclusion, I sincerely hope that this programme proforma book will serve as a valuable guide for students in planning their academic journey. May all initiatives and efforts undertaken by UTHM continue to produce high-quality graduates who will contribute meaningfully to national development and global well-being.

Thank you.

**PROF. Dr. AFANDI BIN AHMAD**
Deputy Vice Chancellor (Academic and International)
Universiti Tun Hussein Onn Malaysia

Foreword by The Dean



Assalamualaikum Warahmatullahi Wabarakatuh and Greetings,

Congratulations and thank you for choosing the Faculty of Electrical and Electronic Engineering (FKEE), Universiti Tun Hussein Onn Malaysia (UTHM).

FKEE UTHM is one of the most well-equipped engineering faculties, providing cutting-edge teaching and research facilities. With over 1,400 students from Malaysia and other countries enrolled in our undergraduate and postgraduate programs, we are proud of our diverse and inclusive academic community.

Our faculty is supported by a dedicated team of more than 140 academic staff, more than 30 assistant engineers, and administrative personnel. All of our academic programs are accredited by the Malaysian Qualifications Agency (MQA) and the Engineering Accreditation Council (EAC), ensuring the highest educational standards.

Beyond classroom learning, FKEE offers valuable opportunities for upskilling through specialized training programs, as well as outbound mobility programs, allowing students to gain global exposure and enhance their educational experience. These initiatives are designed to help you develop both technical and personal skills that will benefit you in your future career.

Everyone at FKEE shares a common goal of making a positive difference in the world, inspired by the philosophies of "continuous learning and improvement" and "giving is the best communication." At FKEE, we not only focus on electrical and electronic engineering but also on shaping well-rounded individuals who will contribute meaningfully to society.

This booklet provides important information about the Bachelor of Electronic Engineering (Robotic and Artificial Intelligence Systems) with Honours (BEA) program and details the courses you will take throughout your studies. Remember, success is a journey, not a destination. During this journey, you will be surrounded by a conducive, positive, and dynamic environment.

Take advantage of this opportunity to utilize our modern laboratories, where you can develop practical skills and apply theoretical concepts.

In short, this is your journey and your chance. Give it your best shot, embrace the learning curve, and make the most of the opportunities available to you, including upskilling and outbound mobility programs.

On behalf of FKEE, I wish you all the success in your studies!

**PROF. TS. DR. ASMARASHID BIN PONNIRAN**
Dean
Faculty of Electrical and Electronic Engineering
Universiti Tun Hussein Onn Malaysia

## Vision

To be a global technical university in sustainable technology and transportation

## Mission

Provide technical solution for industry and community based on tauhidic paradigm

## Education Philosophy of University

UTHM education and training, founded on the tauhidic paradigm, strive to produce competent, professional and entrepreneurial graduates, driven by advanced technologies for global development.

## Logo of University

The logo of UTHM displays a proton, a book, a tiered mortar board (levels of learning), a book-rest and a shield.

Symbolism:

| | |
|---|---|
| Red | Bravery |
| Blue | Collaboration |
| Silver | Quality/ Prestige |
| Book-rest | Knowledge |
| Proton | Science and Technology |
| Book | Knowledge |
| Mortar board | Levels of study |
| Circle | Resilient and related to global characteristics |
| Shield | Confidence |

The whole concept of the logo represents UTHM as a learning institution that supports knowledge expansion and development at all levels of study in science and technology.

**Blue** represents the close relationship among UTHM community in ensuring successful and resilient implementations of the University programmes as well as its education and research activities that are carried out for the benefit of mankind.

**Red** symbolises the adventurous nature of UTHM in exploring new fields to establish itself as a leader in the applications of science and technology. Thus, this reflects the spirit and self-esteem of the UTHM community.

## Chancellor



**HIS ROYAL HIGHNESS**
TUNKU ISMAIL IBNI SULTAN IBRAHIM
Tunku Mahkota Johor

## Pro-Chancellor



**Yang Amat Mulia Tunku Idris Iskandar Al-Haj Ibni Sultan Ibrahim**
Tunku Temenggong Johor



**Yang Berhormat Tan Sri Dato' Dr. Haji Azmi Bin Rohani**
Datuk Pengelola Bijaya Diraja Istana Negara

## Board of Directors of University

### Chairman

**YBhg. Dato' Sri Ibrahim bin Ahmad**

### Members

**YB. Prof. Dr. Mas Fawzi bin Mohd Ali**
Vice-Chancellor, Universiti Tun Hussein Onn Malaysia

**YBrs. Mr. Mohd Najib bin Mohd Sarif**
Director, IPTA Student Admissions Division
Ministry of Higher Education

**Mrs. Mahfuzah binti Baharin**
Deputy Under-Secretary,
(Sector of Tax Incentive & Sectoral) TSBC (GCS) Tax Division, Ministry of Finance Malaysia

**YB. Dato' (Dr.) Haji Nooh bin Gadot**
Advisor, Johor Islamic Religious Council

**YBhg. Prof. Ir. Dr. Mohd. Amri bin Lajis**
Professor, Universiti Tun Hussein Onn Malaysia

**YBrs. Mr. Shahril Anwar bin Mohd Yunos**
Managing Partner, Virtus Capital Partners Sdn Bhd

**YBhg. Datuk Md Jais bin Haji Sarday**
Board Member, Universiti Tun Hussein Onn Malaysia

**YBhg. Datuk Haji Mohd Lassim bin Burhan**
Board Member, Universiti Tun Hussein Onn Malaysia

**YBrs. Ir. Ts. Abdul Rahman bin Bahasa**
Chief Executive Officer, Recove Group

**YBrs. Encik Hasry bin Harun**
Chief Executive Officer, Malaysia Rail Development Corporation

**YBrs. Prof. Ir. Dr. Mohd. Amri bin Lajis**
Professor, Universiti Tun Hussein Onn Malaysia

**YBrs. Mohamad Irza bin Dahari @ Zahari**
Administration and Diplomatic Officer, Department Of Higher Education

**YBrs. Mrs. Norismalinda binti Taarif**
Government Procurement Division, Ministry of Finance

### Secretary

**YBrs. Shereen Sabrina binti Abd Shukor**
Registrar/Chief Operating Officer (COO), Universiti Tun Hussein Onn Malaysia

## Members of Senate

### Chairman

**YB. Prof. Dr. Mas Fawzi bin Mohd Ali**
Vice Chancellor

### Members

**Prof. Dr. Afandi bin Ahmad**
Deputy Vice Chancellor (Academic and International)

**Prof. Ts. Dr. Rabiah Binti Ahmad**
Deputy Vice Chancellor (Research and Innovation)

**Prof. Ts. Dr. Abdul Rasid bin Abdul Razzaq**
Deputy Vice Chancellor (Student Affairs and Alumni)

**Prof. Ts. Dr. Abdul Mutalib bin Leman**
Provost UTHM, Pagoh Branch Campus

**Prof. Dr. Nik Hisyamudin bin Muhd Nor**
Assistant Vice Chancellor / Chief Digital Officer (CDO) (Digital and Infrastructure)

**Prof. Ir. Dr. Mohd Haziman bin Wan Ibrahim**
Dean, Centre for Graduate Studies

Dean, Faculty of Civil Engineering and Built Environment

**Prof. Ts. Dr. Asmarashid Bin Ponniran**
Dean, Faculty of Electrical and Electronic Engineering

**Prof. Ts. Dr. Amir Bin Khalid**
Dean, Faculty of Mechanical and Manufacturing Engineering

**Associate Prof. Dr. Md Asrul Nasid bin Masrom**
Dean, Faculty of Technology Management and Business

**Associate Prof.Ts. Dr. Mohd Hasril bin Amiruddin**
Dean, Faculty of Technical and Vocational Education

**Prof. Ts. Dr. Mohd Farhan bin Md. Fudzee**
Dean, Faculty of Computer Science and Information Technology

**Assoc. Prof. Ts.  Dr. Noor Azura binti Awang**
Dean, Faculty of Applied Science and Technology

**Assoc. Prof. Ts. Dr. Jumadi bin Abdul Sukor**
Dean, Faculty of Engineering Technology

**Dr. Muhammad Faizal bin Ismail**
Dean, Centre for Diploma Studies

Dean, Centre for General Studies and Co-curricular

Dean, Centre for Language Studies

**Associate Prof. Dr. Shafie bin Mohamed Zabri**
Dean, Johor Business School

**Prof. Ir. Dr. Md Saidin bin Wahab**
Director, Centre for Academic Development and TVET

**Prof. Dr. Nafarizal bin Nayan**
Director, Research Management Centre

**Assoc. Prof. Dr. Badaruddin bin Ibrahim**
Director, Malaysia Research Institute for Vocational Education and Training

**Prof. Ts. Dr. Azme bin Khamis**
Chairman, UTHM Council of Professors

**Prof. Eur Ing. Ir. Ts. Dr. Shahiron bin Shahidan**
Innovation & Commercialisation Centre

**Prof. Ts. Dr. Mohd Khairul bin Ahmad**
Institute for Integrated Engineering ($I^2E$)

**Ts. Azamuddin bin Rasidi**
Director, Information Technology Centre

**Prof. Ir. Ts. Dr. Adnan bin Zainorabidin**
Faculty of Civil Engineering and Built Environment

**Prof. Ir. Dr. Erwan bin Sulaiman**
Faculty of Electrical and Electronic Engineering

**Prof. Ir. Dr. Fauziahanim binti Che Seman**
Faculty of Electrical and Electronic Engineering

**Prof. Dr. Hasan Zuhudi bin Abdullah**
Faculty of Mechanical and Manufacturing Engineering

**Prof. Dr. Ahmad Jais bin Alimin**
Faculty of Mechanical and Manufacturing Engineering

**Prof. Ts. Dr. Soew Ta Wee**
Faculty of Technology Management and Business

**Prof. Sr. Dr. Rozilah binti Kasim**
Faculty of Technology Management and Business

**Prof. Ts. Dr. Mimi Mohaffyza binti Mohamad**
Faculty of Technical dan Vocational Education

**Prof. Dr. Rozaida binti Ghazali**
Faculty of Computer Science and Information Technology

**Prof. Ts. Dr. Mohd Fadzelly bin Abu Bakar**
Faculty of Applied Sciences and Technology

**Prof. Ir. Dr. Mohd Amri bin Lajis**
Faculty of Engineering Technology

**Prof. Ir. Dr. Chan Chee Ming**
Faculty of Engineering Technology

**Mdm. Shereen Sabrina binti Abd Shukor**
Registrar / Chief Operating Officer (COO) / Senate Secretary

**Mr.Ismail bin Harun**
Bursar / Chief Financial Officer (CFO)

**Mdm. Siti Afifah binti Che Ismail**
Chief Librarian

**Mdm. Norliah Binti Yaakub**
Legal Advisor

# Faculty of Electrical and Electronic Engineering

## Faculty Background

The Faculty of Electrical and Electronic Engineering (FKEE) was established on 1st May 2004. The Faculty consists of four departments namely:

1. Department of Electronic Engineering (JKEN)
2. Department of Electrical Engineering (JKEK)
3. Department of Graduate Studies (JPSS)
4. Department of Laboratory and Asset Management (JPMA)

The Faculty also has two Centre of Research (CoR) known as Advanced Telecommunication Research Center (ATRC) and Electric Vehicle Research Center (EVRec). There are two Centre of Excellence (CoE) at UTHM associated with the Faculty:

1 Research Center for Applied Electromagnetics (EMCenter)
2 Microelectronics & Nanotechnology Shamsuddin Research Centre (MiNT-SRC)

Currently, there are various focus groups that play pivotal roles towards research culture establishment in FKEE. The list includes the following:

1 Green and Sustainable Energy (GSEnergy)
2 Koordinasi Insulasi dan Voltan Tinggi (KVolt)
3 Power Electronics, Drives and Machines (PEDM)
4 Power Integration System (PI Sys)
5 Instrumentation and Sensing Technology (InSeT)
6 Mechatronic and Control Research Group (MCRG)
7 Group of Robotics Engineering and Technology (GREaT)
8 Computational Signal, Image and Intelligence (CSII)
9 Internet of Things (IoT)
10 Electronic and System Design (ESD)
11 Electroencephalogram and Human Potential (EEG)
12 BioMedical Engineering and Measurement System (BioMEMS)
13 VLSI and Embedded System Technology (VEST)
14 Advanced Medical Imaging and Optics (AdMedic)
15 Advanced Sensing Device and Technology (ASDT)
16 Optical Communication and Artificial Intelligence (OCAI)
17 RF and Microwave Devices (RFMD)
18 Wireless and Propagation (WaP)

The Faculty offers Undergraduate and Postgraduate programmes in both Electrical and Electronic Engineering. These programmes have been designed to cater all the stakeholders needs where the produced graduates are technically competent in their respective engineering field but also possess outstanding soft skills. The faculty offers the following programmes:

1 Bachelor of Electronic Engineering with Honours (BEJ)
2 Bachelor of Electronic Engineering (Robotics and Artificial Intelligence Systems) with Honours (BEA)
3 Bachelor of Electronic Engineering (Semiconductor and Integrated Circuit Design) with Honours (BES)
4 Bachelor of Electrical Engineering with Honours (BEV)
5 Master in Electrical Engineering (Coursework) (MEE)
6 Master in Electrical Engineering (Research) (KEE)
7 Master of Science in IoT (MET)
8 Doctor of Philosophy in Electrical Engineering (PEE)

# FACULTY OF ELECTRICAL AND ELECTRONIC ENGINEERING

**Vision**

To be a global technical university in sustainable technology and transportation.

**Mission**

Provide technical solution for industry and community based on tauhidic paradigm.

**Direction**

UTHM as a Global Technopreneur University 2030 (#GTU2030).

**Motto**

With Wisdom, We Explore.

**Quality Policy**

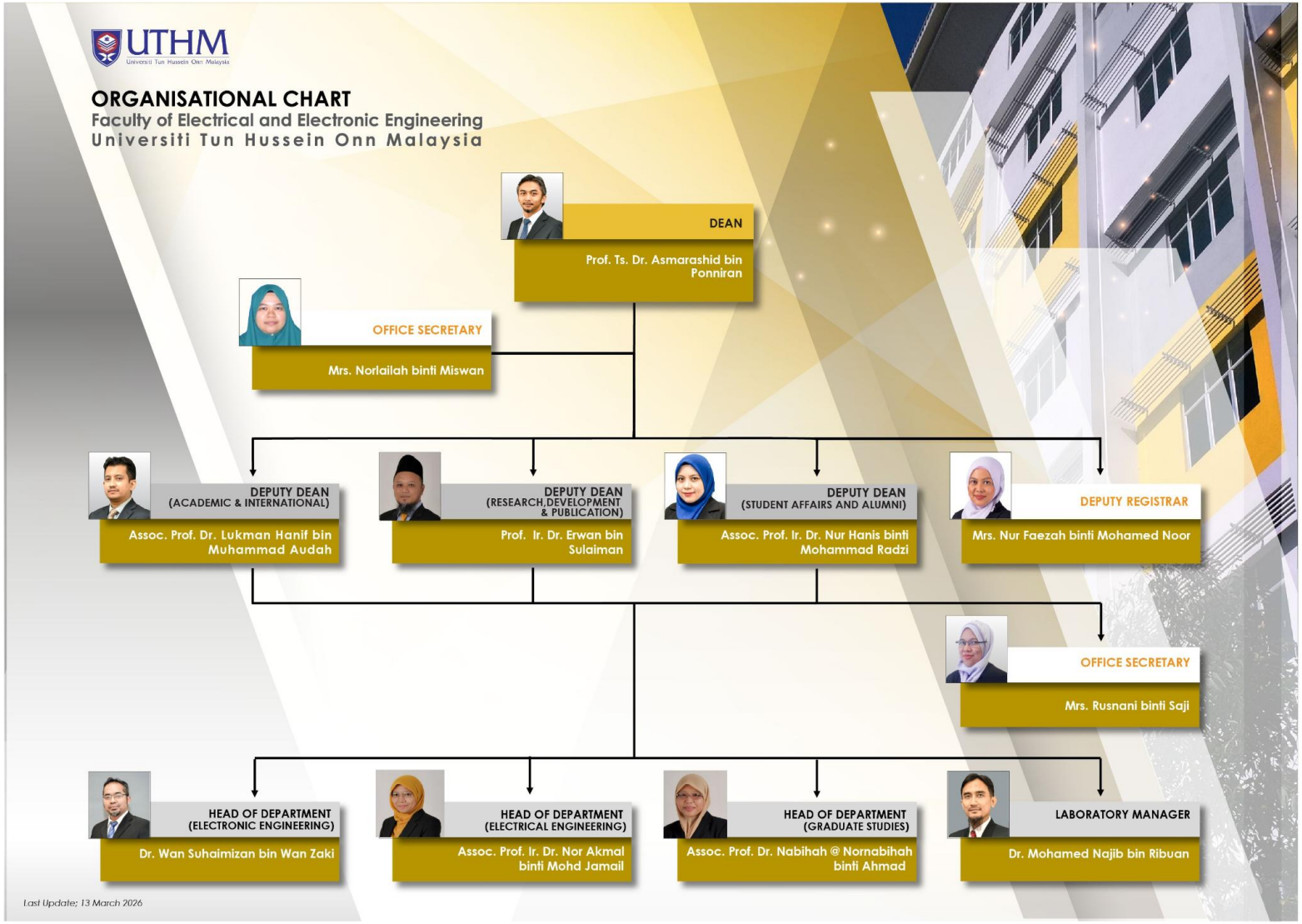
Universiti Tun Hussein Onn Malaysia is committed to offer high quality academic programmes grounded in Engineering, Science and Technology to meet the needs of its stakeholders through an outstanding quality management system in line with the ISO 9001: 2015.

**FKEE Quality Objectives**

FKEE staff is committed to carrying out their responsibilities to ensure that the quality objectives of the current year are achieved, monitored and reviewed in tandem with the vision and mission of the University.

1 To ensure that students enrollment exceeds the 90% target.
2 To ensure that international students enrollment exceeds 6% of the total current enrollment.
3 To ensure that new research grants exceed RM1.9 million per year.
4 To ensure that the university H-Index (SCOPUS) increases by 1 index value each year.
5 To ensure that Graduate Employability after 6 months of graduation exceeds 80%.
6 To ensure that any complaints related to the teaching and learning system or equipment are resolved within a period of not more than 6 months.

# Organizational Chart



# External Advisors

**External Examiner**

Prof. Ir. Dr. Kenneth Sundaraj
Universiti Teknikal Malaysia Melaka (UTEM)

**Industrial Advisory Panel**

Mr. Azman Bin Hamid
Techno Health Services Sdn. Bhd.

Mr. Teoh Giap Seng
SkyeChip Bhd.

Dr. Jeevan A/L Sirkunan
Intel Technology Sdn. Bhd.

En. Redzuan Shah bin Yusoff
TM R&D

# Staff Directory

## Administration

**Dean**
Professor Ts. Dr. Asmarashid bin Ponniran
PhD (Power Electronics) (Nagaoka University of Technology)
MEng (Electrical Power) (UTM)
BEng (Electrical) (KUiTTHO)

**Deputy Dean (Academic and International)**
Associate Professor Dr. Lukman Hanif Bin Muhammad Audah
PhD (Electronic Engineering) (Univ. of Surrey)
MSc (Communications Networks & Software) (Univ. of Surrey)
BEng (Electrical – Telecommunication) (UTM)

**Deputy Dean (Research, Development and Publication)**
Professor Ir. Dr. Erwan bin Sulaiman
PhD (Electrical Engineering) (Nagoya Institute of Technology)
MSc (Electrical) (KUiTTHO)
BEng (Electrical) (UM)

**Deputy Dean (Student Affairs and Alumni)**
Associate Professor Ir. Dr. Nur Hanis binti Mohammad Radzi
PhD (Electrical Power Engineering) (University of Queensland)
MEng (Electrical Power) (UTM)
BEng (Electrical) (UTM)

**Head, Department of Electrical Engineering**
Associate Professor Ir. Dr. Nor Akmal binti Mohd Jamail
PhD (Electrical Engineering) (UTM)
MEng (Electrical) (UTHM)
BEng (Electrical) (UTM)

**Head, Department of Electronic Engineering**
Dr. Wan Suhaimizan bin Wan Zaki
PhD (Electrical and Electronic Engineering) (Univ. of Nottingham)
MSc (Electronic) (UPM)
BEng (Electronic - Medical) (UTM)

**Head, Department of Postgraduate Studies**
Associate Professor Dr. Nabihah@Nornabihah binti Ahmad
PhD (Electronic Engineering) (Massey University)
MEng (Electrical) (KUiTTHO)
BEng (Electrical and Electronic) (UKM)

**Laboratory Manager**
Dr. Mohamed Najib bin Ribuan
PhD (Mechatronic) (Okayama University)
MSc (Mechatronic) (Newcastle University)
BEng (Electrical – Mechatronic) (UTM)

**Deputy Registrar**
Mdm. Nur Faezah binti Mohamed Noor
BSc (Psychology) UKM

**Assistant Registrar**
Mr.Dzulfitry Ameen bin Iskandar

**Senior Assistant Administrative Officer**
Mr. Nazri bin Mohd Suhud

**Assistant Administrative Officer**
Mdm. Nur Farahana binti Azman

**Office Secretary**
Mdm. Norlailah binti Miswan

**Office Secretary**
Mdm. Rusnani binti Saji

**Senior Administrative Assistant**
Mr. Mohd Azrean bin Kosni

**Senior Administrative Assistant**
Mr. Hirman bin Mohamad

**Senior Administrative Assistant**
Mdm. Nurulnadia binti Ghadzali

**Senior Administrative Assistant**
Mr. Muhammad Ariff bin Md Ngadiran

**Administrative Assistant**
Ms. Nur Shahila binti Salim

**Operational Assistant**
Mr. Hasri Suhaimi bin Karmon

## Department of Electronic Engineering (JKEN)

**Head of Department**
**Dr. Wan Suhaimizan bin Wan Zaki**
Phd (Electrical and Electronic Engineering) (Nottingham University)
MEng (Electronic) (UPM)
BEng (Medical Electronic) (UTM)

***Specialisation Area: Communication Engineering (BEP)***

**Associate Professor Dr. Lukman Hanif bin Muhammad Audah**
PhD (Electronic Engineering) (Univ. of Surrey)
MSc (Communications Networks & Software) (Univ. of Surrey)
BEng (Electrical – Telecommunication) (UTM)

**Professor Ir. Dr. Fauziahanim binti Che Seman**
PhD (Electrical Engineering) (Queen's University of Belfast)
MEng (Electrical - Communication) (KUiTTHO)
BEng (Telecommunication) (UTM)

**Professor Dr. Muhammad Ramlee bin Kamarudin**
PhD (Electrical Engineering) (University of Birmingham)
MEng (Communication Engineering) (University of Birmingham)
BEng (Engineering) (UTM)

**Associate Professor Dr. Khairun Nidzam bin Ramli**
PhD (Electrical Engineering) (University of Bradford)
MEng (Communication & Computer Engineering) (UKM)
BEng (Electronic) (University of Manchester Institute. of Science & Technology)

**Associate Professor Dr. Maisara binti Othman**
PhD (Metro Access and Short Range Systems) (Technical University of Denmark)
MEng (Communication & Network) (UPM)
BEng (Computer & Communication System) (UPM)

**Associate Professor Dr. Noran Azizan bin Cholan**
PhD (Communication and Network Engineering) (UPM)
MEng (Electrical – Electronics and Telecommunications) (UTM)
BEng (Electronic) (UNITEN)

**Associate Professor Dr. Zuhairiah binti Zainal Abidin**
PhD (Communication Engineering) (University of Bradford)
MEng (Electrical) (KUiTTHO)
BEng (Electronic) (UTM)

**Associate Professor Dr. Samsul Haimi bin Dahlan**
PhD (Signal and Telecommunication Engineering) (University of Rennes)
MEng (Electrical – Electronic and Telecommunication) (UTM)
BEng (Electrical) (UKM)

**Associate Professor Dr. Syarfa' Zahirah binti Sapuan**
PhD (Electrical Engineering) (UTHM)
MEng (Electrical & Electronic) (Nanyang Technology University)
BEng (Electrical) (KUiTTHO)

**Associate Professor Dr. Xavier Ngu Toh Ik**
PhD (Electrical Engineering) (University of Nottingham)
BEng (Electrical) (KUiTTHO)

**Associate Professor Dr. Yee See Khee**
PhD (Electrical Engineering) (UTHM)
MEng (Electrical) (UTHM)
BEng (Electrical) (KUiTTHO)

**Associate Professor Dr. Mariyam Jamilah binti Homam**
PhD (Electrical Engineering) (Univ. of Leicester)
MEng (Communication & Computer Engineering) (UKM)
BEng (Communication & Computer Engineering) (UKM)

**Associate Professor Dr. Shaharil bin Mohd Shah**
PhD (Electrical & Electronic Engineering) (University of Birmingham)
MSc (Microwave and Wireless Subsystems Design) (University of Surrey)
BEng (Electronic) (MMU)

**Associate Professor Dr. Farhana binti Ahmad Po'ad**
PhD (Communication System) (USM)
MEng (Electrical) (UTHM)
BEng (Electronic-Communication) (KUiTTHO)

**Associate Professor Ts. Dr. Jong Siat Ling**
PhD (Electrical Engineering) (UTM)
MEng (Electrical – Electronics and Telecommunications) (UTM)
BEng (Electrical – Telecommunication) (UTHM)

**Associate Professor Dr. Saizalmursidi bin Md Mustam**
PhD (Electrical Engineering) (UTM)
MEng (Electrical) (UTHM)
BEng (Electronic – Communication) (KUiTTHO)

**Dr. Abul Khair bin Anuar**
PhD (Communication Systems) (Lancaster University)
MEng (Communication & Computer Engineering) (UKM)
BEng (Communication & Computer Engineering) (UKM)

**Dr. Ansar bin Jamil**
PhD (Electrical & Electronic Engineering) (Loughborough University)
MEng (Electrical – Electronics and Telecommunications) (UTM)
BEng (Electrical – Communication) (UTM)

**Dr. Ariffuddin bin Joret**
PhD (Electrical Engineering) (UTHM)
MEng (Electrical & Electronic) (USM)
BEng (Electrical) (UiTM)

**Dr. Maslina binti Yaacob**
PhD (Electrical Engineering) (UTM)
MEng Electrical) (UTM)
BEng (Electrical – Telecommunication) (UTM)

**Dr. Norshidah binti Katiran**
PhD (Electrical Engineering) (UTM)
MEng (Communication & Computer) (UKM)
BEng (Electrical – Telecommunication) (UTM)

**Dr. Rahmat bin Talib**
PhD (Electrical Engineering) (UTHM)
MEng (Electrical-Electronic and Telecommunication) (UTM)
BEng (Electrical, Electronics and System) (UKM)

**Dr. Roshayati binti Yahya @ Atan**
PhD (Electrical Engineering) (UTM)
MSc (Electrical – Electronic and Telecommunication) (UTM)
BEng (Electrical – Electronic and Telecommunication) (KUiTTHO)

**Dr. Shipun Anuar bin Hamzah**
PhD (Electrical Engineering) (UTM)
MEng (Computer & Communication) (UKM)
BEng (Electrical) (UTM)

**Dr. Siti Hajar Aminah binti Ali**
PhD (Electrical & Electronic Engineering) (Kobe University)
MEng (Electrical – Electronics, and Telecommunications) (UTM)
BEng (Electrical-Telecommunications) (UTM)

**Dr. Elfarizanis binti Baharudin**
PhD (Wireless Communication Engineering) (UPM)
MEng (Communication and Computer) (UKM)
BEng (Electrical) (UiTM)

**Mr. Aizan bin Ubin**
MEng (Electrical) (KUiTTHO)
BEng (Electrical) (Univ. of Toledo, Ohio)

**Mdm. Nurulhuda binti Ismail**
MEng (Electrical) (UTHM)
BEng (Electrical) (UiTM)

**Ts. Sharifah binti Saon**
MEng (Electrical) (KUiTTHO)
BSc (Electrical) (KUiTTHO)

***Specialisation Area: Computer Engineering (BEC)***

**Associate Professor Ir. Dr. Abd Kadir bin Mahamad**
PhD (Electrical Engineering and Computer Science) (Kumamoto University)
MEng (Electrical) (KUiTTHO)
BEng (Computer Technology) (KUiTTHO)

**Associate Professor Ir. Dr. Siti Zarina binti Mohd. Muji**
PhD (Electrical Engineering) (UTM)
MSc (Electrical & Electronic) (USM)
BEng (Electrical & Electronics) (USM)

**Associate Professor Dr. Danial bin Md. Nor**
PhD (Electrical Engineering) (UTHM)
MSc (Information Technology) (USM)
BEng (Electrical) (UTM)

**Associate Professor Ir. Ts. Dr. Mohd Norzali bin Hj. Mohd**
PhD (Information Sciences & Biomedical Engineering) (Kagoshima University)
MEng (Radiography) (University of Fukui)
BEng (Radiography) (University of Fukui)

**Associate Professor Ir. Dr. Norfaiza binti Fuad**
PhD (Electrical Engineering) (UiTM)
MEng (Computer and Communication System) (UPM)
BEng (Computer Engineering) (UTM)

**Associate Professor Dr. Tay Kim Gaik**
PhD (Mathematics) (UTM)
Master (Mathematics) (UTM)
Bachelor (Mathematics) (UTM)

**Associate Professor Dr. Chessda Uttraphan a/l Eh Kan**
PhD (Electrical Engineering) (UTM)
MEng (Electrical) (KUiTTHO)
BEng (Electrical) (UTM)

**Associate Professor Dr. Nor Surayahani binti Suriani**
PhD (Electrical, Electronic & System Engineering) (UKM)
MEng (Electrical – Electronics & Telecommunication) (UTM)
BEng (Computer Engineering) (UPM)

**Associate Professor Ts. Dr. Nan bin Mad Sahar**
PhD (Electrical Engineering) (Okayama University)
MEng (System & Communication Engineering) (Okayama University)
BEng (Information & Computer Engineering) (Okayama University)

**Dr. Chew Chang Choon**
PhD (Computer Engineering) (Okayama University)
MEng (Electrical) (KUiTTHO)
BEng (Electrical) (UTM)

**Dr. Chua King Lee**
PhD (Electrical Engineering) (UTHM)
MSc (Microelectronic) (UKM)
BEng (Electrical) (KUiTTHO)

**Dr. Mohamad Hairol bin Jabbar**
PhD (Nanoelectronic & Nanotechnology) (Universite de Grenoble)
MSc (Electrical and Electronic) (Liverpool John Moores University)
BEng (Electrical) (KUiTTHO)

**Dr. Nik Shahidah Afifi binti Md Taujuddin**
PhD (Information Technology) (UTHM)
MSc (Computer Science) (UTM)
BEng (Computer Engineering) (UTM)

**Dr. Radzi bin Ambar**
PhD (Robotic) (Kyushu Institute of Technology)
MEng (Electrical) (UTHM)
BEng (Communication & Computer Engineering) (Toyohashi University of Technology)

**Ts. Dr. Suhaila binti Sari**
PhD (Science and Engineering) (Saitama University)
MSc (Electronic) (Yamagata University)
BEng (Electronic) (Yamagata University)

**Dr. Tasiransurini binti Ab. Rahman**
PhD (Electronic Engineering) (UMP)
MEng (Communication & Computer) (UKM)
BEng (Electrical) (KUiTTHO)

**Mdm. Munirah binti Ab Rahman**
MEng (Electrical – Communication & Computer) (UKM)
BEng (Electrical) (KUiTTHO)

***Specialisation Area: Mechatronic and Robotic Engineering (BER)***

**Professor Dr. Elmy Johana binti Mohamad**
PhD (Electrical Engineering) (UTM)
MEng Electrical – Mechatronics) (UTM)
BEng (Electrical) (KUiTTHO)

**Associate Professor Dr. Rosli bin Omar**
PhD (Autonomous System) (University of Leicester)
MEng (Electrical) (UTM)
BEng (Electrical – Instrumentation & Control System) (UTM)

**Associate Professor Ir. Dr. Tee Kian Sek**
PhD (Mechatronics) (University of Leeds)
BEng (Electrical – Mechatronics) (UTM)

**Associate Professor Ir. Ts. Dr. Mohd Razali bin Tomari**
PhD (Computer Vision and Robotic) (Saitama University)
MSc (Intelligent System) (UPM)
BEng (Electrical – Mechatronic) (UTM)

**Associate Professor Dr. Jamaludin bin Jalani**
PhD (Robotik) (University of Bristol)
MSc (Mechatronic) (IIUM)
BEng (electrical & electronic) (Leeds Metropolitan University)
Dip. (Electronic) (UTM)

**Associate Professor Ir. Dr. Chia Kim Seng**
PhD (Electrical Engineering) (UTM)
BEng (Electrical – Instrumentation & Control) (UTM)

**Associate Professor Dr. Abu Ubaidah bin Shamsudin**
PhD (Robotics) (Tohoku University)
MEng (Mechatronic) (UIA)
BEng (Electrical & Electronic) (UTHM)

**Associate Professor Dr. Herdawatie binti Abdul Kadir**
PhD (Control and Robotic) (USM)
MEng (Electrical – Mechatronic) (UTM)
BEng (Electrical) (UTM)

**Associate Professor Dr. Hisyam bin Abdul Rahman**
PhD (Electrical Engineering) (UTM)
BEng (Electrical – Mechatronic) (UTM)

**Ts. Dr. Ain binti Nazari**
PhD (Electrical, Electronic and System Engineering) (UKM)
MEng (Electrical – Mechatronics & Automatic Control) (UTM)
BEng (Electrical) (UTHM)

**Ir. Dr. Budiman Azzali bin Basir**
PhD (Control System and Digital Electronics) (UTM)
MEng (Mechatronic Engineering) (UTM)
BEng (Mechatronic Engineering) (UTM)

**Dr. Mohamed Najib bin Ribuan**
PhD (Mechatronics) (Okayama University)
MSc (Mechatronics) (Newcastle University)
BEng (Electrical– Mechatronics) (UTM)

**Ts. Dr. Mohammad Afif bin Ayob**
PhD (Electrical Engineering) (UTHM)
MEng (Electrical) (UTHM)
BEng (Electrical) (UTHM)

**Dr. Mohd Fadzli bin Abd Shaib**
PhD (Electrical Engineering) (UTM)
MEng (Electrical) (UTM)
BEng (Electrical & Electronics) (UNITEN)

**Dr. Mohd Hafiz bin A. Jalil @ Zainuddin**
PhD (Electrical Engineering) (UiTM)
MEng (Electrical – Mechatronics) (UTM)
BEng (Electrical) (UiTM)

**Dr. Noor Azizi bin Mardi**
PhD (Control System Engineering) (RMIT University)
BEng (Aerospace Engineering) (University of Minnesota)

**Ir. Dr. Noorhamizah binti Mohamed Nasir**
PhD (Electrical Engineering) (UTHM)
MEng (Electrical) (UTHM)
BEng (Electrical) (UTHM)

**Dr. Rafidah binti Ngadengon @ Ngadungon**
PhD (Electrical Engineering) (UTM)
MEng (Mechatronics) (UTM)
BEng (Communication) (Kitami Institute of Technology)

**Dr. Rohaida binti Mat Akir**
PhD (Electrical and Electronic Engineering) (UKM)
MEng (Electrical – Electronic and Telecommunication) (UTM)
BEng (Electrical - Telecommunication) (UTM)

**Ts. Mohamad Fauzi bin Zakaria**
MEng (Control & Automation) (UPM)
BEng (Electrical) (UTM)

**Ts. Reza Ezuan bin Samin**
MEng (Electrical) (UTHM)
BEng (Electronics) (USM)

***Specialisation Area: Microelectronic Engineering (BEM)***

**Professor Dr. Mohd Khairul bin Ahmad**
PhD Engineering (Electronic) (Shizuoka University)
MEng (Electrical) (UiTM)
BEng (Electronic) (Gunma University)

**Professor Dr. Nafarizal bin Nayan**
PhD Engineering (Electrical Engineering) (Nagoya University)
MEng (Electronic) (Nagoya University)
BEng (Electrical and Electronic) (Nagoya University)

**Associate Professor Dr. Fariza binti Mohamad**
PhD Engineering (Functional Materials Engineering) (Toyohashi University of Technology)
MEng (Electrical & Electronic) (Toyohashi University of Technology)
BEng (Electrical & Electronic) (Toyohashi University of Technology)

**Associate Professor Dr. Marlia binti Morsin**
PhD (Micro Engineering & Nano Electronic) (UKM)
MEng (Electrical) (KUiTTHO)
BEng (Computer Engineering) (UTM)

**Associate Professor Dr. Nabihah@Nornabihah binti Ahmad**
PhD (Electronic Engineering) (Massey University)
MEng (Electrical) (KUiTTHO)
BEng (Electrical and Electronic) (UKM)

**Dr. Intan Sue Liana binti Abdul Hamid**
PhD (Microelectromechanical) (USM)
MEng (Electrical) (UTHM)
BEng (Microelectronic) (UKM)

**Dr. Jais bin Lias**
PhD (Electronic Engineering) (Nagaoka University of Technology)
MEng (Electrical, Electronic & Information Engineering) (Nagaoka University of Technology)
BEng (Electrical & Electronic) (Tottori University)

**Dr. Muhammad Anas bin Razali**
PhD (Electronic Engineering) (University of Surrey)
MSc (Electrical and Electronic) (University of Surrey)
BSc (Electrical and Electronic) (UTM)

**Ir. Ts. Dr. Nurfarina binti Zainal**
PhD (Electrical & Electronic Engineering) (Queen's University Belfast)
BEng (Electrical and Electronic) (Swansea University)

**Dr. Rahmat bin Sanudin**
PhD (Electronic Engineering) (University of Edinburgh)
MEng (Electrical – Electronics and Telecommunications) (UTM)
BEng (Electrical and Electronic) (UNITEN)

**Dr. Riyaz Ahmad bin Mohamed Ali**
PhD (Medical Biosensor) (Osaka University)
MEng (Electrical) (UTHM)
BEng (Electrical) (UTHM)

**Dr. Warsuzarina binti Mat Jubadi**
PhD (Electrical and Electronic Engineering) (University of Manchester)
MEng (Electrical – Electronics and Telecommunications) (UTM)
BEng (Electrical and Electronic) (UTM)

**Mdm. Rosnah binti Mohd Zain**
MEng (Electrical) (KUiTTHO)
BEng (Electrical) (UTM)

***Specialisation Area: Medical Electronic Engineering (BEU)***

**Professor Ts. Dr. Muhammad Mahadi bin Abdul Jamil**
PhD (Electronic Engineering – Medical) (University of Bradford)
BEng (Medical Engineering) (University of Bradford)

**Professor Ir. Dr. Soon Chin Fhong**
PhD (Molecular & Biomedical Engineering) (University of Bradford)
MEng (Electrical) (ITTHO)
BEng (Medical Electronics) (ITTHO)

**Associate Professor Ir. Dr. Audrey Huong Kah Ching**
PhD (Biomedical Optics and Imaging) (University of Nottingham)
BEng (Medical Electronic) (KUiTTHO)

**Associate Professor Ir. Dr. Nabilah binti Ibrahim**
PhD Engineering (Electronic) (Tohoku University)
MEng (Electrical and Computer Science) (Shibaura Institute of Technology)
BEng (Electrical – Communication) (Shibaura Institute of Technology)

**Associate Professor Ts. Dr. Nur Anida binti Jumadi**
PhD (Electrical & Electronic Engineering) (UKM)
MSc (Electrical) (Queen Mary University of London)
BEng (Electrical) (KUiTTHO)

**Associate Professor Dr. Nurmiza binti Othman**
PhD (Electrical and Electronic Engineering) (Kyushu University)
MEng (Electrical and Electronic) (Utsunomiya University)
BEng (Electrical and Electronic) (Utsunomiya University)

**Associate Professor Ir. Dr. Farhanahani binti Mahmud**
PhD Engineering (Biomechanical Science & Bioengineering) (Osaka University)
BEng (Electric & Electronic Engineering) (Toyama University)

**Associate Professor Dr. Wan Mahani Hafizah binti Wan Mahmud**
PhD (Biomedical Engineering) (UTM)
BEng (Biomedical Engineering) (UTM)

**Associate Professor Ts. Dr. Muhammad Hazli bin Hj. Mazlan**
PhD (Biomedical Engineering – Biomechanical) (Kyushu University)
MEng (Biomedical) (UM)
BEng (Electrical) (KUiTTHO)

**Dr. Mohamad Nazib bin Adon**
PhD (Electrical Engineering) (UTHM)
MEng (Electrical – Electronic and Telecommunication) (UTM)
BEng (Electrical) (UTM)

**Dr. Nur Ilyani binti Ramli**
PhD (Electronic Engineering – Medical) (University of Bradford)
BEng (Electrical and Electronic) (Leeds Metropolitan University)

**Dr. Wan Suhaimizan bin Wan Zaki**
Phd (Electrical and Electronic Engineering) (Nottingham University)
MEng (Electronic) (UPM)
BEng (Medical Electronic) (UTM)

**Ms. Masnani binti Mohamed**
MEng (Electrical) (UTM)
BEng (Electrical) (UiTM)

## Department of Electrical Engineering (JKEK)

**Head of Department**
**Associate Professor Ir. Dr. Nor Akmal binti Mohd Jamail**
PhD (Electrical Engineering) (UTM)
MEng (Electrical) (UTHM)
BEng (Electrical) (UTM)

**Professor Ts. Dr. Asmarashid bin Ponniran**
PhD (Power Electronics) (Nagaoka University of Technology)
MEng (Electrical Power) (UTM)
BEng (Electrical) (KUiTTHO)

**Professor Ir. Dr. Erwan bin Sulaiman**
PhD (Electrical Engineering) (Nagoya Institute of Technology)
MSc (Electrical) (KUiTTHO)
BEng (Electrical) (UM)

**Professor Ir. Dr. Mohammad Faiz Liew bin Abdullah**
PhD (Electrical Engineering) (University of Warwick)
MEng (Electrical) (UTM)
BEng (Electrical) (UTM)

**Associate Professor Ir. Ts. Dr. Muhammad Saufi bin Kamarudin**
PhD (Electrical Engineering) (Cardiff University)
MEng (Electrical Power) (UTM)
BEng (Electrical) (UTM)

**Associate Professor Ir. Dr. Dirman Hanafi bin Burhannuddin**
PhD (Electrical Engineering) (UTM)
MEng (Instrumentation & Control) (Institut Teknologi Bandung)
BEng (Electrical) (Universitas Bung Hatta)

**Associate Professor Ts. Dr. Kok Boon Ching**
PhD (Electrical Engineering) (UTM)
MEng (Electrical) (UTM)
BEng (Electrical) (UTM)

**Associate Professor Dr. Shamsul Aizam bin Zulkifli**
PhD (Electrical Engineering) (Loughborough University)
MEng (Electrical Power) (UPM)
BEng (Electrical & Electronics) (UPM)

**Associate Professor Dr. Wahyu Mulyo Utomo**
PhD (Electrical Engineering) (UTM)
MEng (Electrical) (Institut Teknologi Sepuluh Nopember)
BEng (Electrical) (Universitas Brawijaya)

**Associate Professor Ir. Ts. Dr. Rahisham bin Abd Rahman**
PhD (High Voltage Engineering) (Cardiff University)
BEng (Electrical & Electronic) (Cardiff University)

**Associate Professor Ir. Dr. Nur Hanis binti Mohammad Radzi**
PhD (Electrical Power Engineering) (University of Queensland)
MEng (Electrical Power) (UTM)
BEng (Electrical) (UTM)

**Associate Professor Ir. Ir. Dr. Mohd Fairouz bin Mohd Yousof**
Ph.D (High Voltage Engineering) (University of Queensland)
MEng (Electrical Power) (UTM)
BEng (Electrical) (UTM)

**Associate Professor Ts. Dr. Siti Amely Binti Jumaat**
PhD (Electrical Engineering) (UiTM)
MEng (Electrical Power) (UTM)
BEng (Mechatronic) (KUiTTHO)

**Associate Professor Ts. Dr. Sim Sy Yi**
PhD (Electrical & Electronics Engineering) (UTHM)
B.Eng (Electrical & Electronics Engineering) (UTHM)

**Associate Professor Dr. Khairul Anuar bin Mohamad**
PhD (Electronic Engineering) (Muroran Institute of Technology)
MEng (Microelectronic) (University of Newcastle Upon Tyne)
BEng (Electronic) (University of Electro-Communications)

**Associate Professor Dr. Nor Hafizah binti Ngajikin**
PhD (Electrical Engineering) (UTM)
MEng (Electrical) (UTM)
BEng (Electrical - Telecommunication) (UTM)

**Associate Professor Ts. Dr. Mohd Noor bin Abdullah**
PhD (Electrical Power Engineering) (UM)
MEng (Electrical Power) (UTM)
BEng (Electrical) (UTM)

**Dr. Afarulrazi bin Abu Bakar**
PhD (Electrical Engineering) (UTHM)
MEng (Electrical) (UTHM)
BEng (Electrical) (UiTM)

**Ts. Dr. Ahmad Fateh bin Mohamad Nor**
PhD (Electrical Power Engineering) (UTeM)
MEng (Electrical Power Engineering) (UTeM)
BEng (Electrical-Power Electronic and Drive) (UTeM)

**Dr. Jabbar Al-Fattah bin Yahaya**
PhD (Electrical Power Engineering) (UNITEN)
MEng (UM)
BEng (Electronic-Telecommunication) (University of Leeds)

**Ts. Dr. Mahyuzie bin Jenal**
PhD (Electrical Engineering) (UTHM)
MEng (Electrical) (UTHM)
BEng (Electrical) (UTM)

**Dr. Md Zarafi bin Ahmad**
PhD (Electrical Engineering) (UTHM)
MEng (Electrical – Power) (UTM)
BEng (Electrical) (UiTM)

**Dr. Mohd Aifaa bin Mohd Ariff**
PhD (Electrical Engineering) (Imperial College London)
MEng (Electrical Power) (UTM)
BEng (Electrical) (UTM)

**Dr. Nordiana Azlin binti Othman**
PhD (Electrical Engineering) (UTM)
BEng (Electrical) (UTM)

**Dr. Roziah binti Aziz**
PhD (Power Electronics, Drives and Machines) (Newcastle university)
MEng (Electrical) (UTHM)
BEng (Electrical) (UTM)

**Dr. Suriana binti Salimin**
PhD (Electrical Power Engineering) (Newcastle University)
MSc (Power Distribution Engineering) (University of Newcastle Upon Tyne)
BEng (Electrical) (UTM)

**Ts. Dr. Syed Zahurul Islam**
PhD (Electrical Engineering) (UPM)
MEng (Electrical) (UNITEN)
BEng (Computer Science and Engineering) (University of Dhaka)

**Dr. Mimi Faisyalini Ramli**
PhD (Electrical & Electronics Engineering) (University of Manchester)
MEng (Electrical & Electronic Engineering) (UTM)
BEng (Electrical & Electronic Engineering) (UTM)

**Ts. Dr. Zuraidah Binti Ngadiron**
PhD (Electrical Engineering) (UTHM)
M. Eng (Electrical Power Engineering) (UTHM)
B. Eng (Electrical Engineering – Communication (UTM)
Dip. (Electrical Engineering – Communication) (UTM)

**Mdm. Rohaiza binti Hamdan**
MEng (Electrical Power) (UTM)
BEng (Electrical Power) (UNITEN)

**Mr. Suhaimi bin Saiman**
MEng (Electrical Power) (UM)
BEng (Electrical and Electronic) (Leeds Metropolitan University)

## Department of Laboratory and Asset Management (JPMA)

**Laboratory Manager**
**Dr. Mohamed Najib Bin Ribuan**
PhD (Mechatronic) (Okayama University, Japan)
MSc (Mechatronic) (Newcastle University, UK)
BEng (Electrical-Mechatronic) (UTM)

**Mr. Nik Mohd Asri bin Nik Ismail**
MEng (Electrical) (UTHM)
BEng (Electrical) (UiTM)

**Ts. Ezri bin Mohd**
MEng (Electrical) (UTHM)
BEng (Telecommunication) (UTM)

**Mr. Mohd Jais bin Che Soh**
BEng (Electrical) (UM)

**Ts. Muhammad Nafis bin Ismail**
BEng (Electrical) (UTM)

**Ts. Wan Nur Hafsha binti Wan Kairuddin**
MEng (Electrical) (UTHM)
BEng (Electronic) (USM)

**Mr. Abdul Hamid bin Sabran**
Cert. (Electronic Engineering (Communication)) (Poli. Kota Bharu)

**Mr. Aidi bin Basar**
Dip. (Electrical Engineering) (Poli. Merlimau)
Cert. (Electrical Engineering) (Poli. Ibrahim Sultan)

**Mr. Ayoub bin Kasno**
Cert. (Electronic & Computer Technology) (Poli. Ungku Omar)

**Mr. Hairul Nizam bin Tukimin**
Cert. (Electronic Engineering) (Poli. Ibrahim Sultan)

**Mr. K. Kovalan A/L Kanawathi**
Dip. (Electronic Engineering) (Poli. Kota Bharu)
Cert. (Electrical & Electronic Engineering) (Poli. Ibrahim Sultan)

**Mr. M. Nazeri bin Sarmijan**
Dip. (Electrical Engineering) (Poli. Port Dickson)
Cert. (Electrical Power) (Poli. Sultan Hj. Ahmad Shah)

**Mr. Mahmod bin Munajat**
Cert. (Electronic Communication Engineering) (Poli. Ibrahim Sultan)

**Mr. Maslan bin Ahmad**
Cert. (Electronic Communication) (Poli. Kota Bharu)

**En. Mustaffa bin Ahmad**
Dip (Electrical & Electronic Engineering) (Poli. Ungku Omar)

**Mr. Md Hapic bin Mohamad**
Cert. (Electronic Communication) (Poli. Sultan Hj, Ahmad Shah)

**Mr. Md. Rabani bin Adnan**
Dip. (Electrical Engineering (Communication)) (UTM)

**Mr. Md. Zaihan bin Md. Lajis**
Cert. (Electrical Power) (Poli. Sultan Abdul Halim Muadzam Shah)

**Mr. Mohd Shahidan bin Madiah**
Cert. (Electronic Engineering (Control)) (Poli. Ibrahim Sultan)

**Mr. Mohd Shamsuddin bin Muslim**
Cert. (Electrical Power) (Poli. Port Dickson)

**Mr. Mohd Zaki bin Zakaria**
Cert. (Electrical & Electronics Engineering) (Poli. Ibrahim Sultan)

**Mdm. Nooreis Shadila binti Jarkasi**
Dip. (Electronic Engineering (Computer)) (Poli. Seberang Perai)
Cert. (Electrical & Electronics Engineering) (Poli. Ibrahim Sultan)

**Mr. Norazizi bin Hamisan**
Dip (Electronic Engineering) (Poli. Ibrahim Sultan)
Cert (Electrical Engineering) (Poli Port Dickson)

**Mdm. Nurain binti Azizul**
Cert. (Electrical and Electronic Engineering) (Poli. Port Dickson)

**Mdm. Nurul Aqla binti Abdul Razak**
Dip. (Electrical & Electronic Engineering) (Poli. Ibrahim Sultan)
Cert. (Electrical & Electronics Engineering) (Poli. Ibrahim Sultan)

**Mr. Ramlan bin Ralim**
Dip. (Electronics Communication Engineering) (Poli.Sultan Hj. Ahmad Shah)
Cert. (Electronics Communication Engineering) (Poli.Sultan Hj. Ahmad Shah)

**Mr. Rosley bin Sawarno**
Cert. (Electronics Control) (PSA)

**Mr. Sahalan bin Yasin**
Cert. (Electronic Communication Engineering) (Poli. Sultan Hj. Ahmad Shah)

**Mr. Sharifunazri bin Johari**
Cert. (Electronic Communication) (Poli.Sultan Hj. Ahmad Shah)

**Mdm. Siti Ruslina binti Mohamad Rusli**
Dip. (Electronics Engineering) (UiTM)

**Mdm. Suhaini binti Tunan**
Cert. (Electrical Power) (Poli. Port Dickson)

**Mr. Syafiq Afiq bin Sulaiman**
Cert. (Electrical Engineering) (Poli. Ibrahim Sultan)

**Mr. Uzli bin Yusof**
Cert. (Electronic Engineering (Communication)) (Poli.Sultan Hj. Ahmad Shah)

**Mdm. Wan Nor Azliza binti Wan Abdullah**
Dip. (Electronic Engineering (Computer)) (Poli.Sultan Hj. Ahmad Shah)
Cert. (Electronic Engineering (Control)) (Poli. Ibrahim Sultan)

**Mdm. Junaidah binti Azlan**
Sijil Penolong Pegawai Sains Program Bridging, UTM

**Mdm. Wasnita binti Hamsan**
Sijil Penolong Pegawai Sains Program Bridging, UTM

# PROGRAMME INFORMATION

# BACHELOR OF ELECTRONIC ENGINEERING (ROBOTICS AND ARTIFICIAL INTELLIGENCE SYSTEMS) WITH HONOURS (BEA)

**About the Programme**

This programme is designed in alignment with the latest developments in electronic engineering, with particular emphasis on Robotics and Artificial Intelligence Systems, to equip students with the competencies required to address complex engineering problems in this field. The programme structure comprises core electronic engineering courses, specialised elective courses in Robotics and Artificial Intelligence Systems, and laboratory components that integrate experimental work and engineering practice. Graduates of the programme are trained to be technically competent and professionally prepared to meet industrial demands at both national and international levels. In addition, they are equipped with essential generic skills that are applied holistically in professional engineering practice. Furthermore, the programme nurtures graduates to uphold ethical standards and professional integrity in fulfilling the needs and expectations of the global society

**Programme Structure and Assessment**

This program consists of 135 credits to be completed within eight (8) semesters. Assessment of students' performance is based on formative and summative evaluation conducted throughout each semester. The short semester in Year 3 is occupied for industrial training.

**Duration and Award**

Duration : Full Time – Four (4) Years. Intake in October and March
Awards : Bachelor of Electronic Engineering (Robotics and Artificial Intelligence Systems) With Honours

**Year 1 (Semester 1 & 2)**
Occupational Safety and Health, Computer Programming, Electric Circuits I, Instrumentation and Measurement, Fundamental of Electronic Laboratory, Ordinary Differential Equations, Multivariable Calculus, Electric Circuits II, Analog Electronics and Digital Electronics.

**Year 2 (Semester 3 & 4)**
Creativity and Innovation, Numerical Methods, Control Systems, Signals and Systems, Programming for Engineers, Electronic Engineering Laboratory I, Engineering Economics and Entrepreneurship, Engineering Statistics, Electromagnetic Fields and Waves, Power Systems, Artificial Intelligence, and Electronic Engineering Laboratory II.

**Year 3 (Semester 5 & 6)**
Engineers and Society, Engineering Management, Engineering Practices, Electronic Circuits Analysis and Design, Electronic Communication Systems, Microprocessor and Computer Organisation, Digital Signal Processing, Integrated Design Project, Industrial Automation Systems, Data Science for Engineers, Real-Time Embedded Systems and Electronic Engineering Laboratory III.

**Year 3 (Short Semester – 10 Weeks)**
Industrial Training.

**Year 4 (Semester 7 & 8)**
Final Year Project I, Elective Course I, Elective Course II, Robotic Systems, Vision Systems, Microcontroller & Real-Time Systems Laboratory, Final Year Project II, Elective Course III, Mobile Robotics, Intelligent Control Systems and Design and Automation Engineering Laboratory.

**Professional Accreditation**
This program is recognized by the Public Service Department of Malaysia and accredited by the Malaysian Qualification Agencies (MQA) and Engineering Accreditation Council (EAC).

**Career Opportunities**
Robotics Engineer, AI Engineer, Machine Learning Engineer, Autonomous Engineer, Control and Automation Engineer, Data Analyst for Engineering Systems, Embeded Systems Engineer/developer, Vison Systems Engineer, Process Engineer, Mechatronics Engineer, Control & Instrumentation Engineer, Automation Engineer, Machine Software Engineer, Electronics Design Engineer, Data Scientist, Manufacturing Engineer, Smart Manufacturing Engineer, Industrial Robotic Engineer, IIoT Engineer and R&D Engineer

**Commencement of Study**
Twice a year in October and March

**Contact Us**
UTHM website: https://uthm.edu.my/
FKEE website: https://fkee.uthm.edu.my/
Regarding Bachelor of Electronic Engineering with Honours Programme (BEJ)
Dr. Wan Suhaimizan bin Wan Zaki
☎ +607 – 456 4506
✉ mizan@uthm.edu.my

# PROGRAMME EDUCATIONAL OBJECTIVES (PEO)

| PEO | Statement |
|---|---|
| 1 | Graduates Electronic Engineering who establish themselves as globally recognised, competent, and professional talents, contributing effectively to sustainable technology or transportation industries. |
| 2 | Graduates who demonstrate resilience, adaptability, and a technopreneurial mindset in addressing societal and industrial challenges through innovative and sustainable solutions. |
| 3 | Graduates who uphold trustworthiness, ethical values, and good governance in leadership roles while continuously engaging in lifelong learning and career growth. |

# PROGRAMME LEARNING OUTCOMES (PLO)

| PLO | Domain | PLO Statement |
|---|---|---|
| 1 | Engineering Knowledge (EAC 1) | Apply knowledge of mathematics, natural science, computing and engineering fundamentals, and an engineering specialization as specified in WK1 to WK4 respectively to develop solutions to complex engineering problems |
| 2 | Problem Analysis (EAC 2) | Identify, formulate, research literature and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences and engineering sciences with holistic considerations for sustainable development (WK1 to WK4) |
| 3 | Design/Development of Solutions (EAC 3) | Design creative solutions for complex engineering problems and design systems, components or processes to meet identified needs with appropriate consideration for public health and safety, whole-life cost, net zero carbon as well as resource, cultural, societal, and environmental considerations as required (WK5) |
| 4 | Investigation (EAC 4) | Conduct investigation of complex engineering problems using research methods including research-based knowledge, including design of experiments, analysis and interpretation of data, and synthesis of information to provide valid conclusions (WK8) |
| 5 | Tool Usage (EAC 5) | Create, select and apply, and recognize limitation of appropriate techniques, resources, and modern engineering and IT tools, including prediction and modelling, to complex engineering problems, (WK2 and WK6) |
| 6 | The Engineer and the World (EAC 6) | Analyze and evaluate sustainable development impacts to: society, the economy, sustainability, health and safety, legal frameworks, and the environment, in solving complex engineering problems (WK1, WK5, and WK7) |
| 7 | Ethics (EAC 7) | Apply ethical principles and commit to professional ethics and norms of engineering practice and adhere to relevant national and international laws. Demonstrate an understanding of the need for diversity and inclusion (WK9) |
| 8 | Individual & Collaborative Team Work (EAC 8) | Function effectively as an individual, and as a member or leader in diverse and inclusive teams and in multidisciplinary, face-to-face, remote and distributed settings (WK9) |
| 9 | Communication (EAC 9) | Communicate effectively and inclusively on complex engineering activities with the engineering community and with society at large, such as being able to comprehend and write effective reports and design documentation, make effective presentations, taking into account cultural, language, and learning differences |
| 10 | Project Management and Finance (EAC 10) | Apply knowledge and understanding of engineering management principles and economic decision-making and apply these to one's own work, as a member and leader in a team, and to manage projects in multidisciplinary environments |
| 11 | Life Long Learning (EAC 11) | Recognise the need for, and have the preparation and ability for i) independent and life-long learning ii) adaptability to new and emerging technologies and iii) critical thinking in the broadest context of technological change (WK8) |

# Study Plan

## YEAR 1

| Sem. | Course Code | Course Name | Credit |
|---|---|---|---|
| 1 | UQI10102 | *Islamic Studies (local muslim) | 2 |
| | UQI10202 | *Moral Studies (local non-muslim) | 2 |
| | UQI10902 | **Islam in Malaysia (international) | 2 |
| | UQI11002 | **Moral and Professional Ethics (international) | 2 |
| | UQU11202 | *Integrity and Anti-Corruption (local) | 2 |
| | UQU12302 | **Citra Malaysia (international) | 2 |
| | UHB14202 | **Bahasa Melayu Komunikasi 2 (international) | 2 |
| | BEE12202 | Occupational Safety and Health | 2 |
| | BEE11203 | Ordinary Different Equations | 3 |
| | BEJ10102 | Computer Programming | 2 |
| | BEJ10303 | Electric Circuit I | 3 |
| | BEJ10702 | Instrumentation and Measurement | 2 |
| | BEJ10801 | Fundamental Electronics Laboratory | 1 |
| | **Total** | | **17** |

| Sem. | Course Code | Course Name | Credit |
|---|---|---|---|
| 2 | UHB13102 | English for General Communication | 2 |
| | UQU12102 | *Aspira Negara Bangsa (local) | 2 |
| | UQI11902 | *Philosophy and Current Challenges (local) | 2 |
| | UQU12002 | **Integrity and Anti-Corruption (international) | 2 |
| | BEE20303 | Multivariable Calculus | 3 |
| | BEJ10403 | Electric Circuit II | 3 |
| | BEJ10503 | Analog Electronics | 3 |
| | BEJ10603 | Digital Electronics | 3 |
| | **Total** | | **18** |

## YEAR 2

| Sem. | Course Code | Course Name | Credit |
|---|---|---|---|
| 3 | UQ*1XX01 | Co-Curriculum I | 1 |
| | UHB1XX02 | *Foreign Language (local) | 2 |
| | UHB24202 | **Bahasa Melayu Komunikasi 4 (international) | |
| | BEE22402 | Creativity and Innovation | 2 |
| | BEE32402 | Numerical Methods | 2 |
| | BEJ20503 | Control Systems | 3 |
| | BEJ20203 | Signals and Systems | 3 |
| | BEJ20701 | Electronic Engineering Laboratory I | 1 |
| | BEJ24102 | Programming for Engineers | 2 |
| | **Total** | | **16** |

| Sem. | Course Code | Course Name | Credit |
|---|---|---|---|
| 4 | UQ*1XX01 | Co-Curriculum II | 1 |
| | UHB23102 | English for Technical Communication | 2 |
| | BEE22503 | Engineering Economic and Entrepreneurship | 3 |
| | BEE32502 | Engineering Statistics | 2 |
| | BEJ20303 | Electromagnetic Fields and Waves | 3 |
| | BEJ20603 | Power Systems | 3 |
| | BEJ20801 | Electronic Engineering Laboratory II | 1 |
| | BEJ24203 | Artificial Intelligence | 3 |
| | **Total** | | **18** |

## YEAR 3

| Sem. | Course Code | Course Name | Credit |
|---|---|---|---|
| 5 | BEE32302 | Engineers and Society | 2 |
| | BEJ31303 | Microprocessor and Computer Organisation | 3 |
| | BEJ30403 | Electronic Circuits Analysis and Design | 3 |
| | BEJ30103 | Electronic Communication Systems | 3 |
| | BEJ34103 | Industrial Automation Systems | 3 |
| | BEJ34203 | Data Science for Engineers | 3 |
| | BEJ30801 | Electronic Engineering Laboratory III | 1 |
| | **Total** | | **18** |

| Sem. | Course Code | Course Name | Credit |
|---|---|---|---|
| 6 | UHB33102 | English for Professional Communication | 2 |
| | BEE30103 | Engineering Management | 3 |
| | BEE32603 | Integrated Design Project | 3 |
| | BEJ30603 | Digital Signal Processing | 3 |
| | BEJ30701 | Engineering Practices | 1 |
| | BEJ44182 | Real-Time Embedded Systems | 2 |
| | **Total** | | **14** |

| Sem. | Course Code | Course Name | Credit |
|---|---|---|---|
| | BEE32205 | Industrial Training | 5 |
| | **Total** | | **5** |

**YEAR 4**

| Sem. | Course Code | Course Name | Credit |
|---|---|---|---|
| 7 | BEE40602 | Final Year Project I | 2 |
| | BEJ44203 | Robotic Systems | 3 |
| | BEJ44113 | Vision Systems | 3 |
| | BEJ44131 | Microcontroller & Real-Time Systems Laboratory | 1 |
| | XXXxxxx3 | Elective Course I | 3 |
| | XXXxxxx3 | Elective Course I | 3 |
| | **Total** | | **15** |

| Sem. | Course Code | Course Name | Credit |
|---|---|---|---|
| 8 | BEE40704 | Final Year Project II | 4 |
| | BEJ44703 | Mobile Robotics | 3 |
| | BEJ44103 | Intelligent Control Systems | 3 |
| | BEJ44121 | Design and Automation Engineering Laboratory | 3 |
| | XXXxxxx3 | Elective Course I/II/III | 3 |
| | **Total** | | **14** |

## ELECTIVE COURSES – Robotics and Artificial Intelligence Systems Specialisation

### Compulsory Courses

| Course Code | Course Name | Credit |
|---|---|---|
| BEJ20503 | Control Systems | 3 |
| BEJ24102 | Programming for Engineers | 2 |
| BEJ24203 | Artificial Intelligence | 3 |
| BEJ34203 | Data Science for Engineers | 3 |
| BEJ44131 | Microcontroller & Real-Time Systems Laboratory | 1 |
| BEJ34103 | Industrial Automation Systems | 3 |
| BEJ44113 | Vision Systems | 3 |
| BEJ44103 | Intelligent Control Systems | 3 |
| BEJ44203 | Robotic Systems | 3 |
| BEJ44182 | Real-Time Embedded Systems | 2 |
| BEJ44121 | Design and Automation Engineering Laboratory | 1 |
| BEJ44703 | Mobile Robotics | 3 |

### Elective Course I (Choose two/three)

| Course Code | Course Name | Credit |
|---|---|---|
| BEE41603 | Robot Operating Systems (ROS) | 3 |
| BEJ44183 | Manufacturing System | 3 |
| BEJ44503 | Digital Control Systems | 3 |
| BEJ44603 | Process Control Systems | 3 |
| BEJ44803 | Mechatronic Mechanism | 3 |
| BEJ44903 | Instrumentation and Measurement in Oil and Gas | 3 |
| BEJ44143 | Big Data Analytics and Application | 3 |
| BEJ44153 | Internet of Things | 3 |
| BEJ44163 | Data Structures and Algorithm Analysis | 3 |

**Elective Course II (Master General)**

| Course Code | Course Name | Credit |
|---|---|---|
| MEE10103 | Advanced Engineering Mathematics | 3 |
| MEE10203 | Programmable Electronic | 3 |
| MEE10303 | Advanced Digital Signal Processing | 3 |
| MEE10403 | Computational Intelligence | 3 |
| MEE10603 | Advanced Power Electronics | 3 |

**Elective Course III (General)**

| Course Code | Course Name | Credit |
|---|---|---|
| EEF40103 | Introduction to Big data | 3 |
| EWF40103 | Data Science and Applications | 3 |
| BEE41103 | HCIA Routing and Switching | 3 |
| BEE41203 | HCIA Cloud Computing | 3 |
| BEE41303 | HCIA Artificial Intelligence | 3 |
| UQU40103 | Professional at Work | 3 |
| BEE41503 | Photovoltaic Systems | 3 |
| BEE41403 | Electric Vehicles | 3 |
| BEJ43903 | Analog IC Design | 3 |
| EWF40203 | Data Visualisation | 3 |
| EIF40103 | Machine Learning | 3 |
| BEJ44173 | Electrical Machines | 3 |
| BEE41703 | Business Start-up and Technopreneurship | 3 |

# Synopsis of Compulsory University Courses

**UHB 13102 English for General Communication**

*Synopsis:*
This course aims to develop students' existing English Language skills. Through guided and independent learning activities, students will develop their skills in reading, listening, writing and speaking. At the end of the course, students should be able to recognize relevant information in texts on topics of interest and students should also be able to write on familiar topics. Furthermore, this course will provide students with opportunities to enhance their listening and speaking skills.

*References:*

1 Council of Europe (2023). Common European Framework of Reference for Languages: Learning, Teaching, Assessment – Companion Volume. Retrieved from https://rm.coe.int/common-european-framework-of-reference-for-languages-learning-teaching/16809ea0d4
2 Cambridge University Press (2023). English Grammar in Use: A Self-study Reference and Practice Book for Intermediate Learners of English.Retrieved from https://www.cambridge.org/elt/resources/grammar-in-use
3 Oxford University Press (2023). Oxford Learner's Dictionary of Academic English.Retrieved from https://www.oxfordlearnersdictionaries.com/ Cambridge Assessment English (2025). B1 Preliminary.Retrieved from https://www.cambridgeenglish.org/exams-and-tests/preliminary/
4 National Geographic Learning (2025). Pathways: Listening, Speaking, and Critical Thinking – Intermediate Level. Retrieved from https://www.eltngl.com/pathways TESOL International Association (2025). TESOL Resource Center. Retrieved from https://www.tesol.org/resource-center/


**UHB 23102 English for Technical Communication**

*Synopsis:*
This course introduces students to basic information of technical communication such as technical definition and description by using high degree of grammatical control. At this level, students will be exposed to the different types of proposal writing. In addition, students will also learn about the components of technical documents. Finally, students are also expected to execute and present an event.

*Pre-requisite*: A pass in English for General Communication

*References:*

1 Newby, P. (2014). Research methods for education. (2nd ed.). Abingdon: Routledge. LB1028.N48 2014.
2 Paige, W. (2015). The least you should know about English: Writing skills. Stamford, CT: Cengage Learning. PE1408 .G43 2015
3 Randall, V. (2015).The college writer: A guide to thinking, writing, and researching. Australia : Wadsworth. PE1408 .C64 2015
4 Sekaran, U. (2013). Research methods for business: A skillbuilding approach. (6th ed.). Chichester, West Sussex: Wiley. HD30.4.S44 2013.


**UHB 33102 English for Professional Communication**

*Synopsis:*
This course equips students with the necessary English language skills to communicate effectively and professionally in workplace settings. It enhances students' written and oral communication through professional etiquette, structured meetings, and persuasive pitching techniques. Through practical exercises and real-world scenarios, students will develop confidence in writing professional documents, participating in meetings, and delivering impactful presentations. The course also emphasises interpersonal communication, active listening, and the ability to engage diverse audiences in professional contexts.

*Pre-requisite:* A pass in English for Technical Communication

*References:*


1 Challender, J. (Ed.). (2022). Professional ethics in construction and engineering. John Wiley & Sons Ltd. https://doi.org/10.1002/9781119832119
2 Glückler, J., Winch, C., et al. (2023). Professions and proficiency (1st ed.). Springer International Publishing AG. (Knowledge and Space Series)
3 Mullany, L., & Schnurr, S. (Eds.). (2022). Globalisation, geopolitics, and gender in professional communication. Routledge. [eBook]. Retrieved from eBook Collection (EBSCOhost).
4 Price, H., & McIntyre, D. (2023). Communicating linguistics: Language, community and public engagement (1st ed.). Taylor & Francis Group.
5 Räisänen, T., Hynninen, N., & Kankaanranta, A. (2022). English as a business lingua franca. In Reference module in social sciences. Elsevier. [eBook].
6 Schauer, G. A. (2024). Intercultural competence and pragmatics. Palgrave Macmillan. https://doi.org/10.1007/978-3-031-44472-2


**UHB 14202 **Bahasa Melayu Komunikasi 2 (International students)**

*Synopsis:*

This course is designed for international students to communicate in basic Malay in daily situations. Students are exposed to speaking and writing in simple Malay. Teaching and learning will be delivered through lecture, tutorial, assignment and indoor or outdoor experiential learning. At the end of this course, students will be able to speak and write using simple sentences effectively.

*References:*


1 Yong, C. C., Rohaidah Mashudi, Maarof Abd Rahman. (2012). Bahasa Kebangsaan untuk Pelajar Luar Negara: Malay Language for International Students. Petaling Jaya: Pearson Malaysia.
2 Zarina Othman, Roosfa Hashim & Rusdi Abdullah. (2012). Modul Komunikasi Bahasa Melayu Antarabangsa, KPT. Penerbit UKM Press.
3 Mardian Shah Omar. (2016). Perbualan Mudah Bahasa Melayu Untuk Pelancong Asing. Kuala Lumpur: Dewan Bahasa dan Pustaka
4 Nik Safiah Karim, Farid M. Onn, Hashim Haji Musa dan Abdul Hamid Mahmood. (2004). Tatabahasa Dewan, Edisi Baru. Kuala Lumpur: Dewan Bahasa dan Pustaka.
5 Norhashimah Jalaluddin, Mardian Shah Omar dan Norzilawati Jais. (2006). Bahasa Melayu untuk Penutur Asing. Buku 1 dan 2. Kuala Lumpur: Dewan Bahasa dan Pustaka.


**UHB 1XX02 Foreign Language**

*Synopsis:*

Students will need to register only ONE (1) foreign language course throughout their study. Wide selection is available such as Mandarin, Spanish, Japanese, Arabic, German and French.

***All courses related to English and Foreign Language are conducted by Centre for Language Studies (CLS, UTHM). Kindly visit their website or contact for more information.*

**UQI10102 Islamic Studies (local muslim students)**

*Synopsis:*

This course explains about Islamic concept as ad-deen. It discusses the study of al-Quran and al-Hadith, Sunnism, schools of Islamic theology, development of schools of Fiqh, principles of muamalat, Islamic Criminal Law, Islamic work ethics, issues in Islamic family law and current issues.

*References:*


1 Harun Din (Dr.) (2001), Manusia Dan Islam, cetakan pertama, Kuala Lumpur: Dewan Bahasa dan Pustaka. [BP174. M36 1990]
2 Mustafa Abdul Rahman (1998), Hadith 40, Kuala Lumpur: Dewan Pustaka Fajar. [BP135. A2 M87 1998]
3 Ismail Haji Ali, (1995), Pengertian dan Pegangan Iktikad yang benar: Ahli Sunnah Wal Jamaah: Kuala Lumpur: Penerbitan al-Hidayah. [BP166.78. P46 1995]
4 Paizah Haji Ismail (1991), Undang-undang Jenayah Islam, Kuala Lumpur: Dewan Pustaka Islam, Angkatan Belia Islam Malaysia. [BP144. P35 1991]
5 Mustafa Haji Daud (1989), Institusi Kekeluargaan Islam, Kuala Lumpur: Dewan Pustaka dan Bahasa. [BP188.3. F3.M87 1989]

**UQI 11002 Moral and Professional Ethics (local non-muslim students)**

*Synopsis:*
This course explains concepts of moral, aspects of moral and its importance in daily lives, Western moral theories and moral values of great religions of the world, moral values in work and current moral issues.

*References:*

1 Mohd Nasir Omar. (2010). Falsafah Akhlak, Penerbit Universiti Kebangsaan Malaysia, Bangi. [BJ1291 .M524 2010].
2 Hussain Othman. (2009). Wacana Asasi Agama dan Sains. Batu Pahat: Penerbit UTHM. [BL 240.3 H87 2009ª].
3 Hussain Othman, S.M. Dawilah Al-Edrus, Berhannudin M. Salleh & Abdullah Sulaiman. (2009). PBL Untuk Pembangunan Komuniti Lestari. Batu Pahat: Penerbit UTHM. [LB 1027.42 P76 2009a].
4 Eow Boon Hin. (2002). Moral Education. Longman. [LC268 .E48 2008].
5 Ahmad Khamis. (1999). Etika Untuk Institusi Pengajian Tinggi. Kuala Lumpur: Kumpulan Budiman. [LC315.M3 .A35 1999].


Courses listed below are also part of University requirement:

| | |
|---|---|
| UQU11202 | *Integrity and Anti-Corruption (local) |
| UQU12302 | Citra Malaysia (international) |
| UQU12102 | *Aspira Negara Bangsa (local) |
| UQI11902 | *Philosophy and Current Challenges (local) |
| UQU12002 | **Integrity and Anti-Corruption (international) |
| UQ* 1XXX1 | Co-Curriculum I |
| UQ* 1XXX1 | Co-Curriculum II |

***All courses related to Social Science, Co-Curriculum and Islamic Studies are conducted by Centre for General Studies and Co-Curricula (PPUK, UTHM). Kindly visit their website or contact them for more information.*

# Synopsis of Mathematics Courses

**BEE 11203 Ordinary Differential Equations**

*Synopsis:*
This course is mainly about the study of mathematical concepts through the use of knowledge of differential equations. First, students will be introduced to the concept of differential equations including the first order differential equation, second order differential equation and system of first-order differential equations. Then, the concept of series solution for differential equations. Next, students will be introduced to the techniques of Laplace transform for solving differential equations.

*References:*

1 Tay Kim Gaik, Sharifah Saon, Jong Siat Ling, ELfarizanis Baharudin (2022). Ordinary Differential Equations, UTHM Edition
2 Claycomb, James R. (2018). Mathematical Methods for Physics – Using MATLAB and Maple - 5.8.4.3 Direction Field and Phase Portrait. Mercury Learning and Information. Retrieved from https://app.knovel.com/hotlink/pdf/id:kt011Q8X73/mathematical-methods/direction-field-phase"
3 "Engineering Mathematics Group. (2018). Mathematics Formulae for Engineers and Scientists. Penerbit Universiti Sains Malaysia. Retrieved from https://app.knovel.com/hotlink/toc/id:kpMFES0001/mathematics-formulae/mathematics-formulae"
4 Pal, Srimanta Bhunia, Subodh C. (2015).Engineering Mathematics. Oxford University Press. Retrieved from https://app.knovel.com/hotlink/toc/id:kpEM000007/engineering-mathematics/engineering-mathematics
5 Tenenbaum, Morris Pollard, Harry. (1963). Ordinary Differential Equations - An Elementary Textbook for Students of Mathematics, Engineering, and the Sciences.</i> Dover Publications. Retrieved from https://app.knovel.com/hotlink/toc/id:kpODEAETS3/ordinary-differential/ordinary-differential


**BEE 20303 Multivariable Calculus**

*Synopsis:*
This course aims to equip students with the knowledge of Functions of Several Variables, Coordinate Systems, Multiple Integrals and Vector Calculus, as the basic knowledge to support their engineering courses.

*References:*

1 Mendelson, Elliott (2022). Schaum's Outline of Calculus. 7th ed. New York: McGraw Hill. https://www-accessengineeringlibrary-com.ezproxy.uthm.edu.my/content/book/9781264258338
2 James Stewart, Daniel Clegg, and Saleem Watson (2021). Calculus: Metric Version. 9th ed. USA: Cengage Learning.
3 Deborah Hughes-Hallett, Andrew M. Gleason, William G. McCallum (2021). Calculus: Single and Multivariable, 8th ed. USA: Wiley
4 Lipschutz, Seymour, John Liu, and Murray R. Spiegel (2018). Schaum's Outline: Mathematical Handbook of Formulas and Tables. 5th ed. New York: McGraw-Hill Education. https://www-accessengineeringlibrary-com.ezproxy.uthm.edu.my/content/book/9781260010534
5 Robert T. Smith, and Roland B. Minton (2012). Calculus Early Transcendental Function (3rd Edition). New York: McGraw-Hill (QA303.2 .S644 2012)
6 Wrede, Robert, and Murray Spiegel (2010). Schaum's Outline of Advanced Calculus. 3rd ed. New York: McGraw-Hill. [Call number: QA303.2 .W74 2010] https://www-accessengineeringlibrary-com.ezproxy.uthm.edu.my/content/book/9780071623667


**BEE 32402 Numerical Methods**

*Synopsis:*
This course introduces several techniques to solve mathematical engineering problems using numerical estimation and requires an elementary knowledge of functions and linear algebra. It begins with an introduction to a computational method, followed by discussing the several algorithms to solve a linear and a non-linear equation. An analysis using numerical methods on differentiation and integration equations also will be introduced. Besides, an estimation technique using the extrapolation method will be taught to improve result accuracy.

*References:*

1 Kim Gaik Tay, Chang Phang, Piau Phang (2022). Numerical Methods with CASIO FX-570EX CLASSWIZ CALCULATOR, Penerbit UTHM.
2 Esfandiari, Ramin S (2017). Numerical methods for engineers and scientists using MATLAB – 2nd ed. CRC Press, Taylor & Francis Group. [Library call no.: TA335. E84. 2017]

3 Petras, Ivo. (2016). Advances in numerical methods in engineering with MATLAB. Auris Reference Ltd. [Library call no.: QA297. A38. 2016]
4 Chapra, Steven C. (2015). Numerical methods for engineers – 7th ed. McGraw-Hill Education. [Library call no.: TA345. C42. 2015]
5 Qingkai Kong, Timmy Siauw ,Alexandre M.Bayen (2020).Phyton Programming and Numerical Methods: A Guide for Engineers and Scientists, https://www-sciencedirect-com.ezproxy.uthm.edu.my/book/9780128195499/python-programming-and-numerical-methods

**BEE 32502 Engineering Statistics**

*Synopsis:*
This course introduces the concept of statistics to be applied in engineering applications. Topics covered in this course include sampling distributions, estimation, hypothesis testing, and linear regression. Relevant software will be used to perform statistical analysis to generate conclusions based on the given data.

*References:*
1 James T. McClave (2013). Statistics (12th Edition). Pearson. QA276.12 .M34 2013
2 William Navidi (2015). Statistics for engineers and scientists (4th edition). McGraw-Hill. QA276.4 .N38 2015
3 Ronald E. Walpole (2016). Probability and statistics for engineers and scientists (9th edition)). Pearson. TA340 .P79 2016
4 Deborah J. Rumsey (2019). Statistics essential for dummies. John Wiley and Sons. Online: https://ebookcentral.proquest.com/lib/uthm-ebooks/detail.action?docID=5751855&query=

# Synopsis of Core Faculty Courses

**BEE 12202 Occupational Safety and Health**

*Synopsis:*
This course introduces students to knowledge and skills in occupational safety and health in the workplace. Scope of study includes Health, Safety and Environment Managements: Introduction to OSH, OSHA 1994 (Act 514), FMA 1967, EQA 1974, Occupational Safety and Health Management System, Safety, Health and Environment Culture; Risk Management and Assessment: Introduction to Risk Management, Risk Assessment Techniques, HIRARC; Physical Injury & Controls: Introduction to Physical Injury, Construction Work, Electrical Work, Mechanical Work, Chemical Work; Health Hazards: Introduction to Health Hazards & Hygiene, Chemical Hazards, Physical Hazards, Biological Hazards, Hygiene; Accident Investigation & Reporting: Introduction, Accident Investigation, Investigations and Causes of Incident, Incident Analysis and Data Collection Method..

*References:*

1 Occupational Safety and Health Act and Regulations. MDC Publishers Printer Sdn. Bhd. 2001. Call number: KPG1390.M34 2001 rw N2.
2 Factories and Machinery Act & Regulations. MDC Publishers Printer Sdn. Bhd. 2001. Call number: KPG1390.A31967 .A4 2001 rw N1.
3 Ismail Bahari. (2006). Pengurusan Keselamatan dan Kesihatan Pekerjaan. Edisi ke-2. McGraw Hill Education (Malaysia). Call number: T55.I85 2006.
4 Davies, V. J. and Tomasin K. (2006). Construction Safety Handbook. 2 nd ed. Thomas Telford. Call number: TH443.R43 2006.
5 Anton, Thomas J. (2009). Occupational Safety and Health Management. 3rd ed. McGraw-Hill. Call number: T55.A57 1989.


**BEE 22402 Creativity and Innovation**

*Synopsis:*
This course focuses on developing a creative person who will eventually think strategically, creatively and critically. The knowledge and skills acquired throughout the course will later be applied by the students in solving problems and making decisions in the future. In this course, students will be exposed to various creativity and problem solving techniques. Some of the skills to be covered throughout the course are problem solving, techniques in creativity and techniques in innovation. Students will also be participating in exhibitions and competitions. This course will also cover the industry needs by introducing them to the TRIZ concepts.

*References:*

1 Gadd, Karen (2011), TRIZ for engineers: enabling inventive problem solving, ISBN 9780470741887, (T212 .G32 2011).
2 Savransky, Semyon D.(2000), Engineering of creativity : introduction to TRIZ methodology of inventive problem solving ISBN 9780849322556 (TA153 .S28 2000)
3 Terninko, John (1998), Systematic innovation : an introduction to TRIZ ; (theory of inventive problem solving) ISBN 9781574441116 (HD30.29 .T47 1998)
4 Rantanen, Kalevi, Simplified TRIZ: new problem-solving applications for engineers and manufacturing ISBN 9781574443233 (TA153 .R36 2002 n.1)


**BEE 22503 Engineering Economics and Entrepreneurship**

*Synopsis:*
This course covers topics about engineering economics and entrepreneurship. On the engineering economics aspect, the course starts with the analysis of engineering economics and subsequently the principles and application of money-time relationships. On the other hand, this course considers various topics related to basic entrepreneurship including introduction to technology entrepreneurship, business plan and ownership, new product development and intellectual properties, technology commercialization and managing business.

*References:*

1 DeGarmo, E. Paul (1997). Engineering Economy, Prentice-Hall, TA177.4. E63. 1997.
2 Sullivan, William G. (2009). Engineering Economy, Pearsonl, TA177.4 .S94 2009.
3 Kamariah Ismail, Noraini Abu Talib, Mohd. Hassan et al. (2009). Technology Entrepreneurship, Prentice-Hall. Call number HD45 .T44 2009.
4 UiTM Entrepreneurship Study Group (2004). Fundamentals of Entrepreneurship, revised edition, Prentice-Hall. Call number HB615 .F86 2004.

5 Bruce R. Barringer, R. Duane Ireland (2010). Entrepreneurship: successfully launching new ventures, 3rd Edition. Prentice-Hall. Call number HB615 .B37 2010.
6 Charles E. Bamford, Garry D. Bruton (2011). Entrepreneurship: a small business approach. New York: McGraw-Hill. Call number HD62.5 .B35 2011.
7 Schaper M., Volery, T, Weber, P., Lewix, K., (2011). Entrepreneurship and small business; 3rd Asia-Pacific Edition. John Wiley & Son. Call number HD2341 .E57 2011.
8 Jamal Nassar, (2018) Technopreneurship Financing & Startups Ecosystem: How Malaysia Is Creating Another Success Story; Call number HD62.5 .J35 2018
9 Rambat Lupiyoadi, Kurniawan (2020) Technopreneurship, Penerbit Salemba Empat 2020.
10 Shelters David (2013) Start-Up Guide for the Technopreneur, John Wiley, Call number: HD62.37 .S43
11 Scaffidi, Federica; Micelli, Ezio; Nash, Matt (2025) The role of the social entrepreneur for sustainable heritage-led urban regeneration, Cities, Vol 158, March 2025. https://doi.org/10.1016/j.cities.2024.105670
12 Ascencio, Christine; Benmamoun, Mamoun; Katz, Jerome; Brinkmeier, Alex (2024) Enriching the Typology of Social Entrepreneurs: The Transnational Dimension. Administrative Sciences, Vol. 14, Issue 12, p335-350, https://doi.org/10.3390/admsci14120335
13 Shahnoel Noeh, Amirul; Rozaidah Pg Hj Idris, Pg; Anshari, Muhammad (2022) Decision Model in the Development of Technopreneurship and the Adoption of IR4.0 Technologies, International Conference on Decision Aid Sciences and Applications (DASA). https://doi.org/10.1109/DASA54658.2022.9765016

**BEE 30103 Engineering Management**

*Synopsis:*
This course introduces students to the role of engineer in management principles that are applied in engineering projects and organization. Students learn the basics of managing people and responsibilities as an engineering manager. The management functions consist of planning, organizing, leading and controlling also the management tools which comprises taguchi, kaizen, enterprise resource planning (ERP) and six-sigma are exposed to the students. Other elements such as quality management, project management and its activities, lean production, maintenance and reliability are also included in this course.

*References:*
1 Lucy C. Morse, Daniel L Babcock (2007), Managing Engineering and Technology, 4th Edition, Upper Saddle River, Pearson. Call Number TA190 .M68 2007.
2 C. M. Chang (2005), Engineering Management: Challenges in the New Millennium, Upper Saddle River, Pearson. Call Number TA190 .C42 2005.
3 Avraham Shtub, Jonathan F. Bard, Shlomo Globerson (2005), Project Management: Processes, Methodologies and Economics, 2nd Edition, Upper Saddle River, Pearson. Call Number TA190 .S57 2005.
4 4.John V. Chelsom, Andrew C. Payne (2004), Management for Engineers, Scientists and Technologists, 2nd Edition, Hoboken, John Wiley. Call Number TA190 .C44 2005.
5 Abdul Talib Bon (2010), Pengurusan Kejuruteraan, Batu Pahat, Penerbit KUiTTHO. Call Number TA190 .A22 2010 a.

**BEE 32302 Engineer and Society**

*Synopsis:*
To provide knowledge and understanding about the importance of ethics in the engineering profession, and to develop qualities and skills required by engineers to perform their roles and responsibilities competently for the benefit of mankind and nature.

*References:*
1 Kemper, J.D., Sanders, B.R. Engineers and Their Profession (5th Edition), Oxford University Press; New York, 2001. (TA157 .K45 2001)
2 Harris, C.E., Pritchard, M.S., Rabis, M.J., James, R., Englehardt, E., Engineering Ethics: Concepts and Cases, (6th Edition) Wadsworth Cengage Learning, Massachusetts, 2018. (TA157 .H37 2018).
3 Vesilind, P.A., Gunn, A.S., Hold Paramount: The Engineer's Responsibility to Society (3rd Edition), Cengage Learning, Stamford, 2016 (TA157 .G86 2016)
4 Babcock, D.L., Managing Engineering and Technology: An Introduction to Management for Engineers (7th Edition), Prentice Hall, Englewood Cliffs, New Jersey, 2019 (TA190 .32 2019)
5 Schinzinger, R., Martin, M.W., Introduction to Engineering Ethics (2nd Edition), McGraw-Hill, 2009 (TA157 .S43 2009).

# Synopsis of Core Programme Courses

**BEJ 10102 Computer Programming**

*Synopsis:*
This course provides comprehensive programming concepts through the use of high-level programming languages such as C language. After completing this course, students should be able to design, code, debug, test and document well-structured programs based on technical or real engineering problems.

*References:*

1 Harper. A, Ryan.L, Stephen. S, Michael B., Daniel F., Huáscar T., and Moses F. (2022). Programming Survival Skills. Chap. 2 in Gray Hat Hacking: The Ethical Hacker's Handbook. 6th ed. New York: McGraw-Hill. https://www-accessengineeringlibrary-com.ezproxy.uthm.edu.my/content/book/9781264268948/chapter/chapter2
2 Boussaha, K., Hanneche, A., & Chaoua, Z. (2022). Computer Programming Practical Works Activities: From Human to Automatic Scoring. In J. Zhao & J. Richards (Eds.), Virtual Technologies and E-Collaboration for the Future of Global Business (pp. 154-181). IGI Global. https://doi-org.ezproxy.uthm.edu.my/10.4018/978-1-6684-5027-7.ch009
3 Management Association, I. (Ed.). (2021). Research Anthology on Recent Trends, Tools, and Implications of Computer Programming. IGI Global. https://doi-org.ezproxy.uthm.edu.my/10.4018/978-1-7998-3016-0
4 4. King, K.N.(2008).C Programming: A Modern Approach. 2nd ed. New York: W.W.Norton. Call number:QA76.73.C15.K562008 5. Jeri R. Hanly and Elliot B. Koffman (2004). Problem Solving and Program Design in C. 4th ed. USA: Addison-Wesley. Call number: QA76.73.C15 .H364 2004


**BEJ 10303 Electric Circuits I**

*Synopsis:*
This course covers the basic theory of circuit analysis. Topics include basic electrical circuit theory and laws, electrical circuit analysis techniques and concepts, network theorems, review of techniques to solve simultaneous equations, nodal and mesh circuit analysis, dependent sources, Thevenin’s and Norton’s equivalent circuits, and maximum power transfer.

*References:*

1 Alexander, C. K. & Sadiku, M.N.O.; Fundamentals of Electric Circuits; McGraw-Hill 5 th Editions; Call number : TK454.A43 20138.
2 J. David Irwin; Basic Engineering Circuit Analysis, 8th Ed.; John Wiley & sons; 2005. Call number: TK454 .I78 2005.
3 James W. Nilsson & Susan A. Riedel; Electric Circuits; Prentice-Hall; 2008. Call number: TK454 .N54 2011.
4 William H Hayt & Jack E Kemmerly, Engineering Circuit Analysis, McGraw Hill, 2002. Call number: TK454 .I78 2011.
5 James W. Nilsson & Susan A. Riedel; Introductory circuits for electrical and computer engineering; Prentice-Hall 2008. Call number: TK7867 .N54 2002.


**BEJ 10403 Electric Circuits II**

*Synopsis:*
The course has been designed to apply the techniques and principles of electrical circuit analysis to solve DC and AC circuits. Topics in this course includes energy storage elements, transient and steady-state responses of RC, RL and RLC circuits; complex impedance, circuits with DC and sinusoidal sources, steady-state power and power factor correction. Two-port network topic is also introduced for advanced circuit analysis.

*Pre-requisite:* BEJ 10303 Electric Circuits I

*References:*

1 Alexander, C. K. & Sadiku, M.N.O.; Fundamentals of Electric Circuits; McGraw-Hill 5 th Editions; Call number : TK454.A43 2013.
2 J. David Irwin; Basic Engineering Circuit Analysis, 8th Ed.; John Wiley & sons; 2005. Call number: TK454 .I78 2005.
3 James W. Nilsson & Susan A. Riedel; Electric Circuits; Prentice-Hall; 2008. Call number: TK454 .N54 2011.
4 William H Hayt & Jack E Kemmerly, Engineering Circuit Analysis, McGraw Hill, 2002. Call number: TK454 .I78 2011.

5 James W. Nilsson & Susan A. Riedel; Introductory circuits for electrical and computer engineering; Prentice-Hall 2008. Call number: TK7867 .N54 2002.

**BEJ 10503 Analog Electronics**

*Synopsis:*
This course provides fundamental knowledge in analog electronics. It encompasses basic electronic semiconductor devices such as diode, bipolar junction transistor (BJT), field effect transistor (FET). The emphasis is on the design aspects and applications which include the amplifier design based on single and multi-stage, frequency response analysis of amplifiers, and power amplifiers. The course has been designed to provide basic analog electronic skills covering theories and practices.

*Pre-requisite:* BEJ 10103 Electric Circuits I

*References:*
1 R.Boylestad, L. Nashelsky; Electronic Devices and Circuit Theory, 11th Ed.; Prentice Hall; 2013. Call number: TK7867 .B69 2013
2 Donald A. Neamen; Microelectronics Circuit Analysis and Design, 4th Ed.; McGraw Hill, 2010. Call number: TK7867 .N434 2010
3 Louis E Fretzel; Contemporary Electronics: Fundamentals, Devices, Circuits, and Systems; McGraw-Hill; 2014. Call number: TK7816 .F75 2014
4 Albert Paul Malvino, David J. Bates, Electronic Principles, 7th Ed., McGraw Hill, 2007. Call number: TK7816 .M34 2007
5 Thomas L. Floyd, Electronics Fundamentals: Circuits, Devices and Applications, 8th Ed., Prentice Hall, 2013. Call number: TK7816 .F56 2007
6 Robert T.Paynter; Introductory Electronics Devices and Circuits: Conventional Flow Version, 7th Ed., Pearson, 2006. Call number: TK7871.85 .P39 2006
7 Thomas L. Floyd, Electronic Devices, 7th Ed., Prentice Hall, 2005. Call number: TK7870 .F53 2005
8 Shriram K. Vasudevan, Sumana Ravi Ganeson, Jai Vighneshwar Jayakumar, Pradeep Kumar; Integrated Electronics; Alpha Science International Ltd.; 2015. Call number: TK7819 .I57 2015.

**BEJ 10603 Digital Electronics**

*Synopsis:*
The course begins with the introduction to digital systems, followed by representation of physical values in digital form. The basic logic gates and symbols are introduced covering Boolean expressions, truth tables and timing diagrams. Combinational logic gates are implemented in certain function, analyzing circuits to obtain its Boolean expression followed by logic simplification using Boolean theorem and Karnaugh-map approach. In digital arithmetic systems, adder circuits are introduced, starting from half adder, full adder and the design of the carry look-ahead adder and BCD adder. Then, on to MSI logic circuits such as encoder, decoder, multiplexer and demultiplexer. Memory elements such as latches and flip-flops are introduced followed by the related flip-flop applications.

*References:*
1 Floyd, Digital Fundamental, Merill MacMillan, 2009. Call number: TK7868.D5 .F564 2009.
2 J. Tocci, Digital System, Principles and Application, Prentice Hall, 2011. Call number: TK7868.D5 .T62 2011.
3 M. Morris Mano, Charles R. Kime, Logic and Computer Design Fundamentals, 4th Ed., Prentice Hall, 2008. Call number: TK7888.4 .M36 2008.
4 Ferdjallah, Mohammed, Introduction to digital systems: modeling, synthesis, and simulation using VHDL /
5 Kharate, G. K., Digital electronics, New Delhi: Oxford University Press, 2010. Call number: TK7868.D5 .K42 2010.

**BEJ 10702 Instrumentation and Measurement**

*Synopsis:*
This course is about the work principles of various measuring instruments. The students are first introduced with bridge measurement. Next, types of sensors and transducers, their characteristics and applications are discussed. Application of measurement systems is also dealt with. Finally, the students are taught about the digital instrumentation components.

*References:*


1 J. P. Bentley, Principles of Measurement System, 3 rd Edition. Pearson Prentice Hall, 1995. Call number: QC53 .B46 1995.
2 R. G. Gupta, Electronic Instruments and Systems: Principles, Maintenance and Troubleshooting, McGraw Hill, 2001. Callnumber: TK7870.2 .G86 2001.
3 L. D. Jones, and C. A. Foster, Electronic Instruments and Measurements. Prentice Hall International Edition, 1991. Call number: TK7878.4 .J66 1991.
4 D. A. Bell, Electronic Instrumentation and Measurements, 2nd Edition. Prentice Hall Career and Technology, 1994. Call number: TK7878 .B45 1994.


**BEJ 10801 Fundamental Electronics Laboratory**

*Synopsis:*

This course comprises practical implementation for the subject of BEJ 10303 Electric Circuits I and BEJ 10702 Instrumentation and Measurement, as well as introductory to electronic laboratory practice..

*References:*


1 Ida, Nathan,Sensors, actuators, and their interfaces: a multidisciplinary introduction, SciTech Publishing, 2014, Call number TA165 .I32 2014
2 Seksena, S.B Lal, Fundamentals of Electrical Engineering, Cambridge University Press, 2016.Call number TK146 .S44 2016
3 Alexander, Charles K, Fundamentals of electric circuits, McGraw-Hill, 2013. Call number TK454 .A43 2013


**BEJ 20203 Signals and Systems**

*Synopsis:*

This course is an introduction to signals and systems. It is important for students to gain good understanding on the characteristics of signals and systems in time and frequency domains. The topics of this subject are Introduction to Signals and Systems, Fourier series, Fourier Transform, and Laplace Transform. In each topic, the concepts will initially be presented followed by the applications. It is expected that the students should be able to apply the knowledge and experience gained in this subject for better understanding of courses at higher levels.

*Pre-requisite:* BEE 11203 Ordinary Differential Equation
BEJ 10303 Electric Circuits I

*References:*


1 Jong Siat Ling, Abul Khair Anuar, Ansar Jamil, Norshidah Katiran, Shipun Anuar Hamzah. (2023). Signals and Systems. UTHM Publisher.
2 Hsu, Hwei P. (2020). Schaum's Outline of Signals and Systems (4th Edition). New York: McGraw-Hill Education. [https://www-accessengineeringlibrary-com.ezproxy.uthm.edu.my/content/book/9781260454246]
3 Mahmood Nahvi. Signals and Systems. (2014). McGraw-Hill.\Call number : TK5102.9.N33 2014.
4 S. Poornachandra and B. Sasikala. (2010). Signals and Systems. 3rd Edition, Tata McGraw Hill Education Private Limited, Call Number: QA402.P66.
5 A. V. Oppenheim, Alan S. Willsky and S. Hamid Nawab. (2014). Signals and Systems. 2nd Edition, New Jersey: Prentice-Hall, Call Number: QA402 .O66 2014.
6 Nagoor Kani. Signals and Systems, Tata McGraw Hill Education Private Limited. (2010). Call Number: TK5102.9.K36 2010.
7 Alexander D. Poularikas. (2007). Signals and Systems Primer with MATLAB. CRC Press 2007. Call Number: TK5102.9 .P68 2007.
8 Delores M Etter. (2005). Introduction to MATLAB 7, Prentice Hall. Call Number: TA345 .E876 2005.
9 Chi-Tsong Chen. (2004). Signals and Systems. Oxford University Press. Call Number: QA402.
10 Simon Haykin and Barry V. Veen. (2003). Signals and Systems, Wiley & Sons. Call Number: TK5102.5 .H39 2003


**BEJ 20303 Electromagnetics Fields and Waves**

*Synopsis:*

This course is to introduce the fundamentals of electromagnetic including electrostatic, magnetostatic and electromagnetic waves. The main laws governing the electrostatic and magnetostatic will be discussed thoroughly.

*Pre-requisite:* BEE 20303 Multivariable Calculus

*References:*


1 Element of Electromagnetic, Matthew M.O.Sadiku, 4th Edition, Oxford University Press, 2001 (Repr. 2003).Call Number: QC760.S324 2007.
2 Elements of Engineering Electromagnetics, Sadiku, Matthew N. O. New York: Oxford University Press, 2001 (Repr. 2003) Call Number: QC760 .S324 2001.
3 Fundamentals of Applied Electromagnetics, Fawwaz T. Ulaby, Prentice Hall, 6th Ed., 2010. Call Number: QC760.U42 2010.
4 Engineering Electromagnetics, William H. H, McGraw-Hill, 7th ed.: McGraw-Hill, 2006. Call Number: QC670 .H39 2006.
5 Electromagnetics for Engineers, Fawwaz T. Ulaby, Pearson Education, 2005.Call Number: QC760 .U424 2005
6 Fundamentals of engineering electromagnetics, Bansal, Rajeev, Boca Raton, FL: Taylor & Francis, 2006.Call Number: QC760 .F86 2006.


**BEJ 20603 Power Systems**

*Synopsis:*

This course is arranged to provide students with an understanding of electrical power systems. The course is divided into three major parts: fundamentals of single-phase and three-phase systems, the essential basic knowledge of single-phase and three-phase power systems will be covered at the beginning of the course. Subsequently, the electric utility system comprises all the sources for power generation, accessories and auxiliaries used in it, transmission, and distribution of electric energy is also covered in this section. Finally, the protection system will cover the safety and reliability of a power system.

*Pre-requisite:* BEJ 10303 Electric Circuits I

*References:*


1 J Theodore Wildi. Electrical Machines, Drives, and Power Systems, 6th Edition, Pearson Education International, 2006. Call Number TK2182 .W54 2006.
2 King Alexander C & Knight William. Uninterruptible Power Supplies and Standby Power Systems, McGraw-Hill, 2003. Call Number TK1005 .K56 2003.
3 Dugan Roger C, McGranaghan M F, Santoso S and Beaty H Wayne. Electrical Power Systems Quality, 3rd Edition, McGraw-Hill, 2012. Call Number TK1010 .E43 2012.
4 R.B. Theodore. Electrical Systems Design, Prentice Hall, 2003. Call Number TK3101 .B67 2003.
5 T. A. Short. Electric Power Distribution Equipment and Systems, Taylor & Francis Group, 2006. Call Number TK3091 .S56 2006.
6 Emadi, A, Nasiri, and S.B. Bekiarov. Uninterruptible Power Supplies and Active Filters, CRC Press, 2005. Call number: TK1005 .E49 2005.
7 K. Pethebridge and I. Neeson. Electrical Wiring Practice (Volume 2), 7th Edition, McGraw-Hill, 2012. Call Number: TK3201 .P47 2012 v. 2.
8 Hadi Saadat. Power System Analysis, 2nd Edition, Prentice Hall, 2002. Call Number: TK1011 .S33 2002.


**BEJ 20701 Electronic Engineering Laboratory I**

*Synopsis:*

To give students hands-on experience in understanding the material presented in BEJ10503 Analog Electronics and BEJ10603 Digital Electronics.

*References:*


1 R.Boylestad, L. Nashelsky; Electronic Devices and Circuit Theory, 11th Edition; Prentice Hall; 2013. Call number: TK7867 .B69 2013
2 Thomas L. Floyd, Electronics Fundamentals: Circuits, Devices and Applications, 8th Ed., Prentice Hall, 2013. Call number: TK7816 .F56 2007
3 Albert Paul Malvino, David J.Bates, Electronic Principles, 7th Ed. McGraw Hill, 2007. Call number: TK7816 .M34 2007
4 J. Floyd, Digital Fundamental, Merill MacMillan, 2009. Call number: TK7868.D5 .F564 2009
5 J. Tocci, Digital System, Principles and Application, Prentice Hall, 2011. Call number: TK7868.D5 .T62 2011
6 Kharate, G. K., Digital electronics, New Delhi: Oxford University Press, 2010. Call number: TK7868.D5 .K42 2010

**BEJ 20801 Electronic Engineering Laboratory II**

*Synopsis:*
This course comprises practical implementation for the subject of Power System and Control System Theory. Various experiments are covered such as generator and transformer, overhead line, short circuits asymmetrical analysis, protection system, power factor correction, position control system, speed control system and servo system.

*References:*

1 S. L. Herman, The complete laboratory manual for electricity, Clifton Park, NY: Delmar, 2009. Call number: TK147 .H47 2009ca.
2 D. V. Richardson, Laboratory operations for rotating electric machinery and transformer technology Upper Saddle River, NJ: Prentice Hall, 1997. Call number: TK2189 .R523 1997 ca.
3 R. L. Boylestad, Electronic devices and circuit theory. Pearson 2006. Call number: TK7868.B69/2006.
4 N. S. Nise. Control Systems Engineering, 6th Edition. John Wiley, 2011. Call number: TJ213 .N57 2011.
5 M. Gopal. Control Systems: Principle and Design, 2nd Edition. Tata McGraw Hill, 2002. Call number: TJ213 .G66 2002.
6 Nowakowski, Andrzej. Electric power transformer engineering, 2015. Call number: TK2551 .E44 2015.


**BEJ 30103 Electronic Communication Systems**

*Synopsis:*
This course introduces the fundamentals in analog and digital communication systems. Consists of analysis of signals and noise, generation of analog and digital modulation schemes, transmission lines, antenna and wave propagation as a part of a complete system in communication. Finally, the topic discussed relates with current applications in communication systems.

*References:*

1 Wayne Tomasi, Electronic Communication Systems: Fundamental Through Advanced 5th Ed., Pearson Prentice Hall, 2004. Call number: TK5101 .T65 2004.
2 Jeffrey S. Beasley, Gary M. Miller, Modern Electronic Communication 9th Ed., Pearson Prentice Hall 2008. Call number: TK5101 .B42 2008.
3 Couch, L. W., Digital and Analog Communication Systems, 7th Ed, Pearson Prentice-Hall, 2007. Call number: TK5101 .C68 2007.
4 Louis Frenzel, Communication Electronics, McGraw-Hill, 2001. Call number: TK7816 .F67 2001 N8.
5 Proakis, J. G.et al, Essential of Communication System Engineering, Pearson Prentice-Hall, 2005.
6 Simon Haykin, Communication System, 4th Ed, John Wiley and Sons, 2001.
7 Singh, R. P., Communication systems: analog and digital, McGraw-Hill, 2012.
8 Krouk, Evgenii, Modulation and coding techniques in wireless communications, John Wiley, 2011.


**BEJ 30203 Microprocessor and Computer Organisation**

*Synopsis:*
This course provides an introduction to microprocessor systems and computer organisation with a focus on modern microprocessor architecture. The course covers the principles of microprocessor design, system architecture, and the use of modern tools to implement and experiment with microprocessor-based systems. Students will gain experience with programming and interfacing peripherals using the learned processor system.

*References:*

1 Intel, "Intel University Program (Microprocessor and Computer Organization)", Intel FPGA documentation (2021) https://fpgacademy.org/courses.html"
2 David A. Patterson and John L. Hennessy, "Computer Organization and Design – The Hardware/Software Interface (ARM® Edition)", Elsevier (2017).
3 Joseph Yiu, "System-on-Chip Design with Arm Cortex-M Processors", ARM Education, (2020).
4 Muhammad Tahir, Kashif Javed, "ARM Microprocessor Systems Cortex-M Architecture, Programming, and Interfacing", CRC Press (2017)"
5 Intel, "DE1-SoC Computer System with ARM Cortex-A9", Intel FPGA documentation, (2021): https://ftp.intel.com/Public/Pub/fpgaup/pub/Intel_Material/18.1/Computer_Systems/DE1-SoC/DE1-SoC_Computer_ARM.pdf

**BEJ 30403 Electronic Circuits Analysis and Design**

*Synopsis:*
Fundamental concepts of analog electronics and the application of these concepts to the design and analysis of analog circuits. Among the topics covered are the fundamentals of operational amplifiers, linear and non-linear applications of operational amplifiers, active filters, feedback, oscillators and timers, and regulated DC power supply. The focus is on the design and analysis of analog circuits. A simulation of a design using a computer simulation software will be used before circuit implementation is done..

*References:*

1 R.Boylestad, L. Nashelsky; Electronic Devices and Circuit Theory, 11th Ed.; Prentice Hall; 2013. Call number: TK7867 .B69 2013.
2 Donald A. Neamen; Microelectronics Circuit Analysis and Design, 4th Ed.; McGraw Hill, 2010. Call number: TK7867 .N434 2010.
3 Adel S. Sedra and Kenneth C. Smith; Microelectronics Circuits, 5th Ed.; Oxford Univ. Press, 2004. Call number: TK7867 .S32 2004.
4 Thomas L. Floyd; Electronic Devices, 8th Ed.; Prentice Hall, 2005. Call number: TK7870 .F564 2008.
5 Albert Paul Malvino; Electronic Principles, 7th Ed.; McGraw Hill, 2007. Call number: TK7816 .M34 2007.


**BEJ 30603 Digital Signal Processing**

*Synopsis:*
This course aims to introduce the main concepts of digital signal processing, review of discrete signal and system, characteristic and operation, discrete convolution, sampling and quantization, discrete Fourier transform, z-transform and the implementation of digital filters.

*Pre-requisite:* BEJ 20203 Signals and Systems

*References:*

1 Digital Signal Processing: A modern Introduction, Ashok Ambardar, International Student Edition, Thomson, 2007. Call Number: TK5102.5.A43 2007.
2 Digital Signal Processing: Principles, Algorithms and Applications, John G. Proakis, Dimitris G Manolakis, 4th Ed., Pearson Prentice Hall, 2007.
3 Analog and Digital Signal Processing, Ashok Ambardar, 2nd Ed, Thomson, 1999. Call Number: TK5102.9.A43 1999.
4 Digital signal processing with Matlab, Vinay K. Ingle, John G. Proakis, 3rd Ed., Cengage Learning, 2012. Call Number: TK5102.9.I53 2012.
5 Understanding digital signal processing, Richard G. Lyons, 3rd Ed, Prentice Hall, 2011. Call Number: TK5102.9.L96 2011


**BEJ 30801 Electronic Engineering Laboratory III**

*Synopsis:*
This laboratory provides hand-on experience for the student to understand the material presented in the Electronic Communication System BEJ30103 and Electronic Circuit Analysis & Design BEJ30403.

*References:*

1 Martin, Mike W. (2010), Introduction to Engineering Ethics, McGraw Hill. Call number: TA157 .M37 2010, TA157 .M37 2010.
2 Tom Russ (2010), Sustainability and Design Ethics, CRC. Call number: TA157 .R87 2010, TA157 .R87 2010.
3 Bowen, W. Richard (2009), Engineering Ethics: Outline of an Aspirational Approach, Springer. Call number: TA157 .B68 2009, TA157 .B68 2009.
4 Charles E. Harris, Michael S. Pritchard, Michael J. Rabins (2009), Engineering ethics: Concepts and cases, Wadsworth Pub. Call number: TA157 .H37 2009, TA157 .H37 2009.
5 Adisa Azapagic, Slobodon Perdan (2011), Sustainable development in practice: case studies for engineers and scientists, 2nd Edition, Wiley. Call number: TA160 .S97 2011,TA160 .S97 2011.

**BEJ 30701 Engineering Practices**

*Synopsis:*
The course is developed to give the required knowledge of:
1 Domestic electrical wiring and installation. It will develop the capability of carrying out electrical wiring activities up to a certain level of competency. The topics covered are the domestic wiring and installation.
2 Designing of electronic circuit's aspects, Proteus software will be used as it will help in making the schematic entry, signal simulation and printed circuit board layout. Soldering techniques will be introduced to create a skill in the prototype product aspect.
3 PLC will be used to provide the programming knowledge for the controlling of the basic and advanced automation system.

*References:*

1 J .Theodore Wildi. Electrical Machines, Drives, and Power Systems, 6th Edition, Pearson Education International, 2006. (Call Number TK2182 .W54 2006)
2 Dugan Roger C, McGranaghan M F, Santoso S and Beaty H Wayne. Electrical Power Systems Quality, 3rd Edition, McGraw-Hill, 2012. (Call Number TK1010 .E43 2012)
3 T. A. Short. Electric Power Distribution Equipment and Systems, Taylor & Francis Group, 2006. (Call Number TK3091 .S56 2006)
4 N. S. Nise. Control Systems Engineering, 6th Edition. John Wiley, 2011. Call number: TJ213 .N57 2011
5 R. C. Dorf and R. H. Bishop. Modern Control Systems, 11th Edition. Prentice Hall, 2008. Call number: TJ216 .D67 2008
6 Ruzairi Abdul Rahim, Asas pengawal logik boleh atur cara (PLC), Penerbit UTM, 2010. Call number: TJ223 .R89 2010
7 Kamel, Khaled. Programmable Logic Controllers : Industrial Control, McGraw-Hill, 2014 Call number: TJ223.P76 .K35 2014
8 Mike Judd and Keith Brindley, Soldering in Electronics Assembly, 1992, https://doi-org.ezproxy.uthm.edu.my/10.1016/C2013-0-01187-5
9 Kraig Mitzer, Complete PCB Design Using OrCAD and PCB Editor, 2019, 2nd Edition, https://doi-org.ezproxy.uthm.edu.my/10.1016/C2018-0-00854-3


**BEE 32205 Industrial Training**

*Synopsis:*
The course aims to provide an opportunity for students to undergo practical work in the working sector, especially engineering field, technology and management as well as to enhance professional skills and interpersonal skills.

*Pre-requisite:* At least 60% of the total credits have been completed.

*References:*

Buku Log Latihan Industri UTHM (Bahagian A), Pejabat Penerbit, UTHM.


**BEE 32603 Integrated Design Project**

*Synopsis:*
This course introduces students with the principles of integrated electrical and electronic engineering design projects based on a given theme. It involves teamwork, project management, engineering design and technical presentation in a driven environment. Each team is expected to address problem statements, survey, design, analysis, evaluation and revision of design towards engineering problem solutions. The students have to ensure that the proposed project meets the needs of end users with appropriate considerations for public health and safety, cultural, societal, economy and environmental.

Pre-requisite: Student has to complete minimum 70 credit hours

*References:*

1 Kosky, Philip Balmer, Robert Keat, William Wise, George. (2021). Exploring Engineering – An Introduction to Engineering and Design (5th Edition). Elsevier. Retrieved from https://app.knovel.com/hotlink/toc/id:kpEEAIED01/exploring-engineering/exploring-engineering
2 Kerzner, Harold. (2022). Project Management – A Systems Approach to Planning, Scheduling, and Controlling (13th Edition). John Wiley & Sons. Retrieved from https://app.knovel.com/hotlink/toc/id:kpPMASAP05/project-management-systems/project-management-systems

3 Project Management Institute. (2024). Standard for Program Management (5th Edition). Project Management Institute, Inc. (PMI). Retrieved from https://app.knovel.com/hotlink/toc/id:kpSPME0041/standard-program-management/standard-program-management
4 Safety and Health Guideline, Department of Occupational Safety and Health (DOSH). Retrieved September 9, 2024, from https://www.dosh.gov.my/index.php/legislation/guidelines
5 Jayakumar, V. Razak, Khairunisak Abdul. (2024). Engineering Systems, Equipment and Robotics. Trans Tech Publications. Retrieved from https://app.knovel.com/hotlink/toc/id:kpESER0003/engineering-systems-equipment/engineering-systems-equipment
6 Jain, Vishal Chatterjee, Jyotir Moy Kumar, Pradeep Kose, Utku. (2022). Healthcare Monitoring and Data Analysis Using IoT – Technologies and Applications. Institution of Engineering and Technology (The IET). Retrieved from https://app.knovel.com/hotlink/toc/id:kpHMDAUITK/healthcare-monitoring/healthcare-monitoring
7 Westcott, Sean Westcott, Jean Riescher. (2023). Basic Electronics - Theory and Practice (4th Edition). Mercury Learning and Information. Retrieved from https://app.knovel.com/hotlink/toc/id:kpBETP0001/basic-electronics-theory/basic-electronics-theory
8 K. Ghosh. Introduction to Measurements and Instrumentation. New Delhi: Prentice-Hall, 2007. Call number: TA165.G46 2007.

**BEE 40602 Final Year Project I**

*Synopsis:*
This course is the first part of an individual project during the final year of study based on a topic selected from the subjects studied or a related engineering problem. Each student is expected to present his proposal and research in addition to a progress report during the first seminar of the final year project.

*Pre-requisite:* Student has to complete minimum 90 credit hours

*References:*
1 Guidelines for the Implementation of Final Year Project in the Faculty of Electrical and Electronics Engineering UTHM.
2 Guidelines for thesis writing.
3 A guide to technical report writing, The Institution of Engineering and Technology (IET).
4 Final year project, The Institution of Engineering and Technology (IET).

**BEE 40704 Final Year Project II**

*Synopsis:*
This course is the second part of an individual project during the final year of study based on a topic selected from the subjects studied or a related engineering problem. Each student is expected to present the result of his/her final year project.

*Pre-requisite:* BEE 40602 Final Year Project I

*References:*
1 Guidelines for the Implementation of Final Year Project in the Faculty of Electrical and Electronics Engineering UTHM.
2 Guidelines for thesis writing.
3 A guide to technical report writing, The Institution of Engineering and Technology (IET).
4 Final year project, The Institution of Engineering and Technology (IET).

# Synopsis of Specialisation Courses (Compulsory)

**BEJ 20503 Control Systems**

*Synopsis:*
This course is about fundamental concepts of solving control systems problems. This course is organised in seven chapters. Chapter 1 presents an introduction to control systems. Chapter 2 provides introduction to Laplace transforms, transfer function, and mathematical modelling of dynamical systems (mechanical, electrical and electronic systems). Chapter 3 presents stability analysis of control systems followed with chapter 4 which describes the time domain analysis of control systems. Chapter 5 and chapter 6 treat root locus method and frequency domain analysis respectively to analyze control systems while Chapter 7 deals with the basic properties of controllers including PID controller design.

*Pre-requisite:* BEE 11203 Ordinary Differential Equation

*References*:

1 N. S. Nise. Control Systems Engineering, 6th Ed. John Wiley, 2011. Call number: TJ213 .N57 2011.
2 R. C. Dorf and R. H. Bishop. Modern Control Systems, 11th Edition. Prentice Hall, 2008. Call number: TJ216 .D67 2008.
3 F. M. Golnaraghi and B. C. Kuo. Automatic Control System, 9th Ed. John Wiley, 2010. Call number: TJ213 .K86 2010.
4 M. Gopal. Control Systems: Principle and Design, 2 nd Edition. Tata McGraw Hill, 2002. Call number: TJ213 .G66 2002.
5 K. Ogata. Modern Control Engineering, 5th Edition, Prentice Hall, 2010. Call number: TJ213 .O32 2010.


**BEJ 24102 Programming for Engineers**

*Synopsis:*
This course will provide students with the concepts, knowledge and practice of Python programming. These include the basics of programming, sequence, selection and repetition control structures. The students will also learn about functions, lists, tuples, sets and dictionaries in Python, which is very important for future coding. Additionally, students will learn about classes, Python libraries, and machine learning.

*References:*

1 Parker, James R. (2021). Python – An Introduction to Programming (2nd Edition). Mercury Learning and Information. Retrieved from https://app.knovel.com/hotlink/toc/id:kpPAIPE002/python-anintroduction
2 Nguyen, Quan. (2022). Advanced Python Programming (2nd Edition). Packt Publishing. Retrieved from https://app.knovel.com/hotlink/toc/id:kpAPPE000C/advancedpython-programming
3 Speight, April. (2020). Bite-Size Python - An Introduction to Python Programming. John Wiley & Sons. Retrieved from https://app.knovel.com/hotlink/toc/id:kpBSPAIPP1/bite-sizepython-an-introduction
4 Malhotra, Dheeraj Malhotra, Neha. (2021). Data Structures and Program Design Using Python – A Self-Teaching Introduction. Mercury Learning and Information. Retrieved from https://app.knovel.com/hotlink/toc/id:kpDSPDUPA8/datastructures-program/
5 Liyang, Y. Daniel (2013). Introduction to programming using Python. Boston, Pearson. Call number: QA76.73.P98 .L52 2013


**BEJ 24203 Artificial Intelligence**

*Synopsis:*
This course aims is designed to equip students with foundational and advanced knowledge in AI applications specific to robotics. It covers the evolution and applications of AI, focusing on machine learning techniques such as supervised and unsupervised learning, as well as reinforcement learning. The course also explores deep learning, including convolutional neural networks (CNNs) and their use in robotics for tasks like image processing. Additionally, students will study Natural Language Processing (NLP) to improve human-robot interaction. Practical skills in AI development tools and frameworks like TensorFlow and PyTorch are included, preparing students for real-world applications. Finally, the course addresses emerging trends in AI technology, guiding students to future opportunities in robotics and automation.

*References:*


1 Neapolitan, Richard E.,Boca Raton, (2013), Contemporary Artificial Intelligence, Taylor and Francis.
2 Kunal Pal, Bala Chakravarthy Neelapu and J. Sivaraman, (2024), Advances in Artificial Intelligence, https://www-sciencedirect.com.ezproxy.uthm.edu.my/book/9780443190735/advances-in-artificial-intelligence?via=ihub=
3 Aboul Ella Hassanien, Jyotir Moy Chatterjee and Vishal Jain , (2022), Artificial Intelligence and Industry 4.0, https://www-sciencedirect.com.ezproxy.uthm.edu.my/book/9780323884686/artificial-intelligence-and-industry-4-0
4 E.R. Davies and Matthew A. Turk,(2022), Advanced Methods and Deep Learning in Computer Vision, https://www-sciencedirect-com.ezproxy.uthm.edu.my/book/9780128221099/advanced-methods-and-deep-learning-in-computer-vision
5 Rabindra Nath Shaw, Ankush Ghosh,Monica Bianchini, (2021), Artificial Intelligence for Future Generation Robotics, https://wwwsciencedirect.com.ezproxy.uthm.edu.my/book/9780323854986/artificial-intelligence-for-future-generation-robotics


**BEJ 30701 Engineering Practices**

*Synopsis:*

The course is developed to give the required knowledge of:

1 Domestic electrical wiring and installation. It will develop the capability of carrying out electrical wiring activities up to a certain level of competency. The topics covered are the domestic wiring and installation.
2 Designing of electronic circuit's aspects, Proteus software will be used as it will help in making the schematic entry, signal simulation and printed circuit board layout. Soldering technique will be introduced to create a skill in prototype produce aspect.
3 PLC will be used to provide the programming knowledge for the controlling of the basic and advance automation system.

*References:*


1 J .Theodore Wildi. Electrical Machines, Drives, and Power Systems, 6th Edition, Pearson Education International, 2006. (Call Number TK2182 .W54 2006)
2 Dugan Roger C, McGranaghan M F, Santoso S and Beaty H Wayne. Electrical Power Systems Quality, 3rd Edition, McGraw-Hill, 2012. (Call Number TK1010 .E43 2012)
3 T. A. Short. Electric Power Distribution Equipment and Systems, Taylor & Francis Group, 2006. (Call Number TK3091 .S56 2006)
4 N. S. Nise. Control Systems Engineering, 6th Edition. John Wiley, 2011. Call number: TJ213 .N57 2011
5 R. C. Dorf and R. H. Bishop. Modern Control Systems, 11th Edition. Prentice Hall, 2008. Call number: TJ216 .D67 2008
6 Ruzairi Abdul Rahim, Asas pengawal logik boleh atur cara (PLC), Penerbit UTM, 2010. Call number: TJ223 .R89 2010
7 Kamel, Khaled. Programmable Logic Controllers : Industrial Control, McGraw-Hill, 2014 Call number: TJ223.P76 .K35 2014
8 Mike Judd and Keith Brindley, Soldering in Electronics Assembly, 1992, https://doi-org.ezproxy.uthm.edu.my/10.1016/C2013-0-01187-5
9 Kraig Mitzer, Complete PCB Design Using OrCAD and PCB Editor, 2019, 2nd Edition, https://doi-org.ezproxy.uthm.edu.my/10.1016/C2018-0-00854-3


**BEJ 34103 Industrial Automation System**

*Synopsis:*

Student will be introduced to actuator in automation system, industrial sensors, ladder diagram, pneumatic control circuit, motor control circuit, sequential process control design, Programmable Logic Control and manufacturing control system.

*References:*


1 J. Stenerson, Industrial Automation and Process Control, Upper Saddle River, NJ: Prentice Hall, 2003. Call number: TS156.8 .S73 2003.

2 M. P. Groover, Automation, Production Systems, and Computer Integrated Manufacturing, 2 nd Edition, Upper Saddle River, NJ: Prentice-Hall, 2001. Call number: TS183 .G76 2001.

3 W. Bolton, An Introduction: Programmable Logic Controller, 3rd Edition, Oxford Newnes, 2003. Call number: TJ223 .B64 2003.

4 J. R. Hackworth, F. D. Hackworth, PLC: Programming Methods and Application, Pearson Education, 2004.Call number: TJ223.P76 .H32 2004.

5 F. D. Petruzella, Programmable logic controllers, 3rd Edition, McGraw Hill, 2005. Call number: TJ223.P76 .P47 2005.

6 J.A. Rehg, Industrial electronics, Upper Saddle River, NJ: Pearson, 2006. Call number: TK7881 .R43 2006.


**BEJ 34203 Data Science for Engineers**

*Synopsis:*
In this course, students will learn about the concepts of data science and its applications. It covers an introduction to data science, data preprocessing, methodology of data science, data gathering and databases, exploratory data analysis, supervised and unsupervised learning. Also, students need to explore the trend and development in data science for engineering application.

*References:*


1 Klosterman, Stephen. (2021). Data Science Projects with Python (2nd Edition) – A Case Study Approach to Gaining Valuable Insights from Real Data with Machine Learning.Packt Publishing. Retrieved from https://app-knovel-com.ezproxy.uthm.edu.my/s.v?S1615HbN

2 So, Anthony Joseph, Thomas V. John, Robert Thas Worsley, Andrew Asare, Samuel. (2020). Data Science Workshop. Packt Publishing. Retrieved from https://app-knovel-com.ezproxy.uthm.edu.my/s.v?xxskttqO.

3 Mueller, John Paul Massaron, Luca. (2020). Data Science Programming - All-in-One for Dummies. John Wiley & Sons. Retrieved from https://app-knovel-com.ezproxy.uthm.edu.my/s.v?S3RTTx0W

4 Mailund, Thomas. (2019). R Data Science Quick Reference - A Pocket Guide to APIs, Libraries, and Packages. Apress, an imprint of Springer Nature. Retrieved from https://app-knovel-com.ezproxy.uthm.edu.my/s.v?nmGQIItb

5 Klosterman, Stephen. (2021). Data Science Projects with Python (2nd Edition) - A Case Study Approach to Gaining Valuable Insights from Real Data with Machine Learning - 1.3 Different Types of Data Science Problems. (pp. 10). Packt Publishing. Retrieved from https://app-knovel-com.ezproxy.uthm.edu.my/s.v?pcVmkoJt


**BEJ 44103 Intelligent Control Systems**

*Synopsis:*
This course provides students the comprehensive knowledges on Artificial intelligent techniques applied to control system design. Topics include Neural Networks, Fuzzy Logic and Bayesian Networks (Kalman Filter and Particle Filter) and how to design such controller using Engineering Software.

*References:*


1 Ian Goodfellow, Yoshua Bengio and Asron Courville, Deep Learning, MIT Press, 2016. (http://www.deeplearningbook.org)

2 Francois Chollet, Deep Learning with Python, Manning, 2018.

3 T. J.Ross, Fuzzy Logic with Engineering Application 2nd Edition, John Wiley & Sons Ltd, 2004. Call number: TA331 .R67 2004

4 Satish Kumar, Neural Networks, A Classroom Approach, McGraw Hill, 2004. Call number: QA76.87 .K85 2004

5 Leonid Reznik, Fuzzy Controllers, Newnes-Butterworth-Heinemann, 1997. Call number: TJ213 .R48 1997
6 Callan, R., The Essence of Neural Networks, Prentice Hall, 1999. Call number: QA76.87 .C34 1999.
7 Simon Haykin, Neural Networks: A Comprehensive Foundation, Prentice Hall, 1999. Call number: QA76.87. H39 1999.

**BEJ 44203 Robotic Systems**

*Synopsis:*

This subject is about learning the basic concepts of robotic systems and their classifications. It also involves the concept of forward kinematics, inverse kinematics, motion kinematics, dynamics, path planning and control systems of robotics. The operational principles and usage of drive system and sensors in the robotic systems. The technique of basic robot programming and trajectory planning.

*References:*

1 Spong, M. W., Hutchinson, S. and Vidyasagar, M., Robot Dynamics and Control. John Wiley & Sons, 2006.
2 Man Zhihong, Robotics, Prentice Hall, 2005.
3 Craig, J. J. Introduction to Robotics: Mechanics and Control. Addison Wesley, 1989.
4 Siciliano, B., Sciavicco, L., Villani, L., Oriolo, G., Robotics: Modelling, Planning and Control, Springer, 2009.
5 Saha, S. K., Introduction to Robotics (second edition), Tata McGraw-Hill Education, 2014.

**BEJ 44113 Vision Systems**

*Synopsis:*
This course covers theoretical foundations of computer vision. By formulating computer vision as a statistical inference process, computational approaches to vision are presented and analyzed systematically. Chapter 1 presents introduction to computer vision. Chapter 2 and 3 provides introduction to cameras and its parameters. Chapter 4 presents about segmentation process. Chapter 5 covers about noise removal techniques. Chapter 6 elaborate about image features. Chapter 7 discuss about various method for object recognition. Finally, Chapter 8 gives an overview about stereo vision system.

*References:*
1 D. A. Forsyth and J. Ponce, Computer Vision: A Modern Approach, Prentice Hall, 2003. Call number: TA1634 .F67 2003.
2 R. C. Gonzalez and R. E. Woods, Digital Image Processing, 3rd Edition, Prentice Hall, 2002. Call number: TA1632 .G66 2008.
3 K. P. H. Berthold, Robot Vision, 12nd Edition, MIT Press, 1998. Call number: TJ211.3 .H67 1986.
4 E. Trucco and A. Verri, Introductory Techniques for 3-D Computer Vision, Prentice Hall, 1998. Call number: TA1634 .T78 1998.
5 Nguyen, Quan. Advanced Python Programming (2nd Edition) - 10.2 Image Processing Fundamentals. (pp. 288). Packt Publishing. https://app.knovel.com/hotlink/pdf/id:kt0134LJ44/advanced-python-programming/image-processing-fundamentals. 2022.

**BEJ 44121 Design and Automation Engineering Laboratory**

*Synopsis:*
This course equips students with practical skills in Computer-Aided Design (CAD), Programmable Logic Control (PLC), and Process Control. Students will learn 3D modeling, assembly design, and technical drawing in the CAD module. The PLC module covers programming and controlling robot arms, with a focus on sensor integration and feedback systems. The Process Control module introduces level control, flowrate measurement, and control modes, including PID. Through hands-on laboratory activities, students will develop essential skills for design engineering, automation, and process management in industrial applications.

*References:*


1 M. Lombard. (2018). Mastering SolidWorks. Pro Quest Ebook Central. https://ebookcentral.proquest.com/lib/uthm-ebooks/reader.action?docID=5568847&query=solidworks
2 Zeid, Ibrahim (2021). Mastering Solidworks. Macromedia Press, 2021.
3 Almattar, Tayseer Sadiq J. (2022). Learn SOLIDWORKS (2nd Edition). Packt Publishing. Retrieved from https://app.knovel.com/hotlink/toc/id:kpLSOLID03/learn-solidworks-2nd/learn-solidworks-2nd
4 Pollák, M., Kočiško, M. and Goryl, K. (2023). PLC Control of a 2-Axis Robotic Arm in a Virtual Simulation Environment. In Design, Simulation, Manufacturing: The Innovation Exchange (pp. 50-59). Cham: Springer Nature Switzerland.
5 Nof, Shimon Y. (2023). Springer Handbook of Automation (2nd Edition). Springer Nature. Retrieved from https://app.knovel.com/hotlink/toc/id:kpSHA00011/springer-handbook-automation/springer-handbook-automation
6 Frigeni, Fabrizio. (2023). Industrial Robotics Control - Mathematical Models, Software Architecture, and Electronics Design. Apress, an imprint of Springer Nature. Retrieved from https://app.knovel.com/hotlink/toc/id:kpIRCMMSA5/industrial-robotics-control/industrial-robotics-control
7 Bolton, W. (2015). Programmable Logic Controllers (6th Edition). Elsevier. Retrieved from https://app.knovel.com/hotlink/toc/id:kpPLCE0071/programmable-logic-controllers/programmable-logic-controllers
8 K. Ogata. Modern Control Engineering, 5th Ed.; Prentice Hall, 2010. Call Number: TJ213.O32 2010.
9 C. D. Johnson. Process Control Instrumentation Technology, 8th Ed. Prentice Hall, 2006. Call Number: TS156.8 .J63 2006.


**BEJ 44131 Microcontroller and Real-time Systems Laboratory**

*Synopsis:*

This course provides hands-on experience essential for modern engineering. The Microcontroller section covers platform fundamentals, digital and analog I/O operations, pulse width modulation, analog-to-digital conversion techniques, protocol interfacing, and interrupt handling. In the Real-time Systems section, students delve into platform specifics, memory management, context switching, scheduling algorithms, task synchronization, and inter-process communication. Through practical exercises, students gain proficiency in designing, implementing, and troubleshooting embedded systems. This course equips them with practical skills crucial for careers in fields requiring advanced knowledge of microcontrollers and real-time computing.

Pre-requisite: BEJ44182 Real-time Embedded Systems

*References:*


1 1. Richard Barry, Mastering the FreeRTOS™ Real Time Kernel - A Hands-On Tutorial Guide – v1.1.0, Amazon.com. 2023. https://www.freertos.org/Documentation/RTOS_book.html
2 2.The FreeRTOS™ Reference Manual - Reference Manual for FreeRTOS version 10.0.0 issue 1. 2017 Amazon.com. https://www.freertos.org/Documentation/RTOS_book.html
3 3.M. Wolf, “Chapter 6 - Processes and Operating Systems,” in Computers as Components (Fifth Edition), M. Wolf, Ed., Morgan Kaufmann, 2023, pp. 321–379. doi: https://doi.org/10.1016/B978-0-323-85128-2.00006-2.
4 4.L. J. Henschen and J. C. Lee, “Chapter 16 - Operating systems,” in Embedded System Design, L. J. Henschen and J. C. Lee, Eds., Morgan Kaufmann, 2024, pp. 313–325. doi: https://doi.org/10.1016/B978-0-443-18470-3.00016-6.
5 5. An Integration of Open-Source Resources in Distance Teaching for Real-Time Embedded System Using Arduino Microcontroller and Freertos. International Journal of Integrated Engineering 14 (6), 194-205. 2022. https://penerbit.uthm.edu.my/ojs/index.php/ijie/article/view/9494

**BEJ 44182 Real Time Embedded Systems**

*Synopsis:*
The course is designed to teach students how to apply real-time theory to the embedded systems. It is also intended to provide a balance of fundamental theory, review of industry practice, and practical experience for students preparing for a career in the real-time embedded system industries. Throughout this course, student will explore and learn hard and soft real-time concepts and terminology, application example of real-time systems in mechatronics, overview of embedded controller, peripheral interface, concepts of Real-Time operating System (RTOS), multitasking and task scheduling, and RTOS implementation.

*Pre-requisite:* BEJ 10102 Computer Programming

*References:*

1 Jiacun Wang (2017). Real-Time Embedded Systems. TK7895.E42.W364 2017.
2 Ivan Cibrario Bertolotti and Gabriele Manduchi (2012). Real-Time Embedded Systems: Open-Source Operating Systems Perspective. TK7895.E42 B47 2012.
3 Siewert, Sam (2007). Real-time embedded components and systems. TK7895.E42 .S53 2007
4 Laplante, Philip A. (2012). Real-time systems design and analysis: tools for the practitioner. QA76.54.L36 2012


**BEJ 44703 Mobile Robotics**

*Synopsis:*
This course provides a succinct overview of mobile robotics with an emphasis on mobility. It starts with general introduction to mobile robots and proceeds to break down the field into specific topics, such as locomotion, kinematics, planning and navigation. Each topic begins with more summary of the problems faced by mobile robots, then presents the most common solutions or approaches.

*References:*

1 S. Thrun, W. Burgard, and D. Fox, Probabilistic Robotics, The MIT Press, 2005. Call number: TJ211.T57 2005.
2 R. Siegwart, I. R. Nourbakhsh, and F. Scaramuzza, Introduction to Autonomous Mobile Robot 2 nd Edition, The MIT Press, 2011. Call number: QA76.54.L36 2011.
3 T. Braunl, Embedded Robotics: Mobile Robot Design and Application with Embedded System 3 rd Edition, Springer-Verlag Berlin Heidelberg, 2008. Call number: TJ211.415.B72 2008.

# Synopsis of Specialisation Courses
# (Elective Course I - Elective Specialisation)

**BEE 41603 Robot Operating System (ROS)**

*Synopsis:*
In this course, students are introduced to the Robot Operating System (ROS) and its commonly used robotics tools. They learn the fundamental concepts and architecture of ROS, including nodes, topics, messages, and services, which enable communication between different robotic system components. The course guides students through the process of setting up a complete robotic system using the latest stable version of ROS. They gain knowledge and practical experience in integrating various sensors (e.g., cameras, LiDAR, IMUs) and actuators (e.g., motors, servos) into the system and establishing communication with ROS. Autonomous navigation implementation is a key focus, with students utilizing ROS capabilities to develop a navigation stack for perceiving the environment, planning paths, and executing autonomous actions. Both simulation and real-world scenarios are explored, allowing students to test their algorithms virtually and on physical robots. The course progressively increases the difficulty of laboratory activities and a final project to challenge students' problem-solving skills. By the end of the course, students possess a strong foundation in ROS and are proficient in setting up and programming autonomous robots for various applications.

*References:*

1 Joseph, Lentin Johny, Aleena. (2022). Robot Operating System (ROS) for Absolute Beginners - Robotics Programming Made Easy (2nd Edition). Apress, an imprint of Springer Nature. Retrieved from https://app.knovel.com/hotlink/toc/id:kpROSROSA1/robot-operating-system/robot-operating-system
2 Joseph, Lentin (2018). Learning Robotics Using Python : Design, Simulate, Program, and Prototype an Autonomous Mobile Robot Using ROS, OpenCV, PCL, and Python, 2nd Edition, Packt Publishing, Limited. ProQuest Ebook Central, https://ebookcentral.proquest.com/lib/uthm-ebooks/detail.action?docID=5439457
3 Francisco Martin Rico (2022). A Concise Introduction to Robot Programming with ROS2. Chapman & Hall.
4 K. Bipin (2018). Robot operating system cookbook: over 70 recipes to help you master advanced ROS concepts. Birmingham Mumbai: Packt,
5 “ROS 2 Documentation — ROS 2 Documentation: Humble documentation.” http://docs.ros.org/en/humble/ (accessed Jul. 20, 2023).


**BEJ 44143 Big Data Analytics and Application**

*Synopsis:*
This course provides an in-depth understanding of big data analytics techniques and their practical applications. It covers the handling, management, and processing of large datasets, and explores how to leverage these capabilities in various real-world applications, particularly in the fields of intelligent systems and robotics.

*References:*

1 Leclerc, BenoitCale, Jesse (2020) Big Data. Taylor & Francis Group 2020, ISBN:9781138492783 Retrieved from https://ebookcentral.proquest.com/ebc/lib/uthm-ebooks/#/detail?docID=6109516&query=big%20data
2 Sedkaoui, Soraya (2021) Data Analytics and Big Data, John Wiley & Sons, ISBN :9781786303264 Retrieved from https://ebookcentral.proquest.com/ebc/lib/uthm-ebooks/#/detail?docID=5401178&query=big%20data
3 Chu, Wesley W (2014) Data Mining and Knowledge discovery for big data: methodologies, challenge and opportunities. Berlin, Heidelberg: Springer 2014. (QA76.9.D379 2014)
4 Liu, Shen (2015) Computation and statistical methods for analysing big data with applications. London: Academic Press, 2015 (QA76.9.C66 2015)
5 Voss, Jochen (2014) An introduction to statistical computing: a simulation-based approach, Chichester, West Sussex: Wiley 2014 (QA276.4. V67 2014)

**BEJ 44153 Internet of Things**

*Synopsis:*

This course aims to teach students the principles and practices of the Internet of Things. It covers an introduction to IoT, IoT architectures and hardware, IoT communication technologies and protocol, IoT data management and analytics, IoT security and privacy, and IoT platforms and systems. Also, students need to propose an IoT solution based on real-world problems/issues.

*References:*


1 AAbdelaziz, Mohamed. (2022). Designing Production-Grade and Large-Scale IoT Solutions. Packt Publishing. Retrieved from https://app.knovel.com/hotlink/pdf/id:kt0134QSH3/designing-production/section-1-anatomy-iot
2 Soldatos, John. (2021). 360-Degree View of IoT Technologies - 1.1 Defining IoT. Artech House. Retrieved from https://app.knovel.com/hotlink/pdf/id:kt012ZUY3M/360-degree-view-iot-technologies/defining-iot
3 Alazab, Mamoun Gupta, Meenu Ahmed, Shakeel. (2022).AIoT Technologies and Applications for Smart Environments - 15.2 IoT Applications.(pp. 277). Institution of Engineering and Technology (The IET). Retrieved from https://app.knovel.com/hotlink/pdf/id:kt0136MEQ1/aiot-technologies-applications/iot-applications
4 Bernal, Joey Sridhar, Bharath. (2022). Industrial IoT for Architects and Engineers.Packt Publishing. Retrieved from https://app.knovel.com/hotlink/toc/id:kpIITAE002/industrial-iot-architects/industrial-iot-architects
5 Soldatos, John. (2021). 360-Degree View of IoT Technologies. Artech House. Retrieved from https://app.knovel.com/hotlink/toc/id:kpDVITT002/360-degree-view-iot-technologies/360-degree-view-iot-technologies


**BEJ 44163 Data Structures and Algorithm Analysis**

*Synopsis:*
This course provides a concepts of object oriented programming and comprehensive study on data structures and their associated algorithms. Basic data structures such as lists, stacks, queues, and trees, will be studied. Techniques which use recursion and pointer variables are included and various searching and sorting methods are introduced. Intuitive understanding of the complexity of these algorithms will also be developed.

*References:*

1 Malhotra, Dheeraj Malhotra, Neha."Data Structures and Program Design Using Python - A Self-Teaching Introduction". Mercury Learning and Information. Retrieved from https://app.knovel.com/hotlink/toc/id:kpDSPDUPA8/data-structures-program/data-structures-program. 2021
2 Matalia, Jeet, Kathiriand, Shreya, Patel, Priyanka, “Demystifying Complex Algorithms: A Visual Guide Through the DSA Visualizer” Smart Trends in Computing and Communications : Proceedings of SmartCom 2024, Volume 5. 949:207-217 2024
3 Micheal T. Goodrich, Roberto Tamassia and David M. Mount, “Data Structures and Algorithms in C++”, John Wiley & Sons, 2011. Call number: QA76.73.C153 .G66 2011
4 Mark Allen Weiss, “Data Structures and Algorithm Analysis in C++”, 3rd Edition, Addison Wesley, 2006. Call Number: QA76.73.C153.W44 2006
5 Mark Allen Weiss, “Data Structures and Algorithms in Java”. Addison-Wesley, 1999. Call number: QA76.73.J38 .W445 1999


**BEJ 44183 Manufacturing System**

*Synopsis:*
This course covers Manufacturing, Automation, Manufacturing System, Quality Control and Manufacturing Support Systems. Chapter 1 explains Introduction to Manufacturing. Chapter 2 describes Manufacturing Metrics and Economics. Chapter 3 presents Discrete Control and Programmable Logic Controller. Chapter 4 provides Single-Station Manufacturing Cells. Chapter 5 and 6 explain Manual Assembly Lines and Automated Production Lines and Assembly System respectively. Finally, Chapter 7 and 8 describe Quality Programs for Manufacturing and Just-In-Time and Lean Production respectively.

*References:*


1 G. Mikell P. Automation, Production Systems, and Computer-Integrated Manufacturing, 5th Ed, Pearson, 2018
2 S. Stamatios and G. Nikolakopoulos, Introduction to Industrial Automation, 1st Ed, CRC Press, 2020
3 C. Dey and S. K. Sen, Industrial Automation Technologies, st Ed, Taylor & Francis Group, 2020
4 G. Mikell P. Fundamentals of Modern Manufacturing: Materials, Processes, and Systems, 7th Ed, Wiley, 2020
5 M. Mark R and M. Rex. Robots and Robotics: Principles, Systems, and Industrial Applications, 1st Ed, McGraw-Hill Education, 2017


**BEJ 44503 Digital Control Systems**

*Synopsis:*

This course is about the introduction of digital control system, domain-z analysis, digital control design using root locus, frequency response, state space method and pole-placement design method.

*References:*


1 G. F. Franklin and J. D. Powel (1998)l, Digital Control of Dynamic Systems, 3rd Edition, Addison Wesley, 1998. Call number: TJ213 .M53 F72.
2 Digital Control Engineering: Analysis and Design, M. Sami Fadali and Antonio Visioli, Elsevier, 2013. Call number : TJ223.M53 .F33 2013
3 K. Ogata (1995). Discrete-Time Control Systems, Prentice Hall Call number: QA402 .O33 1995
4 G. F. Franklin and J. D. Powell (2002). Feedback Control of Dynamic Systems, International Edition, Call number: TJ216 .F7.
5 D. Landau and G. Zito (2006). , Digital Control Systems: Design, Identification and Implementation, Springer Verlag. Call number: TJ223.M53 .L36 2006


**BEJ 44603 Process Control Systems**

*Synopsis:*

This subject is about the analysis and design of process control systems. The subject is organised in seven chapters. Chapter 1 presents an introduction to process control systems. Chapter 2 provides information regarding the control loop structures applied to process control. Chapter 3 presents mathematical modelling of selected processes. Chapter 4 treats the types of feedback controllers employed in the control loops. Chapter 5 presents the instrumentation that is used in the process control systems. Chapter 6 determines the dynamic behaviour of the closed-loop systems. Finally, Chapter 7 deals with the design of the process control systems.

*References:*


1 D. E. Seaborg, T. F. Edgar, D. A. Mellichamp. Process Dynamics and Control, 3rd Ed. John Wiley, 2011. Call number: TP115 .P76 2011.
2 D. Johnson. Process Control Instrumentation Technology, 8th Ed. Prentice Hall, 2006. Call number: TJ216 .D67 2008.
3 R. Coughanowr. Process Systems Analysis and Control, 2nd Ed., 2 McGraw Hill, 1991. Call number: TP155.75 .C69 1991.
4 W. L. Luyben. Process Modeling, Simulation and Control for Chemical Engineers, 2nd Ed. McGraw Hill, 1990. Call number: TP155.7 .L89 1990.
5 K. Ogata. Modern Control Engineering, 5th Ed., Prentice Hall, 2010. Call number: TJ213 .O32 2010.


**BEJ 44803 Mechatronic Mechanism**

*Synopsis:*

This course is about the analysis and application of mechanism and machine systems that transforms input forces and movement into a desired set of output forces and movement. These essential topics in mechanism might provide students with proficient theoretical and graphical background in dealing with mechanical systems.

*References:*


1 Chow, V. T. (1975). Open-Channel Hydraulics, Auckland: McGraw-Hill. Call number TC175 .C56 1975.
2 Subramanya, K. (2009). Flow in Open Channels. Boston: McGraw-Hill. Call number TC175 .S92 2009.
3 Jain, S. C. (2001). Open-Channel Flow. New York: John Wiley. Call number TC175 .J34 2001.
4 French, R. H. (1985). Open-Channel Hydraulics. New York: McGraw-Hill Call number TC175 .F78 1985.
5 Sturm, T. W. (2001). Open Channel Hydraulics. Boston: McGraw-Hill Call number TC175 .S78 2001.
6 Chanson, H. (2004). The Hydraulics of Open Channel Flow: An Introduction. Amsterdam: Elsevier. Call number TC175 .C42 2004.


**BEJ 44903 Instrumentation and Measurement in Oil and Gas**

*Synopsis:*

This subject is designed to provide the students with foundation in mechanical, thermal, and chemical equipments commonly used in process plant facilities. Types of equipment include pumps, compressors, valves, heat exchangers, and process instrumentations.

*References:*


1 J. P. Bentley, Principles of Measurement System, 3rd Ed. Pearson Prentice Hall, 1995. Call number: QC53.B46 1995.
2 Principles of Measurement System, (Fourth Edition); J.P. Bentley, Pearson Prentice Hall, 2005.
3 R. G. Gupta, Electronic Instruments and Systems: Principles, Maintenance and Troubleshooting, McGraw Hill, 2001. Call number: TK7870.2 .G86 2001.
4 D. Jones, and C. A. Foster, Electronic Instruments and Measurements. Prentice Hall International Edition, 1991. Call number: TK7878.4 .J66 1991.
5 D. A. Bell, Electronic Instrumentation and Measurements, 2nd Ed. Prentice Hall Career and Technology, 1994. Call number: TK7878 .B45 1994.

# Synopsis of Specialisation Courses
# (Elective Course II – Master Integration)

**MEE 10103 Advanced Engineering Mathematics**

*Synopsis:*
Root finding of nonlinear systems, solution of the linear systems, multivariate approximation, optimization and forecasting in engineering.

*References:*

1 Tay, K. G, Kek, S. L & Abdul Kahar, R. (2013). Numerical Methods with Excel. Penerbit UTHM, Batu Pahat.
2 Tay, K.G. & Abdul Kahar, R. (2011). Advanced Engineering Mathematics. 3rd Edition. Penerbit UTHM, Batu Pahat.
3 Tay, K. G, Kek, S. L & Abdul Kahar, R. (2011). Numerical Methods with Casio ES PLUS Calculator. Penerbit UTHM, Batu Pahat.
4 Chapra, S. C. and Canale, R. P. (2009). Numerical Methods for Engineers. Sixth edition. Mc Graw Hill, New York.
5 Gen, M, Cheng, R.(2000). Genetic Algorithms and Engineering Optimization.Japan: John Wiley & Son, Inc.
6 Clerc, M. (2006). Particle Swarm Optimization. USA: ISTE Ltd.


**MEE 10203 Programmable Electronics**

*Synopsis:*
The course introduces the digital hardware design concepts and the modelling using HDL to synthesize digital circuits using Programmable Logic Technology. Students will be exposed to the state of the art of Programmable Logic Technology. Students also learn the development, synthesis and modelling of Combinational Circuits, Sequential Circuit, Finite State Machine, RTL design and the testing approaches on the circuits.

*References:*

1 Roth Jr, Charles H. (2016). Digital systems design using Verilog, Boston: Cengage Learning. [TK7888.3.R67 2016]
2 Wilson, Peter. (2016). Design recipes for FPGAs : using Verilog and VHDL /Peter Wilson, Newnes, Elsevier. [TK7895.G36 .W57 2016]
3 Botros, Nazeih.(2015). HDL with digital design: VHDL and Verilog, Mercury Learning and Information. [TK7885.7 .B67 2015]
4 Mehler, Ronald (2015). Digital integrated circuit design using Verilog and system Verilog, Elsevier. [TK7874.65 .M43 2015]
5 Brown, Stephen. (2014). Fundamentals of digital logic with Verilog design, McGraw-Hill Higher Education. [TK7868.L6 .B76 2014]


**MEE 10303 Advanced Digital Processing**

*Synopsis:*
This subject is to introduce the advance concepts in digital signal processing, to demonstrate its applications and implementation constraints and introducing the real-time DSP using MATLAB tools

*References:*

1 Analog and Digital Signal Processing, Ashok Ambardar, 2nd Ed, brooks/Cole, 1999
2 Discrete-Time Signal Processing, Alan V. Oppenheim, Ronald W. Schafer, 2nd Ed, Prentice Hall, 1999.
3 Random Signals for Engineers Using MATLAB and Mathcad, Richard C. Jaffe, A Springer, 2000.
4 Digital Signal Processing: Principles, Algorithm and Applications, John G. Proakis, Dimitris G. Manolakis, 3rd Ed, Prentice Hall, 1996.
5 Digital Signal Processing and Statistical Classification, George J. Miao, Mark A. Clements, Artech Housing Publishers, 2002.
6 Digital Signal Processing with Examples in MATLAB®, Second Edition (Electrical Engineering & Applied Signal Processing Series) 2nd Edition, Samuel D. Stearns, Donald R. Hush, CRC Press, 2011.

**MEE 10403 Computational Intelligence**

*Synopsis:*
Neural Network Fundamentals; Mathematical Foundations; Supervised Learning NN Model; Backpropagation Algorithm; Unsupervised Learning Model NN; Competitive Networks; Grosberg Networks; Classical set and Fuzzy

*References:*

1 Analog and Digital Signal Processing, Ashok Ambardar, 2nd Ed, brooks/Cole, 1999.
2 Discrete-Time Signal Processing, Alan V. Oppenheim, Ronald W. Schafer, 2nd Ed, Prentice Hall, 1999.
3 Random Signals for Engineers Using MATLAB and Mathcad, Richard C. Jaffe, A Springer, 2000.
4 Digital Signal Processing: Principles, Algorithm and Applications, John G. Proakis, Dimitris G. Manolakis, 3rd Ed, Prentice Hall, 1996.
5 Digital Signal Processing and Statistical Classification, George J. Miao, Mark A. Clements, Artech Housing Publishers, 2002.
6 Digital Signal Processing with Examples in MATLAB®, Second Edition (Electrical Engineering & Applied Signal Processing Series) 2nd Edition, Samuel D. Stearns, Donald R. Hush, CRC Press, 2011.


**MEE 10603 Advanced Power Electronics**

*Synopsis:*
This subject will discuss a review of electrical fundamentals of power electronics devices concepts of PWM modulation techniques apply in power semiconductor switches. The student also will be discussed in detail about Diode Rectifiers, Thyristor-Based Rectifiers, DC to DC Converters, DC to AC Converters, AC to AC Converters in three phase systems. As at the end, utility Applications of Power Electronics in alternative energy application.

*References:*

1 Mohan Ned, Undeland Tore M and Robbin William P, Power Electronics: Converters, Applications and Design, 3rd Edition, John Wiley, 2003. [TK7881.15 .M63 2003]
2 Rashid M.H, Power Electronics, Circuits, Devices and Applications, 3rd Edition, Prentice-Hall, 2004. [TK7881.15 .M5 2004]
3 Rashid M.H, SPICE for power electronics and electric power, 2nd Edition, Bota Raton, Taylor and Francis, 2006 [TK7881.15 .M83 2006]
4 Qing Chang Zhong, Control of power inverters in renewable energy and smart grid integration, John Willey, 2013 TK7872.C8 .Z46 2013
5 Rashid M.H, Alternative Energy in Power Electronics, Amsterdam : Butterworth-Heinemann, 2015, TK7881.15 .A47 2015
6 Chanson, H. (2004). The Hydraulics of Open Channel Flow: An Introduction. Amsterdam: Elsevier. [TC175 .C42 2004]

# Synopsis of Specialisation Courses
# (Elective Course III – General)

**BEE 41103 HCIA Routing and Switching**

*Synopsis:*
Huawei (HCIA) Routing & Switching: network fundamentals, Ethernet, various protocols such as those used in routing, and Huawei's own VRP operating system that covers all essential aspects of HCIA certification. Presenting routing and switching basics in depth, it is a valuable resource for information and communications technology (ICT) practitioners, university students and network technologist.

*References:*

1 Huawei Technologies Co. Ltd, HCNA Networking Study Guide, Springer, 2016
2 W.Stallings, High Speed Networking, TCP/IP and ATM Design Principles, Prentice Hall, 1998
3 W. Stallings, Data and Computer Communications, 5e, Prentice Hall, 1997
4 B. Sklar, Digital Communications: Fundamentals and Applications, Prentice Hall, 1988
5 Nalin K.Sharda, Multimedia Information Networking, Prentice Hall, 1999


**BEE 41203 HCIA Cloud Computing**

*Synopsis:*
uawei HCIA-Cloud Computing course is aimed at introducing the basic of cloud computing, as well as how to use virtualization technology to realize the basic characteristics of cloud computing. This course covers the introduction of Cloud Computing and virtualization, storage, network in Cloud Computing, virtualization features and development trend of Cloud Computing, which are valuable resources for information and communications technology (ICT) practitioners, university students and network technologist.

*References:*

6 Huawei Technologies Co. Ltd, HCNA Networking Study Guide, Springer, 2016
7 Jiongjiong Gu, Cloud Computing Architecture: Technologies and Practice, 2021.
8 Lei Zhang and Le Chen, Cloud Data Center Network Architectures and Technologies, 2021.
9 Dan C. Marinescu, Cloud Computing: Theory and Practice, Call Number : QA76.585 .M37 2013.
10 Jamsa, Kris A, Cloud Computing: SaaS, PaaS, IaaS, Virtualization, Business Models, Mobile, Security and More, Call Number : QA76.585 .J35 2013.


**BEE 41303 HCIA Artificial Intelligence**

*Synopsis:*
Huawei HCIA-AI course is aimed to introduce the basic of artificial intelligence (AI), as well as understand the AI development history. This course covers the AI, Machine Learning and Deep Learning overview, mainstream development framework for AI, Huawei AI development framework, Huawei AI Computing Platform, Huawei AI platform for smart devices and Huawei Cloud Enterprise Intelligence application platform. This course contents are valuable resources for those who are interested in learning how to build and manage AI for commercial needs, ICT practitioners, university students and network technologist.

*References:*

1 Huawei Technologies Co. Ltd, HCNA Networking Study Guide, Springer, 2016
2 Xiaoyao Liang, Ascend AI Processor Architecture and Programming: Principles and Applications of CANN, 2020
3 Zhiyuan Chen, Bing Liu, Lifelong Machine Learning: Second Edition, 2018
4 Flach, Peter A, Machine learning: The Art and Science of Algorithms That Make Sense of Data, Call Number: Q325.5. F52 2012.
5 Brent M. Gordon, Artificial Intelligence: Approaches, Tools and Applications, Call Number: Q335.5. A78 2011.

**BEE 41403 Electric Vehicles**

*Synopsis*:
This course introduces the fundamental concepts, principles, components and control of electric vehicles. This course goes deeper into the various aspects of the electric drive-train, such as the technologies, configuration, types of electric machines, energy storage devices, and electric vehicle control. Each topic is developed in logical progression with the latest information.

*References*:

1 IOT fundamentals: networking technologies. protocols, and use cases for the internet of things, Indianapolis, IN: Cisco Press, 2017.
2 Sebastian Thrun; Wolfram Burgard; Dieter Fox: Probabilistic robotics, Cambridge, Massachusetts: The MIT Press, 2006.
3 Electric vehicle technology explained / James Larminie, John Lowry.Call number: TL220.L35, 2003.
4 Introduction to modern power electronics / Andrzej M. Trzynadlowski. Call number: TK7881.15. T79 2016.
5 Power electronics and electric drives for traction applications/ edited by Gonzalo Abad. Call number: TJ1095.P68, 2017.
6 Modeling power electronics and interfacing energy conversion systems / M.Godoy Simoes and Felix A. Farret. Call Number: TK7881.15. S55, 2017.


**BEE 41503 Photovoltaic Systems**

*Synopsis*:
The course has been designed to introduce the technology of solar photovoltaic engineering and grid-connected photovoltaic (GCPV) design. The main topic of this course consists of basic solar engineering, photovoltaic technology, GCPV system design, performance evaluation, operation and maintainance. The GCPV design software and related national and international standards are also discussed in this course.

*References*:

1 Seda Malaysia Grid-Connected Photovoltaic Systems Design, Sustainable Energy Development Authority Malaysia, 2016.
2 Seda Malaysia Off-Connected Photovoltaic Systems Design, Sustainable Energy Development Authority Malaysia, 2014.
3 Ali Keyhani, Design of Smart Power Grid Renewable Energy System, Wiley, ISBN 9781118978771, 2017.


**BEE 41703 Business Start-up and Technopreneurship**

*Synopsis*:
This course introduces students to the fundamentals of technopreneurship, guiding them from idea generation to startup launch. Covering design thinking, business structures, financial planning, intellectual property, and digital marketing, it emphasizes hands-on learning through workshops, case studies, simulations, and field visits. The course culminates in a Demo Day where students pitch and showcase their Minimum Viable Products (MVPs), preparing them to navigate Malaysia's startup ecosystem with innovation and entrepreneurial confidence.

*References*:

1 DeGarmo, E. Paul (1997). Engineering Economy, Prentice-Hall, TA177.4. E63. 1997.
2 Sullivan, William G. (2009). Engineering Economy, Pearsonl, TA177.4 .S94 2009.
3 Kamariah Ismail, Noraini Abu Talib, Mohd. Hassan et al. (2009). Technology Entrepreneurship, Prentice-Hall. Call number HD45 .T44 2009.
4 UiTM Entrepreneurship Study Group (2004). Fundamentals of Entrepreneurship, revised edition, Prentice-Hall. Call number HB615 .F86 2004.
5 Bruce R. Barringer, R. Duane Ireland (2010). Entrepreneurship: successfully launching new ventures, 3rd Edition. Prentice-Hall. Call number HB615 .B37 2010.

6 Charles E. Bamford, Garry D. Bruton (2011). Entrepreneurship: a small business approach. New York: McGraw-Hill. Call number HD62.5 .B35 2011.
7 Schaper M., Volery, T, Weber, P., Lewix, K., (2011). Entrepreneurship and small business; 3rd Asia-Pacific Edition. John Wiley & Son. Call number HD2341 .E57 2011.
8 Jamal Nassar, (2018) Technopreneurship Financing & Startups Ecosystem: How Malaysia Is Creating Another Success Story; Call number HD62.5 .J35 2018
9 Rambat Lupiyoadi, Kurniawan (2020) Technopreneurship, Penerbit Salemba Empat 2020.
10 Shelters David (2013) Start-Up Guide for the Technopreneur, John Wiley, Call number: HD62.37 .S43
11 Scaffidi, Federica; Micelli, Ezio; Nash, Matt (2025) The role of the social entrepreneur for sustainable heritage-led urban regeneration, Cities, Vol 158, March 2025. https://doi.org/10.1016/j.cities.2024.105670
12 Ascencio, Christine; Benmamoun, Mamoun; Katz, Jerome; Brinkmeier, Alex (2024) Enriching the Typology of Social Entrepreneurs: The Transnational Dimension. Administrative Sciences, Vol. 14, Issue 12, p335-350, https://doi.org/10.3390/admsci14120335
13 Shahnoel Noeh, Amirul; Rozaidah Pg Hj Idris, Pg; Anshari, Muhammad (2022) Decision Model in the Development of Technopreneurship and the Adoption of IR4.0 Technologies, International Conference on Decision Aid Sciences and Applications (DASA). https://doi.org/10.1109/DASA54658.2022.9765016

**BEJ 43903 Analog IC Design**

*Synopsis*:
This course provides a comprehensive introduction to the principles and techniques of analog integrated circuit (IC) design. Students will explore the fundamentals of MOS transistors, design and analysis of single-stage and differential amplifiers, and operational amplifiers. Other topics include the fundamental analog circuit topologies, concepts and essential ICs layout design techniques. The course also delves into operational amplifiers, highlighting their configurations, applications, and key parameters.

*References*:
1 Behzad Razavi (2001). Design of Analog CMOS Integrated Design, 2nd. Ed., McGraw Hill. Call number TK7874.654 .R39 2001 N4
2 R. Jacob Baker (2005). CMOS: Circuit Design, Layout, and Simulation, 4th Ed,. Wiley-IEEE Press. Call number TK7871.99.M44 .B34 2005
3 Philip E. Allen and Douglas R. Holberg (2011). CMOS Analog Circuit Design, 3rd. Ed., Oxford University Press. Call number TK7874 .A44 2002
4 Behzad Razavi (2015). Microelectronics, 2nd. Ed., Wiley. Call number TK7874 .R39 2015
5 Tony Chan Carusone, David A. Johns and Kenneth W. Martin (2013). Analog Integrated Circuit Design. 2nd. Ed., Wiley. Call number TK7874 .C44 2013]
6 Alan Hasting (2006). The Art of Analog Layout, 2nd. Ed., Prentice Hall. Call number TK7874 .H37 2001 N2
7 Çilingiroğlu, Uğur. 2019. " Small-Signal Modeling and Circuit Analysis." Chap. 3.7 in Analog Integrated Circuit Design by Simulation: Techniques, Tools, and Methods. 1st ed. New York: McGraw-Hill Education. https://www-accessengineeringlibrary-com.ezproxy.uthm.edu.my/content/book/9781260441451/toc-chapter/chapter3/section/section33

**BEJ 44173 Electrical Machines**

*Synopsis:*
The principles of electrical engineering are fundamental to understanding the operations and characteristics of various AC and DC circuits and machines. This course provides a comprehensive study of electrical systems, including transformers, AC and DC machines, and generators. Through this subject, students will gain the skills and knowledge necessary to analyze and solve real-world electrical engineering problems across different industries, preparing them for challenges in the modern electrical and industrial environment.

*References:*
1 Chapman Stephen J., Electric Machinery Fundamentals, 5th Edition; McGraw-Hill, 2005. Call number: TK2000 .C42 2012

2 Chitra A., Sanjeevikumar Padmanaban, Jens Bo Holm-Nielsen, and S. Himavathi. (2020). Artificial Intelligent Techniques for Electric and Hybrid Electric Vehicles. ProQuest Ebook Central. https://ebookcentral.proquest.com/lib/uthm-ebooks/reader.action?docID=6261123&query=electric+motor
3 Sahdev, S.K., 2017. Electrical machines. Cambridge University Press.
4 Fernandes, J.F., Bhagubai, P.P. and Branco, P.J., 2022. Recent Developments in Electrical Machine Design for the Electrification of Industrial and Transportation Systems. Energies, 15(17), p.6390.

**EFF 40103 Introduction to Big data**

*Synopsis:*
Big Data is a term used to describe a collection of data that is huge in size and yet growing exponentially with time. In short, such data is so large and complex that none of the traditional data management tools are able to store it or process it efficiently. This course provides knowledge on how to handle and manage big data.

*References:*
1 Chu, Wesley W Data Mining and Knowledge discovery for big data: methodologies, challenge and opportunities. Berlin, Heidelberg: Springer 2014. Call Number: QA76.9.D379 2014
2 Reiss, Rolf D. Statistical of extreme values: with applications to insurance, finance, hydrology and other fields. Basel: Birkhauser Call Number: QA273.6.R44 2007.
3 Little, Roderick J.A. Statistical analysis with missing data. Hoboken, NJ: John Wiley, 2002 Call Number: QA276. L57 2002
4 Liu, Shen Computation and statistical methods for analysing big data with applications. London: Academic Press, 2015 Call Number: QA76.9.C66 2015
5 Voss, Jochen An introduction to statistical computing: a simulation-based approach, Chichester, West Sussex: Wiley 2014 Call Number: QA276.4. V67 2014

**EIF 40103 Machine Learning**

*Synopsis:*
Data visualisation is the graphical representation of information using visual elements like charts, graphs, maps, dashboard and etc. Data visualisation tools such as Tableau and Microsoft Power BI provides an accessible way to see and understand trends, outliers, forecast and patterns in data.

*References:*
1 Lee Meng Wei. (2019). Python Machine Learning. Wiley.
2 Mohri Mehryar, Afshin Rostamizadeh, and Ameet Talwalkar. (2018). Foundations of Machine Learning. The MIT Press.
3 Andreas C. Müller & Sarah Guido. (2016) Introduction to Machine Learning with Python: A Guide for Data Scientists. O'Reilly Media.
4 Shalev-Shwartz S., Ben-David S. (2014). Understanding Machine Learning: From Theory to Algorithms. Cambridge University Press.
5 Christopher M. Bishop. (2011). Pattern Recognition and Machine Learning. Springer

**EWF 40103 Data Science and Applications**

*Synopsis:*
In this course, student will learn how to leverage on data to unlock new economic value for your business, as well as apply useful data science concepts to every aspect of your daily life from personal finances, to reading, lifestyle habits, and work decisions. This course will combine a good balance of theoretical knowledge and practical application where students will learn the processes of gathering, cleaning and handling data and learning big data concepts by using case study references to reinforce learning.

*References:*


1 Kelleher, J. D. & Tierney, B. (2018). Data Science. The MIT Press, USA. ISBN: 9780262535434.
2 Baumer, R. B. Kaplan, D., & Horton, N. (2017). Modern Data Science with R. Chapman and Hall/CRC Press: Florida, USA. ISBN 9781498724487.
3 Igual, L. & Seui, S. (2017). Introduction to Data Science: A Python Approach to Concepts, Techniques and Applications. Springer Nature, Cham, Switzerland. ISBN: 9783319500164.
4 EMC Education Services. (2015). Data Science & Big Data Analytics: Discovering, Analyzing, Visualizing and Presenting Data. John Wiley & Sons, Inc., ISBN: 9781118876138.
5 Grus, J. (2015). Data Science from Scratch: First Principles with Python. O'Reilly Media Inc., Sebastopol, Canada. ISBN: 9781491901427.
6 O'Neil, C. & Schutt, R. (2013). Doing Data Science. O'Reilly Media, Inc., Sebastopol, Canada. ISBN: 9781449358655.
7 Huang, M.L. 2014. Innovative Approaches of Data Visualization and Visual Analytics. Hershey: Information Science Reference. (QA76.9 .I52 2014)
8 Information Dashboard Design: Displaying Data for At-a-Glance Monitoring Stephen Few, O'Reilly Media (2013)


**EWF 40203 Data Visualisation**

*Synopsis:*

Data visualisation is the graphical representation of information using visual elements like charts, graphs, maps, dashboard and etc. Data visualisation tools such as Tableau and Microsoft Power BI provides an accessible way to see and understand trends, outliers, forecast and patterns in data.

*References:*


1 Dzemyda, G. 2013. Multidimensional data visualization: methods and applications. New York: Springer. (TK7881.16 . D93 2013).
2 Yau, N. (2011). Visualize This: The FlowingData Guide to Design, Visualization, and Statistics. Indianapolis: O'Reilly.
3 Few, S. (2012). Show me the numbers: Designing tables and graphs to enlighten. Burlingame, CA: Analytics Press.
4 Huang, M.L. 2014. Innovative Approaches of Data Visualization and Visual Analytics. Hershey: Information Science Reference. (QA76.9 .I52 2014).
5 Information Dashboard Design: Displaying Data for At-a-Glance Monitoring Stephen Few, O'Reilly Media (2013).


**UQU40103 Professional@Work**

*Synopsis*:

The Professional at Work course is designed to improve the ability of students to develop their technical skills in professionalism, social responsibility, and environmental sustainability. Nurturing and empowering the student with these skills could enhance the student's professionalism prior to entering the workspace. The philosophy of the course is ongoing, systematic, and aimed toward a fulfilling work life, which is part of their overall plan for personal development. This course includes an introduction to professional practice, ethics, legal, innovation and infrastructure, social responsibility, and professional environment. Also, this course was developed by referring to Sustainable Development Goals (SDG) and Politic, Economy, Social, Technology, Environment, and Legal (PESTEL) guidelines. Particularly, students will propose a suitable community service project that deals with local/community issues that lead to professional practices.

*References*:


1. Lydia E. Anderson & Sandra B. Bolt (2016). Professionalism: skills for workplace success. Pearson, c2013 ISBN 9780132624664
2. Department of Economic and Social Affairs, United Nation (2019). Handbook for th preparation of valuntary national reviews

3. Purohit, S. S. (2008). Green technology: an approach for sustainable environment. ISBN: 9788177543438, [S494.5.S86 .P87 2008]
4. Russ, Tom (2010). Sustainability and design ethics. ISBN: 9781439808542 [TA157. R87 2010]
5. Yoe, Charles (2012). Principles of risk analysis: decision making under uncertainty. ISBN: 9781439857496 [T57.95 .Y63 2012]

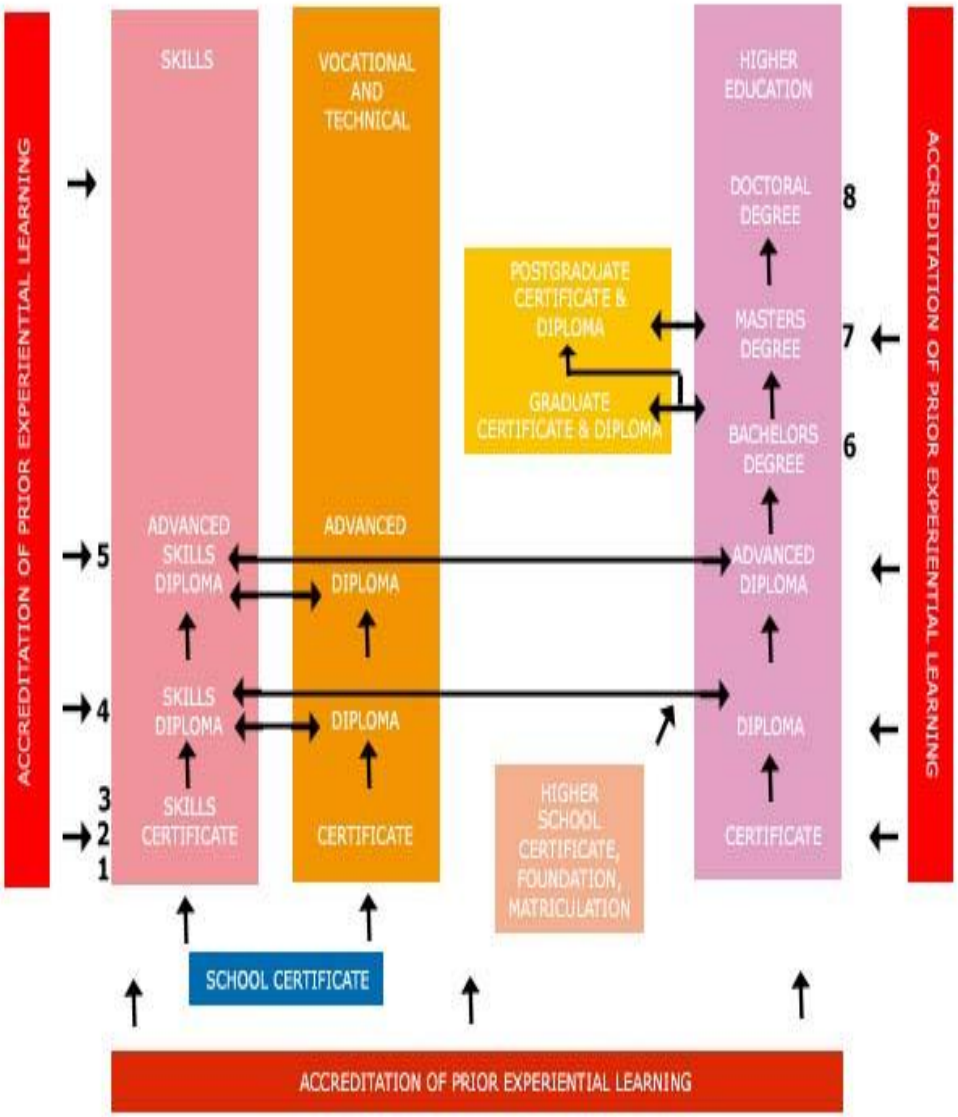
## Career and Further Education Prospect

Graduates of the Bachelor of Electronic Engineering (Robotics and Artificial Intelligence Systems) with Honours are equipped with strong technical knowledge and practical skills in electronic engineering, robotics, automation, embedded systems, and artificial intelligence. The programme prepares students to meet the rapidly growing demands of Industry 4.0, smart manufacturing, and intelligent engineering systems at both national and global levels

Upon graduation, students will have excellent opportunities to pursue professional careers in a wide range of industries, including robotics, automation, automotive, manufacturing, healthcare technology, and smart industrial systems. With strong technical competencies and hands-on laboratory experience, graduates may pursue professional roles as Robotics Engineers, AI Engineers, Machine Learning Engineers, Control and Automation Engineers, Embedded Systems Developers, Vision Systems Engineers, Industrial Automation Engineers, IoT Engineers, Data Scientists, and R&D Engineers.

Nevertheless, the room for continuing studies is always available. The programme also provides a solid foundation for further education, enabling graduates to continue postgraduate studies at the Master or PhD level in specialised areas such as robotics, intelligent systems, automation, data science, and electronic engineering. This ensures graduates remain competitive and adaptable in supporting Industry 4.0 and future technological advancements.

## MQF BASED ON QUALIFICATION LEVEL AND EDUCATIONAL PATHWAY



## MALAYSIAN QUALIFICATIONS FRAMEWORK: QUALIFICATIONS AND LEVELS

<table>
<tr><th rowspan="2">MQF Levels</th><th colspan="3">Sectors</th><th rowspan="2">Lifelong Learning</th></tr>
<tr><th>Skills</th><th>Vocational and Technical</th><th>Higher Education</th></tr>
<tr><td>8</td><td rowspan="4" colspan="2"></td><td>Doctoral Degree</td><td rowspan="9">Accreditation of Prior Experiential Learning (APEL)</td></tr>
<tr><td rowspan="2">7</td><td>Masters Degree</td></tr>
<tr><td>Postgraduate Certificate & Diploma</td></tr>
<tr><td rowspan="2">6</td><td>Bachelors Degree</td></tr>
<tr><td>Graduate Certificate & Diploma</td></tr>
<tr><td>5</td><td>Advanced Diploma</td><td>Advanced Diploma</td><td>Advanced Diploma</td></tr>
<tr><td>4</td><td>Diploma</td><td>Diploma</td><td>Diploma</td></tr>
<tr><td>3</td><td>Skills Certificate 3</td><td rowspan="3">Vocational and Technical Certificate</td><td>Certificate</td></tr>
<tr><td>2</td><td>Skills Certificate 2</td><td rowspan="2"></td></tr>
<tr><td>1</td><td>Skills Certificate 1</td></tr>
</table>

**Disclaimer:**

This is a revised Faculty of Electrical and Electronic Engineering Proforma Bachelor of Electronic Engineering with Honours as of 15th September 2026 FKEE



**Centre for Academic Development and Training**
**Universiti Tun Hussein Onn Malaysia**
**86400 Batu Pahat, Johor Darul Ta'zim**
**www.uthm.edu.my**