UTeM
UNIVERSITI TEKNIKAL MALAYSIA MELAKA

ACADEMIC HANDBOOK SESSION 2021/2022

FOR BACHELOR DEGREE PROGRAMMES

FTKEE

FACULTY OF ELECTRICAL AND ELECTRONIC ENGINEERING TECHNOLOGY

UNIVERSITI TEKNIKAL MALAYSIA MELAKA

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DATUK AZHAR BIN MOHAMED
Legal Advisor

UNIVERSITI TEKNIKAL MALAYSIA MELAKA

UTeM VISION, MISSION, MOTTO

Vision
To Be One of the World's Leading Innovative and Creative Technical Universities.

Mission
UTeM is committed to pioneer and contribute towards the prosperity of the nation and the world by:

1. Promoting knowledge through innovative teaching & learning, research and technical scholarship.
2. Developing professional leaders with impeccable moral values.
3. Generating sustainable development through smart partnership with the community and industry.

Motto
Excellence Through Competency

UTeM GENERAL EDUCATION GOALS

1. To conduct academic & professional programs based on relevant needs of the industries.
2. To produce graduates with relevant knowledge, technical competency, soft skills, social responsibility and accountability.
3. To cultivate scientific method, critical thinking, creative & innovation problem solving & autonomy in decision making amongst graduates.
4. To foster development and innovation activities in collaboration with industries for the development of national wealth.
5. To equip graduates with leadership & teamwork skills as well as develop communication & life-long learning skills.
6. To develop technopreneurship & managerial skills amongst graduates.
7. To instill an appreciation of the arts & cultural values and awareness of healthy life styles amongst graduates.

WELCOME TO FTKEE

Assalammualaikum and *Salam Sejahtera*,

Welcome to the Faculty of Electrical and Electronics Engineering Technology (FTKEE)!

It is my pleasure to welcome you as a student of this faculty. You are joining a multidisciplinary community of more than 165 staffs comprising of administrative and academicians. FTKEE has a growing curriculum committed to providing a quality education leading to variety of degrees including computer engineering, electronic engineering and electrical engineering.

Joining FTKEE, you will benefit immensely from an academically rich environment supported by advanced equipment technology and assisted by highly technical trainers and teaching engineers. In addition, you will be equipped with sound knowledge and skills relevant to the needs of multi-faceted industries which focused on the portion of the technological spectrum closest to various areas such as product design, product improvement, manufacturing, construction, system developments and engineering operational functions.

FTKEE aims to support the nation's need for highly skilled workforces towards achieving the vision to be a high-income nation. It is a unique faculty where all the programs offered are application-oriented based on the current industrial needs and been taught by lecturers with industrial

experiences. The faculty's strong link with industries will also be beneficial to the students to be exposed to the actual industrial environment. The ready-to-practice engineering technologists are not only trained to be creative and innovative with high ethical values but with emphasis on the soft skills such as communication, team work and leadership as required by the industries.

This handbook is prepared to provide valuable information about our academic programs, which to assist you in the process of being a student at FTKEE. As a student you are responsible to consult regularly with your academic advisor particularly when it is time to register for your courses. Developing your creativity, skills and resourcefulness in such a fast changing discipline in this new millennium has many benefits in technological practices and many other future careers. At FTKEE, we are committed to creating a productive, efficient and friendly atmosphere within the faculty and welcome your partnership in this noble endeavor. We are pleased that you have chosen FTKEE and we are committed to the notion that you will continue to strive towards excellence throughout your tenure at FTKEE.

TS. DR. ROSTAM AFFENDI BIN HAMZAH

Dean,

Faculty of Electrical & Electronic Engineering Technology

FTKEE VISION, MISSION AND MOTTO

Vision

Our vision is to be one of the best engineering technology educational providers, well recognized locally, nationally and internationally for its achievements.

Mission

To provide quality programmes in engineering technology that will drive students toward achieving their educational objectives, professional goals and an engagement to life-long learning.

Motto

Towards Engineering Technology Educational Excellence.

FTKEE OBJECTIVES

1. To provide high quality and demanding engineering technology programme that meet current need of industry and society.
2. To produce highly skilled and competence workforce that is recognized by professional bodies nationally and internationally.
3. To implement modern and innovative approaches in our teaching and learning environment.
4. To establish network, good relationship and collaboration with universities and industries.
5. To participate in activities that supports the intellectual and economic development of business, industry, government and stakeholders.

FTKEE PROGRAMME EDUCATIONAL OBJECTIVES (PEO)

1. To produce engineering technologists who are creative and innovative to practice in electrical/ electronic/computer engineering technology fields.
2. To produce engineering technologists who are able to engage with continuous professional development and constantly adapt to evolving technologies.
3. To produce engineering technologists who are able to practice professional ethics and leadership to meet the needs of the society.

FTKEE ADMINISTRATION

Ts. DR. ROSTAM AFFENDI BIN HAMZAH
DEAN

Ts. DR. SYED NAJIB BIN SYED SALIM
DEPUTY DEAN (ACADEMIC)

Ir. DR. MOHD FARRIZ BIN MD. BASAR
DEPUTY DEAN (RESEARCH & INDUSTRY NETWORK)

Ts. DR. MUHAMMAD SHARIL BIN YAHYA
DEPUTY DEAN (STUDENTS AFFAIR)

DR. MOHD BADRIL BIN NOR SHAH
HEAD OF ELECTRICAL ENGINEERING TECHNOLOGY

Ir. Ts. DR. MOHD FAUZI BIN AB RAHMAN
HEAD OF ELECTRONICS & COMPUTER ENGINEERING TECHNOLOGY

Ts. AHMAD ZUBIR BIN JAMIL
HEAD OF BACHELOR OF TECHNOLOGY

PUAN MARSITA BINTI MOHD TAIB
DEPUTY REGISTRAR

COURSE COORDINATOR
ELECTRICAL ENGINEERING TECHNOLOGY

ELECTRICAL ENGINEERING TECHNOLOGY (INDUSTRIAL POWER)

BEEI

Ts. DR. ZULKIFLI BIN IBRAHIM

ELECTRICAL ENGINEERING TECHNOLOGY (INDUSTRIAL AUTOMATION & ROBOTIC)

BEEA

Ts. DR. SAHAZATI BINTI MD ROZALI

ELECTRICAL ENGINEERING TECHNOLOGY

BEEY

DR. AZHAN BIN AB. RAHMAN

COURSE COORDINATOR
ELECTRONICS/COMPUTER ENGINEERING TECHNOLOGY

ELECTRONICS ENGINEERING TECHNOLOGY (TELECOMMUNICATIONS)

BEET

Ts. ZAHARIAH BINTI MANAP

ELECTRONICS ENGINEERING TECHNOLOGY (INDUSTRIAL ELECTRONICS)

BEEE

Ts. DR. MOHD SYAFIQ BIN MISPAN

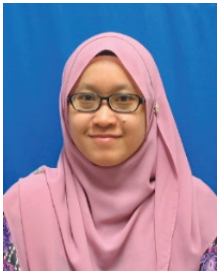
ELECTRONICS ENGINEERING TECHNOLOGY

BEEZ

PUAN IZADORA BINTI MUSTAFFA

COMPUTER ENGINEERING TECHNOLOGY (COMPUTER SYSTEMS)

BEEC



DR. SUHAILA BINTI MOHD. NAJIB

COURSE COORDINATOR BACHELOR OF TECHNOLOGY

BACHELOR TECHNOLOGY OF ELECTRONIC INDUSTRIAL AUTOMATION

BEEL

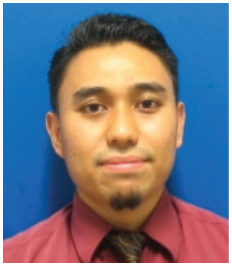
Ts. AHMAD NIZAM BIN MOHD JAHARI @ MOHD JOHARI

BACHELOR TECHNOLOGY OF ELECTRICAL MAINTENANCE SYSTEM

BEEM

Ts. ASRI BIN DIN

COURSE COORDINATOR MATHEMATICS



EN. ADAM BIN SAMSUDIN

COURSES OFFERED

No	Programme Name	Short Code
1	Bachelor of Electrical Engineering Technology (Industrial Power) with Honours	BEEI
2	Bachelor of Electrical Engineering Technology (Industrial Automation & Robotics) with Honours	BEEA
3	Bachelor of Electrical Engineering Technology with Honours	BEEY
4	Bachelor of Electronics Engineering Technology (Telecommunications) with Honours	BEET
5	Bachelor of Electronics Engineering Technology (Industrial Electronics) with Honours	BEEE
6	Bachelor of Computer Engineering Technology (Computer Systems) with Honours	BEEC
7	Bachelor of Electronic Engineering Technology with Honours	BEEZ
8	Bachelor Technology of Electrical Maintenance System	BEEM
9	Bachelor Technology of Electronic Industrial Automation	BEEL

COURSES DURATION

For Bachelor's Degree duration is within minimum of 4 years and up to maximum of 6 years.

For Bachelor Technology' s Degree duration is within minimum 3 years 6 months up to maximum of 5 years.

GRADING SYSTEM

A student's achievement for each subject is based on the grades which are illustrated in Table 1.

Table 1: Marks, Grades and Points Awarded

Marks	Grade	Points	Achievements
80 – 100	A	4.0	Distinction
75 – 79	A-	3.7	Distinction
70 – 74	B+	3.3	Merit
65 – 69	B	3.0	Merit
60 – 64	B-	2.7	Merit
55 – 59	C+	2.3	Pass
50 – 54	C	2.0	Pass
47 – 49	C-	1.7	Conditional Pass
44 – 46	D+	1.3	Conditional Pass
40 – 43	D	1.0	Conditional Pass
0 – 39	E	0.0	Fail

ACADEMIC CLASSIFICATION

A student's achievement is evaluated based on Grade Point Average (GPA) and Cumulative Grade Point Average (CGPA). A student's academic status will be provided at the end of each semester based on CGPA as shown in Table 2.

Table 2: Academic Status Classification

STATUS	CGPA
Good (KB)	CGPA ≥ 2.00
Conditional (KS)	1.70 ≤ CGPA < 2.00
Fail (KG)	CGPA < 1.70

(Note: KB = Kedudukan Baik, KS = Kedudukan Bersyarat, KG = Kedudukan Gagal)

ACADEMIC ADVISORY SYSTEM

Students are free to take subjects offered by the faculty at any semester based on their capability, as long as it complies with the rules and regulations set up by the faculty and university academic board. Students need to plan their own study carefully and the faculty shall appoint an academic advisor to guide them during their duration of study in the university.

Characteristics of the Semester System:

- Students are free to take any subjects offered in each semester based on their ability; and conditions of subject selection are determined by the faculty and university's academics regulations.
- Students should plan their study and learning appropriately or as advised by their academic advisor.

The Importance of Academic Advisor:

- Students need to be guided in term of subjects taken under the semester system, where they are free to determine the number of subjects to be taken based on their capability or in case the student obtained a Conditional Position (KS) in the previous semester. They need to plan carefully to take subjects which are suitable for them to carry and fully aware on its implication to their whole study period in the university.
- Semester system is a flexible system for a student with high, moderate or less capability to complete their study based on their own capability whilst complying with the maximum study period set up by the university.
- The academic advisor is able to provide an advice not only in the academic matter, but also in the aspects of how the students can adapt themselves to the semester system, culture shock of studying in the university, time management and private matters that may affect the students' study performance.
- In the condition where the student is not with the same batch of other students during the study period due to difference in the subjects taken, difficulty may be expected for him/her to discuss on the matter of study with the others. Thereby, the role of academic advisor is important.

Roles and Responsibilities of student and academic advisor in the Academic Advisory System are as follows:

Academic Advisor	Student
• Conduct a meeting with students at least twice every semester.	• Always be open-minded when meeting with the academic advisor.
• Make sure to student understand the academic system in UTeM.	• Attend meetings conducted by the academic advisor.
• Guide and make sure student's subjects registration is based on his/her current academic result.	• Regard the academic advisor as a mentor and seek advice on the academic matters from them.
• Supervise the student study progress and provide guidance in making a good study planning.	• Learn to have a good understanding of the academic system.
• Inspire students so that they will always be motivated in their study.	• Provide a copy of examination result to the academic advisor for each semester.
• Ensure the student's record and file is always updated – make sure no subject is missed to fulfill the requirement for the award of a Bachelor's Degree.	• Get the certification of registration form, copy of certificates and reference letter from the academic advisor.
• Refer the student to certain department/ centre for further action if necessary.	• Keep records on all subjects that have already been taken during the period of study to prevent missed subject and fulfill the requirement for degree award.

GPA & CGPA CALCULATION

A student's overall achievement is based on Grade Point Average (GPA) obtained for a particular semester and Cumulative Grade Point Average (CGPA) for the semesters that have been completed.

Grade Point Average (GPA)

GPA is the grade point average obtained in a particular semester. It is based on the following calculations:

Total Points, $JMN = k_1m_1 + k_2m_2 + ...k_nm_n$

Total Calculated Credits, $JKK = k_1 + k_2 + ...k_n$

$GPA = JMN / JKK$

$= [k_1m_1 + k_2m_2 + ...k_nm_n] / [k_1 + k_2 + ...k_n]$

Where : k_n = Credit for n course

m_n = Points from the n course

Cumulative Grade Point Average (CGPA)

CGPA is the cumulative grade point average obtained for the semesters that have been completed. It is based on the following calculations:

$CGPA = [JMN_1 + JMN_2 + ...JMN_n] / [JKK_1 + JKK_2 + ...JKK_n]$

Where: JMN_n = Total points obtained in n semester

JKK_n = Total credits in n semester

AWARD

A Bachelor's Degree shall be awarded if all the following conditions are fulfilled by the student:

1. Must get Good (KB) status in the final semester.
2. Pass all the subjects required as listed in the course curriculum.
3. Apply for the award of the degree, approved by the faculty and certified by senate.
4. Pass MUET according to the university directive. For UTeM entrance's requirement, student must at least acquire Band 2. For certain conditions, those who are accepted into UTeM with no MUET certification or with only Band 1, **MUST** obtain at least Band 2 before graduation.
5. Meet all the other university requirement.

ACADEMIC HANDBOOK SESSION 2021/2022
FOR BACHELOR DEGREE PROGRAMMES

CURRICULUM STRUCTURE

FTKEE

FACULTY OF ELECTRICAL AND
ELECTRONIC ENGINEERING TECHNOLOGY
UNIVERSITI TEKNIKAL MALAYSIA MELAKA

ELECTRICAL ENGINEERING TECHNOLOGY

PROGRAMME LEARNING OUTCOMES (PLO)

PLO1	Ability to apply knowledge of mathematics, science, engineering fundamentals and engineering specialization principles to defined and applied engineering procedures, processes, systems or methodologies in the field of electrical engineering technology (industrial automation & robotics/ industrial power).
PLO2	Ability to solve broadly-defined engineering problems systematically to reach substantiated conclusions, using tools and techniques appropriate to electrical engineering technology (industrial automation & robotics / industrial power).
PLO3	Ability to design solutions for broadly-defined engineering technology problems, and to design systems, components or processes to meet specified needs with appropriate consideration for public health and safety, as well as cultural, societal, environmental and sustainability concerns.
PLO4	Ability to plan and conduct experimental investigations of broadly-defined problems, using data from relevant sources.
PLO5	Ability to select and apply appropriate techniques, resources and modern engineering tools, with an understanding of their limitations.
PLO6	Ability to demonstrate an awareness of and consideration for societal, health, safety, legal and cultural issues and their consequent responsibilities.
PLO7	Ability to demonstrate an understanding of the impact of engineering technology practices, taking into account the need for sustainable development.
PLO8	Ability to demonstrate an understanding of professional ethics, responsibilities and norms of engineering technology practices.
PLO9	Ability to function effectively as individuals, and as members or leaders in diverse technical teams.
PLO10	Ability to communicate effectively with the engineering community and society at large.
PLO11	Ability to demonstrate an awareness of project management, business practices and entrepreneurship.
PLO12	Ability to recognise the need for professional development and to engage in independent and lifelong learning.

Bachelor of Electrical Engineering Technology (Industrial Power) with Honours (BEEI)

	CODE	COURSE	CATEGORY	CREDIT	PRE-REQUISITE
SEMESTER 1	BEEU 1013	*Matematik Teknikal* Technical Mathematics	P	3	
	BEEY 1303	*Sistem Pengukuran & Instrumentasi* Measurement & Instrumentation Systems	K	3	
	BEEA 1313	*Rekabentuk Terbantu Komputer* Computer Aided Design	K	3	
	BEEA 1304	*Elektronik & Sistem Digital* Digital Electronics & Systems	K	4	
	BEEI 1303	*Pengenalan Litar Elektrik* Electrical Circuit Fundamental	K	3	
	BIPW 1132	*Falsafah dan Isu Semasa* Philosophy and Current Issue	W	2	
	BKKX XXX1	*Kokurikulum I* Cocurriculum I	W	1	
TOTAL CREDITS THIS SEMESTER				**19**	
SEMESTER 2	BEEU 1023	*Kalkulus untuk Teknologi* Calculus for Technology	P	3	
	BEEI 1311	*Bengkel Elektrik I* Electrical Workshop I	K	1	
	BEEI 1323	*Elektrik & Kemagnetan* Electrical & Magnetism	K	3	
	**BEEI 1333	*Litar Elektrik Lanjutan* Advanced Electrical Circuits	K	3	BEEI 1303
	BEEA 1343	*Pengaturcaraan Komputer* Computer Programming	K	3	
	BEEI 1453	*Prinsip Elektronik* Electronic Principle	K	3	
	BLLW 1142	*Bahasa Inggeris untuk Akademik* English for Academic Purposes	W	2	
	BLLW 1172	*Bahasa Melayu Komunikasi* ***(untuk pelajar antarabangsa)*** Malay Language for Communication ***(for international students)***	W	2	
TOTAL CREDITS THIS SEMESTER					
LOCAL STUDENT				**18**	
INTERNATIONAL STUDENT				**20**	

	CODE	COURSE	CATEGORY	CREDIT	PRE-REQUISITE
SEMESTER 3	BEEU 2033	*Kalkulus Lanjutan untuk Teknologi* Advanced Calculus for Technology	P	3	
	BEEA 2061	*Seminar Kejuruteraan I* Engineering Seminar I	P	1	
	**BEEI 2342	*Bengkel Elektrik II* Electrical Workshop II	K	2	BEEI 1311
	BEEI 2373	*Mesin Elektrik* Electrical Machines	K	3	
	BEEI 2364	*Teknologi Elektrik* Electrical Technology	K	4	
	BEEA 2383	*Pengenalan Sistem Kawalan* Control System Fundamental	K	3	
	BKKX XXX1	*Kokurikulum II* Cocurriculum II	W	1	
	BLLW 1XX2	*Bahasa Ketiga* Third Language	W	2	
TOTAL CREDITS THIS SEMESTER				**19**	
SEMESTER 4	BEEU 2043	*Kaedah Statistik* Statistical Methods	P	3	
	BEEA 2374	*Sistem Terbenam* Embedded Systems	K	4	
	BEEI 2463	*Termodinamik & Pemindahan Haba* Thermodynamic & Heat Transfer	K	3	
	BEEI 2383	*Teknologi Sistem Kuasa* Power System Technology	K	3	
	BEEI 3413	*Elektronik Kuasa* Power Electronics	K	3	
	BLLW 2152	*Penulisan Akademik* Academic Writing	W	2	
TOTAL CREDITS THIS SEMESTER				**18**	

	CODE	COURSE	CATEGORY	CREDIT	PRE-REQUISITE
SEMESTER 5	**BEEI 3393	*Sistem Kuasa Lanjutan* Advanced Power System	K	3	BEEI 2383
	BEEI 3423	*Penggerak & Pemacu* Actuators & Drives	K	3	
	BEEA 3414	*PLC & Automasi* PLC & Automation	K	4	
	BEEI 3474	*Sistem Kuasa Penjanaan & Penghantaran* Power System Genaration & Transmission	K	4	
	BIPW 2132 BIPW 2122	*Penghayatan Etika dan Peradaban* ***(untuk pelajar tempatan)*** Appreciation of Ethics and Civilisation ***(for local students)*** *Kebudayaan Malaysia* ***(untuk pelajar antarabangsa)*** (Malaysian Culture) ***(for international students)***	W	2	
	***BPIW	*Elektif Umum* General Elective	E	2	
		TOTAL CREDITS THIS SEMESTER		**18**	
SEMESTER 6	BEEI 3061	*Seminar Kejuruteraan II* Engineering Seminar II	P	1	
	BEEU 4053	*Etika Kejuruteraan & KPPP* Engineering Ethics & OSHE	P	3	
	BEEU 3764	*Projek Sarjana Muda I* Bachelor Degree Project I	K	4	
	BEEI 4823	*Teknologi Voltan Tinggi* High Voltage Technology	K	3	
	BEEI 3403	*Sistem Pengagihan Kuasa* Power Distribution System	K	3	
	BEEI 4833	*Perlindungan Sistem Kuasa* Power Systems Protection	K	3	
	BLLW 2152	*Bahasa Inggeris untuk Interaksi Profesional* English for Professional Interaction	W	2	
	#BEEX 3100	*Kursus Persediaan Pensijilan Profesional* Professional Certificate Preparation Course			
		TOTAL CREDITS THIS SEMESTER		**19**	

	CODE	COURSE	CATEGORY	CREDIT	PRE-REQUISITE
SEMESTER 7	**BEEU 4774	*Projek Sarjana Muda II* Bachelor Degree Project II	K	4	
	BIPW 3112	*Pemikiran Kritis dan Kreatif* ***(untuk pelajar tempatan)*** Critical and Creative Thinking ***(for local students)***	W	2	
	BTMW 4012	*Keusahawanan Teknologi* Technology Enterpreneurship	W	2	
	*BEEX XXXX	*Elektif I* Elective I	E	3	
	*BEEX XXXX	*Elektif II* Elective II	E	3	
	*BEEX XXXX	*Elektif III* Elective III	E	3	
TOTAL CREDITS THIS SEMESTER					
LOCAL STUDENT				**17**	
INTERNATIONAL STUDENT				**15**	
SEMESTER 8	BEEU 4786	*Latihan Industri* Industrial Training	K	6	
	BEEU 4796	*Laporan Latihan Industri* Industrial Training Report	K	6	
TOTAL CREDITS THIS SEMESTER				**12**	
TOTAL CREDITS				**140**	

** Pre-requisite Course

* For Elective I, II and III students may choose any THREE (3) COURSES from the list below:

NO.	CODE	COURSE NAME
1	BEEI 4803	*Operasi & Automasi Sistem Kuasa* Power Systems Operation & Automation
2	BEEI 4813	*Kaedah Penambahbaikan Kualiti* Quality Improvement Tools
3	BEEY 3803	*Sistem Tenaga Lestari* Renewable Energy System
4	BEEI 4863	*Kualiti Kuasa* Power Quality
5	BEEY 4413	*Kecekapan Tenaga* Energy Efficiency
6	BEEI 4843	*Keserasian Elektromagnet Sistem Kuasa* Power Systems Electromagnetic Compatibility
7	BEEA 4813	*Kawalan Proses Industri* Industrial Process Control
8	BEEI 4853	*Ekonomi Sistem dan Pasaran Elektrik* Electricity Market and System Economics

*** For General elective, students may choose any ONE (1) COURSE from the list below:

NO.	CODE	COURSE NAME
1	BIPW 1142	*Falsafah Sains dan Teknologi* Philosophy of Science and Technology
2	BIPW 4112	*Komunikasi Organisasi* Organizational Communication
3	BIPW 1152	*Psikologi Industri dan Organisasi* Industrial Psycology and Organization
4	BIPW 4122	*Kemahiran Perundingan* Negotiation Skills
5	BIPW 2142	*Sosiologi Industri* Industrial Sociology

For Professional Certificate Preparation Course, student may choose any ONE (1) certificate from the list below:

NO.	CODE	CERTIFICATE NAME
1	BEEA 3100	Certified LabView Associate Developer (CLAD)
2	BEEE 3100	Programmable Logic Controller (PLC) Level 1 and Level 2
3	BEEZ 3100	SMCT MT1 – Practical Mechatronics 1

Number of credit hours regarding to course category is represented in the table below.

W = university compulsory subjects
P = program core subjects
K = course core subjects
E = elective subjects

Programme P	**P**	**17**
Course K	**K**	**82**
University Compulsory	**W**	**18**
Industrial Training	**K**	**12**
Elective	**E**	**11**
		140

Bachelor of Electrical Engineering Technology (Industrial Automation & Robotic) with Honours (BEEA)

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	BEEA 1304	*Elektronik & Sistem Digital* Digital Electronics & Systems	K	4	
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	BEEA 2061	*Seminar Kejuruteraan I* Engineering Seminar I	P	1	
	**BEEI 2342	*Bengkel Elektrik II* Electrical Workshop II	K	2	BEEI 1311
	BEEA 2363	*Statik & Mekanik* Static & Mechanics	K	3	
	BEEI 2364	*Teknologi Elektrik* Electrical Technology	K	4	
	BEEI 2373	*Mesin Elektrik* Electrical Machine	K	3	
	BLLW 1XX2	*Bahasa Ketiga* Third Language	W	2	
	BKKX XXX1	*Kokurikulum II* Cocurriculum II	W	1	
TOTAL CREDITS THIS SEMESTER				**19**	
SEMESTER 4	BEEU 2043	*Kaedah Statistik* Statistical Methods	P	3	
	BEEA 2374	*Sistem Terbenam* Embedded Systems	K	4	
	BEEI 3413	*Elektronik Kuasa* Power Electronics	K	3	
	BMMH 2313	*Mekanik Bendalir* Fluids Mechanics	K	3	
	BEEA 2383	*Pengenalan Sistem Kawalan* Control System Fundamental	K	3	
	BLLW 2152	*Penulisan Akademik* Academik Writing	W	2	
TOTAL CREDITS THIS SEMESTER				**18**	

	CODE	COURSE	CATEGORY	CREDIT	PRE-REQUISITE
SEMESTER 5	BEEI 2383	*Teknologi Sistem Kuasa* Power System Technology	K	3	
	BEEA 3463	*Data Komunikasi Industri* Industrial Data Communication	K	3	
	**BEEA 3393	*Kejuruteraan Sistem Kawalan* Control System Engineering	K	3	BEEA 2383
	BEEA 3464	*PLC & Automasi* PLC & Automation	K	4	
	BIPW 2132 BIPW 2122	*Penghayatan Etika dan Peradaban* ***(untuk pelajar tempatan)*** Aprreciation of Ethics and Civilisation ***(for local students)*** OR *Kebudayaan Malaysia* ***(untuk pelajar antarabangsa)*** Malaysian Culture ***(for international students)***	W	2	
	***BPIW	*Elektif Umum* General Elective	E	2	
		TOTAL CREDITS THIS SEMESTER			
		LOCAL STUDENT		**17**	
		INTERNATIONAL STUDENT		**17**	
SEMESTER 6	BEEI 3061	*Seminar Kejuruteraan II* Engineering Seminar II	P	1	
	BEEU 4053	*Etika Kejuruteraan & KKPP* Engineering Ethics & OSHE	P	3	
	BEEU 3764	*Projek Sarjana Muda I* Bachelor Degree Project I	K	4	
	BEEA 3454	*Sistem Kawalan Peggerak* Motion Control System	K	4	
	BEEA 3443	*Pneumatik & Hidraulik* Pneumatic & Hydraulic	K	3	
	BEEA 3433	*Robotik Industri* Industrial Robotics	K	3	
	BLLW 2152	*Bahasa Inggeris untuk Interaksi Profesional* English for Professional Interaction	W	2	
	#BEEX 3100	*Kursus Persediaan Pensijilan Profesional* Professional Certificate Preparation Course			
		TOTAL CREDITS THIS SEMESTER		**20**	

	CODE	COURSE	CATEGORY	CREDIT	PRE-REQUISITE
SEMESTER 7	**BEEU 4774	*Projek Sarjana Muda II* Bachelor Degree Project II	K	4	BEEU 3764
	BIPW 3112	*Pemikiran Kritis dan Kreatif* ***(untuk pelajar tempatan)*** Critical and Creative Thinking ***(for local students)***	W	2	
	BTMW 4012	*Keusahawanan Teknologi* Technology Enterpreneurship	W	2	
	*BEEA 48X3	*Elektif I* Elective I	E	3	
	*BEEA 48X3	*Elektif II* Elective II	E	3	
	*BEEA 48X3	*Elektif II* Elective II	E	3	
TOTAL CREDITS THIS SEMESTER					
LOCAL STUDENT				**17**	
INTERNATIONAL STUDENT				**15**	
SEMESTER 8	BEEU 4786	*Latihan Industri* Industrial Training	K	6	
	BEEU 4796	*Laporan Latihan Industri* Industrial Training Report	K	6	
TOTAL CREDITS THIS SEMESTER				**12**	
TOTAL CREDITS				**140**	

** Pre-requisite Course

* For Elective I, II and III students may choose any THREE (3) COURSES from the list below:

NO.	CODE	COURSE NAME
1	BEEA 4803	*Sistem Pembuatan Teranjal* *Flexible Manufacturing System*
2	BEEA 4813	*Kawalan Proses Industri* Industrial Process Control
3	BEEA 4823	*Penglihatan Mesin* Machine Vision
4	BEEA 4833	*Sistem Kawalan Teragih* Distributed Control System
5	BEEA 4843	*Sistem Pembuatan Lanjutan* Advanced Manufacturing System
6	BEEA 4853	*Sistem Kawalan Lanjutan* Advanced Control System
7	BEEA 4863	*Pembelajaran Mesin* Machine Learning
8	BMMM 3523	*Teknologi Penyelenggaraan & Pengurusan Aset* Maintenance Technology & Asset Management

*** For General elective, students may choose any ONE (1) COURSE from the list below:

NO.	CODE	COURSE NAME
1	BIPW 1142	*Falsafah Sains dan Teknologi* Philosophy of Science and Technology
2	BIPW 4112	*Komunikasi Organisasi* Organizational Communication
3	BIPW 1152	*Psikologi Industri dan Organisasi* Industrial Psycology and Organization
4	BIPW 4122	*Kemahiran Perundingan* Negotiation Skills
5	BIPW 2142	*Sosiologi Industri* Industrial Sociology

For Professional Certificate Preparation Course, student may choose any ONE (1) certificate from the list below:

NO.	CODE	CERTIFICATE NAME
1	BEEA 3100	Certified LabView Associate Developer (CLAD)
2	BEEE 3100	Programmable Logic Controller (PLC) Level 1 and Level 2
3	BEEZ 3100	SMCT MT1 – Practical Mechatronics 1

Number of credit hours regarding to course category is represented in the table below.

W = university compulsory subjects
P = program core subjects
K = course core subjects
E = elective subjects

Programme P	**P**	**17**
Course K	**K**	**82**
University Compulsory	**W**	**18**
Industrial Training	**K**	**12**
Elective	**E**	**11**
		140

Bachelor of Electrical Engineering Technology with Honours (BEEY)

	CODE	COURSE	CATEGORY	CREDIT	PRE-REQUISITE
SEMESTER 1	BEEU 1013	*Matematik Teknikal* Technical Mathematics	P	3	
	BEEE 1013	*Fizik Teknikal* Technical Physics	P	3	
	BEEY 1303	*Pengukuran dan Sistem Instrumentasi* Measurement and Instrumentation System	K	3	
	BEEA 1313	*Rekabentuk Terbantu Komputer* Computer Aided Design	K	3	
	BEEI 1303	*Pengenalan Litar Elektrik* Electrical Circuit Fundamental	K	3	
	BIPW 1132	*Falsafah dan Isu Semasa* Philosophy and Current Issue	W	2	
	BKKX XXX1	*Kokurikulum I* Cocurriculum I	W	1	
TOTAL CREDITS THIS SEMESTER				**18**	
SEMESTER 2	BEEU 1023	*Kalkulus untuk Teknologi* Calculus for Technology	P	3	
	BEEY 1313	*Bengkel Elektrik* Electrical Workshop	K	3	
	BEEI 1323	*Elektrik & Kemagnetan* Electrical & Magnetism	K	3	
	BEEY 1323	*Elektronik & Sistem Digital* Digital Electronics & System	K	3	
	**BEEI 1333	*Litar Elektrik Lanjutan* Advanced Electrical Circuit	K	3	BEEI 1303
	BKKX XXX1	*Kokurikulum II* Cocurriculum II	W	1	
	BLLW 1442	*Bahasa Inggeris untuk Akademik* English for Academic Purposes	W	2	
	BLLW 1172	*Bahasa Melayu Komunikasi I* ***(untuk pelajar antarabangsa)*** Malay Language for Communication I ***(for international students)***	W	2	
TOTAL CREDITS THIS SEMESTER					
LOCAL STUDENT				**18**	
INTERNATIONAL STUDENT				**20**	

	CODE	COURSE	CATEGORY	CREDIT	PRE-REQUISITE
SEMESTER 3	BEEU 2033	*Kalkulus Lanjutan untuk Teknologi* Advanced Calculus for Technology	P	3	
	BEEY 2333	*Pemasangan Elektrik I* Electrical Installation I	K	3	
	BEEY 2343	*Peranti Elektronik* Electronic Devices	K	3	
	BEEY 2353	*Teknologi Elektrik* Electrical Technology	K	3	
	BEEA 1343	*Pengaturcaraan Komputer* Computer Programming	K	3	
	BEEY 2361	*Kerjaya Teknologi Kejuruteraan Elektrik* Electrical Engineering Technology Career	K	1	
	BLLW 12X2	*Bahasa Ketiga* Third Language	W	2	
TOTAL CREDITS THIS SEMESTER				**18**	
SEMESTER 4	BEEU 2043	*Kaedah Statistik* Statistical Methods	P	3	
	BEEA 2374	*Sistem Terbenam* Embedded Systems	K	4	
	BEEY 2373	*Pemasangan Elektrik II* Electrical Installation II	K	3	
	BEEA 2383	*Pengenalan Sistem Kawalan* Control System Fundamental	K	3	
	BEEA 2353	*Elektronik Analog* Analog Electronics	K	3	
	BLLW 2152	*Penulisan Akademik* Academic Writing	W	2	
	***BIPW XXX2	*Elektif Umum* General Elective	E	2	
	#BEEX 3100	*Kursus Persediaan Pensijilan Profesional* Professional Certificate Preparation Course			
TOTAL CREDITS THIS SEMESTER				**20**	

	CODE	COURSE	CATEGORY	CREDIT	PRE-REQUISITE
SEMESTER 5	BEEI 2373	*Mesin Elektrik* Electrical Machines	K	3	BEEI 2383
	BEEY 3383	*Peranti Elektronik Kuasa* Power Electronics Devices	K	3	
	BEEI 2383	*Teknologi Sistem Kuasa* Power System Technology	K	3	
	BEEU 3803	*Rekabentuk Projek Berintegrasi* Integrated Design Project	K	3	
	BLHW 2772 BLHW 2752	*Penghayatan Etika dan Peradaban* ***(untuk pelajar tempatan)*** Appreciation of Ethics and Civilisations ***(for local students)*** *Kebudayaan Malaysia* ***(untuk pelajar antarabangsa)*** Malaysian Culture ***(for international students)***	W	2	
	*BEEY 38X3	*Elektif I* Elective I	E	3	
	*BEEY 3823	*Elektif II* Elective II	E	3	
		TOTAL CREDITS THIS SEMESTER		**20**	
SEMESTER 6	BEEU 3764	*Projek Sarjana Muda I* Bachelor Degree Project I	K	4	
	BEEY 4393	*Sistem Elektronik Kuasa* Power Electronics Systems	K	3	
	BEEY 3404	*Automasi Industri* Industrial Automation	K	4	
	BIPW 3112	*Pemikiran Kritis dan Kreatif* ***(untuk pelajar tempatan)*** Critical and Creative Thinking ***(for local students)***	W	2	
	BLLW 3162	*Bahasa Inggeris untuk Interaksi Profesional* English for Professional Interaction	W	2	
	*BEEY 38X3	*Elektif III* Elective III	E	3	
		TOTAL CREDITS THIS SEMESTER		**19**	
		LOCAL STUDENTS		**18**	
		INTERNATIONAL STUDENTS		**16**	

	CODE	COURSE	CATEGORY	CREDIT	PRE-REQUISITE
SEMESTER 7	BEEU 4053	*Etika Kejuruteraan & KKPP* Engineering Ethics & OSHE	P	3	
	**BEEU 4774	*Projek Sarjana Muda II* Bachelor Degree Project II	K	4	BEEU 3764
	BEEY 4413	*Kecekapan Tenaga* Energy Efficiency	K	3	
	BEEI 3403	*Reka Bentuk Sistem Pengagihan Kuasa* Power Distribution System Design	K	3	
	BTMW 4012	*Keusahawanan Teknologi* Technology Enterpreneurship	W	2	
	*BEEX 4XX3	*Elektif IV* Elective IV	E	3	
TOTAL CREDITS THIS SEMESTER				**18**	
SEMESTER 8	BEEU 4786	*Latihan Industri* Industrial Training	K	6	
	BEEU 4796	*Laporan Latihan Industri* Industrial Training Report	K	6	
TOTAL CREDITS THIS SEMESTER				**12**	
TOTAL CREDITS				**142**	

** Pre-requisite Course

* For Elective I, students may choose any ONE (1) COURSE from the list below:

NO.	CODE	COURSE NAME
1	BEEY 3803	*Sistem Tenaga Diperbaharui* Renewable Energy System
2	BEEY 3813	*Pengenalan kepada Sistem Pengangkutan Elektrik* Introduction To Electric Transportation System

* For Elective II, students must choose below COURSE:

NO.	CODE	COURSE NAME
1	BEEY 3823	*Teknologi Penyimpanan Tenaga* Energy Storage Technology

* For Elective III, students may choose any ONE (1) COURSE from the list below:

NO.	CODE	COURSE NAME
1	BEEY 3833	*Polisi Tenaga* Energy Policy
2	BEEY 3843	*Rekabentuk Sistem PV* PV System Design
3	BEEY 3853	*Aplikasi Elektronik Kuasa* Power Electronics Application
4	BEEY 3863	*Pemacu Motor dan Sistem Tarikan* Motor Drive and Traction System

* For Elective IV, students may choose any ONE (1) COURSE from the list below:

NO.	CODE	COURSE NAME
1	BEEY 4873	*Trend Teknologi dalam Industri* Technology Trend in Industry
2	BEEI 4843	*Keserasian Elektromagnetik Sistem Kuasa* Power System Electromagnetic Compatibility
3	BEEY 4903	*Sistem Pemacu Moden* Modern Drive System
4	BEEY 4913	*Kenderaan Elektrik Hibrid* Hybrid Electric Vehicle

*** For General elective, students may choose any ONE (1) COURSE from the list below:

NO.	CODE	COURSE NAME
1	BIPW 1142	*Falsafah Sains dan Teknologi* Philosophy of Science and Technology
2	BIPW 4112	*Komunikasi Organisasi* Organizational Communication
3	BIPW 1152	*Psikologi Industri dan Organisasi* Industrial Psychology and Organisation
4	BIPW 4122	*Kemahiran Perundingan* Negotiation Skills

For Professional Certificate Preparation Course, student may choose any ONE (1) certificate from the list below:

NO.	CODE	CERTIFICATE NAME
1	BEEA 3100	Certified LabView Associate Developer (CLAD)
2	BEEE 3100	Programmable Logic Controller (PLC) Level 1 and Level 2
3	BEEZ 3100	SMCT MT1 – Practical Mechatronics 1

Number of credit hours regarding to course category is represented in the table below.

W = university compulsory subjects
P = program core subjects
K = course core subjects
E = elective subjects

Programme P	**P**	**18**
Course K	**K**	**80**
University Compulsory	**W**	**18**
Industrial Training	**K**	**12**
Elective	**E**	**14**
		142

ELECTRONICS & COMPUTER ENGINEERING TECHNOLOGY

PROGRAMME LEARNING OUTCOMES (PLO)

PLO1	Ability to apply knowledge of mathematics, science, engineering fundamentals and engineering specialization principles to defined and applied engineering procedures, processes, systems or methodologies in the field of electrical engineering technology (industrial automation & robotics/ industrial power).
PLO2	Ability to solve broadly-defined engineering problems systematically to reach substantiated conclusions, using tools and techniques appropriate to electrical engineering technology (industrial automation & robotics / industrial power).
PLO3	Ability to design solutions for broadly-defined engineering technology problems, and to design systems, components or processes to meet specified needs with appropriate consideration for public health and safety, as well as cultural, societal, environmental and sustainability concerns.
PLO4	Ability to plan and conduct experimental investigations of broadly-defined problems, using data from relevant sources.
PLO5	Ability to select and apply appropriate techniques, resources and modern engineering tools, with an understanding of their limitations.
PLO6	Ability to demonstrate an awareness of and consideration for societal, health, safety, legal and cultural issues and their consequent responsibilities.
PLO7	Ability to demonstrate an understanding of the impact of engineering technology practices, taking into account the need for sustainable development.
PLO8	Ability to demonstrate an understanding of professional ethics, responsibilities and norms of engineering technology practices.
PLO9	Ability to function effectively as individuals, and as members or leaders in diverse technical teams.
PLO10	Ability to communicate effectively with the engineering community and society at large.
PLO11	Ability to demonstrate an awareness of project management, business practices and entrepreneurship.
PLO12	Ability to recognise the need for professional development and to engage in independent and lifelong learning.

Bachelor of Electronics Engineering Technology (Telecommunications) with Honours (BEET)

	CODE	COURSE	CATEGORY	CREDIT	PRE-REQUISITE
SEMESTER 1	BEEU 1013	*Matematik Teknikal* Technical Mathematics	P	3	
	BEEE 1013	*Fizik Teknikal* Technical Physics	P	3	
	BEEI 1303	*Pengenalan Litar Elektrik* Electrical Circuit Fundamental	K	3	
	BEEE 1303	*Bengkel Kejuruteraan I* Engineering Workshop I	K	3	
	BLHW 1142	*Bahasa Inggeris untuk Akademik* English for Academic Purposes	W	2	
	BIPW 1132	*Falsafah dan Isu-isu Semasa* Philosophy and Current Issues	W	2	
	BKKX XXX1	*Kokurikulum I* Cocurriculum I	W	1	
TOTAL CREDITS THIS SEMESTER				**17**	
SEMESTER 2	BEEU 1023	*Kalkulus untuk Teknologi* Calculus for Technology	P	3	
	BEEC 1313	*Asas Pengaturcaraan* Programming Fundamental	K	3	
	BEEE 1313	*Bengkel Kejuruteraan II* Engineering Workshop II	K	3	
	**BEEI 1333	*Litar Elektrik Lanjutan* Advanced Electrical Circuit	K	3	BEEI 1303
	BEEE 1323	*Pengenalan Elektronik* Electronic Fundamentals	K	3	
	BEEE 2373	*Teknologi Elektrik* Electrical Technology	K	3	
	BIPW 2132 BLLW 1172	*Penghayatan Etika dan Peradaban* ***(untuk pelajar tempatan)*** Appreciation of Ethics and Civilisation ***(for local students)*** *Bahasa Melayu Komunikasi 1* ***(untuk pelajar antarabangsa)*** Malay Language for Communication 1 ***(for international students)***	W	2	
TOTAL CREDITS THIS SEMESTER					
LOCAL STUDENT				**20**	
INTERNATIONAL STUDENT				**20**	

	CODE	COURSE	CATEGORY	CREDIT	PRE-REQUISITE
SEMESTER 3	BEEU 2033	*Kalkulus Lanjutan untuk Teknologi* Advanced Calculus for Technology	P	3	
	**BEEE 2333	*Peranti Elektronik Analog* Analogue Electronic Devices	K	3	BEEE 1323
	BEEC 2404	*Elektronik Digital* Digital Electronic	K	4	
	BEEE 2364	*Prinsip Kawalan* Control Principles	K	4	
	BEET 2313	*Isyarat & Sistem Berterusan* Continuous Signal & System	K	3	
	BLLW 2152	*Penulisan Akademik* Academic Writing	W	2	
TOTAL CREDITS THIS SEMESTER				**19**	
SEMESTER 4	BEEU 2043	*Kaedah Statistik* Statistical Methods	P	3	
	BEEE 2354	*Sistem Elektronik* Electronic Systems	K	4	
	BEET 2324	*Komunikasi & Rangkaian Data* Data Communication & Networking	K	3	
	BEET 2333	*Prinsip Komunikasi* Communication Principle	K	3	
	BEET 2343	*Isyarat & Sistem Diskrit* Discrete Signal & System	K	3	
	BIPW 3112 BIPW 2122	*Pemikiran Kritis dan Kreatif* ***(untuk pelajar tempatan)*** Critical and Creative Thinking ***(for local students)*** *Kebudayaan Malaysia* ***(untuk pelajar antarabangsa)*** Malaysian Culture ***(for international students)***	W	2	
	BKKX XXX1	*Kokurikulum II* Cocurriculum II			
TOTAL CREDITS THIS SEMESTER					
LOCAL STUDENT				**20**	
INTERNATIONAL STUDENT				**20**	

	CODE	COURSE	CATEGORY	CREDIT	PRE-REQUISITE
SEMESTER 5	BEET 3353	*Sistem Telekomunikasi* Telecommunication System	K	3	
	BEEC 3483	*Asas Mikropemproses & Mikropengawal* Fundamental of Microprocessor & Microcontroller	K	3	
	BEET 3363	*Elektronik Telekomunikasi* Telecommunication Electronic	K	3	
	BEET 3373	*Pemprosesan Isyarat Digital* Digital Signal Processing	K	3	
	BEET 3383	*Elektromagnetik* Electromagnetic	K	3	
	BTMW 4012	*Keusahawanan Teknologi* Technology Entrepreneurship	W	2	
	BLLW 3162	*Bahasa Inggeris untuk Interaksi Profesional* English for Professional Interaction	W	2	
	#BEEX XXX0	*Kursus Pensijilan Profesional* Professional Certificate Course			
TOTAL CREDITS THIS SEMESTER				**19**	
SEMESTER 6	**BEET 3403	*Komunikasi Digital* Digital Communication	K	3	BEET 2333
	BEEE 4443	*Pengurusan Kualiti* Quality Management	K	3	
	BEET 3393	*Sistem Pensuisan Telekomunikasi* Telecommunication Switching System	K	3	
	BEEU 3764	*Projek Sarjana Muda I* Bachelor Degree Project I	K	4	
	BEET 3414	*Teknik FR & Gelombang Mikro* RF Technique & Microwave	K	4	
	BLLW XXX2	*Bahasa Ketiga* Third Language	W	2	
TOTAL CREDITS THIS SEMESTER				**19**	

	CODE	COURSE	CATEGORY	CREDIT	PRE-REQUISITE
SEMESTER 7	BEEU 4053	*Etika Kejuruteraan & KKPP* Engineering Ethics & OSHE	P	3	
	**BEEU 4774	*Projek Sarjana Muda II* Bachelor Degree Project II	K	4	BEEU 3764
	*BEET 48X3	*Elektif I* Elective I	E	3	
	*BEET 48X3	*Elektif II* Elective II	E	3	
	*BEET 48X3	*Elektif III* Elective III	E	3	
	***BIPW XXX2	*Elektif Umum* General Elective	E	2	
TOTAL CREDITS THIS SEMESTER				**18**	
SEMESTER 8	BEEU 4786	*Latihan Industri* Industrial Training	K	6	
	BEEU 4796	*Laporan Latihan Industri* Industrial Training Report	K	6	
TOTAL CREDITS THIS SEMESTER				**12**	
TOTAL CREDITS				**144**	

** Pre-requisite Course

* For Elective I, II and III students may choose any THREE (3) COURSES from the list below:

NO.	CODE	COURSE NAME
1	BEET 4803	*Komunikasi Satelit* Satellite Communication
2	BEET 4813	*Komunikasi Mudah Alih* Mobile Communication
3	BEET 4823	*Komunikasi Optik & Opto Elektronik* Optical Communications & Optoelectronic
4	BEET 4833	*Kejuruteraan Antena* Antenna Engineering

*** For General elective, students may choose any ONE (1) COURSE from the list below:

NO.	CODE	COURSE NAME
1	BIPW 1142	*Falsafah Sains dan Teknologi* Philosophy of Science and Technology
2	BIPW 4112	*Komunikasi Organisasi* Organizational Communication
3	BIPW 1152	*Psikologi Industri dan Organisasi* Industrial Psycology and Organization
4	BIPW 4122	*Kemahiran Perundingan* Negotiation Skills

For Professional Certificate Preparation Course, student may choose any ONE (1) certificate from the list below:

NO.	CODE	CERTIFICATE NAME
1	BEEA 3100	Certified LabView Associate Developer (CLAD)
2	BEEE 3100	Programmable Logic Controller (PLC) Level 1 and Level 2
3	BEEZ 3100	SMCT MT1 – Practical Mechatronics 1

Number of credit hours regarding to course category is represented in the table below.

W = university compulsory subjects
P = program core subjects
K = course core subjects
E = elective subjects

Programme P	**P**	**18**
Course K	**K**	**85**
University Compulsory	**W**	**18**
Industrial Training	**K**	**12**
Elective	**E**	**11**
		144

Bachelor of Electronics Engineering Technology (Industrial Electronics) with Honours (BEEE)

	CODE	COURSE	CATEGORY	CREDIT	PRE-REQUISITE
SEMESTER 1	BEEU 1013	*Matematik Teknikal* Technical Mathematics	P	3	
	BEEE 1013	*Fizik Teknikal* Technical Physics	P	3	
	BEEE 1303	*Bengkel Kejuruteraan I* Engineering Workshop I	K	3	
	BEEI 1303	*Pengenalan Litar Elektrik* Electrical Circuit Fundamental	K	3	
	BLLW 1142	*Bahasa Inggeris untuk Akademik* English for Academic Purposes	W	2	
	BKKX XXX1	*Kokurikulum I* Cocurriculum I	W	1	
TOTAL CREDITS THIS SEMESTER				**15**	
SEMESTER 2	BEEU 1023	*Kalkulus untuk Teknologi* Calculus for Technology	P	3	
	BEEE 1313	*Bengkel Kejuruteraan II* Engineering Workshop II	K	3	
	**BEEI 1333	*Litar Elektrik Lanjutan* Advanced Electrical Circuit	K	3	BEEI 1303
	BEEE 1323	*Pengenalan Elektronik* Electronic Fundamentals	K	3	
	BEEC 1313	*Asas Pengaturcaraan* Programming Fundamental	K	3	
	BKKX XXX1	*Kokurikulum II* Cocurriculum II	W	1	
	BIPW 1132	*Falsafah dan Isu-isu Semasa* Philosophy and Current Issues	W	2	
TOTAL CREDITS THIS SEMESTER				**18**	

	CODE	COURSE	CATEGORY	CREDIT	PRE- REQUISITE
SEMESTER 3	BEEU 2033	*Kalkulus Lanjutan untuk Teknologi* Advanced Calculus for Technology	P	3	
	**BEEC 1353	*Pengaturcaraan Lanjutan* Advanced Programming	K	3	BEEC 1313
	**BEEE 2333	*Peranti Elektronik Analog* Analogue Electronic Devices	K	3	BEEE 1323
	BEEC 2404	*Elektronik Digital* Digital Electronic	K	4	
	BEEE 2343	*Lukisan Kejuruteraan* Engineering Drawing	K	3	
	BLLW 2152	*Penulisan Akademik* Academic Writing	W	2	
	BIPW 3112	*Pemikiran Kritis dan Kreatif* ***(untuk pelajar tempatan)*** Critical and Creative Thinking ***(for local students)***	W	2	
	BIPW 2122	*Kebudayaan Malaysia* ***(untuk pelajar antarabangsa)*** Malaysian Culture ***(for international students)***			
		TOTAL CREDITS THIS SEMESTER			
		LOCAL STUDENT		**20**	
		INTERNATIONAL STUDENT		**20**	

	CODE	COURSE	CATEGORY	CREDIT	PRE-REQUISITE
SEMESTER 4	BEEU 2043	*Kaedah Statistik* Statistical Methods	P	3	
	BEET 2333	*Prinsip Komunikasi* Communication Principle	K	3	
	BEEE 2354	*Sistem Elektronik* Electronic Systems	K	4	
	BEEE 2364	*Prinsip Kawalan* Control Principles	K	4	
	BEEE 2373	*Teknologi Elektrik* Electrical Technology	K	3	
	BIPW 2132	*Penghayatan Etika dan Peradaban* ***(untuk pelajar tempatan)*** Appreciation of Ethics and Civilisation ***(for local students)***	W	2	
	BLLW 1172	*Bahasa Melayu Komunikasi 1* ***(untuk pelajar antarabangsa)*** Malay Language for Communication 1 ***(for international students)***			
TOTAL CREDITS THIS SEMESTER					
LOCAL STUDENT				**19**	
INTERNATIONAL STUDENT				**19**	
SEMESTER 5	BEEE 3384	*Kawalan Industri* Industrial Control	K	4	
	BEEC 3444	*Teknologi Mikropemproses & Mikropengawal* Microprocessor & Microcontroller Technology	K	4	
	BEEE 3394	*Proses Instrumentasi* Process Instrumentation	K	4	
	BEEE 3404	*Perolehan Data & Penderia* Data Acquisition & Sensors	K	4	
	BLLW 3162	*Bahasa Inggeris untuk Interaksi Profesional* English for Professional Interaction	W	2	
	***BIPW XXX2	*Elektif Umum* General Elective	E	2	
TOTAL CREDITS THIS SEMESTER				**20**	

	CODE	COURSE	CATEGORY	CREDIT	PRE-REQUISITE
SEMESTER 6	BEEE 3414	*Pneumatik Perindustrian* Industrial Pneumatics	K	4	
	BEEE 3424	*Aplikasi Sistem Terbenam* Embedded Systems Application	K	4	
	BEEU 3764	*Projek Sarjana Muda I* Bachelor Degree Project I	K	4	
	BTMW 4012	*Keusahawanan Teknologi* Technology Entrepreneurship	W	2	
	BLLW 1XX2	*Bahasa Ketiga* Third Language	W	2	
	*BEEX XXX4	*Elektif I* Elective I	E	4	
	#BEEE X210	*Kursus Pensijilan Profesional* Professional Certificate Course			
			TOTAL CREDITS THIS SEMESTER	**20**	
SEMESTER 7	BEEU 4053	*Etika Kejuruteraan & KKPP* Engineering Ethics & OSHE	P	3	
	BEEE 4434	*Automasi Perindustrian* Industrial Automation	K	4	
	BEEE 4443	*Pengurusan Kualiti* Quality Management	K	3	
	**BEEU 4774	*Projek Sarjana Muda II* Bachelor Degree Project II	K	4	BEEU 3764
	*BEEX XXX4	*Elektif II* Elective II	E	4	
			TOTAL CREDITS THIS SEMESTER	**18**	
SEMESTER 8	BEEU 4786	*Latihan Industri* Industrial Training	K	6	
	BEEU 4796	*Laporan Latihan Industri* Industrial Training Report	K	6	
			TOTAL CREDITS THIS SEMESTER	**12**	
			TOTAL CREDITS	**142**	

** Pre-requisite Course

* For Elective I, students may choose any ONE (1) COURSE from the list below:

NO.	CODE	COURSE NAME
1	BEEE 3804	*Elektronik Kuasa* Power Electronic
2	BEEC 4814	*Pengantaramukaan Komputer* Computer Interfacing\
3	BEEE 3814	*Proses Perindustrian Semikonduktor* Semiconductor Industrial Process

* For Elective II, students may choose any ONE (1) COURSE from the list below:

NO.	CODE	COURSE NAME
1	BEEE 4814	*Robotik Perindustrian* Industrial Robotic
2	BEEE 4824	*Pemacu & Kawalan Elektrik* Electrical Drives & Control
3	BEEC 4844	*Pengujian Litar Bersepadu* IC Testing

*** For General elective, students may choose any ONE (1) COURSE from the list below:

NO.	CODE	COURSE NAME
1	BIPW 1142	*Falsafah Sains dan Teknologi* Philosophy of Science and Technology
2	BIPW 4112	*Komunikasi Organisasi* Organizational Communication
3	BIPW 1152	*Psikologi Industri dan Organisasi* Industrial Psycology and Organization
4	BIPW 4122	*Kemahiran Perundingan* Negotiation Skills

\# For Professional Certificate Preparation Course, student may choose any ONE (1) certificate from the list below:

NO.	CODE	CERTIFICATE NAME
1	BEEE 3100	Programmable Logic Controller (PLC) Level 1 and Level 2
2	BEEZ 3100	SMCT MT1 – Practical Mechatronics 1

Number of credit hours regarding to course category is represented in the table below.

W = university compulsory subjects
P = program core subjects
K = course core subjects
E = elective subjects

Programme P	**P**	**18**
Course K	**K**	**84**
University Compulsory	**W**	**18**
Industrial Training	**K**	**12**
Elective	**E**	**10**
		142

Bachelor of Computer Engineering Technology (Computer Systems) with Honours (BEEC)

	CODE	COURSE	CATEGORY	CREDIT	PRE- REQUISITE
SEMESTER 1	BEEU 1013	*Matematik Teknikal* Technical Mathematics	P	3	
	BEEE 1013	*Fizik Teknikal* Technical Physics	P	3	
	BEEC 1303	*Asas Elektronik* Basic Electronics	K	3	
	BEEC 1323	*Bengkel Kejuruteraan Komputer I* Computer Engineering Workshop I	K	3	
	BEEC 1313	*Asas Pengaturcaraan* Programming Fundamental	K	3	
	BLLW 1442	*Bahasa Inggeris untuk Akademik* English for Academic Purposes	W	2	
		TOTAL CREDITS THIS SEMESTER		**17**	
SEMESTER 2	BEEU 1023	*Kalkulus untuk Teknologi* Calculus for Technology	P	3	
	BEEI 1303	*Pengenalan Litar Elektrik* Electrical Circuit Fundamental	K	3	
	BEEC 1333	*Bengkel Kejuruteraan Komputer II* Computer Engineering Workshop II	K	3	
	BEEC 2373	*Organisasi & Senibina Komputer* Computer Organization & Architecture	K	3	
	**BEEC 1353	*Pengaturcaraan Lanjutan* Advanced Programming	K	3	BEEC 1313
	BIPW 1132	*Falsafah dan Isu-isu Semasa* Philosophy and Current Issues	W	2	
	BKKX XXX1	*Ko-kurikulum I* Co-curriculum I	W	1	
	BIPW2132 BLLW1172	*Penghayatan Etika dan Peradaban* ***(untuk pelajar tempatan)*** Appreciation of Ethics and Civilisation ***(for local students)*** *Bahasa Melayu Komunikasi 1* ***(untuk pelajar antarabangsa)*** Malay Language for Communication 1 ***(for international students)***	W	2	
		TOTAL CREDITS THIS SEMESTER			
		LOCAL STUDENT		**20**	
		INTERNATIONAL STUDENT		**20**	

	CODE	COURSE	CATEGORY	CREDIT	PRE- REQUISITE
SEMESTER 3	BEEU 2033	*Kalkulus Lanjutan untuk Teknologi* Advanced Calculus for Technology	P	3	
	BEEC 2363	*Struktur Data & Algoritma* Data Structure & Algorithm	K	3	
	BEET 2333	*Prinsip Komunikasi* Communication Principle	K	3	
	BEET 2423	*Isyarat & Sistem* Signal & Systems	K	3	
	BEEE 2373	*Teknologi Elektrik* Electrical Technology	K	3	
	BLLW2152	*Penulisan Akademik* Academic Writing	W	2	
	BKKX XXX1	*Ko-kurikulum II* Co-curriculum II	W	1	
TOTAL CREDITS THIS SEMESTER				**18**	
SEMESTER 4	BEEU 2043	*Kaedah Statistik* Statistical Methods	P	3	
	BEEC 1343	*Sistem Pengurusan Pangkalan Data* Database Management System	K	3	
	BEEC 2383	*Sistem & Rangkaian Komputer* Computer Network & System	K	3	
	BEEC 2393	*Teknologi Internet & Multimedia* Internet Technology & Multimedia	K	3	
	BEEC 2404	*Elektronik Digital* Digital Electronic	K	4	
	BLLW 12X2	*Bahasa Ketiga* Third Language	W	2	
	BIPW 2132	*Penghayatan Etika dan Peradaban* ***(untuk pelajar tempatan)*** Appreciation of Ethics and Civilisation ***(for local students)***	W	2	
	BLLW 1172	*Bahasa Melayu Komunikasi 1* ***(untuk pelajar antarabangsa)*** Malay Language for Communication 1 ***(for international students)***			
TOTAL CREDITS THIS SEMESTER					
LOCAL STUDENT				**20**	
INTERNATIONAL STUDENT				**20**	

	CODE	COURSE	CATEGORY	CREDIT	PRE-REQUISITE
SEMESTER 5	BEEC 3453	*Sistem Pengoperasian* Operating Systems	K	3	
	BEEC 3413	*Matematik Diskrit* Discrete Mathematics	K	3	
	**BEET 3373	*Pemprosesan Isyarat Digital* Digital Signal Processing	K	3	BEET 2423
	**BEEC 3433	*Rangkaian & Keselamatan Komputer* Computer Network & Security	K	3	BEEC 2383
	BEEC 3444	*Teknologi Mikropemproses & Mikropengawal* Microprocessor & Microcontroller Technology	K	4	
	BLLW3162	*Bahasa Inggeris untuk Interaksi Profesional* English for Professional Interaction	W	2	
	***BIPW XXX2	*Elektif Umum* General Elective	E	2	
	#BEEX XXX0	*Kursus Pensijilan Profesional* Professional Certificate Course			
		TOTAL CREDITS THIS SEMESTER		**20**	
SEMESTER 6	BEEU 3764	*Projek Sarjana Muda I* Bachelor Degree Project I	K	4	
	BEEC 3463	*Kejuruteraan Perisian* Software Engineering	K	3	
	BEEC 3423	*Kejuruteraan Sistem Komputer* Computer System Engineering	K	3	
	BTMW 4012	*Keusahawanan Teknologi* Technology Entrepreneurship	W	2	
	*BEEC 48X4	*Elektif I* Elective I	E	4	
	*BEEC 48X4	*Elektif II* Elective II	E	4	
		TOTAL CREDITS THIS SEMESTER		**20**	

	CODE	COURSE	CATEGORY	CREDIT	PRE-REQUISITE
SEMESTER 7	BEEU 4053	*Etika Kejuruteraan & KKPP* Engineering Ethics & OSHE	P	3	
	**BEEU 4774	*Projek Sarjana Muda II* Bachelor Degree Project II	K	4	BEEU 3764
	BEEE 4443	*Pengurusan Kualiti* Quality Management	K	3	
	BEEC 4473	*Sistem Terbenam* Embedded System	K	3	
	*BEEC 48X4	*Elektif III* Elective III	E	4	
TOTAL CREDITS THIS SEMESTER				**17**	
SEMESTER 8	BEEU 4786	*Latihan Industri* Industrial Training	K	6	
	BEEU 4796	*Laporan Latihan Industri* Industrial Training Report	K	6	
TOTAL CREDITS THIS SEMESTER				**12**	
TOTAL CREDITS				**144**	

** Pre-requisite Course

* For Elective I, II & III, students may choose any THREE (3) COURSES from the list below:

NO.	CODE	COURSE NAME
1	BEEC 4804	*Rekabentuk & Fabrikasi VLSI* VLSI Design & Fabrication
2	BEEC 4814	*Pengantaramukaan Komputer* Computer Interfacing
3	BEEC 4824	*Pemprosesan Imej & Video* Image & Video Processing
4	BEEC 4834	*Sistem Masa Nyata* Real Time Systems
5	BEEC 4844	*Pengujian Litar Bersepadu* Integrated Circuit Testing

*** For General elective, students may choose any ONE (1) COURSE from the list below:

NO.	CODE	COURSE NAME
1	BIPW 1142	*Falsafah Sains dan Teknologi* Philosophy of Science and Technology
2	BIPW 4112	*Komunikasi Organisasi* Organizational Communication
3	BIPW 1152	*Psikologi Industri dan Organisasi* Industrial Psycology and Organization
4	BIPW 4122	*Kemahiran Perundingan* Negotiation Skills

For Professional Certificate Preparation Course, student may choose any ONE (1) certificate from the list below:

NO.	CODE	CERTIFICATE NAME
1	BEET 3100	Cisco Certified Network Associate Routing & Switching (Preparation)
2	BEEC 2210	IoT Fundamentals: Connecting Things Professional Certification
3	BEEC 2220	IoT Fundamentals: Big Data &Analytics Professional Certification

Number of credit hours regarding to course category is represented in the table below.

W = university compulsory subjects
P = program core subjects
K = course core subjects
E = elective subjects

Programme P	**P**	**18**
Course K	**K**	**82**
University Compulsory	**W**	**16**
Industrial Training	**K**	**2**
Elective	**E**	**12**
		144

Bachelor of Electronic Engineering Technology with Honours (BEEZ)

	CODE	COURSE	CATEGORY	CREDIT	PRE-REQUISITE
SEMESTER 1	BEEU 1013	*Matematik Teknikal* Technical Mathematics	P	3	
	BEEE 1013	*Fizik Teknikal* Technical Physics	P	3	
	BEEI 1303	*Pengenalan Litar Elektrik* Electrical Circuit Fundamental	K	3	
	BEEE 1303	*Bengkel Kejuruteraan I* Engineering Workshop I	K	3	
	BEEC 1313	*Asas Pengaturcaraan* Programming Fundamental	K	3	
	BLLW 1142	*Bahasa Inggeris untuk Akademik* English for Academic Purposes	W	2	
TOTAL CREDITS THIS SEMESTER				**17**	
SEMESTER 2	BEEU 1023	*Kalkulus untuk Teknologi* Calculus for Technology	P	3	
	BEEZ 1203	*Analisa Litar AC* AC Circuit Analysis	K	3	
	BEEE 1313	*Bengkel Kejuruteraan II* Engineering Workshop II	K	3	
	BEEE 2343	*Lukisan Kejuruteraan* Engineering Drawing	K	3	
	BEEE 1323	*Pengenalan Elektronik* Electronic Fundamentals	K	3	
	BKKX XXX1	*Kokurikulum I* Cocurriculum I	W	1	
	BIPW 1132	*Falsafah dan Isu-isu Semasa* Philosophy and Current Issues	W	2	
TOTAL CREDITS THIS SEMESTER				**18**	

	CODE	COURSE	CATEGORY	CREDIT	PRE-REQUISITE
SEMESTER 3	BEEU 2033	*Kalkulus Lanjutan untuk Teknologi* Advanced Calculus for Technology	P	3	
	**BEEE 2333	*Peranti Elektronik Analog* Analogue Electronic Devices	K	3	BEEE 1323
	BEEC 2404	*Elektronik Digital* Digital Electronic	K	4	
	BEET 2423	*Isyarat & Sistem* Signal & Systems	K	3	
	BEEZ 1213	*Instrumentasi & Pengukuran* Instrumentation & Measurement	K	3	
	BLLW 2152	*Penulisan Akademik* Academic Writing	W	2	
	BKKX XXX1	*Kokurikulum II* Cocurriculum II	W	1	
TOTAL CREDITS THIS SEMESTER				**19**	
SEMESTER 4	BEEU 2043	*Kaedah Statistik* Statistical Methods	P	3	
	BEET 2333	*Prinsip Komunikasi* Communication Principle	K	3	
	BEEE 2354	*Sistem Elektronik* Electronic Systems	K	4	
	BEEE 2364	*Prinsip Kawalan* Control Principles	K	4	
	BEEZ 2404	*Teknologi Mikropengawal* Microcontroller Technology	K	4	
	BIPW 3112 BIPW 2122	*Pemikiran Kritis dan Kreatif* ***(untuk pelajar tempatan)*** Critical and Creative Thinking ***(for local students)*** *Kebudayaan Malaysia* ***(untuk pelajar antarabangsa)*** Malaysian Culture ***(for international students)***	W	2	
TOTAL CREDITS THIS SEMESTER					
LOCAL STUDENT				**20**	
INTERNATIONAL STUDENT				**20**	

	CODE	COURSE	CATEGORY	CREDIT	PRE-REQUISITE
SEMESTER 5	BEET 3383	*Elektromagnetik* Electromagnetic	K	3	
	BEEU 3803	*Rekabentuk Projek Berintegrasi* Integrated Design Project	K	3	
	BEEC 2383	*Sistem & Rangkaian Komputer* Computer Network & System	K	3	
	**BEET 3373	*Pemprosesan Isyarat Digital* Digital Signal Processing	K	3	BEET 2423
	BLHW 2772 BLHL 1012	*Penghayatan Etika dan Peradaban* ***(untuk pelajar tempatan)*** Appreciation of Ethics and Civilisation ***(for local students)*** *Bahasa Melayu Komunikasi 1* ***(untuk pelajar antarabangsa)*** Malay Language for Communication 1 ***(for international students)***	W	2	
	*BEEX XXX3	*Elektif I* Elective I	E	3	
	***BIPW XXX2	*Elektif Umum* General Elective	E	2	
		TOTAL CREDITS THIS SEMESTER			
		LOCAL STUDENT		**19**	
		INTERNATIONAL STUDENT		**19**	
SEMESTER 6	BEEE 3404	*Perolehan Data & Penderia* Data Acquisition & Sensors	K	4	
	BEEU 3764	*Projek Sarjana Muda I* Bachelor Degree Project I	K	4	
	BLLW 3162	*Bahasa Inggeris untuk Interaksi Profesional* English for Professional Interaction	W	2	
	BTMW 4012	*Keusahawanan Teknologi* Technology Entrepreneurship	W	2	
	*BEEX XXX3	*Elektif II* Elective II	E	3	
	*BEEX XXX3	*Elektif III* Elective III	E	3	
	#BEEX XXX0	*Kursus Pensijilan Profesional* Professional Certificate Course			
		TOTAL CREDITS THIS SEMESTER		**18**	

	CODE	COURSE	CATEGORY	CREDIT	PRE-REQUISITE
SEMESTER 7	BEEU 4053	*Etika Kejuruteraan & KKPP* Engineering Ethics & OSHE	P	3	
	BEEE 3424	*Aplikasi Sistem Terbenam* Embedded Systems Application	K	4	
	BEEE 4443	*Pengurusan Kualiti* Quality Management	K	3	
	**BEEU 4774	*Projek Sarjana Muda II* Bachelor Degree Project II	K	4	BEEU 3764
	BLLW 1XX2	*Bahasa Ketiga* Third Language	W	2	
	*BEEX XXX3	*Elektif IV* Elective IV	E	3	
TOTAL CREDITS THIS SEMESTER				**19**	
SEMESTER 8	BEEU 4786	*Latihan Industri* Industrial Training	K	6	
	BEEU 4796	*Laporan Latihan Industri* Industrial Training Report	K	6	
TOTAL CREDITS THIS SEMESTER				**12**	
TOTAL CREDITS				**142**	

** Pre-requisite Course

* For Elective I, students may choose any ONE (1) COURSE from the list below:

NO.	CODE	COURSE NAME
1	BEET 3353	*Sistem Telekomunikasi* Telecommunication System
2	BEET 3413	*Teknik RF & Gelombang Mikro* RF Technique & Microwave
3	BEEZ 4803	*Anatomi & Fisiologi* Anatomy & Physiology
4	BEEZ 4813	*Pengimejan Perubatan dan Pemprosesan Imej* Medical Imaging and Image Processing
5	BEEZ 4923	*Fabrikasi Mikroelektronik* Microelectronic Fabrication
6	BEEZ 4903	*Proses Semikonduktor* Semiconductor Process

* For Elective II & III, students may choose any TWO (2) COURSES from the list below:

NO.	CODE	COURSE NAME
1	BEET 4813	*Komunikasi Mudah Alih* Mobile Communication
2	BEET 4833	*Kejuruteraan Antena* Antenna Engineering
3	BEEZ 4823	*Peranti Perubatan dan Peranti Instrumentasi* Medical Devices and Instrumentation
4	BEEZ 4853	*Etika, Akta, Piawai & Keselamatan Bioperubatan* Biomedical Ethics Acts, Standards & Safety
5	BEEZ 4873	*Rekabentuk VLSI* VLSI Design
6	BEEZ 4883	*Rekabentuk IC Digital* Digital IC Design

* For Elective IV, students may choose any ONE (1) COURSE from the list below:

NO.	CODE	COURSE NAME
1	BEET 4803	*Komunikasi Satelit* Satellite Communication
2	BEEZ 4863	*Sistem Navigasi Radio* Radio Navigation System
3	BEEZ 4843	*Penyelenggaraan Kejuruteraan Bioperubatan* Biomedical Engineering Maintenance
4	BEEZ 4833	*Biomekanik* Biomechanics
5	BEEZ 4913	*Seni Bina VLSI* VLSI Architecture
6	BEEZ 4893	*Pengujian IC Digital* Digital IC Testing

*** For General elective, students may choose any ONE (1) COURSE from the list below:

NO.	CODE	COURSE NAME
1	BIPW 1142	*Falsafah Sains dan Teknologi* Philosophy of Science and Technology
2	BIPW 4112	*Komunikasi Organisasi* Organizational Communication
3	BIPW 1152	*Psikologi Industri dan Organisasi* Industrial Psycology and Organization
4	BIPW 4122	*Kemahiran Perundingan* Negotiation Skills

For Professional Certificate Preparation Course, student may choose any ONE (1) certificate from the list below:

NO.	CODE	CERTIFICATE NAME
1	BEET 3100	Cisco Certified Network Associate Routing & Switching (Preparation)
2	BEEC 2210	IoT Fundamentals: Connecting Things Professional Certification
3	BEEC 2220	IoT Fundamentals: Big Data &Analytics Professional Certification

Number of credit hours regarding to course category is represented in the table below.

W = university compulsory subjects
P = program core subjects
K = course core subjects
E = elective subjects

Programme P	**P**	**18**
Course K	**K**	**80**
University Compulsory	**W**	**18**
Industrial Training	**K**	**12**
Elective	**E**	**14**
		142

BACHELOR TECHNOLOGY OF ELECTRICAL MAINTENANCE SYSTEM (BEEM)

PROGRAMME LEARNING OUTCOMES (PLO)

PLO1	Apply knowledge of technology fundamentals to broadly-defined procedures processes, systems and methodologies in electrical system maintenance.
PLO2	Able to suggest and apply latest tools and techniques to solve broadly-defined problems.
PLO3	Demonstrate strong analytical and critical thinking skills to solve broadly-defined problems in electrical system maintenance.
PLO4	Able to communicate and articulate effectively in both verbal and written among technologist communities and society at large.
PLO5	Demonstrate understanding of the societal related issues and the consequent responsibilities relevant to broadly-defined technology practices.
PLO6	Recognize the needs for professional development and to engage independent lifelong learning in specialist technologists.
PLO7	Demonstrate an awareness of management and technopreneurship practices in real perspective.
PLO8	Demonstrate professionalism and social and ethical consideration.
PLO9	Demonstrate leadership quality, mentoring and work effectively in diverse teams.

Bachelor Technology of Electrical Maintenance System with Honours (BEEM)

	CODE	COURSE	CATEGORY	CREDIT	PRE-REQUISITE
SEMESTER 1	BEEM1114	Electrical System Drafting and Simulation *Draf dan Simulasi Elektrik*	T	4	
	BEEM1124	Technical Reporting *Pelaporan Teknikal*	T	4	
	BEEM1135	Electrical System Measurement & Testing *Pengukuran & Pengujian Sistem Elektrik*	T	5	
	BTMU1112	Basic Intepreneuship *Asas Keusahawanan*	G	2	
	BLHW 1442	English for Academic Purpose *Bahasa Inggeris Untuk Tujuan Akademik*	G	2	
	BLHW1762	Philosophy and Current Issues *Falsafah & Isu Semasa*	G	2	
TOTAL CREDITS THIS SEMESTER				**19**	
SEMESTER 2	BEEM1245	Solar PV Installation and Maintenance *Pemasangan dan Penyelenggaraan PV Solar*	T	5	
	BEEM1255	Switchboard Maintenance and Calibration *Penyelenggaraan dan Kalibrasi Papan Pensuisan*	T	5	
	BEEM1263	Professional Practices *Amalan Profesional*	T	3	
	BLHW2452	Academic Writing *Penulisan Akademik*	G	2	
	BKKM1561	Co-Curriculum 1 *Ko-kurikulum 1*	G	1	
	BLHL1212	Third Language *Bahasa Ketiga*	G	2	
TOTAL CREDITS THIS SEMESTER				**18**	

	CODE	COURSE	CATEGORY	CREDIT	PRE-REQUISITE
SEMESTER 3	BEEM2375	Building Electrical System Maintenance *Penyelenggaraan Sistem Elektrik Bangunan*	T	5	
	BEEM2385	Renewable Energy System Maintenance *Penyelenggaraan Sistem Tenaga boleh Diperbaharui*	T	5	
	BEEM2395	Generator System Maintenance *Penyelenggaraan Sistem Penjana*	T	5	
	BLHW 2772	Appreciation of Ethics and Civilisations *Penghayatan Etika & Peradaban*	G	2	
	BKKC1631	Co-Curriculum 2 *Ko-kurikulum 2*	G	1	
TOTAL CREDITS THIS SEMESTER				**18**	
SEMESTER 4	BEEM2405	Electrical Machine & Drive System Integration *Integrasi Mesin Elektrik & Sistem Penggerak*	T	5	
	BEEM2415	Energy Efficiency Optimization *Pengoptimunan Kecekapan Tenaga*	T	5	
	BEEM2423	Collegiality Interaction and Management *Pengurusan & Interaksi Rakan Sejawat*	T	3	
	BTMU2124	Technopreneur Capstone I *Teknopreneur Capstone I*	T	4	
	BLHW3462	English for Professional Interaction *Bahasa Inggeris Untuk Interaksi Profesional*	G	2	
TOTAL CREDITS THIS SEMESTER				**19**	
SEMESTER 5	BEEM3535	Industrial Machinery Control System Design *Rekabentuk Sistem Kawalan Pemesinan Industry*	T	5	
	BEEM3545	Monitoring System Integration *Integrasi Sistem Pemantauan*	T	5	
	BEEM3554	Industrial Data Analysis *Analisis data Perindustrian*	T	4	
	BTMU3134	Technopreneur Capstone II *Teknopreneur Capstone II*	T	4	
TOTAL CREDITS THIS SEMESTER				**18**	

	CODE	COURSE	CATEGORY	CREDIT	PRE-REQUISITE
SEMESTER 6	BEEM3664	Maintenance Management System (MMS) *Sistem Pengurusan Penyelenggaraan*	T	4	
	BEEM3674	Project Planning and Execution *Perancangan Projek dan Perlaksanaan*	T	4	
	BEEM3684	Final Year Project I *Projek Tahun Akhir I*	T	4	
			TOTAL CREDITS THIS SEMESTER	**12**	
SHORT SEMESTER	BEEM3696	Final Year Project II *Projek Tahun Akhir II*	T	6	**BEEM3684
			TOTAL CREDITS THIS SEMESTER	**6**	
SEMESTER 7	BEEL4112	Industrial Training *Latihan Industri*	T	12	
			TOTAL CREDITS THIS SEMESTER	**12**	
			TOTAL CREDITS	**142**	

** Pre-requisite Course

Number of credit hours regarding to course category is represented in the table below.

G = general component subjects
T = technology subjects

General	**G**	**16**
Technology	**T**	**94**
Industrial Training	**T**	**12**
		122

BACHELOR TECHNOLOGY OF ELECTRONIC INDUSTRIAL AUTOMATION (BEEL)

PROGRAMME LEARNING OUTCOMES (PLO)

PLO1	Apply knowledge of technology fundamentals to broadly-defined procedures processes, systems and methodologies in industrial electronic automation.
PLO2	Able to suggest and apply latest tools and techniques to solve broadly-defined problems.
PLO3	Demonstrate strong analytical and critical thinking skills to solve broadly-defined problems in industrial electronic automation.
PLO4	Able to communicate and articulate effectively in both verbal and written among technologist communities and society at large.
PLO5	Demonstrate understanding of the societal related issues and the consequent responsibilities relevant to broadly-defined technology practices.
PLO6	Recognize the needs for professional development and to engage independent lifelong learning in specialist technologists.
PLO7	Demonstrate an awareness of management and technopreneurship practices in real perspective.
PLO8	Demonstrate professionalism and social and ethical consideration.
PLO9	Demonstrate leadership quality, mentoring and work effectively in diverse teams.

Bachelor Technology of Electronic Industrial Automation with Honours (BEEL)

	CODE	COURSE	CATEGORY	CREDIT	PRE-REQUISITE
SEMESTER 1	BEEL1112	Technology Skill and Development in Electronic Automation I *Kemahiran Teknologi dan Pembangunan Automasi Elektronik I*	T	2	
	BEEL1125	Product Development Technology *Teknologi Pembangunan Produk*	T	5	
	BEEL1135	Flexible Manufacturing System I *Sistem Pembuatan Fleksibel I*	T	5	
	BEEL1142	Technology System Programming I *Pengaturcaraan Sistem Teknologi I*	T	2	
	BLHW 1762	Philosophy and Current Issues *Falsafah & Isu Semasa*	G	2	
	BTMU 1112	Basic Entrepreneurship *Asas Keusahawanan*	G	2	
	BLHW1442	English for Academic Purpose *Bahasa Inggeris untuk Tujuan Umum*	G	2	
		TOTAL CREDITS THIS SEMESTER		**20**	
SEMESTER 2	BEEL1214	Technology Skill and Development in Electronic Automation II *Kemahiran Teknologi dan Pembangunan Automasi Elektronik II*	T	4	**BEEL1112
	BEEL1222	Network, Switching and Routing *Rangkaian, Pensuisan dan Penghalaan*	T	2	
	BEEL1234	Technology System Programming II *Pengaturcaraan Sistem Teknologi II*	T	4	**BEEL1142
	BEEL1243	Professional Practices *Amalan Profesional*	T	3	
	BLHL1212	Third Language *Bahasa Ketiga*	G	2	
	BLHW2452	Academic Writing *Penulisan Akademik*	G	2	
		TOTAL CREDITS THIS SEMESTER		**17**	

	CODE	COURSE	CATEGORY	CREDIT	PRE-REQUISITE
SEMESTER 3	BEEL2112	Technology Data Acquisition and Analysis I *Teknologi Capaian Data dan Analisis I*	T	2	
	BEEL2125	Flexible Manufacturing System II *Sistem Pembuatan Fleksibel II*	T	5	**BEEL1135
	BEEL2135	Embedded System Programming Tool *Peralatan Pengaturcaraan Sistem Terbenam*	T	5	
	BEEL2143	Network Security Implementation *Implementasi Rangkaian Keselamatan*	T	3	
	BLHW 2772	Appreciation of Ethics and Civilisations *Penghayatan Etika & Peradaban*	G	2	
	BKKM1561	Co-Curricular Activity I *Ko-kurikulum I*	G	1	
TOTAL CREDITS THIS SEMESTER				**18**	
SEMESTER 4	BEEL2214	Technology Data Acquisition and Analysis II *Teknologi Capaian Data dan Analisis II*	T	4	**BEEL2112
	BEEL2222	Technology System Optimization I *Pengoptimuman Sistem Teknologi I*	T	2	
	BEEL2232	Application System Development I *Pembangunan Sistem Aplikasi I*	T	2	
	BEEL2244	Technology Operation Management *Pengurusan Operasi Teknologi*	T	4	
	BEEL2254	Technopreneur Capstone I *Teknopreneur Capstone I*	T	4	
	BKKC1631	Co-Curricular Activity II *Ko-kurikulum II*	G	1	
TOTAL CREDITS THIS SEMESTER				**17**	
SEMESTER 5	BEEL3114	Technology System Optimization II *Pengoptimuman Sistem Teknologi II*	T	4	**BEEL2222
	BEEL3124	Application System Development II *Pembangunan Sistem Aplikasi II*	T	4	**BEEL2232
	BEEL3134	Technology Quality Management *Pengurusan Kualiti Teknologi*	T	4	
	BEEL3144	Technopreneur Capstone II *Teknopreneur Capstone II*	T	4	**BEEL2254
	BLHW3462	English for Technical Communication *Bahasa Inggeris untuk Komunikasi Teknikal*	G	2	
TOTAL CREDITS THIS SEMESTER				**18**	

	CODE	COURSE	CATEGORY	CREDIT	PRE-REQUISITE
SEMESTER 6	BEEL3215	System Integration Designing *Rekabentuk Sistem Integrasi*	T	5	
	BEEL3225	Maintenance Management System *Sistem Pengurusan Penyelenggaraan*	T (elective)	5	
	BEEL3234	Final Year Project I *Projek Tahun Akhir I*	T	4	
			TOTAL CREDITS THIS SEMESTER	**14**	
SHORT SEMESTER	BEEL3316	Final Year Project II *Projek Tahun Akhir II*	T	6	**BEEL3234
			TOTAL CREDITS THIS SEMESTER	**6**	
SEMESTER 7	BEEL4112	Industrial Training *Latihan Industri*	T	12	
			TOTAL CREDITS THIS SEMESTER	**12**	
			TOTAL CREDITS	**122**	

** Pre-requisite Course

Number of credit hours regarding to course category is represented in the table below.

G = general component subjects
T = technology subjects

General	**G**	**16**
Technology	**T**	**89**
Industrial Training	**T**	**5**
		12
		122

ACADEMIC HANDBOOK SESSION 2021/2022
FOR BACHELOR DEGREE PROGRAMMES

SUMMARY OF COURSES

FTKEE

FACULTY OF ELECTRICAL AND
ELECTRONIC ENGINEERING TECHNOLOGY
UNIVERSITI TEKNIKAL MALAYSIA MELAKA

UNIVERSITY COMPULSORY COURSES (W)

BKKX XXX1
COCURRICULUM I & COCURRICULUM II/ KOKURIKULUM I & KOKURIKULUM II

LEARNING OUTCOMES

Upon completion of this course, students should be able to:

1. Apply the technique in the relevant field.
2. Demonstrate the ability to participate in a team in the relevant field.

LEARNING OUTCOMES

Upon completion of this subject, student should be able to:

1. Apply skills in relevant fields.
2. Demonstrate teamwork abilities in related subjects.

SYNOPSIS

1. **Cultural**
   Choir, Gamelan, Cak Lempung, Nasyid, Seni Khat, Seni Lakon, Art, English Elocution, Bahasa Melayu Elocution, and Kompang.

2. **Entrepreneurship**
   Video, Film and Photography, Publishing & Journalism, Computer and Technopreneurship.

3. **Society**
   Fiqh Muamalat, Fiqh Amali, Tahsin Al-Quran & Yaasin and Peer Program.

4. **Recreation**
   Go-Kart, Adventure and Cycling.

5. **Sports**
   Swimming, Volley Ball, Golf, Kayaking, Takraw, Aerobic, Badminton, Football and Net ball.

6. **Martial Arts**
   Silat Gayong, Karate-Do and Taekwando.

BLLW 1XX2
THIRD LANGUAGE/ BAHASA KETIGA

Bahasa Arab Tahap 1
Bahasa Arab Tahap 2
Bahasa Mandarin Tahap 1
Bahasa Mandarin Tahap 2
Bahasa Jepun Tahap 1
Bahasa Jepun Tahap 2
Bahasa Jerman Tahap 1
Bahasa Jerman Tahap 2
Bahasa Perancis Tahap 1
Bahasa Perancis Tahap 2

BLLW 1142
ENGLISH FOR ACADEMIC PURPOSES/
BAHASA INGGERIS UNTUK AKADEMIK

LEARNING OUTCOMES

Upon completion of this course, students should be able to:

1. Apply correct grammar rules according to context.
2. Demonstrate knowledge of various reading skills in the reading tasks given.

SYNOPSIS

This course aims to develop students' reading skills and grammar. A variety of academic reading texts and reading skills are explored to facilitate students' comprehension of the texts. These reading skills are also necessary in assisting students to master study skills. Grammar elements are taught in context to develop students' accuracy in the use of the language. This course also includes elements of blended learning.

REFERENCES

1. De Chazal, E., & Rogers, L. (2013). Oxford EAP: A Course in English for Academic Purposes. Oxford: Oxford University Press.
2. McDonald, A. & Hancock, M. (2010). English Result. Oxford: Oxford University Press.
3. Paterson, K. & Wedge, R. (2013). Oxford Grammar For Eap. Oxford: Oxford University Press.

BLLW 1172
BAHASA MELAYU KOMUNIKASI/
MALAY LANGUAGE FOR COMMUNICATION

HASIL PEMBELAJARAN

Pada akhir kursus ini, pelajar akan dapat:

1. Membaca dan menjelaskan maksud ayat serta petikan mudah.
2. Bertutur dalam situasi tertentu dengan menggunakan ayat mudah.
3. Menyusun idea dalam penulisan karangan pendek.

SINOPSIS

Kursus ini memperkenalkan susuk tatabahasa Bahasa Melayu. Pelajar didedahkan dengan aspek-aspek nahu, klausa, terminologi, binaan ayat, penjodoh bilangan dan unsur sastera. Diharapkan pelajar dapat menguasai pertuturan atau berkomunikasi dengan baik dan mudah.

RUJUKAN

1. Daftar Ejaan Rumi Bahasa Malaysia. (2006). Kuala Lumpur: Dewan Bahasa dan Pustaka.
2. Daftar Istilah Majlis Bahasa Indonesia-Malaysia. (2005). Kuala Lumpur: Dewan Bahasa dan Pustaka.
3. Yong Chyn Chye, Rohaidah Mashudi dan Maarof Abd Rahman. (2012). Bahasa Kebangsaan Untuk Pelajar Luar Negara (Malay Language for International Students). Kuala Lumpur: Pearson Malaysia Sdn. Bhd.

BLLW 2152
ACADEMIC WRITING/
PENULISAN AKADEMIK

LEARNING OUTCOMES

Upon completion of this course, students should be able to:

1. Prepare clear and detailed descriptions of a product related to fields of interest.
2. Express arguments systematically in a composition.
3. Prepare short reviews of technical materials.

SYNOPSIS

This course aims to equip the students with the skills to communicate clear and detailed viewpoints in writing. The students are expected to have a stand on topics of their fields by providing advantages and disadvantages to support their arguments. From time to time, consultations with the students will be conducted throughout the completion of their assignments. This serves as the formative evaluation in the course. Grammar components are embedded in the course to support the required writing skills. Blended learning is incorporated in this course.

REFERENCES

1. Blass, L & Vargo, M (2018). Pathways: Reading, Writing, and Critical Thinking 3. Mason: Cengage Learning, Inc.
2. Chazal, E.d. & Rogers, L. (2012). Oxford EAP: A course in English for Academic Purposes. New York: Oxford University Press.
3. Paterson, K. & Wedge, R. (2013). Oxford Grammar for EAP. UK: Oxford University Press.

BLLW 3162
ENGLISH FOR PROFESSIONAL INTERACTION/
BAHASA INGGERIS UNTUK INTERAKSI PROFESIONAL

LEARNING OUTCOMES

Upon completion of this course, students should be able to:

1. Listen and infer based on situations in context.
2. Respond to standard spoken language using communication strategies.
3. Display detailed descriptions by expanding and supporting points of view using relevant examples.

SYNOPSIS

This course which is designed based on a blended and student-centred learning approach aims to develop students' listening skills as well as communication skills and strategies. Among the elements covered are professional interactions that include group discussion and public speaking. Students are also required to express ideas with relevant examples in public speaking and online assessments. They are also exposed to the rudiments of grammar implicitly via the communicative activities.

REFERENCES

1. Fry, R. (2016). 101 smart questions to ask on your interview. U.K.: New Page Books.
2. Cooper, S. (2016). 100 tricks to appear smart in meetings: How to get by without even trying. Andrews McMeel Publishing.
3. Hood, J.H. (2013). How to book of meetings: A complete guide for every business. South Australia: Magill.
4. Carmine, G. (2014). Talk like TED: The 9 public-speaking secret of the world's top minds. New York: St Martins Press.
5. Jason, S.W. (2013). Workplace communication for the 21st century: Tools and strategies that impact the bottom line. California: Praeger.

PRE-REQUISITE

BLLW 2152
ACADEMIC WRITING/ PENULISAN AKADEMIK

BIPW 1142
FALSAFAH DAN ISU SEMASA/
PHILOSOPHY & CURRENT ISSUE

HASIL PEMBELAJARAN

Pada akhir kursus ini, pelajar akan dapat:

1. Menjelaskan isu semasa berlandaskan ilmu falsafah, Falsafah Pendidikan Kebangsaan dan Rukunegara.
2. Menerangkan isu semasa berdasarkan aliran pemikiran utama dalam pelbagai aliran falsafah.
3. Menghuraikan isu semasa melalui perspektif perbandingan falsafah sebagai asas bagi menjalinkan dialog antara budaya.

SINOPSIS

Kursus ini merangkumi hubungan ilmu falsafah dengan Falsafah Pendidikan Kebangsaan dan Rukunegara. Penggunaan falsafah sebagai alat untuk memurnikan budaya pemikiran dalam kehidupan melalui seni dan kaedah berfikir serta konsep insan. Topik utama dalam falsafah iaitu epistemologi, metafizik dan etika dibincangkan dalam konteks isu semasa. Penekanan diberi kepada falsafah sebagai asas bagi menjalin dialog antara budaya serta memupuk nilai sepunya. Di hujung kursus ini, pelajar akan mampu melihat disiplin-disiplin ilmu sebagai satu badan ilmu yang komprehensif dan terkait antara satu sama lain.

RUJUKAN

1. Dzulkifli, A. R. & Rosnani, H (2019). Pentafsiran Baharu Falsafah Pendidikan Kebangsaan dan Pelaksanaannya Pasca 2020. Kuala Lumpur: IIUM Press.
2. Rosnani Hashim (2017). Revitalization of Philosophy and Philosophical Inquiry in Muslim Education. Gombak: Kull of Education, IIUM.
3. Al-Attas, S. M. Naquib (1991). The Concept of Education in Islam. Kuala Lumpur: ISTAC.

BIPW 21322
PENGHAYATAN ETIKA DAN PERADABAN/
APPRECIATION OF ETHICS AND CIVILISATION

LEARNING OUTCOMES

Pada akhir kursus ini, pelajar akan dapat:

1. Menjelaskan konsep etika daripada perspektif peradaban yang berbeza.
2. Membandingkan sistem, tahap perkembangan, kemajuan social dan kebudayaan merentas bangsa.
3. Membincangkan isu kontemporari berkaitan ekonomi, politik, sosial, budaya dan alam sekitar daripada perspektif etika dan peradaban.

SINOPSIS

Kursus ini menerangkan tentang konsep etika daripada perspektif peradaban yang berbeza. Ia bertujuan bagi mengenal pasti sistem, tahap perkembangan, kemajuan dan kebudayaan sesuatu bangsa dalam mengukuhkan kesepaduan sosial. Selain itu, perbincangan berkaitan isu-isu kontemporari dalam aspek ekonomi, politik, sosial, budaya dan alam sekitar daripada perspektif etika dan peradaban dapat melahirkan pelajar yang bermoral dan profesional. Penerapan amalan pendidikan berimpak tinggi (HIEPs) yang bersesuaian digunakan dalam penyampaian kursus ini. Di hujung kursus ini pelajar akan dapat menghubungkaitkan etika dan kewarganegaraan berminda sivik.

RUJUKAN

1. Harari Y. N. (2017). Homo Deus: A Brief History of Tomorrow. Australia: Harper Collins.
2. MacKinnon, B. (2015). Ethics: Theory and Contemporary Issues (8th) ed). Stamford CT: Cengage Learning.
3. Shamsul Amri Baharuddin (2012). Modul Hubungan Etnik. Selangor: Institut Kajian Etnik Universiti Kebangsaan Malaysia.

BIPW 2122
KEBUDAYAAN MALAYSIA/
MALAYSIAN CULTURE

LEARNING OUTCOMES

Upon completion of this course, students should be able to:

1. Analyse the general issues related to Malaysian culture.
2. Report the scenario of cultural diversity in Malaysia.
3. Explain the comparison between Malaysian culture with their home countries in various aspects.

SYNOPSIS

This course exposes international students to the socio-cultural background of Malaysia which includes ethnic composition, religions, traditions and values. Other elements like music, arts, cuisine, costume, ethnic games, celebrations and national festivals are also highlighted. Student Centered Learning (SCL) methods such as group discussion and presentation will be used in order to assist international students in developing their understanding and appreciation of Malaysian culture.

REFERENCES

1. Guan Yeoh Seng (2011). Media, Culture and Society in Malaysia. Kuala Lumpur: Routledge.
2. Heidi Munan (2010). Cultural Shock. A Guide to Customs and Etiquette. Kuala Lumpur: The New Straits Times Press.
3. Heidi Munan (2010). Malaysian Culture Group. Kuala Lumpur: Book Group.

BIPW 3112
CRITICAL AND CREATIVE THINKING/
PEMIKIRAN KRITIS DAN KREATIF

LEARNING OUTCOMES

Upon completion of this course, students should be able to:

1. Identify basic principles of critical and creative thinking skills.
2. Analyse collected and traceable information to make decisions.
3. Form a new concept or idea of a solution.

SYNOPSIS

This course is designed to give students an introduction to the principles of critical and creative thinking, and problem-solving. Students will be exposed to the roles of the right brain and left brain, mental determination, elements of critical and creative thinking as well as problem solving. This subject is conducted in accordance with the concept of problem-based learning (PBL).

REFERENCES

1. Aziz Yahya, Aida Nasirah Abdullah, Hazmilah Hasan, Raja Roslan Raja Abd Rahman. (2011) Critical and Creative Thinking Module 2. Melaka. Penerbit UTeM.
2. Buzan, T. & Buzan, B. (2006). The Mind Map Book, Essex: BBC Active, Pearson Education.
3. Claxton, G. & Lucas, B. (2007). The Creative Thinking Plan, London: BBC Books.
4. Reichenbach, W. (2000). Introduction to Critical Thinking, McGraw-Hill College.

GENERAL ELECTIVE COURSES (E)

BIPW 1132
PHILOSOPHY OF SCIENCE AND TECHNOLOGY/
FALSAFAH SAINS DAN TEKNOLOGI

HASIL PEMBELAJARAN

Pada akhir kursus ini, pelajar akan dapat:

1. Menilai kepentingan konsep ilmu dan isu-isu falsafah sains dan teknologi serta kepentingan isu dan cabaran berkaitan ilmu, falsafah sains dan teknologi.
2. Membina pemahaman tentang ilmu dan isu falsafah sains dan teknologi dalam kehidupan masyarakat masa kini melalui kerja berpasukan

SINOPSIS

Kursus ini membincangkan tentang konsep ilmu, konsep falsafah, sains dan teknologi yang berunsurkan kreativiti dan inovasi menurut sarjana Islam dan barat. Selain itu, kursus ini juga menekankan tentang metodologi dalam sains Islam, konsep dan pencapaian tamadun Islam dalam bidang matematik, astronomi, fizik, kimia, perubatan, konsep penciptaan alam dan kosmologi dalam Islam, pencapaian dalam bidang telekomunikasi terkini dan isu-isu sains semasa. Pendekatan sarjana Islam silam menjadi contoh kepada generasi masa kini menjadi manusia yang kreatif dan mempunyai pemikiran kritis dalam pelbagai bidang seperti penciptaan dan kejuruteraan

RUJUKAN

1. Azrina Sobian. (2014). Membina Kekuatan Sains Di Malaysia. Kuala Lumpur: Institut Kefahaman Islam Malaysia.
2. Abdul Rahman Abdullah (2010). Wacana Falsafah Sains Sejarah dan Pemikiran. Pulau Pinang: Pusat Kajian Pengurusan Pembangunan Islam USM
3. Azizan Baharuddin & Maisarah Hasbullah (2010). Pendidikan Sejarah dan Falsafah Sains di Institusi Pengajian Tinggi Awam. Kuala Lumpur: Dewan Bahasa dan Pustaka.
4. Ahmad Ridzwan Mohd Noor, Radzuan Nordin, Norliah Kudus, Nor Azilah Ahmad, Mahadi Abu Hassan, Shahrulanuar Mohamed, Ali Hafizar Mohd Rawi & Ismail Ibrahim. (2008). Modul Falsafah Sains dan Teknologi. Cetakan Dalaman Universiti Teknikal Malaysia Melaka.

BIPW 4112
ORGANIZATIONAL COMMUNICATION/
KOMUNIKASI ORGANISASI

HASIL PEMBELAJARAN

Pada akhir kursus ini, pelajar akan dapat:

1. Membincangkan prinsip-prinsip asas kemahiran komunikasi organisasi untuk tujuan interaksi dalam organisasi.
2. Memberikan maklum balas mengenai isu-isu yang berkaitan dengan pembangunan kemahiran komunikasi organisasi.
3. Menyelesaikan masalah komunikasi organisasi berdasarkan konteks persekitaran organisasi sebenar.

SINOPSIS

Kursus ini akan mendedahkan pelajar kepada idea-idea asas organisasi dalam komunikasi umum dan organisasi. Selain itu, pelajar juga akan dapat mengetahui teori-teori yang berkaitan dengan komunikasi organisasi dan memahami elemen-elemen penting dalam organisasi seperti kepimpinan, komunikasi rasmi dan komunikasi tidak rasmi. Selain itu, pelajar akan menyedari halangan, penyelesaian masalah dan membuat keputusan kemahiran dalam komunikasi organisasi. Akhirnya, pelajar akan mempunyai pemahaman iklim organisasi, hubungan teknologi dan organisasi dan komunikasi korporat dalam organisasi

RUJUKAN

1. Miller, K. (2012). Organizational Communication. (4rd. ed). Belmont: Thomson Wadsworth Publishing Company.
2. Dennis K. Mumby (2018). Organizational Communication: A Critical Approach. (2nd ed). SAGE Publications, Incorporated.

BIPW 2142
INDUSTRIAL PSYCOLOGY AND ORGANIZATION/
PSIKOLOGI INDUSTRI DAN ORGANISASI

HASIL PEMBELAJARAN

Pada akhir kursus ini, pelajar akan dapat:

1. Menghubung kait proses persekitaran dan teori di tempat kerja dalam dunia organisasi dan perindustrian.
2. Mempamerkan ciri-ciri kepimpinan dalam aktiviti tugasan kumpulan.
3. Memberi tindak balas terhadap peranan dan tanggungjawab sebagai seorang bakal pekerja di dalam organisasi.

SINOPSIS

Kursus ini memberi pendedahan kepada aspek psikologi dalam dunia pekerjaan dalam sektor industri serta permasalahan yang berhubung dengan tingkah laku dalam organisasi. Terdapat beberapa topik yang dibincangkan termasuk isu-isu semasa dalam psikologi di tempat kerja, perancangan personel, tekanan di tempat kerja dan psikologi kejuruteraan.

RUJUKAN

1. Schultz & Schultz, Duane (2017). Psychology and Work Today. New York: Prentice Hall.
2. Azlina A. B. (2016). Psikologi Industri dan Pengurusan Sumber Manusia. Terengganu: Penerbit Universiti Malaysia Terengganu.
3. Yukl, G. (2010). Leadership in Organization. New York: Prentice Hall.

BIPW 4122
NEGOTIATION SKILLS/
KEMAHIRAN PERUNDINGAN

HASIL PEMBELAJARAN

Pada akhir kursus ini, pelajar akan dapat:

1. Mengenalpasti konsep-konsep asas dalam proses perundingan menggunakan amalan komunikasi berkesan.
2. Membuat kesimpulan terhadap teknik-teknik perundingan yang terbaik berdasarkan pendekatan teori yang pelbagai.
3. Menyelesaikan isu-isu perundingan berdasarkan teknik-teknik kemahiran perundingan yang berkesan berasaskan pelbagai situasi.

SINOPSIS

Kursus ini akan membincangkan konsep asas perundingan, teknik berfikiran secara kritis dan kreatif, teknik komunikasi berkesan dan teknik mendengar dan menyoal secara berkesan. Pelajar turut didedahkan dengan pengetahuan dan kemahiran yang diperlukan untuk menjalankan dan meguruskan proses perundingan pelbagai secara berkesan. Selian itu, kemahiran berfikir secara kritis dan kreatif, serta kemahiran komunikasi berkesan yang diperlukan bagi menjalankan proses perundingan juga akan dibincangkan.

RUJUKAN

1. Lemiwki, R., Barry, B. & Saunders, D. (2016). Essentials of Negotiation. USA: McGraw Hill Education.
2. Covey, S. (2013) The 3rd Alternative: Solving Life's Most Difficult Problems. New York: Free Press
3. Fisher, R & Ury. (2011). Getting to YES: Negotiating Agreement Without Giving In. Third Edition. Penguin Books.
4. Larson, R. (2016). Algebra And Trigonometry With Calchat And Calview (10th ed,). Brooks Cole.

PROGRAMME CORE COURSES (P)

BEEU 1013
TECHNICAL MATHEMATICS/
MATEMATIK TEKNIKAL

LEARNING OUTCOMES

Upon completion of this course, students should be able to:

1. Explain the concepts of matrices, trigonometry, complex number and three dimensional vector operations.
2. Use appropriate methods to solve matrices, trigonometry, complex numbers and three-dimensional vector operations.
3. Solve application problems using appropriate techniques

SYNOPSIS

This course has four components - matrices, trigonometry, complex numbers and three-dimensional vector operations. In matrices, it covers some fundamental concepts such as determinants, inverses of square matrices and techniques for solving systems of linear equations using matrices. In trigonometry, the use of trigonometric identities to solve trigonometric equations and its applications will be emphasized. In complex numbers, it covers some fundamental concepts of imaginary numbers and its representations on the complex plane, as well as the representations of the polar and exponential forms of the complex numbers. Three-dimensional coordinate system and vectors operations will also be introduced. This includes the concepts of the dot and the cross products of vectors.

REFERENCES

1. Adam Bin Samsudin, Mohd Fariduddin bin Mukhtar, Siti Haryanti binti Hj Hairol Anuar, Irianto, "Introductory: Technical Mathematics for Engineering Technology", Penerbit UTeM, 2019
2. Miller, J., Gerken, D., "College Algebra & Trigonometry", Mcgraw-Hill Education, 2016.
3. Sullivan, M., "Algebra and Trigonometry, Loose-Leaf Edition", Pearson Education, 11st Edition, 2019.
4. Lial, M., L., Hornsby, J., Schneider, D., I., Daniels, C.," College Algebra and Trigonometry", Global Edition, Pearson Education Limited, 2016.
5. Larson, R., "Algebra and Trigonometry with Calchat and Calview", 10th Edition, Brooks Cole, 2016.

BEEU 1023
CALCULUS FOR TECHNOLOGY/
KALKULUS UNTUK TEKNOLOGI

LEARNING OUTCOMES

Upon completion of this course, students should be able to:

1. Use appropriate methods to find the limits and continuity of a function.
2. Use appropriate methods to differentiate and integrate various functions.
3. Solve application problems using appropriate techniques.

SYNOPSIS

This course introduces the differential and integral calculus of a single variable, with applications. The topics covered are limits and continuity of a function, the derivative with all techniques and methods to differentiate, applications of differentiation such as approximation, related rates, maximum and minimum values, as well as optimization problems. Integration covers methods like substitution, integration by parts, integration by partial fraction decomposition and trigonometric substitution. While its applications cover the area of a bounded region or area between curves as well as the volume of a solid of a revolution.

REFERENCES

1. Ezzatul Farhain Azmi, Nurul Amira Zainal, Khairum Hamzah, and Rahaini Mohd Said, (2020) "Elementary Calculus for Technology, Module for Engineering Technology Degree Programmes, Penerbit UTeM.
2. James. S. (2016). "Calculus (8th Ed.), Cengage Learning.
3. Abd Wahid Md Raji, et al. (2009). Calculus for science and engineering. Batu Pahat: UTHM.
4. Anton, H., Bivens, I., Davis, S., & Polaski, T. (2009). Calculus: multivariable (9th ed.). Addison-Wesley.
5. Briggs, W., Cochran, L., & Gillett, B. (2011). Calculus: early transcendentals. Pearson Education.
6. Goldstein, L. J., et al. (2010). Calculus and its applications (12th ed.). Pearson Education.
7. Stewart, J. (2008). Calculus: early transcendentals (6th ed.). Brooks/Cole.

BEEU 2033
ADVANCED CALCULUS FOR TECHNOLOGY/
KALKULUS LANJUTAN UNTUK TEKNOLOGI

LEARNING OUTCOMES

Upon completion of this course, students should be able to:

1. Apply the basic knowledge of vector functions and multivariable functions to solve the related problems.
2. Use appropriate methods to find the solutions of the differential equations.
3. Solve application problems using appropriate techniques

SYNOPSIS

This course has two parts. The first part introduces the vector-valued functions which include the derivative, integration, arc length and curvature of vector functions, partial derivatives that include limits and continuity, chain rule, and maximum and minimum values, and multiple integrals which include the double and triple integrals of multivariable functions. The second part of the course covers the solutions of ordinary differential equations. The topics include solving the first order differential equations using the separable, exact differentiation, and linear equations methods. While solutions of the second order equations covers the homogeneous and the non-homogeneous equations using the undetermined coefficients methods and variation parameters.

REFERENCES

1. Muhammad Izzat Zakwan bin Muhammad Zabidi, Iskandar Waini, Najiyah Safwa Khashi'ie, Fadzilah Salim. (2019). Advanced Calculus Workbook for Engineering Technology Students. Penerbit UTeM.
2. Stewart, J., Clegg, D. K., & Watson, S. (2020). Calculus: Early Transcendentals. Cengage Learning.
3. Anton, H., Bivens, I. C., & Davis, S. (2016). Calculus: Late Transcendental. John Wiley & Sons.
4. Stewart, J., Clegg, D. K., & Watson, S. (2020). Multivariable Calculus. Cengage Learning.
5. Zill, D. G. (2016). Differential Equations with Boundary-Value Problems. Nelson Education.

BEEU 2043
STATISTICAL METHODS/
KAEDAH STATISTIK

LEARNING OUTCOMES

Upon completion of this course, students should be able to:

1. Apply the knowledge of probability and statistics to solve the related problems.
2. Solve problems in statistical inferences related to hypothesis testing, regression and ANOVA.
3. Execute some real problems using Microsoft Excel data analysis application

SYNOPSIS

This course covers the concept of probability and statistics and their real application problems. Probability topics include all the basic concepts of probability such as events and probability, mutually exclusive events, independent events, multiplication rule, addition rule, conditional probability, discrete and continuous random variables. The inferential statistics covers topics like sampling, hypothesis testing, correlation, simple linear regression, chi-square independent test and ANOVA. Students will be exposed to statistical data analysis application in Microsoft Excel to solve real application questions.

REFERENCES

1. Nur Aiman Hanis Hasim, Nor Hafizah Hussin, Aminah Ahmad, and Nor Hamizah Miswan (2019), Statistical Methods for Technology, (Work Book) for Engineering Technology Degree Programs. Penerbit UTeM.
1. Paolella, Marc S. (2018), Fundamental Statistical Inference: A Computational Approach, John Wiley & Sons, Incorporated. ISBN: 9781119417880 (EBook)
2. Steyer, Rolf & Nagel, Werner (2017), Probability and Conditional Expectation: Fundamentals for the Empirical Sciences, John Wiley & Sons, Incorporated. ISBN: 9781119243502 (EBook)
3. Hahn, Gerald J., Meeker, William Q., & Escobar, Luis A. (2017), Statistical Intervals: A Guide for Practitioners and Researchers, 2nd ed., John Wiley & Sons, Incorporated. ISBN: 9781118594957. (EBook)
4. Rohatgi, Vijay K. & Saleh, A. K. Ehsanes (2015), An Introduction to Probability and Statistics, 3rd. ed., John Wiley & Sons, Incorporated. ISBN: 9781118799659 (EBook).

BEEU 4053
ENGINEERING ETHICS & OSHE/
ETIKA KEJURUTERAAN & KKPP

LEARNING OUTCOMES

Upon completion of this course, students should be able to:

1. Understand special consideration for societal, health, safety, environment, moral, legal and cultural issues towards becoming engineering technologist.
2. Discuss contemporary engineering technology issues and sustainability development.
3. Analyze critically the moral and ethical principles in developing strong commitment of engineering technologist practice and ethical responsibilities.

SYNOPSIS

This subject introduces the student the rules and standards governing the conduct of engineers in their roles as professionals; professional ethics, engineering code of ethics, ethical theories, ethical problems and problem solving techniques, engineers rights and responsibilities and how to do the right things. At the end of the course, the student will be introduced to OSHE acts, risks, safety, accidents and hazards and environmental issues. Contemporary and sustainability issues will also be enlightened.

REFERENCES

1. Harris, C. E., Michael S. Pritchard, and Michael J. Rabins. Engineering Ethics: Concepts and Cases. Belmont, CA: Wadsworth, Cengage Learning, 6th Ed., 2018.
2. Fleddermann, C. B. (2014). Engineering Ethics (4th ed.). Pearson.
3. Technologist and Technicians Act 2014. National Society of Professional Engineers. Code of Ethics for Engineers, 2007.
4. Board of Engineers Malaysia. Circular No. 3/2005. Guidelines for Code of Professional Conduct.
5. Occupational Safety and Health Act, 1994.
6. Factories and Machinery Act, 1967.
7. Environment Quality Act, 1974.

BEEI AND BEEA
PROGRAMME CORE COURSES (P)

BEEA 2061
ENGINEERING SEMINAR I/
SEMINAR KEJURUTERAAN I

LEARNING OUTCOMES
Upon completion of this course, students should be able to:
1. Identify the requirement of electrical engineering technology practices through exposure to the industry operation.
2. Apply the main features of groups and team that affect teamwork or team effectiveness in relation to electrical engineering technology field.
3. Explain the professional experiences gain through industrial visit.

SYNOPSIS
In this subject, students will be equipped with several session of engineering seminar given by the industrialists as well as by professional member of engineering bodies. The context of the seminar will be the general engineering issues and career path for engineering technologists.

REFERENCES
None

BEEI 3061
ENGINEERING SEMINAR II/
SEMINAR KEJURUTERAAN II

LEARNING OUTCOMES
Upon completion of this course, students should be able to:
1. Identify the route to professional electrical engineering technology practices requirement.
2. Apply the concept of sustainable engineering development practice in electrical engineering technology field.
3. Explain the professional experiences gain through industrial talk.

SYNOPSIS
This subject presents the procedure and process of route to professional engineer. The students will expose to the concepts an idea of renewable energy and also concepts of sustainability development of electrical engineering and its practice. The subject covered the idea of new requirement of manufacturing process and practice in order to expose student the basic knowledge to apply in real working field.

There are various issues of sustainable engineering will be covered and discussed.

REFERENCES
None

BEEY, BEET, BEEE, BEEC, BEEZ
PROGRAMME CORE COURSES (P)

BEEE 1013
TECHNICAL PHYSICS/
FIZIK TEKNIKAL

LEARNING OUTCOMES

Upon completion of this course, students should be able to:

1. Apply the physics concept systematically in engineering.
2. Display an ability to follow lab procedure in handling physic experiment through lab session.
3. Work individually or in groups effectively to perform assignments/tasks given.

SYNOPSIS

This course will discuss about Mechanics: Physical Quantities and Measurements, Kinematics of Linear Motion, Force, Momentum and Impulse, Work, Energy and Power, Static, Circular Motion, etc. Properties of Matter: Static, Dynamics, Circular Motion, Simple Harmonic, Moment of Inertia, Density and Specific Gravity, Hydrostatics, Elasticity, Friction, Viscosity, Osmosis, Diffusion, Acceleration and Newton's Second Law of Motion, Motion with a Changing Velocity and Ohm law. Thermodynamics, Wave, Light & Sound. All topics covered are basic knowledge that essential for engineering programs.

REFERENCES

1. Giancolli DC, "Physics for Scientists and Engineers with Modern Physics", 4th Edition, Pearson Prentice Hall, 2009.
2. "Physics for Scientists and Engineers with Modern Physics", 8th Edition, Cengage learning, 2010.
3. Giambatista A., Richardson B.M and Richardson R.C., "College Physics", 2nd Edition, Mc-Graw Hill, 2007.
4. Walker J.S., "Physics", 3rd Edition, Addison Wesley, 2007.

ACADEMIC HANDBOOK SESSION 2021/2022
FOR BACHELOR DEGREE PROGRAMMES

COURSE DETAILS FOR JTKE PROGRAMMES

FTKEE

FACULTY OF ELECTRICAL AND
ELECTRONIC ENGINEERING TECHNOLOGY
UNIVERSITI TEKNIKAL MALAYSIA MELAKA

BEEI COURSE CORE COURSES (K)

SEMESTER 1

BEEY 1303
MEASUREMENT & INSTRUMENTATION/
PENGUKURAN & INSTRUMENTASI

LEARNING OUTCOMES

Upon completion of this course, students should be able to:

1. Apply the knowledge of principles, techniques, components and tools in measurement and instrumentation system.
2. Measure and operate the electrical parameter by using analogue and digital instruments.
3. Explain effectively the knowledge about the measurement and instrumentation tools, techniques and standard.

SYNOPSIS

This subject discuss about units and dimensions, standards, errors and calibration in measurement. It covers the measurement devices such as digital meter, analog meter, oscilloscope, function generator and any device related. This subject also covers on instrumentation elements for complete data acquisition system such as sensors & transducers, signal conditioning & processing, A/D and D/A conversion, interfacing standards and data presentation.

REFERENCES

1. Uday A. Bakshi and Ajay V. Bakshi, Electrical Measurements and Instrumentation, Technical Publication, 2014.
2. Muhammad Sharil Yahya et. Al, Pengukuran & Instrumentasi, Penerbit UTeM, 2013.
3. Alan S. Moris and Reza Langari, Measurement and Instrumentation: Theory and Application, Second Edition, Academic Press, 2015.
4. HS Kalsi, Electronic Instrumentation, McGraw Hill, 2011.
5. Uday A. Bakshi and Ajay V. Bakshi, Electrical & Electronic Measurement, Technical Publication, 2012.
6. Muhammad Sharil Yahya et. Al, Asas dan Konsep Pengukuran, Penerbit UTeM, 2012.

BEEA 1304
DIGITAL ELECTRONICS & SYSTEMS/
ELEKTRONIK & SISTEM DIGITAL

LEARNING OUTCOMES

Upon completion of this course, students should be able to:

1. Apply the knowledge of principles, techniques, components and tools in measurement and instrumentation system.
2. Measure and operate the electrical parameter by using analogue and digital instruments.
3. Explain effectively the knowledge about the measurement and instrumentation tools, techniques and standard

SYNOPSIS

This subject discusses about number systems & codes, Boolean algebra, logic families and the characteristic of logic gates, combinational logic, analysis and design, MSI combinational logic circuit, flip-flops, counter and shift-register, synchronous and asynchronous sequential circuit. Analysis and design of adder, decoder, encoder, multiplexer and de-multiplexer. PLD devices such as ROM, PAL, counter and register.

REFERENCES

1. Aminurrashid Noordin et. al (2014), Digital Electronics & Systems, Penerbit UTeM.
2. Thomas Floyd, Digital Fundamentals, Global Edition, 11th Edition, Jan 2015, Pearson New International Edition.
3. Ronald Tocci, Neal Widmer, Greg Moss, Digital Systems Principles and Applications: 11th Edition, Jul 2013, Pearson New International Edition.
4. Thomas Floyd, Digital Electronics a Systems Approach, CourseSmart eTextBook, Oct 2012, Pearson New International Edition.

BEEA 1313
COMPUTER AIDED DESIGN/
REKABENTUK TERBANTU KOMPUTER

LEARNING OUTCOMES

Upon completion of this course, students should be able to:

1. Use a standard Computer Aided Design command tools for two-dimensional engineering drawing.
2. Produce three-dimensional solid models using standard Computer Aided Design software.
3. Demonstrate an accurate engineering drawing based on given problem.

SYNOPSIS

This course will be presented by means of lecture, tutorials, labs, lab test assignments and quiz fully in the CAD studio, without a final exam. The course concentrates on how to use Computer Aided Design (CAD) software to produce the basic engineering drawing, for example, geometric, orthographic, isometric, section cut and detail drawing. The students will be exposed to CAD interface, CAD coordinate system, basic drawing command tools, display controls, basic editing commands tools, text, dimensioning, isometric and template preparation in order to produce various types of engineering drawing. This course will introduce the implementation of CAD software in the real electrical engineering drawing. Drawing such as electrical layout, electrical fitting and schematic drawing. The 3D Solid Modelling Object Development drawing will also be covered.

REFERENCES

1. Tickoo, “Autocad 2016: A Problem-Solving Approach, Basic And Intermediate (22nd Ed.)”, Cadcim Technologies, 2016.
2. Onstott. S., “Autocad 2016 And Autocad Lt 2016 Essentials: Autodesk Official Press”, N.j. Wiley, 2016.
3. Leach. J., “Autocad Instructor. Sdc”, 2016.
4. Fane. B., “Autocad For Dummies. (17th Ed.)”, 2016.

BEEI 1303
ELECTRIC CIRCUIT FUNDAMENTAL/
PENGENALAN LITAR ELEKTRIK

LEARNING OUTCOMES

Upon completion of this course, students should be able to:

1. Apply analytical method and theorem to DC and AC (steady state) circuits in electrical circuit.
2. Conduct experiment on DC and AC (steady state) circuit based on electrical circuit theorem.
3. Participate effectively for any assignment and experiment.

SYNOPSIS

This subject introduces the students to Ohm’s Law, Kircchoff’s Laws and use them to calculate current, voltage and power in DC / AC (steady state) circuits. Following this the students will learn the analytical methods namely mesh and nodal analysis. The use of theorems like Thevenin, Norton, Superposition and the Maximum Power Transfer will follow next. The applications of the above tools will cover both dc and ac circuits. This subject will be supported by laboratory works to impart to the students some basic practical skills.

REFERENCES

1. K.A. Charles, N.O. Sadiku, Fundamentals of Electric Circuits,6th Ed. McGraw Hill, 2016.
2. Robbins and Miller, Circuit Analysis and Practice, 5th. Ed., Thomson and Delmar. 2016.
3. Nilsson and Riedel, Electric Circuits,10th Ed., Prentice Hall, 2014.
4. Thomas L. Floyd, Principles of Electric Circuits, 9th Ed., Pearson, 2010.

SEMESTER 2

BEEI 1323
ELECTRICAL & MAGNETISM/
ELEKTRIK & KEMAGNETAN

LEARNING OUTCOMES

Upon completion of this course, students should be able to:

1. Apply the concept and application of Electrical Field, Coulombs Law, Gauss Law, Lenz Law and Faradays Law in electrical charge phenomena.
2. Demonstrate electrical concepts, basic magnetic quantities and phenomena to simple devices (DC motor and transformer) in electrical engineering technology.
3. Present written and oral communications to document work and experiment results.

SYNOPSIS

This course will begins with an introduction of static electrical charge including the related law such as coulomb's law and gauss, lenz law concept, conductors, dielectrics, and electric boundary conditions. The magnetism fundamental also will be covered in the syllabus, which includes magnetic shell, magnetic flux, emf and faraday's law, magnetic field produced by direct current, solenoid magnetic field and force produce by more than one current carrying conductor.

REFERENCES

1. John W. Jewett, Jr. Raymond A. Serway, (2014), Physics For Scientists And Engineers, 9th Edition, Brooks/Cole Cengage Learning.
2. Matthew N. O. Sadiku (2015) Principles Of Electromagnetics, 4th Edition, Oxford University Press.
3. Ulaby, F. (2012) Electromagnetics For Engineers, Pearson Education, 6th Edition.
4. Hayt, W. And Buck, J., (2011) Engineering Electromagnetics, 8th Edition, Mcgraw Hill International Edition.

BEEI 1333
ADVANCED ELECTRICAL CIRCUIT/
LITAR ELEKTRIK LANJUTAN

LEARNING OUTCOMES

Upon completion of this course, students should be able to:

1. Analyze first order and second order electrical circuit in transient and frequency response.
2. Conduct experiment on frequency response and electrical circuit measurement.
3. Present written and oral communications to document work and experiment results.

SYNOPSIS

These subject exposes students to the application of several tools in analyzing electrical circuits, such as the Laplace transform and two ports network. The students are required to use the tools to analyze transient and frequency response in electrical circuit.

REFERENCES

1. Charles, K.A & Sadiku, N.O (2013). Fundamental of Electric Circuit (5th ed.). McGraw-Hill.
2. Nilsson, J. W. & Riedel, S. (2015). Electric Circuit (10th ed.). Prentice Hall.
3. Glisson, T. H. (2011). Introduction to Circuit Analysis and Design. Springer.
4. Hayt, W. H. (2012). Engineering Circuit Analysis (8th ed.). McGraw-Hill.
5. O'Maley, J. (2011). Basic Electric Circuit. McGraw-Hill.

PRE-REQUISITE

BEEI 1303
ELECTRIC CIRCUIT FUNDAMENTAL/
PENGENALAN LITAR ELEKTRIK

BEEI 1453
ELECTRONIC PRINCIPLE/
PRINSIP ELEKTRONIK

LEARNING OUTCOMES

Upon completion of this course, students should be able to:

1. Apply knowledge of semiconductor devices in electronic circuit.
2. Perform the experiment of semiconductor devices using simulation software and electronic components in electronic circuit.
3. Work in group effectively while performing group assignment.

SYNOPSIS

This course explains to students about the electronic principles and concepts. It involves the introduction to four semiconductor devices which are diode, bipolar junction transistor (BJT), field effect transistor (FET) and operational amplifier. Besides, students will be also learned about the types, structures, characteristics, configurations and applications of these devices. In terms of practical skills, students will conduct experiments and simulation works related to the application of electronic devices.

REFERENCES

1. Thomas L. Floyd, Electronic Devices, 10th Edition Pearson, 2018.
2. Robert L. Bolysted, Louis Nashelsky, Electronic Devices and Circuit Theory, 11th Edition, Pearson, 2013.
3. John Bird, Electrical and Electronic Principles and Technlogy, 5th Edition, Routledge, 2014.
4. S. Salivahanan, N. Suresh Kumar, Electronic devices and circuits, 4th Edition, McGraw-Hill, 2018.
5. Atul P. Godse, Uday A. Bakshi, Electronic devices & circuits, Technical Publication Pune, 2011.

BEEA 1343
COMPUTER PROGRAMMING/
PENGATURCARAAN KOMPUTER

LEARNING OUTCOMES

Upon completion of this course, students should be able to:

1. Produce computer programming code based on principles, structures and techniques in C++.
2. Construct programming language code by applying suitable C++ programming techniques to solve a given problem.
3. Work in group effectively while performing group assignment.

SYNOPSIS

Throughout the course, students will be introduced with basic principles of computers and software development methodology. The course also consists of basic programming principles such as syntax semantic, compiling, and linking. Programming techniques using C++ such as data type and operator, selection, repetition, function, array, file, and pointer are learnt towards the end of this course.

REFERENCES

1. Abdul Kadir, (2016), C++ Programming A Practical Hands-On For Self Learning, 1st Edition, Penerbit Universiti, Universiti Teknikal Malaysia Melaka.
2. Gaddis, T., (2015), Starting Out With C++. From Control Structures Through Objects, 8th Edition, Global Edition, Pearson Education.
3. Daniel Liang, Y, (2014), Introduction To Programming With C++ 3rd Edition, Pearson Education.
4. Deitel, H.d., (2014), C++ How To Program, 9th Edition, Pearson Education.
5. Nell, D., (2013), Programing And Problem Solving With C++: Comprehensive, 6th Edition, Jones & Bartlett Learning.

BEEI 1311
ELECTRICAL WORKSHOP I/
BENGKEL ELEKTRIK I

LEARNING OUTCOMES

Upon completion of this course, students should be able to:

1. Apply knowledge in single phase electrical installation for domestic-based application.
2. Perform single phase electrical installation for domestic-based application.
3. Conform each workshop activities based on existing acts, regulations & standard.

SYNOPSIS

This subject is required students to carry out practical works in Electrical Workshop in order to gain learning experience in electrical installation works. Students will experience the electrical installation works such as constructing circuits layout drawing, electrical components, testing equipments, domestic wiring circuit, and relay control circuit work as well as instilling the moral and ethical values throughout the practical works. Students are also emphasized on the safety and regulatory requirements. Assessment will be conducted on student ability in the functionality, wiring, testing, safety awareness, discipline while carry out the practical tasks.

REFERENCES

1. Akta Bekalan Elektrik 1990 (Akta 447) & Peraturan-Peraturan Elektrik 1994 (Pindaan 2015), 2015.
2. Malaysian Standard International Electrotechnical Commission (MS IEC) 60364, 2015.
3. Caddick, John, Electrical Safety Handbook, McGraw Hill, 2012.
4. Brian Scaddan, 17th Edition Wiring Regulations, Newnes, 2011.
5. Electricity Supply Application Handbook, Tenaga Nasional Berhad, 2007.

SEMESTER 3

BEEI 2342
ELECTRICAL WORKSHOP II/
BENGKEL ELEKTRIK II

LEARNING OUTCOMES

Upon completion of this course, students should be able to:

1. Apply knowledge in three phase electrical installation and motor starter for industrial-based application.
2. Perform three phase electrical installation and motor starter for industrial-based application.
3. Conform each workshop activities based on existing acts, regulations & standard.

SYNOPSIS

This subject is required students to carry out practical works in Electrical Workshop in order to gain learning experience in three phase wiring system and construct motor starter circuit. Students will experience designing & performing electrical installation in industrial wiring & motor starter circuit following by inspection & testing steps. Students are also emphasized on the safety and regulatory requirements. Assessment will be conducted on student ability in the functionality, wiring, testing, safety awareness, discipline while carry out the practical tasks.

REFERENCES

1. Akta Bekalan Elektrik 1990 (Akta 447) & Peraturan-Peraturan Elektrik 1994 (Pindaan 2015), 2015.
2. Malaysian Standard International Electrotechnical Commission (MS IEC) 60364, 2015.
3. Caddick, John, Electrical Safety Handbook, McGraw Hill, 2012.
4. Brian Scaddan, 17th Edition Wiring Regulations, Newnes, 2011.
5. Garis Panduan Pendawaian Elektrik Bangunan Kediaman, Suruhanjaya Tenaga, 2015.
6. Electricity Supply Application Handbook, Tenaga Nasional Berhad, 2007.

PRE-REQUISITE

BEEI 1311
ELECTRICAL WORKSHOP I/ BENGKEL ELEKTRIK

BEEI 2364
ELECTRICAL TECHNOLOGY/
TEKNOLOGI ELEKTRIK

LEARNING OUTCOMES

Upon completion of this course, students should be able to:

1. Analyze basic electrical parameters for AC electrical system.
2. Conduct experiment on electrical parameters for AC electrical system.
3. Participate effectively in AC generation project-based activities.

SYNOPSIS

This subject introduces students to topics such as alternating current circuit analysis, phasor representation, RMS value, average power, reactive power, active power, apparent power, power factor and power factor correction. Magnetic circuit, construction and operation of transformer, generation of three phase voltage, balanced and unbalanced three phase load and also voltage, current, power and power factor calculation.

REFERENCES

1. Hughes, Electrical & Electronics Technology, 11th ed., Prentice Hall, Feb 2012.
2. Bird, J.O., Electrical Circuit Theory and Technology, 5th ed., Routledge, Nov 2013.
3. Bird, J.O., Electrical Principles and Technology for Engineering, Elsevier, 2013.
4. Aminurrashid Noordin et. al, Principles of Electric & Electronics (Part 1), Penerbit UTeM, 2013.
5. Asri Din et, al, Principles of Electric & Electronics (Part 2), Penerbit UTeM, 2013.

BEEI 2373
ELECTRICAL MACHINES/
MESIN ELEKTRIK

LEARNING OUTCOMES

Upon completion of this course, students should be able to:

1. Analyze the differences of physical and electrical construction and working principles of DC and AC electrical machines.
2. Conduct experiments to determine electrical and mechanical parameters and the performance of DC and AC electrical machines.
3. Conform to the safety and legal requirements for DC and AC electrical machines operation.

SYNOPSIS

This subject discuss about introduction to dc and ac type of electrical machines which cover physical construction and equivalent electrical circuit diagram. The machine performances like torque, speed and efficiency are investigated. The starting and control techniques are also investigated for a better machine selection of appropriate application.

REFERENCES

1. Electric Machinery Fundamentals, Stephen J. Chapman, 5th Ed., New York, Ny: Mcgraw-Hill, 2012.
2. Electric Machines, Mulukutla S. Sarma, Mukesh K. Pathak., Singapore: Cengage Learning, 2010.
3. Fitzgerald & Kingsley's Electric Machinery, Stephen D. Umans., 7th Ed., New York, Ny: Mcgraw-Hill Companies, 2014.
4. Electric Machines, D.P. Kothari, I.J. Nagrath.,4th Ed., New Delhi: Tata Mcgraw-Hill, 2010 (Rep. 2011).
5. Linear Electric Machines, Drives, And Maglevs Handbook, Ion Boldea, Boca Raton, Fl: Crc Press/ Taylor & Francis, 2013.

BEEA 2383
CONTROL SYSTEM FUNDAMENTAL/
PENGENALAN SISTEM KAWALAN

LEARNING OUTCOMES

Upon completion of this course, students should be able to:

1. Apply appropriate techniques in describing the characteristics of control systems in time domain.
2. Construct experiments to distinguish system performances of open loop and closed loop systems.
3. Report the analysis of transient and steady state performance for first and second order control systems.

SYNOPSIS

This subject will discuss about the concepts in control system; open and closed loop system; transfer function; signal flow graphs; feedback control system; hydraulic and pneumatic process control systems; modelling for electrical system, mechanical system, electromechanical system, speed control system and process control system such as current, temperature and flow; using scicoslab.

REFERENCES

1. Norman S. Nise, Control Systems Engineering, 6th Edition, John Wiley & Sons Inc., 2011.
2. Katsuhiko Ogata, Modern Control Engineering, 5th Edition, Pearson, 2010.
3. Richard C. Dort, Robert H. Bishop, Modern Control Systems, 12th Edition, Pearson, 2011.
4. Syed Najib Syed Salim, Maslan Zainon, Control Systems Engineering, 2nd Edition, Penerbit UTeM, 2016.
5. Gopal, M, Control Systems: Principles and Design, 4th Edition, Mc Graw Hill, 2012.

SEMESTER 4

BEEI 2383
POWER SYSTEM TECHNOLOGY/
TEKNOLOGI SISTEM KUASA

LEARNING OUTCOMES

Upon completion of this course, students should be able to:

1. Calculate the power system parameters using power system model, per unit (P.U) quantities and protection system requirements.
2. Conduct experiments on power system components using hardware or simulation software.
3. Present written and oral communications to document work and experiment results.

SYNOPSIS

This subject gives the overall components of power system to the students without going into detail. The power system components will be modelled for the analysis purposes. The topics include per-unit quantities, transmission line, transformer, synchronous generator, power flows, symmetrical components, power protection and power system stability.

REFERENCES

1. JD Glover, MS Sarma, TJ Overbye, Power System Analysis & Design, 5th (SI) Edition, Thomson, 2012.
2. Hadi Saadat, Power System Analysis, 3rd Edition, Mc Graw Hill, 2011.
3. Arthur r. Bergen, Power System Analysis, 2nd Edition, Prentice Hall, 2000.
4. Grainger and Stevenson Jr., Power System Analysis, Mcgraw Hill, 1994.
5. Willian D. Stevenson Jr., Elements of Power System Analysis, 4th Edition, Mcgraw Hill, 1998.

BEEA 2374
EMBEDDED SYSTEMS/
SISTEM TERBENAM

LEARNING OUTCOMES

Upon completion of this course, students should be able to:

1. Analyze the operation of a microcontroller's architecture, peripherals subsystem.
2. Construct hardware and software of microcontroller based system to solve related problem.
3. Demonstrate business practice and entrepreneurship in microcontroller project development.

SYNOPSIS

This course exposes the basic concept of microcontroller and the difference between microcontroller and microprocessor. Start with understanding of microcontrollers architecture, compiler, programming language and software. All the interrupt available including timer/counter are explained in details. Continue to the analog digital converter and pwm signal are exposed to the integration of dc motor, servo motor, and stepper motor. Student will exposed to the application of programming involve with the input and outputs such as switches and 'light emitting diodes', multiple sensor, serial and i2c devices. Students will apply microcontroller with simple mechatronic system.

REFERENCES

1. Jon Hoffman, Mastering Arduino: A Project-Based Approach To Electronics, Circuits, And Programming, Packt, 2018.
2. Jeremy Blum, Exploring Arduino: Tools And Techniques For Engineering Wizardry, 2nd Ed, Wiley, 2013.
3. Zach Webber, Arduino: The Complete 3 Books In 1 For Beginners, Intermediate And 19 Sample Designs And Codings And Advance Crash Guide In Arduino Programming, 2018.
4. Francis Perea, Arduino Essentials, Packt, 2015.
5. Syed Omar Faruk Towaha, Learning C For Arduino, Packt, 2017.

BEEI 2463
THERMODYNAMIC & HEAT TRANSFER/
THERMODINAMIK & PEMINDAHAN HABA

LEARNING OUTCOMES

Upon completion of this course, students should be able to:

1. Analyze a heat transfer principle and process and energy equilibrium processes in thermodynamics for power system application.
2. Solve problems involving heat in mechanical system and properties in thermodynamics for power system application.
3. Practice the knowledge of heat transfer phenomena, thermodynamics laws, and properties professionally and ethically.

SYNOPSIS

This course introduces the basic concepts heat transfer and engineering thermodynamics. Concept of model heat transfer, one dimensional conduction, one dimensional convective heat transfer, heat transfer by natural convection, heat transfer in boiling and condensation, heat exchangers and evaporators will be covered in heat transfer. In Thermodynamics, topics covered include property of pure substances, energy, work, heat, and the 1st and 2nd Law of Thermodynamics.

REFERENCES

1. Çengel, Y. A. Introduction to Thermodynamics and Heat Transfer + EES Software. McGraw-Hill, New York, 2nd Ed., 2009.
2. Holman J.P.,"Heat Transfer", Mc Graw-Hill, 9th.Ed., 2002.
3. Cengel, Y.A. and Boles, M.A., 2014, Thermodynamics: An Engineering Approach, 8th Ed., McGraw-Hill Education.
4. Borgnakke, C. and Sonntag, E.E., 2012, Fundamentals of Thermodynmics, 8th Ed., Wiley.
5. Dutta B.K.,"Heat Transfer: Principles and Applications", PHI, 2001.

BEEI 3413
POWER ELECTRONIC/
ELEKTRONIK KUASA

LEARNING OUTCOMES

Upon completion of this course, students should be able to:

1. Analyze the basic topologies of converters and power supplies for device applications in industrial practices.
2. Conduct experiments on the characteristics and performance of rectifiers, converters choppers and inverters.
3. Work in a team to design rectifiers, choppers, switch-mode power supplies (SMPS) and inverters based on converter topologies.

SYNOPSIS

This course is about the basic principles of semiconductor devices, switching process and the application in rectifier circuit, one and three-phase inverter, switching losses, heat sink, the application of semiconductor devices as AC to DC, DC to AC and DC to DC converters, circuits as DC drives, AC drives, snubbers and harmonic effects, and also the introduction to computer simulation (PESIM).

REFERENCES

1. Rashid, Muhammad H., Power Electronics Handbook (4th Edition), Elsevier, 2018.
2. Ned Mohan, Power Electronics: A First Course, John Wiley & Sons, 2012.
3. Daniel W. Hart, Power Electronics, Mcgraw-Hill, 2011.
4. Ioinovici, Adrian, Power Electronics And Energy Conversion Systems, John Wiley & Sons, 2013.
5. Fang Lin Luo, Hong Ye. Power Electronics: Advanced Conversion Technologies – Circuits, Devices, And Applications, Taylor & Francis, 2010.
6. D S. Sivanagaraju, M. Balasubba Reddy, A. Mallikarjuna Prasad, Power Electronics, Phi Learning, 2012.

SEMESTER 5

BEEI 3393
ADVANCED POWER SYSTEM /
SISTEM KUASA LANJUTAN

LEARNING OUTCOMES

Upon completion of this course, students should be able to:

1. Analyze power flow, faults and transient stability in power system operation and planning.
2. Perform analysis of power flow, faults and transient stability using simulation software.
3. Present technical investigation results among peers.

SYNOPSIS

This course deals with node equations of power system networks, development of bus admittance and bus impedance matrixes, utilization of bus admittance and bus impedance matrixes in power system analysis, i.e. symmetrical fault analysis, asymmetrical fault analysis, load flow study and transient stability analysis. Furthermore, application of power system analysis software is also useful to the students where they are able to model and investigate the impact on electrical power system.

REFERENCES

1. Glover, J.D., Sarma, M.S. & Overbye, T.J. (2017). Power System Analysis and Design, 6th Edition, Cengage Learning.
2. Subramanyam, B. (2012). Power System Analysis, I K International Publishing House.
3. Kothari, D.P. (2011). Modern Power System Analysis, 4th Edition, McGraw Hill Education.
4. Pai, M.A. (2014). Computer Techniques in Power System Analysis, 3rd Edition, McGraw Hill Education.
5. Ramar, S. (2013). Power System Analysis, Phi Learning Private Limited.
6. Saadat, H. (2011). Power System Analysis, 3rd Edition, PSA Publishing LLC.

PRE-REQUISITE

BEEI 2383
POWER SYSTEM TECHNOLOGY/
TEKNOLOGI SISTEM KUASA

BEEA 3414
PLC & APPLICATIONS/
PLC & APLIKASI

LEARNING OUTCOMES

Upon completion of this course, students should be able to:

1. Apply knowledge to solve basic industrial automation system problems using a PLC system.
2. Demonstrate PLC system experiments.
3. Communicate effectively for any assignments and experiments.

SYNOPSIS

This subject will expose students with knowledge and skills of PLC including its definition, main hard components, PLC programming languages, interfacing PLC with computers, integrates PLC hardware and software to design a simple automation system.

REFERENCES

1. Perez, Adrover E. (2012), Introduction to PLCs: A Beginner's Guide to Programmable Logic Controllers, CRC Press.
2. Macaulay, Tyson (2012), Cybersecurity for Industrial Control Systems: SCADA, DCS, PLC, HMI, and SIS, CRC Press.
3. Frank, Lamb (2013), Industrial Automation, McGraw-Hill.
4. Doug, Arent (2013), Automation Systems of the 21st Century: New Technologies, Applications and Impacts on the Environment & Industrial Processes, Nova Science.

BEEI 3474
POWER SYSTEM GENERATION & TRANSMISSION/
PENJANAAN SISTEM KUASA & TRANSMISI

LEARNING OUTCOMES

Upon completion of this course, students should be able to:

1. Evaluate various options available for power generation methods and perform analysis on typical issues effecting different types of transmission lines.
2. Perform experiments related to power system generation and transmission.
3. Conform the power generation and transmission practice according to the related codes, regulations and standards.

SYNOPSIS

This course covers two main aspects of power system which are power system generation and power system transmission. The generation part introduces the students to the conventional and distributed generation methods. Meanwhile, the transmission part looks on the parameters involve as well as the steady-state operation. Delivery methods include lectures, tutorials and practical sessions.

REFERENCES

1. Glover, J.D., Sarma, M.S., Overbye, T.J. Power System; Analysis and Design. Toronto: Thomson, 2008.
2. John J. Grainger, William D. Stevenson Jr, Power System Analysis, Macgraw-Hill 2009.

BEEI 3423
ACTUATORS & DRIVES/
PENGGERAK & PEMACU

LEARNING OUTCOMES

Upon completion of this course, students should be able to:

1. Analyze the design of electrical and mechanical actuator and drives in motor drives, pneumatic and hydraulic applications.
2. Conduct the experiment on DC and AC motor drives, pneumatic/hydraulic and electro pneumatic/hydraulic systems.
3. Present assignment given on various actuators and drives for engineering technology application.

SYNOPSIS

This subject will introduce to the electrical, mechanical, pneumatic and hydraulic electrical actuator & drive system. This subject wills discussion on the definition, symbols, system, circuits, operation and component of the pneumatic, hydraulic and mechanical actuator system. Another part of this subject will covers on the electrical drive for DC and AC motor. It focuses on the fundamental of the electrical drive including element, block diagram, feedback, load characteristics and motor sizing. In addition, special discussion on the four quadrants operation with chopper fed dc driver for DC motor drive and three phase drive system.

REFERENCES

1. Electric Drives – An Integrative Approach, Ned Mohan, MNPERE, Minneapolis.
2. Power Electronic Control of AC Motors – JMD Murphy & FG Turbull, Pergamon Press.
3. Electric Motor Drives, R. Krishnan, Prentice–Hall, 2001.
4. Vector Control And Dynamics Of AC Drives, DW Novotny & TA Lipo, Oxford Science & Publications.
5. Fundamental Of Electrical Drives – GK Dubey, Narosa Publishing House.
6. Power Electronics And AC Drives – BK Bose, Prentice-Hall.
7. Control Of Electrical Drives, W Leonhard, Springer.

SEMESTER 6

BEEU 3764
BACHELOR DEGREE PROJECT I/
PROJEK SARJANA MUDA I

LEARNING OUTCOMES

Upon completion of this course, students should be able to:

1. Relate previous works and relevant theories using various resources. Use related previous work and its relevant theory.
2. Propose objectives and scopes of industrial-based or practice-oriented project.
3. Find appropriate methodologies for successful execution of the project.
4. Explain the project execution and findings in oral and written forms effectively.
5. Imitate appropriate existing concepts in engineering technology fields.

SYNOPSIS

The student needs to plan and implement the project individually that related to the respective engineering technology field. The student should implement a project, do the analysis and apply the theory to solve the problems related to topic. At the end, the student should write a problem based learning report that covers problem statement, literature review, methodology to overcome the problem. The student needs to achieve the objective of the project and presented it in the report.

REFERENCES

1. Manual Projek Sarjana Muda (PSM), Fakulti Teknologi Kejuruteraan, Universiti Teknikal Malaysia Melaka.

BEEI 4833
POWER SYSTEM PROTECTION/
PERLINDUNGAN SISTEM KUASA

LEARNING OUTCOMES

Upon completion of this course, students should be able to:

1. Analyse the differences of function, design, and operation of protection schemes of power system operation.
2. Perform experiments to determine grading studies for radial and systems using IDMT overcurrent relays.
3. Conform to the safety and legal requirements for protection systems of power system operation.

SYNOPSIS

The general aim of this course is to enable students to identify and examine the main concept related to the function, design and operation of protection schemes for power transmission, distribution and (to a lesser extent) generation systems. Upon completion of the course, students should be able to understand the reasons why protection systems are required, the basic philosophies of protection, the components involved and how typical protection systems are designed and configured.

REFERENCES

1. Power System Protection, Y.G. Paithankar, S.R. Bhide, PHI Learning Private Limited, 2015.
2. Power System Protection, P.M. Anderson, Wiley, 2015.
3. Art and Science of Protective Relaying, General Electric, 2015.
4. Network Protection and Automation Guide, Areva, 2015.

BEEI 4823
HIGH VOLTAGE TECHNOLOGY/
TEKNOLOGI VOLTAN TINGGI

LEARNING OUTCOMES

Upon completion of this course, students should be able to:

1. Conform the systematic procedure of handling an experiment of HV AC, DC and impulse generation by considering generation terminology, measurement and safety rules.
2. Demonstrate the generation of high voltage AC, DC and impulse signal by organizing specific generation set up, measurement and safety.
3. Evaluate the conduction and breakdown criteria in gases, solids and liquids for power system operation.
4. Analyse the effect of overvoltage phenomenon in power system apparatus for insulation coordination.
5. Design the layout of insulation system for testing and diagnostic according to standard requirement before operation.

SYNOPSIS

High voltage technology course mainly covers the important knowledge and practice of high voltage engineering and technology concerning on electrical insulation and processes that take place in power systems at operating voltages and overvoltage. This course includes studies of gases as insulating media, ionisation processes, townsend current growth equation and the presence of secondary processes, townsend's criterion for breakdown, breakdown in electronegative gases, streamer theory of breakdown in gases, paschen's law, breakdown in non-uniform field and corona discharges, post breakdown phenomena and applications, conduction and breakdown in liquid dielectrics: pure liquids and commercial liquids, conduction and breakdown in pure liquids, breakdown in solid dielectrics: introduction, intrinsic breakdown, electromechanical breakdown, thermal breakdown, breakdown of solid dielectrics in practice, generation of high voltage and currents: ac, dc and impulse, measurements of high voltages and currents: ac, dc and impulse, non destructive testing of materials and electrical apparatus: measurement of d.c. resistivity, measurement

of dielectric constant and loss factor, partial discharge measurements, high voltage testing of electrical apparatus: testing of insulators and bushings, testing of isolators and circuit breakers, cables, testing of transformers and surge diverter radio interference measurements.

REFERENCES

1. M S Naidu and V Kamaraju, High Voltage Engineering, McGraw Hill 2013.
2. High Voltage Engineering Fundamentals, Newnes, 2000.
3. High Voltage Construction Kit, Heafley, 2018.
4. Hussain Ahmad, Kilat dan Perlindungan, Penerbit UTM,1998.
5. E. Kuffel, W.S. Zaengl & J. Kuffel, High Voltage Engineering Fundamentals, 2000.

BEEI 3403
POWER SYSTEM DISTRIBUTION/
PENGAGIHAN SISTEM KUASA

LEARNING OUTCOMES

Upon completion of this course, students should be able to:

1. Design low voltage distribution system based on problem statement or case study given.
2. Perform testing on protection and metering equipment based on low voltage distribution design drawing.
3. Conform to the safety and legal requirements for designing and testing of low voltage distribution system.

SYNOPSIS

This course outlines the principles and design of electrical distribution system. There are various issues of distribution system that is covered; including regulations and standards related to electrical installation. Characteristic and specification for circuit breakers, cable size selection, and method of earthing and earthing arrangement are described in detail. The students are also exposed to the use of standard design procedures and type of testing and troubleshooting required for low voltage system.

REFERENCES

1. Electricity Supply Acts 1990 (Act 447) and Regulations (Amendment 2019), 2019.
2. Malaysian Standard International Electrotechnical Commission (MS IEC) 60364, 2015.
3. Boca Raton, The Electric Power Engineering Handbook, 3rd Ed., CRC Press, 2018.
4. H.L Wilis, R.R. Schrieber, Aging Power Delivery Infrastructures, 2nd Ed., CRC Press, 2017.
5. U.A Bakshi, M.V Bakshi, Transmission & Distribution, 2nd Ed., India Technical Pub., 2018.

SEMESTER 7

BEEU 4774
BACHELOR DEGREE PROJECT II/
PROJEK SARJANA MUDA II

LEARNING OUTCOMES

Upon completion of this course, students should be able to:

1. Complete planned project systematically.
2. (Re)construct solutions of broadly-defined engineering problems using relevant tools and techniques.
3. Display self-reliance in achieving the objectives of the project.
4. Demonstrate project results using appropriate techniques with an understanding of it limitations.

SYNOPSIS

This is the second part of the bachelor degree project. Students are expected to continue the project performed in bachelor degree project (beeu 3764) until completion. At the end of the semester, students are required to submit the bachelor degree project report and present their projects for assessment.

REFERENCES

1. Manual Projek Sarjana Muda (PSM), Fakulti Teknologi Kejuruteraan, Universiti Teknikal Malaysia Melaka.

PRE-REQUISITE

BEEU 3764
BACHELOR DEGREE PROJECT I/
PROJECT SARJANA MUDA I

BEEI 4803
POWER SYSTEMS OPERATION & AUTOMATION/
OPERASI & AUTOMASI SISTEM KUASA

LEARNING OUTCOMES

Upon completion of this course, students should be able to:

1. Describe the power system operation criteria and standards appropriately
2. Recommend asset management strategies through Reliability Centred Maintenance (RCM) properly
3. Use the basic application of Supervisory Control and Data Acquisition (SCADA) and its component in Distribution Automation System (DAS)
4. Practice the knowledge of Distribution Automation System (DAS) professionally and ethically.

SYNOPSIS

This subject discuss about operation criteria and standards use in power system. It also covers the load and operation management, asset management strategies, RCM in power system especially in distribution level. This subject also covers the automation in power system which is focus in basic SCADA system, RTU and it components. Describe RTU, SCADA and master station protocol and communication. Explain about Distribution Management System (DMS) and Energy Management System (EMS).

REFERENCES

1. James Northcote-Green, Robert G. Wilson; 'Control And Automation Of Electrical Power Distribution Systems', Crc Press, 2006.
2. Boca Raton, The Electric Power Engineering Handbook, 3rd Ed., Crc Press, 2012.
3. H.I Wilis, R.r. Schrieber, Aging Power Delivery Infrastructures, 2nd Ed., Crc Press, 2013.
4. U.a Bakshi, M.v Bakshi, Transmission & Distribution, 2nd Ed., India Technical Pub., 2012.
5. M. Cepin, Assessment Of Power System Reliability: Methods And Applications, Springer, 2011.
6. Thomas, Mini S., Mcdonald, John Douglas; 'Power System Scada And Smart Grids', Crc Press, 2015.
7. Padilla, Evelio; Substation Automation Systems: Design And Implementation, John Wiley & Sons Inc, 2015.

BEEY 3803
SISTEM TENAGA DIPERBAHARUI/
RENEWABLE ENERGY SYSTEM

LEARNING OUTCOMES

Upon completion of this course, students should be able to:

1. Classify general principles and technology of Renewable Energy Systems for electrical power generation.
2. Perform experiments of Renewable Energy Systems for system performance.
3. Explain effectively as an individual and group member for conducted assignment and experiment.

SYNOPSIS

This subject is an introductory course for renewable energy system. The material encountered in the subject includes: introduction of energy usage, conventional energy sources, renewable energy sources (e.g PV, Wind, Biomass), basic energy storage, renewable energy case study, and engineering recommendations and generator protection requirements.

REFERENCES

1. Leon Freris & David Infield, Renewable Energy in Power System, Wiley 2008.
2. Godfrey Boyle, renewable Energy: Power for Sustainable Future, Oxford 2014.
3. D.P Kothari, KC Singal, Rakesh Ranjan, Renewable Energy Sources and Emerging Technologies, Prentice Hall of India, 2008.

BEEI 4813
QUALITY IMPROVEMENT TOOLS/
KAEDAH PENAMBAHBAIKAN KUALITI

LEARNING OUTCOMES

Upon completion of this course, students should be able to:

1. Apply the quality improvement tools, Acceptance Sampling Systems and techniques of Statistical Process Control to solve quality issues.
2. Construct the Control Charts for Variables and Attributes as well as other Statistical Process Control (SPC).
3. Practice the knowledge of quality improvement professionally and ethically.

SYNOPSIS

This subject focuses on the tools of quality. It begins with a brief discussion of Ishikawa's basic tools of quality. Ishikawa's seven basic tools include flow charts; check sheets, the histogram and control charts, scatter diagrams, cause and effect diagrams and Pareto charts. It is later followed by the new seven quality tools (N7) for quality are introduced and discussed, including the affinity diagram, the interrelationship digraph, tree diagrams, prioritization grids, matrix diagrams, process decision program charts, and activity network diagrams. It also covers various problem solving methods such as Statistical Process Control (SPC) and Acceptance Sampling. The tools are essential to improve processes and products quality.

REFERENCES

1. Dale H. Besterfield, "Quality Control", 7th Edition, Prentice Hall, 2004.
2. Douglas C. Montgomery, "Introduction to Statistical Quality Control", 5th Edition, John Wiley and Sons, 2005.
3. Dona C. S. Summers, "Quality", 3rd Edition, Prentice Hall, 2003.
4. Mark A. Fryman, "Quality and Process Improvement", Thomson Learning, 2002.
5. Amiyata Mitra, "Fundamentals of Quality Control", 2nd Edition, Prentice Hall, 1998.

BEEI 4843
POWER SYSTEMS ELECTROMAGNETIC COMPATIBILITY/
KESERASIAN ELEKTROMAGNET SISTEM KUASA

LEARNING OUTCOMES

Upon completion of this course, students should be able to:

1. Analyse the technical requirements of testing, shielding, grounding and bonding of EMC for power systems operation.
2. Perform experiments to determine suitable types of EMC mitigation approach for a different power systems scenario.
3. Conform to the safety and legal requirements for EMC for power systems operation.

SYNOPSIS

The general aim of this course is to enable students to identify and examine the main concepts related to the function and design of emc mitigation for power transmission, distribution and (to a lesser extent) generation systems. Upon completion of the course, students should be able to understand the reasons why power systems emc are required, the basic philosophies of emc phenomena, shielding, grounding and bonding, the components involved and how typical emc mitigation are designed and configured.

REFERENCES

1. Introduction to Electromagnetic Compatibility (Emc), Clayton R. Paul, 2nd Edition, Wiley, 2006.
2. Electric Machinery Fundamentals, Stephen J. Chapman, 5th Ed., New York, Ny: Mcgraw-Hill, 2012.
3. Electric Machines, Mulukutla S. Sarma, Mukesh K. Pathak., Singapore: Cengage Learning, 2010.
4. Fitzgerald & Kingsley's Electric Machinery, Stephen D. Umans., 7th Ed., New York, Ny: Mcgraw-Hill Companies, 2014.
5. Electric Machines, D.P. Kothari, I.J. Nagrath.,4th Ed.., New Delhi: Tata McGraw-Hill, 2010 (Rep. 2011).
6. Linear Electric Machines, Drives, And Maglevs Handbook, Ion Boldea, Boca Raton, Fl: Crc Press/ Taylor & Francis, 2013.

BEEA 4813
INDUSTRIAL PROCESS CONTROL/
KAWALAN PROSES INDUSTRI

LEARNING OUTCOMES

Upon completion of this course, students should be able to:

1. Analyze the control system characteristics and instrumentations for appropriate controller application in the process control industries.
2. Apply industrial process control elements and instruments for the process variables in the process control industries.
3. Prepare a design of process control plant.

SYNOPSIS

This subject will cover topic on introduction to industrial process control including basic terms and diagrams. It's also emphasized on process variables, elements, and instruments for temperature, level and flow of process control. The right controllers for process control are discussed and control loops in process control are analyzed. Applications of automation technologies such as SCADA and DCS for process control are also explained.

REFERENCES

1. Curtis D. Johnson, Process Control Instrumentation Technology, 8th ed. Pearson, 2014.
2. Dale E. Seborg, Process Dynamics and Control, 3rd Ed, Hoboken, NJ: John Wiley & Sons, 2011.
3. Myke King, Process Control: A Practical Approach, Chichester: John Wiley & Sons, 2011.

BEEY 4413
ENERGY EFFICENCY/
KECEKAPAN TENAGA

LEARNING OUTCOMES

Upon completion of this course, students should be able to:

1. Analyze the properties of electrical power management for improving energy efficiency in electrical system.
2. Demonstrate the functionality of important electrical parameters for controlling electrical energy efficiency through experiments in laboratory.
3. Create awareness among colleagues regarding the importance of energy sustainability.

SYNOPSIS

This is an introductory course to the concept of energy efficiency, energy management, energy audit, hvac system, available energy saving equipment as well as green and renewable energy systems. At the beginning of the course, students will learn on the importance of energy management which relates to the needs of an electrical energy manager as required by the efficient management of electrical energy regulations 2008 (emeer 2008). Practical wise, students will be exposed to several ways to perform energy audit on buildings through the usage of different equipment once they have grasp the understanding of load apportioning and building efficiency index (bei). Affective wise, students are required to demonstrate their awareness on the subject matters through the assignment which needs to be presented at the end of the course.

REFERENCES

1. Andreas Sumper, Angelo Baggini, Electrical Energy Efficiency: Technologies and Applications, First Edition, Wiley, 2012.
2. Barney L. Capehart Guide to Energy Management, Seventh Edition, 2016.
3. Frank Kreith, D. Yogi Goswami, Handbook of Energy Efficiency and Renewable Energy, 2007.
4. Gilbert M. Masters, Renewable and Efficient Electric Power Systems, Wiley, 2005.

BEEI 4853
EKONOMI SISTEM DAN PASARAN ELEKTRIK/
ELECTRICITY MARKET AND SYSTEM ECONOMICS

LEARNING OUTCOMES

Upon completion of this course, students should be able to:

1. Analyse suitable electricity generation and transmission system to be implemented based on economic factors in power systems.
2. Perform experiments on reliability assessment for power generation and power transfer in power systems.
3. Conform to the safety and legal requirements of different electricity industry regulations in power systems.

SYNOPSIS

This course deals with knowledge and practical related experience on electricity market and system economics within power systems. Student will have the opportunity to experience and be assessed on the economics, trading and pricing of electricity supply and how it is shaped by technical, commercial and regulatory considerations. Student will also be assessed on the understanding of system economics under the environment of multiple suppliers and users, deep appreciation of factors affecting security of supply and how it might be quantified and finally how to put engineering knowledge concerning electricity supply into context.

REFERENCES

1. Fundamentals of Power System Economics, Daniel S. Kirschen, Goran Strbac: Wiley, 2015.
2. Power System Economics, Steven Stoft: IEEE Press, 2015.
3. Risk Assessment of Power Systems, Wenjuan Li: IEEE Press, 2015.
4. Power Markets and Economics, Barrie Murray: Wiley, 2015.

BEEI 4863
POWER QUALITY/
KUALITI KUASA

LEARNING OUTCOMES

Upon completion of this course, students should be able to:

1. Evaluate different types of power quality and suggest suitable mitigation techniques for different case given.
2. Perform measurement and power quality monitoring by using power quality analyser.
3. Conform the power quality problems according to the related standards.

SYNOPSIS

This course covers all important aspects of power quality. The main topics are introduction to power quality, power quality characteristics, power quality measurement and monitoring tools, related standards, different types of power quality problem, mitigation techniques as well as relevant issues. Delivery methods include lectures, tutorials and practical sessions.

REFERENCES

1. Dugan, Roger C. Electrical Power Systems Quality. New York: McGraw Hill, 2012.
2. Caramia, Pierluigi. Power Quality Indices in Liberalized Markets. Chichester: John Wiley, 2009.
3. Vedam, R. Sastry. Power Quality: VAR Compensation in Power Systems. Boca Raton, FL: CRC, 2009.
4. Baggini, Angelo B. Handbook of Power Quality. Hoboken, NJ: John Wiley and Sons, 2008.

SEMESTER 8

BEEU 4786
INDUSTRIAL TRAINING/
LATIHAN INDUSTRI

LEARNING OUTCOME

Upon completion of this course, students should be able to:

1. Display technical competencies and skills gained throughout their internship
2. Prepare a report on the industrial field daily activities in the log book systematically.
3. Work effectively with staff, colleagues and other personnel.
4. Practice professional ethics in accordance with industry rules and regulations.

SYNOPSIS

All students are required to undergo industrial training as part of their curriculum to complete four (4) years course for the Bachelor of Engineering Technology. The duration of training is 24 weeks and it will be taken place at the end of the course (semester 8). The students are expected to gain knowledge and enhance their technical skills within industrial environment relevant to their field of study.

REFERENCES

1. UTeM Guideline Handbook for Industrial Training.

BEEU 4796
INDUSTRIAL TRAINING REPORT/
LAPORAN LATIHAN INDUSTRI

LEARNING OUTCOME

Upon completion of this course, students should be able to:

1. Produce industrial training report.
2. Present report orally on working experience.

SYNOPSIS

All students are required to undergo industrial training as part of their curriculum to complete four (4) years course for the Bachelor of Engineering Technology. The duration of training is 24 weeks and it will be taken place at the end of the course (semester 8). The students are expected to gain knowledge and enhance their technical skills within industrial environment relevant to their field of study.

PRE-REQUISITE

Student required to pass Industrial Training BEEU 4786 in order to pass Industrial training report.

REFERENCES

1. UTeM Guideline Handbook for Industrial Training.

BEEA COURSE CORE COURSES (K)

SEMESTER 1

BEEY 1303
MEASUREMENT & INSTRUMENTATION/
PENGUKURAN & INSTRUMENTASI

LEARNING OUTCOMES

Upon completion of this course, students should be able to:

1. Apply the knowledge of principles, techniques, components and tools in measurement and instrumentation system.
2. Measure and operate the electrical parameter by using analogue and digital instruments.
3. Explain effectively the knowledge about the measurement and instrumentation tools, techniques and standard.

SYNOPSIS

This subject discusses about units and dimensions, standards, errors and calibration in measurement. It covers the measurement devices such as digital meter, analog meter, oscilloscope, function generator and any device related. This subject also covers on instrumentation elements for complete data acquisition system such as sensors & transducers, signal conditioning & processing, A/D and D/A conversion, interfacing standards and data presentation.

REFERENCES

1. Uday A. Bakshi and Ajay V. Bakshi, Electrical Measurements and Instrumentation, Technical Publication, 2014.
2. Muhammad Sharil Yahya Et. Al, Pengukuran & Instrumentasi, Penerbit UTeM, 2013.
3. M. R. Mohamad Sapiee Et. Al, Instrumentation System Module, Penerbit UTeM, 2019.
4. Alan S. Moris and Reza Langari, Measurement And Instrumentation: Theory And Application, Second Edition, Academic Press, 2015.
5. Hs Kalsi, Electronic Instrumentation, McGraw Hill, 2011.
6. Uday A. Bakshi and Ajay V. Bakshi, Electrical & Electronic Measurement, Technical Publication, 2012.
7. Muhammad Sharil Yahya Et. Al, Asas Dan Konsep Pengukuran, Penerbit Utem, 2012.

BEEA 1313
COMPUTER AIDED DESIGN/
REKABENTUK TERBANTU KOMPUTER

LEARNING OUTCOMES

Upon completion of this course, students should be able to:

1. Use a standard Computer Aided Design software command tools for basic two-dimensional engineering drawing.
2. Produce three-dimensional solid models using standard Computer Aided Design software.
3. Demonstrate an accurate engineering drawing based on given problem.

SYNOPSIS

This course will be presented by means of lecture, tutorials, labs, laboratory project fully in the CAD studio. The course concentrates on how to use Computer Aided Design (CAD) software to produce the basic engineering drawing, for example, geometric, orthographic, isometric, section cut and detail drawing. The students will be exposed to CAD interface, CAD coordinate system, basic drawing command tools, display controls, basic editing commands tools, text, dimensioning, isometric and template preparation in order to produce various types of engineering drawing. Drawing such as electrical layout, electrical fitting and schematic drawing, the 3D solid modelling object development drawing will also be covered.

REFERENCES

1. Leach. J., “Autocad 2020 Instructor”, Sdc, 2019.
2. Tickoo, “Autocad 2020: A Problem-Solving Approach, Basic and Intermediate (22nd Ed.)”, Cadcim Technologies, 2019.
3. George Omura, Brian C. Benton, “Mastering Autocad 2019 And Autocad Lt 2019”, Wiley, 2018.
4. Fane. B., “Autocad for Dummies. (18th Ed.)”, 2019.

BEEA 1304
DIGITAL ELECTRONICS & SYSTEMS/
ELEKTRONIK & SISTEM DIGITAL

LEARNING OUTCOMES

Upon completion of this course, students should be able to:

1. Apply the knowledge basic features and configuration of combinational logic and sequential logic circuit in digital system.
2. Construct experiments and project on combinational, sequential, encoder, decoder and memory logic circuit by using simulation software and digital trainer kit.
3. Explain effectively as an individual and group member for conducted assignment and experiment

SYNOPSIS

This subject discusses about number systems & codes, boolean algebra, logic families and the characteristic of logic gates, combinational logic, analysis and design, msi combinational logic circuit, flip-flops, counter and shift-register, synchronous and asynchronous sequential circuits, analysis and design of adder, decoder, encoder, multiplexer, demultiplexer, counter and register. Simulations of digital logic systems are also included.

REFERENCES

1. Aminurrashid Noordin et. al (2014), Digital Electronics & Systems, Penerbit UTeM.
2. Thomas Floyd, Digital Fundamentals, Global Edition, 11th Edition, Jan 2015, Pearson New International Edition.
3. Ronald Tocci, Neal Widmer, Greg Moss, Digital Systems Principles and Applications, 11th Edition, Jul 2013, Pearson New International Edition.
4. Thomas Floyd, Digital Electronics a Systems Approach, CourseSmart eTextBook, Oct 2012, Pearson New International Edition.

BEEI 1303
ELECTRICAL CIRCUIT FUNDAMENTAL/
PENGENALAN LITAR ELEKTRIK

LEARNING OUTCOMES

Upon completion of this course, students should be able to:

1. Apply analytical method and theorem to DC and AC (steady state) circuits in electrical circuit.
2. Conduct experiment on DC and AC (steady state) circuit based on electrical circuit theorem.
3. Participate effectively for any assignment and experiment.

SYNOPSIS

This subject introduces the students to Ohm's Law, Kircchoff's Laws and use them to calculate current, voltage and power in DC / AC (steady state) circuits. Following this the students will learn the analytical methods namely mesh and nodal analysis. The use of theorems like Thevenin, Norton, Superposition and the Maximum Power Transfer will follow next. The applications of the above tools will cover both dc and ac circuits. This subject will be supported by laboratory works to impart to the students some basic practical skills.

REFERENCES

1. BEEI 1303 Electrical Circuit Fundamental Module.
2. K.A. Charles, N.O. Sadiku, Fundamentals Of Electric Circuits,6th Ed. Mcgraw Hill, 2016.
3. Robbins and Miller, Circuit Analysis And Practice, 5th. Ed., Thomson And Delmar. 2016.

SEMESTER 2

BEEI 1323
ELECTRICAL & MAGNETISM/
ELEKTRIK & KEMAGNETAN

LEARNING OUTCOMES

Upon completion of this course, students should be able to:

1. Explain the concept and application of Electrical Field, Coulombs Law, Lenz Law and Faradays Law in electrical charge phenomena.
2. Demonstrate electrical concepts, basic magnetic quantities and phenomena to simple devices (DC motor and transformer) in electrical engineering technology.
3. Present written communication to document work and experiment results.

SYNOPSIS

This course will begin with an introduction of static electrical charge including the related law such as coulomb's law and gauss, Lenz law concept, conductors, dielectrics, and electric boundary conditions. The magnetism fundamental also will be covered in the syllabus, which includes magnetic shell, magnetic flux, EMF and Faraday's Law, magnetic field produced by direct current, solenoid magnetic field and force produce by more than one current carrying conductor.

REFERENCES

1. John W. Jewett, Jr. Raymond A. Serway, (2014), Physics for Scientists and Engineers, 9th Edition, BROOKS/COLE CENGAGE Learning.
2. Matthew N. O. Sadiku (2015) Principles of Electromagnetics, 6th Edition, Oxford University Press.
3. Ulaby, F. (2012) Electromagnetics for Engineers, Pearson Education, 6th Edition.
4. Hayt, W. and Buck, J., (2011) Engineering Electromagnetics, 8th Edition, McGraw Hill International Edition.

BEEI 1333
ADVANCED ELECTRICAL CIRCUIT/
LITAR ELEKTRIK LANJUTAN

LEARNING OUTCOMES

Upon completion of this course, students should be able to:

1. Analyze first order and second order electrical circuit in transient and frequency response.
2. Conduct experiment on frequency response and electrical circuit measurement.
3. Participate effectively for any assignment and experience

SYNOPSIS

These subject exposes students to the application of several tools in analyzing electrical circuits, such as the Laplace transform and two ports network. The students are required to use the tools to analyze transient and frequency response in electrical circuit.

REFERENCES

1. Charles, K.A & Sadiku, N.O (2016). Fundamental of Electric Circuit (6th ed.). McGraw-Hill.
2. Nilsson, J. W. & Riedel, S. (2015). Electric Circuit (10th ed.). Prentice Hall.

PRE-REQUISITE

BEEI 1303
ELECTRIC CIRCUIT FUNDAMENTAL/
PENGENALAN LITAR ELEKTRIK

BEEI 1453
ELECTRONIC PRINCIPLE/
PRINSIP ELEKTRONIK

LEARNING OUTCOMES

Upon completion of this course, students should be able to:

1. Apply knowledge of semiconductor devices in electronic circuit.
2. Perform the experiment of semiconductor devices using simulation software and electronic components in electronic circuit.
3. Work in group effectively while performing group assignment.

SYNOPSIS

This course explains to students about the electronic principles and concepts. It involves the introduction to four semiconductor devices which are diode, bipolar junction transistor (BJT), field effect transistor (FET) and operational amplifier. Besides, students will be also learned about the types, structures, characteristics, configurations and applications of these devices. In terms of practical skills, students will conduct experiments and simulation works related to the application of electronic devices.

REFERENCES

1. Thomas L. Floyd, Electronic Devices, 10th Edition Pearson, 2018.
2. Robert L. Bolysted, Louis Nashelsky, Electronic Devices and Circuit Theory, 11th Edition, Pearson, 2013.
3. John Bird, Electrical and Electronic Principles and Technlogy, 5th Edition, Routledge, 2014.
4. S. Salivahanan, N. Suresh Kumar, Electronic devices and circuits, 4th Edition, McGraw-Hill, 2018.

BEEA 1343
COMPUTER PROGRAMMING/
PENGATURCARAAN KOMPUTER

LEARNING OUTCOMES

Upon completion of this course, students should be able to:

1. Produce computer programming code based on principles, structures and techniques in C++.
2. Construct programming language code by applying suitable C++ programming techniques to solve a given problem.
3. Work in group effectively while performing group assignment.

SYNOPSIS

Throughout the course, students will be introduced to computer architecture and software development. The course consists of basic programming principles such as introduction to c++ programming syntax, variables, data types, operators, selection, repetition, function, array, pointer, structures and file processing.

REFERENCES

1. Abdul Kadir, (2016), C++ Programming a Practical Hands-On for Self Learning, 1st Edition, Penerbit Universiti, Universiti Teknikal Malaysia Melaka.
2. Gaddis, T., (2015), Starting Out with C++. From Control Structures Through Objects, 8th Edition, Global Edition, Pearson Education.
3. Daniel Liang, Y, (2014), Introduction to Programming with C++ 3rd Edition, Pearson Education.
4. Deitel, H.D., (2014), C++ How to Program, 9th Edition, Pearson Education.
5. Nell, D., (2013), Programing and Problem Solving With C++: Comprehensive, 6th Edition, Jones & Bartlett Learning.

BEEI 1311
ELECTRICAL WORKSHOP I/
BENGKEL ELEKTRIK I

LEARNING OUTCOMES

Upon completion of this course, students should be able to:

1. Perform single phase electrical installation for domestic-based application

SYNOPSIS

This subject is required students to carry out practical works in electrical workshop in order to gain learning experience in electrical installation works. Students will experience the electrical installation works such as constructing circuits layout drawing, electrical components, testing equipments, domestic wiring circuit, and relay control circuit work as well as instilling the moral and ethical values throughout the practical works. Students are also emphasized on the safety and regulatory requirements. Assessment will be conducted on student ability in the functionality, wiring, testing, safety awareness, discipline while carry out the practical tasks.

REFERENCES

1. Electrical Workshop I Lab Sheet Module.
2. Electrical Act 1990 (Act 447) & Regulations (Amendment 2015), Mdc Publisher, 2015.
3. Malaysian Standard International Electrotechnical Commission (Ms Iec) 60364, Sirim, 2015.
4. Garis Panduan Pendawaian Elektrik Bangunan Kediaman, Suruhanjaya Tenaga, 2015.
5. Electricity Supply Application Handbook, Third Edition (Version 3.1) Tenaga Nasional Berhad, August 2019.
6. Caddick, John, Electrical Safety Handbook, Mcgraw Hill, 2012.
7. Brian Scaddan, 17th Edition Wiring Regulations, Newnes, 2011.

SEMESTER 3

BEEI 2373
ELECTRICAL MACHINES/
MESIN ELEKTRIK

LEARNING OUTCOMES

Upon completion of this course, students should be able to:

1. Analyze the differences of physical and electrical construction and working principles of DC and AC electrical machines.
2. Conduct experiments to determine electrical and mechanical parameters and the performance of DC and AC electrical machines.
3. Conform to the safety and legal requirements for DC and AC electrical machines operation.

SYNOPSIS

This subject discuss about introduction to dc and ac type of electrical machines which cover physical construction and equivalent electrical circuit diagram. The machine performances like torque, speed and efficiency are investigated. The starting and control techniques are also investigated for a better machine selection of appropriate application.

REFERENCES

1. Electric Machinery Fundamentals, Stephen J. Chapman, 5th Ed., New York, NY: Mcgraw-Hill, 2012.
2. Fitzgerald & Kingsley's Electric Machinery, Stephen D. Umans., 7th Ed., New York, NY: Mcgraw-Hill Companies, 2014.
3. Electric Machines, D.P. Kothari, I.J. Nagrath., 4th Ed., New Delhi: Tata Mcgraw-Hill, 2010 (Rep. 2011).
4. Linear Electric Machines, Drives, And Maglevs Handbook, Ion Boldea, Boca Raton, FL: CRC Press/ Taylor & Francis, 2013.

BEEI 2364
ELECTRICAL TECHNOLOGY/
TEKNOLOGI ELEKTRIK

LEARNING OUTCOMES

Upon completion of this course, students should be able to:

1. Analyse basic electrical parameters for AC electrical system.
2. Conduct experiment on electrical parameters for AC electrical system.
3. Participate effectively in AC generation project-based activities.

SYNOPSIS

This subject introduces students to topics such as alternating current circuit analysis, phasor representation, RMS value, average power, reactive power, active power, apparent power power factor and power factor correction. Magnetic circuit, construction and operation of transformer, generation of three phase voltage, balanced and unbalanced three phase load and also voltage, current, power and power factor calculation.

REFERENCES

1. Hughes, Electrical & Electronics Technology, 12th ed., Prentice Hall, Feb 2016.
2. Bird, J.O., Electrical Circuit Theory and Technology, 6th ed., Routledge, Nov 2017.
3. Bird, J.O., Electrical Principles and Technology for Engineering, Elsevier, 2017.
4. Aminurrashid Noordin et. al, Principles of Electric & Electronics (Part 1), Penerbit UTeM, 2013.

BEEI 2342
ELECTRICAL WORKSHOP II/
BENGKEL ELEKTRIK II

LEARNING OUTCOMES

Upon completion of this course, students should be able to:

1. Perform three phase electrical installation and motor starter for industrial-based application.

SYNOPSIS

This subject is required students to carry out practical works in Electrical Workshop in order to gain learning experience in three phase wiring system and construct motor starter circuit. Students will experience designing & performing electrical installation in industrial wiring & motor starter circuit following by inspection & testing steps. Students are also emphasized on the safety and regulatory requirements. Assessment will be conducted on student ability in the functionality, wiring, testing, safety awareness, discipline while carry out the practical tasks.

REFERENCES

1. Electrical Workshop II Lab Sheet Module
2. Electrical Act 1990 (Act 447) & Regulations (Amendment 2015), Mdc Publisher, 2015.
3. Malaysian Standard International Electrotechnical Commission (Ms Iec) 60364, Sirim, 2015.
4. Garis Panduan Pendawaian Elektrik Bangunan Kediaman, Suruhanjaya Tenaga, 2015.
5. Electricity Supply Application Handbook, Third Edition (Version 3.1) Tenaga Nasional Berhad, August 2019.
6. Caddick, John, Electrical Safety Handbook, Mcgraw Hill, 2012.
7. Brian Scaddan, 17th Edition Wiring Regulations, Newnes, 2011.

PRE-REQUISITE

BEEI 1311
ELECTRICAL WORKSHOP 1/
BENGKEL ELEKTRIK 1

BEEA 2363
STATIC & MECHANICS/
STATIK & MEKANIK

LEARNING OUTCOMES

Upon completion of this course, students should be able to:

1. Explain the concepts and characteristics of static forces and mechanical systems.
2. Construct the statics and mechanics principles of materials through laboratory experiments.
3. Explain effectively either individually or in group for any assignment and experient in term of basic concept of force and material mechanics.

SYNOPSIS

STATICS

Introduction to basic concepts in statics and mechanics as a study of physical sciences, system of units, scalars and vectors, free body diagram, forces system resultant and moment, equilibrium of particle, equilibrium of rigid body, structural analysis, centre of gravity and centroid.

MECHANICS

Introduction to various type of structures, type of supports, concepts and definition of stress, strain, torsion, shear force and bending moment, theory on axial loading, torsion, pure bending and beam deflection, and combination of loads.

REFERENCES

1. Hibbeler R.C., 2016, Engineering Mechanics - Statics, 14th Si Ed., Prentice Hall, New York.
2. Beer, F. P. And Johnston Jr., E. R. And Eisenberg, E. R., 2016, Vector Mechanics for Engineers - Statics, 11th Ed. In Si Units, Mcgraw Hill, New York.
3. Gere J. M., 2012, Mechanics of Materials, Thompson
4. Hibbeler R. C., 2010, Mechanics of Materials, Si Edition, Prentice Hall.

SEMESTER 4

BEEA 2374
EMBEDDED SYSTEMS/
SISTEM TERBENAM

LEARNING OUTCOMES

Upon completion of this course, students should be able to:

1. Analyze the operation of a microcontroller's architecture, peripherals subsystem.
2. Construct hardware and software of microcontroller based system to solve related problem.
3. Function effectively as a team in micontroller-based project.

SYNOPSIS

This course exposes the basic concept of microcontroller and the difference between microcontroller and microprocessor. Start with understanding of microcontrollers architecture, compiler, programming language and software. All the interrupt available including timer/counter are explained in details. Continue to the analog digital converter and pwm signal are exposed to the integration of dc motor, servo motor, and stepper motor. Student will exposed to the application of programming involve with the input and outputs such as switches and 'light emitting diodes', multiple sensor, serial and I2C devices. Students will apply microcontroller with simple mechatronic system.

REFERENCES

1. Jon Hoffman, Mastering Arduino: A Project-Based Approach to Electronics, Circuits, And Programming, Packt, 2018.
2. Zach Webber, Arduino: The Complete 3 Books in 1 For Beginners, Intermediate and 19 Sample Designs and Codings and Advance Crash Guide in Arduino Programming, 2018.
3. Rancis Perea, Arduino Essentials, Packt, 2015.
4. Syed Omar Faruk Towaha, Learning C for Arduino, Packt, 2017.

BEEA 2383
CONTROL SYSTEM FUNDAMENTAL/
PENGENALAN SISTEM KAWALAN

LEARNING OUTCOMES

Upon completion of this course, students should be able to:

1. Apply appropriate techniques in describing the characteristics of control systems in time domain.
2. Construct experiments to distinguish system performances of open loop and closed loop systems.
3. Report the analysis of transient and steady state performance for first and second order control systems.

SYNOPSIS

This subject will discuss about the concepts in control system; open and closed loop system; transfer function; block diagram reduction and signal flow graphs; modeling for electrical system, mechanical system and electromechanical system; transient and steady-state performance for first and second order systems; Routh Hurwitz criteria for stability; steady-state error analysis; speed and position control system analysis using ScicosLab.

REFERENCES

1. Norman S. Nise, Control Systems Engineering, 7th Edition, John Wiley & Sons Inc., 2017.
2. Katsuhiko Ogata, Modern Control Engineering, 5th Edition, Pearson, 2010.
3. Richard C. Dort, Robert H. Bishop, Modern Control Systems, 12th Edition, Pearson, 2011.
4. Theory & Worked Examples Basic Control Systems, Penerbit Utem, 2008.
5. Syed Najib Syed Salim, Maslan Zainon, Control Systems Engineering, 2nd Edition, Penerbit UTeM, 2016.
6. Gopal, M, Control Systems: Principles and Design, 4th Edition, Mc Graw Hill, 2012.

BEEI 3413
POWER ELECTRONICS/
ELEKTRONIK KUASA

LEARNING OUTCOMES

Upon completion of this course, students should be able to:

1. Analyze the basic topologies of converters and power supplies for device applications in industrial practices.
2. Conduct experiments on the characteristics and performance of rectifiers, converters choppers and inverters.
3. Work in a team to design rectifiers, choppers, switch-mode power supplies (SMPS) and inverters based on converter topologies.

SYNOPSIS

This course is about the basic principles of semiconductor devices, switching process and the application in rectifier circuit, one and three-phase inverter, switching losses, heat sink, the application of semiconductor devices as AC to DC, DC to AC and DC to DC converters, circuits as DC drives, AC drives, snubbers and harmonic effects, and also the introduction to computer simulation (PESIM).

REFERENCES

1. Rashid, Muhammad H., Power Electronics Handbook (4th Edition), Elsevier, 2018.
2. Ned Mohan, Power electronics: a first course, John Wiley & Sons, 2012.
3. Daniel W. Hart, Power electronics, McGraw-Hill, 2011.
4. Ioinovici, Adrian, Power electronics and energy conversion systems, John Wiley & Sons, 2013.
5. Fang Lin Luo, Hong Ye. Power electronics: advanced conversion technologies – Circuits, Devices, and Applications, Taylor & Francis, 2010.
6. D S. Sivanagaraju, M. Balasubba Reddy, A. Mallikarjuna Prasad, Power electronics, PHI Learning, 2012.

BMMH 2313
FLUID MECHANICS/
MEKANIK BENDALIR

LEARNING OUTCOMES

Upon completion of this course, students should be able to:

1. Apply fluid mechanics concept in solving fluid statics and fluid dynamics problem.
2. Measure realted parameter by using appropriate techniques in fluid mechanics application.
3. Function effectively either as a member or leader in group for any assignment or experiment.

SYNOPSIS

Introduction to this subject is about the basic physical properties of fluid. Then it covers the definition of pressure and head. Next it followed by derivation of hydrostatic equation and its application in pressure measurement, static forces analysis on immersed surface and buoyancy analysis. For fluid dynamics, it started with introduction to fluid dynamics and fluid flow analysis. Then it is continued by derivation of flow equations, the application of energy equation and Bernoulli equation in the calculation of flow velocity, discharge, and head lost in piping systems. The last topic for this subject is dimensional analysis and its application.

REFERENCES

1. Cengel, Y. A. And Cimbala, J. M., 2014, Fluid Mechanics: Fundamentals and Applications, 3rd Edition, Mcgraw-Hill, Singapore.
2. Munson, B. R., Rothmayer, A. P., Okiishi, T. H. And Huebsch, W. W., 2012, Fundamentals of Fluid Mechanics, 7th Ed., John Wiley & Sons, Inc, Asia.
3. Som, S. K. And Biswas, G., 2010, Introduction to Fluid Mechanics and Fluid Machines, Revised 2nd Ed., Tata Mcgraw-Hill, New Delhi.
4. Douglas, J. F., Gasiorek, J. M. And Swaffield, J. A., 2011, Fluid Mechanics, 6th Ed., Prentice Hall, Spain.
5. Cengel, Y. A. And Cimbala, J. M., 2014, Fluid Mechanics: Fundamentals and Applications, 3rd Edition, Mcgraw-Hill, Singapore.
6. Kundu, P. K., Cohen, I. M. And Dowling, D. R., 2011, Fluid Mechanics, 5th Ed., Academic Press, Waltham, USA.

SEMESTER 5

BEEA 3464
PLC & AUTOMATION/
PLC & AUTOMASI

LEARNING OUTCOMES

Upon completion of this course, students should be able to:

1. Apply knowledge to solve basic industrial automation system problems using a PLC system.
2. Demonstrate PLC system experiments.
3. Communicate effectively for any assignments and experiments.

SYNOPSIS

This subject will expose students with knowledge and skills of PLC including its definition, main hard components, PLC programming languages, interfacing PLC with computers, integrates PLC hardware and software to design a simple automation system.

REFERENCES

1. Perez, Adrover E. (2012), Introduction to PLCs: A Beginner's Guide to Programmable Logic Controllers, CRC Press.
2. Macaulay, Tyson (2012), Cybersecurity for Industrial Control Systems: SCADA, DCS, PLC, HMI, and SIS, CRC Press.
3. Frank, Lamb (2013), Industrial Automation, McGraw-Hill.
4. Doug, Arent (2013), Automation Systems of the 21st Century: New Technologies, Applications and Impacts on the Environment & Industrial Processes, Nova Science.

BEEI 2383
POWER SYSTEM TECHNOLOGY/
TEKNOLOGI SISTEM KUASA

LEARNING OUTCOMES

Upon completion of this course, students should be able to:

1. Calculate the power system parameters using power system model, per unit (P.U) quantities and protection system requirements.
2. Conduct experiments on power system components using hardware or simulation software.
3. Present written communication to document work and experiment results.

SYNOPSIS

This subject gives the overall components of power system to the students without going into detail. The power system components will be modelled for the analysis purposes. The topics include per-unit quantities, transmission line, transformer, synchronous generator, power flows, symmetrical components, power protection and power system stability.

REFERENCES

1. Glover & Sarma, Power System Analysis and Design, 6th Edition, Thomson Learning, 2017
2. P.S.R. Murty, Power System Analysis, 2nd Edition, Elsevier Science & Technology, 2017
3. Md Salam, Fundamental of Electrical Power System Analysis, Springer, 2020
4. John J. Grainger, William D. Stevenson, Power System Analysis, 2020

BEEA 3393
CONTROL SYSTEM ENGINEERING/
KEJURUTERAAN SISTEM KAWALAN

LEARNING OUTCOMES

Upon completion of this course, students should be able to:

1. Design the compensators in time domain and frequency domain of control feedback systems using root locus and bode plot techniques
2. Construct experiments using controller designed to achieve desired system performance in time domain and frequency domain.
3. Explain the role of designed controllers by comparing the uncompesated and compensated systems in fulfilling desired specification.

SYNOPSIS

This subject will discuss about the control systems engineering; analysis in time and frequency domain responses; stability in time and frequency domain; design in time domain (root locus) and frequency domain (Bode plot).

REFERENCES

1. Syed Najib Syed Salim, Maslan Zainon, Control Systems Engineering, 2nd Edition, Penerbit Utem, 2016.
2. Norman S. Nise (2011), Control Systems Engineering, 6th Edition, John Wiley & Sons Inc.
3. Syed Najib Syed Salim, Maslan Zainon, Control Systems Engineering, 2nd Edition, Penerbit Utem, 2016.
4. Norman S. Nise (2011), Control Systems Engineering, 6th Edition, John Wiley & Sons Inc.
5. Richard C. Dort (2011), Robert H. Bishop, Modern Control Systems, 12th Edition, Pearson.
6. Katsuhiko Ogata (2010), Modern Control Engineering, 5th Edition, Pearson.
7. Gopal, M (2012), Control Systems: Principles and Design, 4th Edition, Mc Graw Hill.

PRE-REQUISITE

BEEA 2383
CONTROL SYSTEM FUNDAMENTAL/
PENGENALAN SISTEM KAWALAN

BEEA 3463
INDUSTRIAL DATA COMMUNICATION/
DATA KOMUNIKASI INDUSTRI

LEARNING OUTCOMES

Upon completion of this course, students should be able to:

1. Explain and describe the concept of computer system network, communication model, network models, network components, network topology, network technology and applications
2. Design, install, configure and troubleshoot of an industrial data communication
3. Demonstrate a good practice standard in conducted assignment and experiments.

SYNOPSIS

Topics covered are: Introduction to Computer Network, Data Communications, Network Structure, Local Area Network, Wide Area Network, Interconnection, and Internetworking

REFERENCES

1. Lawrence M. Thompson, Industrial Data Communications, 5th Edition, Isa, 2015
2. Deon R., Steve M., And Edwin W., Practical Indusrial Data Communication - Best Practive Techniques, Elsevier, 2005.
3. IDC Technologies, Communication, Industrial Networking and Tcp/Ip, 2012.

SEMESTER 6

BEEU 3764
BACHELOR DEGREE PROJECT I/
PROJEK SARJANA MUDA I

LEARNING OUTCOMES

Upon completion of this course, students should be able to:

1. Relate previous works and relevant theories using various resources.
2. Propose objectives and scopes of industrial-based or practice-oriented project.
3. Find appropriate methodologies for successful execution of the project.
4. Explain the project execution and findings in oral and written forms effectively.
5. Imitate appropriate existing concepts in engineering technology fields.

SYNOPSIS

The student needs to plan and implement the project individually that related to the respective engineering technology field. The student should implement a project, do the analysis and apply the theory to solve the problems related to topic. At the end, the student should write a problem based learning report that covers problem statement, literature review, methodology to overcome the problem. The student needs to achieve the objective of the project and presented it in the report.

REFERENCES

1. Manual Projek Sarjana Muda (PSM), Fakulti Teknologi Kejuruteraan, Universiti Teknikal Malaysia Melaka.

BEEA 3454
MOTION CONTROL SYSTEM/
SISTEM KAWALAN PENGGERAK

LEARNING OUTCOMES

Upon completion of this course, students should be able to:

1. Identify the basic components and the system structure of motion control systems.
2. Apply software and hardware packages to set, measure, analyze and program basic motion control parameters as well as simulate and build basic motion control systems
3. Demonstrate hands-on experience of motion control systems.

SYNOPSIS

This subject introduces students to basic principles of motion control which include components and system structure, mechanisms (gearbox, pulley, lead screw and rack/pinion), sensors and encoders (potentiometer, incremental encoder, resolver) and the basic principles of servo motor and stepper motor. Students will be involved in the application of software and hardware packages to set, measure, analyze and program basic motion control parameters as well as simulate and build basic motion control systems. Students are also required to diagnose and resolve equipment problems by utilizing technical assessment skills that include planning, reliability, logical thinking, and ability to use drawings, schematics and documentation.

REFERENCES

1. Terry L.M. Bartelt, Industrial Automated Systems: Instrumentation and Motion Control, Cengage Learning, 2011.
2. W. Bolton, Mechatronics: Electronic Control Systems in Mechanical and Electrical Engineering, Pearson, 2011.
3. Asif Sabanovic, Kouhei Ohnishi, Motion Control System, John Wiley & Sons, 2011

BEEA 3443
PNEUMATIC & HYDRAULIC/
PNEUMATIK & HIDRAULIK

LEARNING OUTCOMES

Upon completion of this course, students should be able to:

1. Apply the knowledge of basic application circuits of pneumatics/hydraulics and electro-pneumatics/ electro-hydraulics systems commonly used in manufacturing industries.
2. Demonstrate the basic application circuits of pneumatics/hydraulics and electro-pneumatics/ electro-hydraulics systems commonly used in manufacturing industries.
3. Function effectively as a team in laboratory works and in developing an electro-pneumatics system project.

SYNOPSIS

This subject introduces students to the fundamentals physical principles of fluid power, which consists of hydraulic and pneumatic systems. This course is taught by practical applications approach (theory and practice) in the laboratory session. Lab equipment is provided that allows students to design, install, and test most of the circuits discussed in class. Lab project/mini project/project oriented problem-based learning is incorporated in this subject.

REFERENCES

1. Esposito A. (2014), “Fluid Power with Applications”, 7th Edition, Pearson New International Edition, 2014.
2. Pany M. & Sabine S. (2012), “Pneumatic Basic Level”, FESTO.
3. Pany M. & Sabine S. (2012), “Electropneumatic Basic Level”, FESTO
4. Pany M. & Sabine S. (2012), “Hydraulic Basic Level”, FESTO.
5. Pany M. & Sabine S. (2012), “Electrohydraulic Basic Level”, FESTO.

BEEA 3433
INDUSTRIAL ROBOTICS/
ROBOTIC INDUSTRI

LEARNING OUTCOMES

Upon completion of this course, students should be able to:

1. Evaluate the forward, inverse & dynamic kinematic equation in robotic configuration in industrial robotics.
2. Construct specific robotic programming & simulation for actual robots used in industrial automation system.
3. Arrange the appropriate robotic technologies considering the impact to industrial environment.

SYNOPSIS

Introduction to robotics, classification of robots, basic components of robot systems, basic concepts of kinematics and dynamics, mechanical structure of robot systems, robot drives and motion control system using stepper motor, servo motor, servo amplifier and pneumatics, sensory devices such as position, force and torque, tactile, basic robot programming, robot simulations and industrial robot applications. Experiments will include application of MATLAB, simple robot development and robot programming and simulation using a real industrial robot.

REFERENCES

1. Bajd, Tadej, Introduction to Robotics, Springer, 2013
2. Shah, Suril Vijaykumar, Dynamics of Tree-Type Robotic Systems, Springer, 2013.
3. S Niku, Saeed B, Introduction to Robotics Analysis, System, Applications, Prentice Hall, 2011.

SEMESTER 7

BEEU 4774
BACHELOR DEGREE PROJECT II /
PROJEK SARJANA MUDA II

LEARNING OUTCOMES

Upon completion of this course, students should be able to:

1. Complete planned project systematically.
2. (Re)construct solutions of broadly-defined engineering problems using relevant tools and techniques.
3. Display self-reliance in achieving the objectives of the project.
4. Demonstrate project results using appropriate techniques with an understanding of it limitations.
5. Explain the project execution and findings in oral and written form effectively.

SYNOPSIS

This is the second part of the Bachelor Degree Project. Students are expected to continue the project done in Bachelor degree Project Part 1 till completion. At the end of the semester students are required to submit the Bachelor Degree Project report both orally and in writing for assessment.

REFERENCES

1. Manual Projek Sarjana Muda (PSM), Fakulti Teknologi Kejuruteraan, Universiti Teknikal Malaysia Melaka.

PRE-REQUISITE

BEEU 3764
BACHELOR DEGREE PROJECT I/
PROJECT SARJANA MUDA I

BEEA 4803
FLEXIBLE MANUFACTURING SYSTEM/
SISTEM PEMBUATAN TERANJAL

LEARNING OUTCOMES

Upon completion of this course, students should be able to:

1. Analyze the manufacturing operations, manufacturing metrics and economics for discrete manufacturing systems as well as the quantitative analysis for Flexible Manufacturing Cells (FMC) and Flexible Manufacturing Systems (FMS).
2. Demonstrate an advanced manufacturing system's operation and an HMI/SCADA system commonly used in industry.
3. Function effectively as a team in laboratory works and in developing an HMI/SCADA system project.

SYNOPSIS

Introduction to industrial field topics such as production system, manufacturing system, manufacturing operation, production concept and mathematical models as well as manufacturing operation costs besides FMS, CIM, SCADA, HMI, CAD/CAM and TPM systems with the complete descriptions and relevant analysis where those systems are integrated in building modern automated systems in manufacturing industries.

REFERENCES

1. Groover, M. P. (2019), "Automation, Production Systems, and Computer-Integrated Manufacturing", 5th Ed., Prentice Hall.
2. Groover, M. P. (2012), "Fundamentals of Modern Manufacturing: Materials, Processes, and Systems", 5th Ed., John Wiley & Sons Inc.
3. Kalpakjian, S. & Schmid, S. R. (2013), "Manufacturing, Engineering, and Technology", 7th Ed., Prentice Hall.
4. Dima I. C. (2013), "Industrial Production Management in Flexible Manufacturing Systems", 1st Ed., IGI Global.

BEEA 4813
INDUSTRIAL PROCESS CONTROL/
KAWALAN PROSES INDUSTRI

LEARNING OUTCOMES

Upon completion of this course, students should be able to:

1. Analyse the control system characteristics and instrumentations for appropriate controller application in the process control industries
2. Apply industrial process control elements and instruments for the process variables in the process control industries
3. Prepare a design of process control plant.

SYNOPSIS

This subject will cover topic on introduction to industrial process control including basic terms and diagrams. It's also emphasized on process variables, elements, and instruments for temperature, level and flow of process control. The right controllers for process control are discussed and control loops in process control are analyzed. Applications of automation technologies such as SCADA and DCS for process control are also explained.

REFERENCES

1. Curtis D. Johnson, Process Control Instrumentation Technology, 8th Ed. Pearson, 2014.
2. Dale E. Seborg, Process Dynamics And Control, 3rd Ed, Hoboken, Nj: John Wiley & Sons, 2011.
3. Myke King, Process Control: A Practical Approach, Chichester: John Wiley & Sons, 2011.

BEEA 4823
MACHINE VISION/
PENGLIHATAN MESIN

LEARNING OUTCOMES

Upon completion of this course, students should be able to:

1. Identify the application areas, restrictions, structure of machine vision system and digital image processing.
2. Implement algorithms using image processing tools and apply the basic machine learning approaches to decision making for machine vision system.
3. Organise effectively in a team for a machine vision project related to industrial automation system.

SYNOPSIS

The aim of this course is to introduce the theory, applications and techniques of machine vision to students, and to provide students with an understanding of the problems involved in the development of machine vision systems. The course begins with low level processing and works its way up to the beginnings of image interpretation. This approach is taken because image understanding originates from a common database of information. The learner will be required to apply their understating of the concepts involved through the process of building applications that manipulate bi-level and greyscale images through the use of suitable packages (e.g. Matlab or OpenCV).

REFERENCES

1. Davis, E. R. (2012), Computer & Machine Vision: Theory, Algorithm, Practicalities, 4th Edition, Academic Press.
2. Bruce, G., (2012), Machine Vision Handbook, London Springer.
3. Sonka, M., (2015), Image Processing, Analysis, And Machine Vision, Cengage Learning.
4. Cipolla, R., (2013), Machine Learning for Computer Vision, Heidelberg Springer.
5. Lesley, M., (2015), Machine Vision and Its Applications, Jersey City.
6. Corke, P., (2011), Robotics, Vision and Control: Fundamental Algorithms in Matlab, Springer.
7. Fisher, R.B., (2014), Dictionary of Computer Vision and Image Processing, John Wiley & Sons.

BEEA 4833
DISTRIBUTED CONTROL SYSTEM/
SISTEM KAWALAN TERAGIH

LEARNING OUTCOMES

Upon completion of this course, students should be able to:

1. Analyze Distributed Control System (DCS) by knowledge of architechture (software and hardware), communication and engineering drawing.
2. Completes the experiment on DCS hardware and doftware using Distributed Control System (DCS).
3. Explain effectively either individually or in group for subjects's assignment and experiment.

SYNOPSIS

This subject introduces students to distributed control system (DCS). DCS is a technology that provide an automated control to a plant. Student will be exposed to the architecture of dcs, control scheme, configuration, communication protocol and engineering drawing. This subject will be supported by laboratory works to polish students' skill in dcs system.

REFERENCES

1. Abb Dcs 800xa Manual
2. Thomas E. Marlin, Process Control, 2nd Edition, 2015.
3. Dr. Moustafa Elshafei, Modern Distributed Control Systems, 2016.
4. B. R. Mehta, Reddy Y. J, Applying Foundation Fieldbus, 2016.

BEEA 4843
ADVANCED MANUFACTURING SYSTEM/
SISTEM PEMBUATAN LANJUTAN

LEARNING OUTCOMES

Upon completion of this course, students should be able to:

1. Analyze the manufacturing operations, manufacturing metrics and economics for discrete manufacturing systems as well as the quantitative analysis for Flexible Manufacturing Cells (FMC) and Flexible Manufacturing Systems (FMS).
2. Demonstrate an advanced manufacturing system's operation and an HMI/SCADA system commonly used in industry.
3. Function effectively as a team in laboratory works and in an HMI/SCADA system task

SYNOPSIS

Introduction to industrial field topics such as production systems, manufacturing systems, manufacturing operations, manufacturing metrics and economics as well as manufacturing support systems besides FMS, CIM, CNC, HMI, SCADA, QC, CAD/CAM and TPM systems with the complete descriptions and relevant analysis where those systems are integrated in building modern automated systems in manufacturing industries.

REFERENCES

1. Groover, M. P. (2015), "Automation, Production Systems, and Computer-Integrated Manufacturing", 4th Ed., Pearson Education.
2. Groover, M. P. (2012), "Fundamentals of Modern Manufacturing: Materials, Processes, and Systems", John Wiley & Sons Inc.
3. Kalpakjian, S. & Schmid, S. R. (2013), "Manufacturing, Engineering, and Technology", 7th Ed., Prentice Hall.
4. Rich, N. & Malik, F. T. (2020), "International Standards for Design and Manufacturing: Quality Management and International Best Practice", 1st Ed., Kogan Page Limited.

BEEA 4853
ADVANCED CONTROL SYSTEM/
SISTEM KAWALAN LANJUTAN

LEARNING OUTCOMES

Upon completion of this course, students should be able to:

1. Assess concepts, principals and theories relating to advance control system.
2. Demonstrate the advanced control systems & strategies in simulation using Labview, Matlab and Simulink.
3. Work effectively either individually or in a group to solve control system problems.

SYNOPSIS

This elective course introduces the fundamental concepts, principles and application of advanced control system techniques and analysis. The course material shall include three general topics. Chapter 1 covers state-space representations, controllability & observability, state variable feedback design and state observer. Sampling & Z transform, stability in Z plane and digital compensator design are included in chapter 2. While chapter 3 comprises artificial intelligence in engineering i.e. Fuzzy Logic System and Neural Network.

REFERENCES

1. Dorf & Bishop; Modern Control System 13th Edition, Pearson, 2017.
2. Roland S.Burns; Advanced Control Engineering, Butterworth-Heinemann, 2001
3. Elmer P. Dadios; Fuzzy Logic – Controls, Concepts, Theories and Applications, 2012
4. Michael Negnevitsky; Artificial Intelligence a Guide to Intelligent System, Kindle Edition, 2011.
5. Dorf & Bishop; Modern Control System 13th Edition, Pearson, 2017.
6. Robert H. Bishop; Modern Control Systems with LabView, National Technology & Science Press, 2012.
7. Norman S.Nise; Control Systems Engineering, 6th Edition, John Wiley & Sons, Inc, 2011.

BEEA 4863
ARTIFICIAL INTELLIGENCE/
KEPINTARAN BUATAN

LEARNING OUTCOMES

Upon completion of this course, students should be able to:

1. Demonstrate the ability to model engineering problem for artificial intelligent implementation.
2. Display ability to compose appropriate artificial intelligent toolbox
3. Work individually or in groups effectively to perform assignments/tasks given.

SYNOPSIS

Artificial intelligence (AI) is a field of study concerns on allowing machines to imitate human's thinking or behaviour. By applying ai techniques, machines would be able to solve complex engineering problems. In this course students will be focusing on two popular subtopics in artificial intelligence area which are fuzzy logic and neural network. Students will be exposed towards the concept of neural network and/or fuzzy logic and its implementation methods in control system using appropriate tools such as Simulink/Matlab.

REFERENCES

1. Michael Negnevitsky; Artificial Intelligence a Guide to Intelligent System, Kindle Edition, 2011.
2. Kevin Warwick; Artificial Intelligence: The Basics, Taylor & Francis Group, 2011.
3. Elmer P. Dadios; Fuzzy Logic – Controls, Concepts, Theories and Applications, 2012
4. Rogerson, Jeremy; Designs and Applied Principles of Artificial Neural Networks, Jersey City, 2015.

BMMM 3523
MAINTENANCE TECHNOLOGY & ASSET MANAGEMENT/
TEKNOLOGI PENYELENGGARAAN & PENGURUSAN ASET

LEARNING OUTCOMES

Upon completion of this course, students should be able to:

1. Distinguish the method and strategy for maintenance and asset management.
2. Reproduce by using computerized maintenance management system in maintenance problem.
3. Present the best practices of maintenance and asset management.

SYNOPSIS

Students will be introduced to the maintenance strategy, calculating the life of each unit machine and instrument. Identifying maintenance workshop and scheduling, maintenance organisation, effective use of maintenance resources, maintenance system, maintenance best practices, engineering economy such as weibull and pareto analysis, cost estimation, asset replacement analysis, risk analysis and control,application of reliability data, accident prevention, fire protection and cost control.

REFERENCES

1. R.C. Mishra, K. Pathak, 2013, Maintenance Engineering and Management, PHI Learning Pvt. Ltd.
2. B.S. Dhillon, 2002, Engineering Maintenance: A Modern Approach,CRC Press.
3. Terry Wireman, 2010, Benchmarking Best Practices in Management Maintenance, Industrial Press.
4. John D. Campbell, Andrew K.S. Jardine, Joel McGlynn, 2010, Asset Management Excellence: Optimizing Equipment Life-Cycle Decisions, 2nd Edition, CRC Press.
5. Nicholas Anthony John Hastings, 2009, Physical Asset Management, Springer.
6. John S. Mitchell, John E. Hickman, J.E. Amadi-Echendu and H. Paul Barringer, 2006, Physical Asset Management Handbook.
7. Terry Wireman, 2005, Developing Performance Indicators for Managing Maintenance, 2nd Edition, Industrial Press Inc.

SEMESTER 8

BEEU 4786
INDUSTRIAL TRAINING/
LATIHAN INDUSTRI

LEARNING OUTCOME
Upon completion of this course, students should be able to:
1. Display technical competencies and skills gained throughout their internship.
2. Prepare a report on the industrial field daily activities in the log book systematically.
3. Work effectively with staff, colleagues and other personnel.
4. Practice professional ethics in accordance with industry rules and regulations.

SYNOPSIS
All students are required to undergo industrial training as part of their curriculum to complete four (4) years course for the Bachelor of Engineering Technology. The duration of training is 24 weeks and it will be taken place at the end of the course (semester 8). The students are expected to gain knowledge and enhance their technical skills within industrial environment relevant to their field of study.

REFERENCES
1. UTeM Guideline Handbook for Industrial Training.

BEEU 4796
INDUSTRIAL TRAINING REPORT/
LAPORAN LATIHAN INDUSTRI

LEARNING OUTCOME
Upon completion of this course, students should be able to:
1. Produce industrial training report.
2. Present report orally on working experience.

SYNOPSIS
All students are required to undergo industrial training as part of their curriculum to complete four (4) years course for the Bachelor of Engineering Technology. The duration of training is 24 weeks and it will be taken place at the end of the course (semester 8). The students are expected to gain knowledge and enhance their technical skills within industrial environment relevant to their field of study.

PRE-REQUISITE
Student required to pass Industrial Training BEEU 4786 in order to pass Industrial training report.

REFERENCES
1. UTeM Guideline Handbook for Industrial Training.

BEEY COURSE CORE COURSES (K)

SEMESTER 1

BEEY1303
MEASUREMENT & INSTRUMENTATION SYSTEM/
PENGUKURAN & SISTEM INSTRUMENTASI

LEARNING OUTCOMES

Upon completion of this course, students should be able to:

1. Apply the knowledge of principles, techniques, components and tools in measurement and instrumentation system.
2. Measure electrical parameter by using analogue and digital instruments.
3. Explain effectively the knowledge about the measurement and instrumentation tools, techniques and standard.

SYNOPSIS

This subject discusses about units and dimensions, standards, errors and calibration in measurement. It covers the measurement devices such as digital meter, analog meter, oscilloscope, function generator and any device related. This subject also covers on instrumentation elements for complete data acquisition system such as sensors & transducers, signal conditioning & processing, A/D and D/A conversion, interfacing standards and data presentation.

REFERENCES

1. Alan S. Moris and Reza Langari, Measurement and Instrumentation: Theory and Application, Academic Press, 2011.
2. HS Kalsi, Electronic Instrumentation, McGraw Hill, 2011.
3. Uday A. Bakshi and Ajay V. Bakshi, Electrical & Electronic Measurement, Technical Publication, 2012.
4. Uday A. Bakshi and Ajay V. Bakshi, Electrical Measurements and Instrumentation, Technical Publication, 2014.
5. Muhammad Sharil Yahya et. Al, Asas dan Konsep Pengukuran, Penerbit UTeM, 2012.
6. Muhammad Sharil Yahya et. Al, Pengukuran & Instrumentasi, Penerbit UTeM, 2013.

BEEA 1313
COMPUTER AIDED DESIGN/
REKABENTUK TERBANTU KOMPUTER

LEARNING OUTCOMES

Upon completion of this course, students should be able to:

1. Use a standard Computer Aided Design software command tools for basic two-dimensional drafting and produce geometric, orthographic, isometric, section cut and detail drawing.
2. Construct detailed two-dimensional engineering drawings and basic three-dimensional solid modelling models using standard Computer Aided Design software.
3. Demonstrate an accurate engineering drawing based on given problem.

SYNOPSIS

This course will be presented by means of lecture, tutorials, labs, lab test assignments and quiz fully in the CAD studio, without a final exam. The course concentrates on how to use Computer Aided Design (CAD) software to produce the basic engineering drawing, for example, geometric, orthographic, isometric, section cut and detail drawing. The students will be exposed to CAD interface, CAD coordinate system, basic drawing command tools, display controls, basic editing commands tools, text, dimensioning, isometric and template preparation in order to produce various types of engineering drawing. However, this course will focus on the electrical engineering drawing type. The 3D Solid Modelling Object Development drawing will also be covered.

REFERENCES

1. Leach. j., “Autocad 2020 Instructor”, SDC, 2019
2. Tickoo, “Autocad 2020: A Problem-Solving Approach, Basic and Intermediate (22nd ed.)”, Cadcim Technologies, 2019.
3. George Omura, Brian C. Benton, “Mastering Autocad 2019 and Autocad LT 2019”, Wiley, 2018.

BEEI 1303
ELECTRICAL CIRCUIT FUNDAMENTAL/
PENGENALAN LITAR ELEKTRIK

LEARNING OUTCOMES

Upon completion of this course, students should be able to:

1. Apply analytical method and theorem to DC and AC (steady state) circuits in electrical circuit.
2. Conduct experiment on DC and AC (steady state) circuit based on electrical circuit theorem.
3. Participate effectively for any assignment and experiment.

SYNOPSIS

This subject introduces the students to Ohm's Law, Kirchhoff's Laws and use them to calculate current, voltage and power in DC / AC (steady state) circuits. Following this the students will learn the analytical methods namely mesh and nodal analysis. The use of theorems like Thevenin, Norton, Superposition and the Maximum Power Transfer will follow next. The applications of the above tools will cover both dc and ac circuits. This subject will be supported by laboratory works to impart to the students some basic practical skills.

REFERENCES

1. Thomas L. Floyd, Principles of Electric Circuits, 9th Ed., Pearson, 2010.
2. Charles Alexander and Matthew Sadiku, Fundamentals of Electric Circuits, 5th Ed., McGraw Hill, 2013.
3. Allan H. Robbins and Wilhelm C Miller, Circuit Analysis Theory and Practice, 5th Ed., Delmar and Cengage Learning, 2012.
4. James W. Nilsson and Susan Riedel, Electric Circuits, 10th Ed., Prentice Hall, 2014.

SEMESTER 2

BEEY 1323
DIGITAL ELECTRONICS & SYSTEM/
ELEKTRONIK & SISTEM DIGITAL

LEARNING OUTCOMES

Upon completion of this course, students should be able to:

1. Apply the knowledge, basic features and configuration of combinational logic and sequential logic circuit.
2. Construct digital system experiments and assignment.
3. Explain effectively either individually or in group for any assignment and experiment.

SYNOPSIS

This subject discusses about number systems & codes, Boolean algebra, logic families and the characteristic of logic gates, combinational logic, analysis and design, MSI combinational logic circuit, flip-flops, counter and shift- register, synchronous and asynchronous sequential circuits, analysis and design of adder, decoder, encoder, multiplexer, demultiplexer, counter and register. Simulations of digital logic systems are also included.

REFERENCES

1. Aminurrashid Noordin et. al (2014), Digital Electronics & Systems, Penerbit UTeM.
2. Thomas Floyd, Digital Fundamentals, Global Edition, 11th Edition, Jan 2015, Pearson New International Edition.
3. Ronald Tocci, Neal Widmer, Greg Moss, Digital Systems Principles and Applications, 11th Edition, Jul 2013, Pearson New International Edition.
4. Thomas Floyd, Digital Electronics a Systems Approach, CourseSmart eTextBook, Oct 2012, Pearson New International Edition.

BEEI 1323
ELECTRICS & MAGNETISM/
ELEKTRIK & KEMAGNETAN

LEARNING OUTCOMES

Upon completion of this course, students should be able to:

1. Explain the concept and application of Electrical Field, Coulombs Law, Lenz Law and Faradays Law in electrical charge phenomena.
2. Demonstrate electrical concepts, basic magnetic quantities and phenomena to simple devices (DC motor and transformer) in electrical engineering technology.
3. Present written and oral communications to document work and experiment results.

SYNOPSIS

This course will begin with an introduction of static electrical charge including the related law such as coulomb's law and gauss, Lenz law concept, conductors, dielectrics, and electric boundary conditions. The magnetism fundamental also will be covered in the syllabus, which includes magnetic shell, magnetic flux, EMF and Faraday's Law, magnetic field produced by direct current, solenoid magnetic field and force produce by more than one current carrying conductor.

REFERENCES

1. John W. Jewett, Jr. Raymond A. Serway, (2014), Physics for Scientists and Engineers, 9th Edition, BROOKS/COLE CENGAGE Learning.
2. Matthew N. O. Sadiku (2015) Principles of Electromagnetics, 6th Edition, Oxford University Press.
3. Ulaby, F. (2012) Electromagnetics for Engineers, Pearson Education, 6th Edition.
4. Hayt, W. and Buck, J., (2011) Engineering Electromagnetics, 8th Edition, McGraw Hill International Edition.
5. Raju, G.S.N. (2006) Electromagnetic Field Theory and Transmission Lines, 1st Edition, Pearson Education.

BEEI 1333
ADVANCED ELECTRICAL CIRCUIT/
LITAR ELEKTRIK LANJUTAN

LEARNING OUTCOMES

Upon completion of this course, students should be able to:

1. Analyze first order and second order electrical circuit in transient and frequency response.
2. Conduct experiment on frequency response and electrical circuit measurement.
3. Present written and oral communications to document work and experiment results.

SYNOPSIS

These subject exposes students to the application of several tools in analyzing electrical circuits, such as the Laplace transform and two ports network. The students are required to use the tools to analyze transient and frequency response in electrical circuit.

REFERENCES

1. Charles, K.A & Sadiku, N.O (2013). Fundamental of Electric Circuit (5th ed.). McGraw-Hill.
2. Nilsson, J. W. & Riedel, S. (2015). Electric Circuit (10th ed.). Prentice Hall.
3. Glisson, T. H. (2011). Introduction to Circuit Analysis and Design. Springer.
4. Hayt, W. H. (2012). Engineering Circuit Analysis (8th ed.). McGraw-Hill.
5. O'Maley, J. (2011). Basic Electric Circuit. McGraw-Hill.

PRE-REQUISITE

BEEI 1303
ELECTRICAL CIRCUIT FUNDAMENTAL/
PENGENALAN LITAR ELEKTRIK

BEEY 1313
ELECTRONICS WORKSHOP/
BENGKEL ELEKTRONIK

LEARNING OUTCOMES

Upon completion of this course, students should be able to:

1. Apply the knowledge of basic electronic components, circuit simulation, PCB fabrication, soldering, troubleshooting and test verification of an electronic circuitry design.
2. Measure an electrical parameter in troubleshooting and test verification using appropriate tools and equipment.
3. Explain effectively the knowledge about the Health and Safety Regulation.

SYNOPSIS

This subject aims to enable the student to acquire competency in the safe use of electronics laboratory test equipment and to acquire competency in construction and testing electronic assemblies. The practical element of the electronic production is considered to be of great importance. Student gains valuable experience in physical component identification and the use of supplier catalogues in the component identification and ordering procedure. The skills of PCB fabrication, circuit design and simulation, circuit assembly and soldering, debugging and troubleshooting are developed in this subject.

REFERENCES

1. Thomas L. Floyd, Electronic Devices, Pearson Education, Limited, 5 Jan 2017.
2. Hughes, John M., Practical Electronics: Components and Techniques, O'Reilly Media, 2015.
3. Occupational safety and health (classification, labelling and safety datasheet of hazardous chemicals) regulations 2013, Department of Occupational safety and health Malaysia.
4. Laboratory Safety Guidance, Occupational Safety and Health Administration U.S. Department of Labor, 2011.
5. R. S. Khandpur, Printed Circuit Boards: Design, Fabrication, Assembly and Testing, Tata McGraw-Hill Education, 2005.
6. Howard Manko, Solders and Soldering, Fourth Edition, McGraw Hill Professional, Mar 2001.
7. Rudolf Strauss, Dr. Ing., FIM, SMT Soldering Handbook, second edition, Newnes, 1998.

SEMESTER 3

BEEA 133
COMPUTER PROGRAMMING/
PENGATURCARAAN KOMPUTER

LEARNING OUTCOMES

Upon completion of this course, students should be able to:

1. Produce computer programming code based on principles, structures and techniques in C++.
2. Construct programming language code by applying suitable C++ programming techniques to solve a given problem.
3. Work in group effectively while performing group assignment.

SYNOPSIS

Throughout the course, students will be introduced with basic principles of computers and software development methodology. The course also consists of basic programming principles such as syntax semantic, compiling, and linking. Programming techniques using C++ such as data type and operator, selection, repetition, function, array, file, and pointer are learnt towards the end of this course.

REFERENCES

1. Abdul Kadir, (2016), C++ Programming a Practical Hands-on for Self Learning, 1st Edition, Penerbit Universiti, Universiti Teknikal Malaysia Melaka.
2. Gaddis, T., (2015), Starting Out with C++: From Control Structures through Objects, 8th Edition, Global Edition, Pearson Education.
3. Daniel Liang, Y, (2014), Introduction to Programming with C++, 3rd Edition, Pearson Education.
4. Deitel, H.D., (2014), C++ How to Program, 9th Edition, Pearson Education.
5. Nell, D., (2013), Programming and Problem Solving with C++: Comprehensive, 6th Edition, Jones & Bartlett Learning.

BEEY 2343
ELECTRONIC DEVICES/
PERANTI ELEKTRONIK

LEARNING OUTCOMES

Upon completion of this course, students should be able to:

1. Apply knowledge of semiconductor devices in electronic circuit.
2. Perform the experiment of semiconductor devices using simulation software and electronic components in electronic circuit.
3. Explain effectively either individually or in group for any assignment and experiment

SYNOPSIS

This subject introduces students to semiconductor devices. There are four semiconductor devices involve which are diode, bipolar junction transistor (BJT), field effect transistor (FET) and operational amplifier. Students will learn the types of these four devices, structure characteristic, configuration and application. In term of circuit analysis, student will learn how to calculate current and voltage in a circuit contain these semiconductor devices and draw output voltage waveform for diode application circuit. This subject will be supported by laboratory works and assignment to impart the students some basic practical skills.

REFERENCES

1. Thomas L. Floyd, Electronic Devices, 9th, Pearson, 2012.
2. Robert L. Bolysted, Louis Nashelsky, Electronic Devices and Circuit Theory, 11th Edition, Pearson, 2013.
3. S. Salivahanan, N. Suresh Kumar, Electronic devices and circuits, 3rd Edition, McGraw-Hill, 2012.
4. Atul P. Godse, Uday A. Bakshi, Electronic devices & circuits, Technical Publication Pune, 2011.

BEEY 2333
ELECTRICAL INSTALLATION I/
PEMASANGAN ELEKTRIK I

LEARNING OUTCOMES

Upon completion of this course, students should be able to:

1. Design single phase electrical installation based on domestic application.
2. Perform single phase electrical installation based on domestic application.
3. Conform to single phase electrical installation based on existing acts, regulations and standards.

SYNOPSIS

This course outlines the principles, design and application of single phase electrical installation system. The course covers various matters of single phase electrical installation system such as electrical requirements by i.e Public Works Department, consultants and electrical utility companies. This would also involve relevant acts, regulations, standards and safety to be complied with the existing legal requirement by the Energy Commission of Malaysia and electrical utility companies. Students will carry out their learning activities on single phase electrical installation involving planning (sizing of circuit breakers and cables), application designing (electrical drawing, single line diagram, commissioning (cable installation) and troubleshooting.

REFERENCES

1. Ir Md Nazri, Aminuddin Aman, Md hairul Nizam, Engineering Practice: Wiring System & Motor Starter.
2. Md Nasir, Panduan Pendawaian Elektrik, IBSbuku, 2006.
3. Mohd Nazi, Teknologi Pemasangan Elektrik, DBP.
4. Akta Bekalan Elektrik (447 pindaan 2001).
5. Brian Saddan, IEE wiring regulations 3rd edition, Inspection, Testing and Certification, Newnes, 2001.

BEEY 2361
ELECTRICAL ENGINEERING TECHNOLOGY CAREER/
KERJAYA TEKNOLOGI KEJURUTERAAN ELEKTRIK

LEARNING OUTCOMES

Upon completion of this course, students should be able to:

1. Identify the requirement of electrical engineering technology practices in terms of engineering ethics, economy, finance and law and route to professional engineering technologist.
2. Apply the main features of groups and team that affect teamwork or team effectiveness in relation to electrical engineering technology field.
3. Explain the professional experiences gain through industrial talk and industrial visit.

SYNOPSIS

In this subject, students will be equipped with several session of engineering seminar given by the industrialists as well as by professional member of engineering bodies. The context of the seminar will be the general engineering issues and career path for engineering technologists.

BEEY 2353
ELECTRICAL TECHNOLOGY/
TEKNOLOGI ELEKTRIK

LEARNING OUTCOMES

Upon completion of this course, students should be able to:

1. Analyze single-phase, three-phase and magnetic circuit for alternating current (AC).
2. Conduct experiment on single-phase and three-phase system for alternating current (AC).
3. Participate effectively to fulfil experimentation task with peers.

SYNOPSIS

This subject introduces students to topics such as alternating current circuit analysis, phasor representation, RMS value, average power, reactive power, active power, apparent power, power factor and power factor correction. Furthermore, this subject also includes the topics of magnetic circuit, construction and operation of transformer, generation of three phase voltage, balanced and unbalanced three phase load and also voltage, current, power and power factor calculation.

REFERENCES

1. Hughes, Electrical & Electronics Technology, 11th ed., Prentice Hall, Feb 2012.
2. Bird, J.O., Electrical Circuit Theory and Technology, 5th ed., Routledge, Nov 2013.
3. Bird, J.O., Electrical Principles and Technology for Engineering, Elsevier, 2013.
4. Aminurrashid Noordin et. al, Principles of Electric & Electronics (Part 1), Penerbit UTeM, 2013.
5. Asri Din et, al, Principles of Electric & Electronics (Part 2), Penerbit UTeM, 2013.

SEMESTER 4

BEEA 2353
ANALOG ELECTRONICS/
ELEKTRONIK ANALOG

LEARNING OUTCOMES

Upon completion of this course, students should be able to:

1. Analyze the operation of analog electronic circuit based on the component characteristics.
2. Conduct experiment on analog electrical circuit by using measurement equipment and simulation software.
3. Explain effectively in group for assignment.

SYNOPSIS

This course is about the basic principle of analog electronic circuits mostly performing the concepts of amplification. The course subjects contain the concepts of amplifier, BJT as one of devices usually used in amplifiers, small signal amplifier, power amplifiers (class A and class AB), oscillator, active filters and voltage regulators (shunt and series).

REFERENCES

1. Modul Analog Electronics, UTeM
2. Bolysted, R., Nashelsky, L., Electronic Devices and Circuit Theory, 11th Edition, Prentice Hall, 2012.
3. Floyd, T., Electronic Devices,9th, Edition Prentice Hall, 2012.
4. L.K. Maheswari, M.M.S. Anand, Analog Electronics, Eastern economy ed., 2012.
5. Atul P. Godse, Uday A. Bakshi, Electronic circuits, 2009.

BEEA 2374
EMBEDDED SYSTEM/
SISTEM TERBENAM

LEARNING OUTCOMES

Upon completion of this course, students should be able to:

1. Analyze the operation of a microcontroller's architecture, peripherals subsystem.
2. Construct hardware and software of microcontroller based system to solve related problem.
3. Demonstrate business practice and entrepreneurship in microcontroller project development.

SYNOPSIS

This course exposes students to the basic concept of microcontroller and microprocessor. It starts with understanding microcontrollers architecture, compiler, programming language and software. All the interrupt available including timers and counters are explained in details. Then, it continues with the analog digital converter and PWM signal. Students are exposed to the integration of DC motor, servo motor, stepper motor and to the application of programming including the input and output such as switches and 'Light Emitting Diodes', multiple sensors, serial and i2c devices. Students will apply microcontroller to simple mechatronic system.

REFERENCES

1. Peatman, J.B., Design with PIC microcontrollers, 8th ed., Prentice Hall, 1998.
2. http://www.mikroe.com/eng/chapters/view/1/ introductio n-world-of-microcontrollers/ (online PIC book).
3. Milan Verle., PIC Microcontroller, Mikroelektronika.
4. Milan Verle., PIC Microcontroller – Programming in C, Mikroelektronika.
5. Iovine, J., PIC Microcontroller Project Book, McGraw-Hill, USA 2000.

BEEA 2383
CONTROL SYSTEM FUNDAMENTAL/
PENGENALAN SISTEM KAWALAN

LEARNING OUTCOMES

Upon completion of this course, students should be able to:

1. Apply appropriate techniques in describing the characteristics of control systems in time domain.
2. Construct experiments to distinguish system performances of open loop and closed loop systems.
3. Report the analysis of transient and steady state performance for first and second order control systems.

SYNOPSIS

This subject will discuss about the concepts in control system; open and closed loop system; transfer function; block diagram reduction and signal flow graphs; modeling for electrical system, mechanical system and electromechanical system; transient and steady-state performance for first and second order systems; Routh Hurwitz criteria for stability; steady-state error analysis; speed and position control system analysis using ScicosLab.

REFERENCES

1. Norman S. Nise, Control Systems Engineering, 6th Edition, John Wiley & Sons Inc., 2011.
2. Katsuhiko Ogata, Modern Control Engineering, 5th Edition, Pearson, 2010.
3. Richard C. Dort, Robert H. Bishop, Modern Control Systems, 12th Edition, Pearson, 2011.
4. Syed Najib Syed Salim, Maslan Zainon, Control Systems Engineering, 2nd Edition, Penerbit UTeM, 2016.
5. Gopal, M, Control Systems: Principles and Design, 4th Edition, Mc Graw Hill, 2012.
6. Khalil Azha Mohd Annuar et. Al., Introduction to Control System, Penerbit UTeM, 2015

BEEY 2373
ELECTRICAL INSTALLATION II/
PEMASANGAN ELEKTRIK II

LEARNING OUTCOMES

Upon completion of this course, students should be able to:

1. Design three phase electrical installation and motor starter circuit based on industrial application.
2. Perform three phase electrical installation and motor starter circuit based on industrial application.
3. Conform to three phase electrical installation and motor starter circuit based on existing acts, regulations and standards.

SYNOPSIS

This course outlines the principles, design and application of three phase electrical installation system and electrical motor control. The course covers various matters of three phase electrical installation system such electrical requirements by i.e Public Works Department, consultants and electrical utility companies. This would also involve relevant acts, regulations, standards and safety to be complied with the existing legal requirement by the Energy Commission of Malaysia and electrical utility companies. Students will carry out their learning activities on three phase electrical installation and motor control involving planning (sizing of circuit breakers and cables), application designing (electrical drawing, single line diagram, main circuit and control circuit), commissioning (cable installation) and troubleshooting.

REFERENCES

1. Ir Md Nazri, Aminuddin Aman, Md hairul Nizam, Engineering Practice: Wiring System & Motor Starter.
2. Md Nasir, Panduan Pendawaian Elektrik, IBSbuku, 2006.
3. Mohd Nazri, Teknologi Pemasangan Elektrik, DBP.
4. Akta Bekalan Elektrik (447 pindaan 2001).
5. Brian Saddan, IEE wiring regulations 3rd edition, Inspection, Testing and Certification, Newnes, 2001.

SEMESTER 5

BEEI 2383
POWER SYSTEM TECHNOLOGY/
TEKNOLOGI SISTEM KUASA

LEARNING OUTCOMES

Upon completion of this course, students should be able to:

1. Calculate the power system parameters using power system model, per unit (P.U) quantities and protection system requirements.
2. Conduct experiments on power system components using hardware or simulation software.
3. Present written and oral communications to document work and experiment results.

SYNOPSIS

This subject gives the overall information on components of power system to the students. The power system components will be modelled for analysis purposes. The topics covered are including per-unit quantities, transmission lines, transformer, synchronous generator, power flows, symmetrical components, power protection and power system stability.

REFERENCES

1. Glover & Sarma, Power System Analysis and Design, 5th Edition, Thomson Learning, 2012.
2. Hadi Saadat, Power System Analysis, 3rd Edition, McGraw Hill, 2010.
3. Arthur R. Bergen, Power System Analysis, 2nd Edition, Prentice Hall, 2000.
4. Grainger and Stevenson Jr., Power System Analysis, McGraw Hill, 1994.
5. Willian D. Stevenson Jr., Elements of Power System Analysis, 4th Edition, McGraw Hill, 1998.

BEEI 2373
ELECTRICAL MACHINES/
MESIN ELEKTRIK

LEARNING OUTCOMES

Upon completion of this course, students should be able to:

1. Analyze the differences of physical and electrical construction and working principles of DC and AC electrical machines.
2. Perform experiments to determine electrical and mechanical parameters and the performance of DC and AC electrical machines.
3. Conform to the safety and legal requirements for DC and AC electrical machines operation.

SYNOPSIS

This course deals with knowledge and practical related experience on electrical machines. Students will have the opportunity to experience and be assessed on laboratory activities involving determination of electrical and mechanical parameters and also the performance of DC and AC electrical machines covering both types; generators and motors. Students will also be emphasized on the safety and regulatory requirements on electrical machines. On top of that, students will also experience and be assessed on the ability to setup specific laboratory connection which will lead towards a complete electrical machine training system to be used for laboratory activities.

REFERENCES

1. Electric machinery fundamentals, Stephen J. Chapman, 5th ed., New York, NY: McGraw-Hill, 2012.
2. Electric machines, Mulukutla S. Sarma, Mukesh K. Pathak., Singapore: Cengage Learning, 2010.
3. Fitzgerald & Kingsley's electric machinery, Stephen D. Umans., 7th ed., New York, NY: McGraw-Hill Companies, 2014.
4. Electric machines, D.P. Kothari, I.J. Nagrath.,4th ed.., New Delhi: Tata McGraw-Hill, 2010 (Rep. 2011).
5. Linear electric machines, drives, and maglevs handbook, Ion Boldea, Boca Raton, FL: CRC Press/ Taylor & Francis, 2013.

BEEY 3383
POWER ELECTRONICS DEVICES/
PERANTI ELEKTRONIK KUASA

LEARNING OUTCOMES

Upon completion of this course, students should be able to:

1. Analyze the characteristics power electronic devices and performance of uncontrolled rectifier, DC-DC converter and single-phase inverter.
2. Design an uncontrolled rectifier, DC-DC converter and single-phase inverter for various engineering application.
3. Report the analysis on basic power electronics circuitry.

SYNOPSIS

This course covers the basic principles of power electronics devices such as MOSFET, IGBT and thyristor, and its application in uncontrolled rectifier circuit, DC to DC converter and single-phase inverter. It covers aspects such as switching methods, analysis on switching losses, heat dissipation, snubbers and harmonic effects. Students are also introduced to the design aspect of various converter and inverter through computer simulation (PSIM, MATLAB or Pspice) as well as lab practical.

REFERENCES

1. Ned Mohan, Power electronics: a first course, John Wiley & Sons, 2012.
2. Daniel W. Hart, Power Electronics, McGraw-Hill, 2011.
3. Ioinovici, Adrian, Power electronics and energy conversion systems, John Wiley & Sons, 2013.
4. Fang Lin Luo, Hong Ye. Power electronics: advanced conversion technologies – Circuits, Devices, and Applications, Taylor & Francis, 2010.
5. D S. Sivanagaraju, M. Balasubba Reddy, A. Mallikarjuna Prasad, Power electronics, PHI Learning, 2012.

BEEU 3803
INTEGRATED DESIGN PROJECT/
PROJEK REKABENTUK BERSEPADU

LEARNING OUTCOMES

Upon completion of this course, students should be able to:

1. Design solution by synthesizing electrical engineering technology knowledge that will solve broadly defined engineering technology problem in accordance with relevant standards.
2. Utilize modern engineering technology and IT tools in facilitating solutions to broadly defined engineering technology problem with an understanding of the limitations.
3. Evaluate the impact of the design product, component or processes in term of safety, environmental and sustainability factors.
4. Demonstrate effectively teamwork skill in completing the IDP.
5. Apply project management and financial knowledge effectively in completing the IDP.

SYNOPSIS

Integrated Design Project is a course where students have to design an engineering technology project to solve broadly defined problem. Broadly defined problem is engineering problems which cannot be pursued without a coherent and detailed knowledge of defined aspects of a professional discipline with a strong emphasis on the application of developed technology. The design project activities include project management, project planning, project feasibility study, design selection, design costing and sizing, analysis and evaluation. The course focuses on the implementation and integration of product/conceptual design development to produce a comprehensive final technical report, including engineering proposals and drawings, specifications and bills of quantities, cost estimates of development projects given to students, working in groups. Apart from basic engineering design, students are also required to integrate their knowledge of other engineering disciplines such as (but not limited to) structural analysis and design, including material selections, project scheduling techniques and sustainable development considerations into their overall

project work. At the end of this course, the students will be able to comprehend the needs and requirements for product design procedures and are able to appreciate the importance of integration and synthesis of various disciplines of electrical engineering knowledge.

REFERENCES

1. International Engineering Alliance, Graduates attributes and professional competencies, version 3, June 2013.
2. Dieter, G.E. & Schmidt, L.C. (2013). Engineering Design, 5th Edition, McGraw Hill.
3. Theodore R. Bosela Ph.D. PE, 2003, Electrical Systems Design 1st Edition.
4. Ulrich, K.T. & Eppinger, S.D. (2008). Product Design and Development, 4th Edition, McGraw Hill.
5. Keith H. Sueker, Power Electronics Design: A Practitioner's Guide, 2005.
6. Mahesh Patil, Pankaj Rodey, Control Systems for Power Electronics: A Practical Guide. Springer, 2015.
7. Ziyad Salameh, Renewable Energy System Design, 2014 Elsevier Inc.
8. Michael F. Ashby., 2010, Materials Selection in Mechanical Design, Fourth Edition 4th Edition, Butterworth-Heinemann; 4 Edition (October 5, 2010).
9. Malaysian standard guidelines. (Can be access via UTeM's library, guideline: http://bit.ly/2bCWuvi).

BEEY 3803
SISTEM TENAGA DIPERBAHARUI/ RENEWABLE ENERGY SYSTEM

LEARNING OUTCOMES

Upon completion of this course, students should be able to:

1. Classify general principles and technology of Renewable Energy Systems for electrical power generation.
2. Perform experiments of Renewable Energy Systems for system performance.
3. Explain effectively as an individual and group member for conducted assignment and experiment.

SYNOPSIS

This subject is an introductory course for renewable energy system. The material encountered in the subject includes: introduction of energy usage, conventional energy sources, renewable energy sources (e.g PV, Wind, Biomass), basic energy storage, renewable energy case study, and engineering recommendations and generator protection requirements.

REFERENCES

1. Leon Freris & David Infield, Renewable Energy in Power System, Wiley 2008.
2. Godfrey Boyle, renewable Energy: Power for Sustainable Future, Oxford 2014.
3. D.P Kothari, KC Singal, Rakesh Ranjan, Renewable Energy Sources and Emerging Technologies, Prentice Hall of India, 2008.

BEEY 3813
PENGENALAN KEPADA SISTEM PENGANGKUTAN ELEKTRIK/
INTRODUCTION TO ELECTRIC TRANSPORTATION SYSTEM

LEARNING OUTCOMES

Upon completion of this course, students should be able to:

1. Analyze the principle operation of various types of road, railway and elevation electric transportation systems.
2. Construct lab experiment load estimation and energy requirement of electrical transportation.
3. Demonstrate practical competence on basic electric vehicle system.

SYNOPSIS

This subject will discuss on principle aspect of electric transportation systems, covering on railway electrification system, electric & electronic system, data communication, suspension and aerodynamic. Practical lab sessions will expose student on such topics.

REFERENCES

1. Brenna, m. (2018), Electrical Railway Transportation Systems, Wiley.
2. Rajamani, r. (2011). Vehicle Dynamics and Control. Springer Science & Business media.
3. Georg, r. (2012) road vehicle dynamics: fundamental and modelling, crc press Taylor & France

BEEY 3823
TEKNOLOGI PENYIMPANAN TENAGA/
ENERGY STORAGE TECHNOLOGY

LEARNING OUTCOMES

Upon completion of this course, students should be able to:

1. Analyse the performance characteristics of conventional energy storage technologies applied in renewable energy and electrical transportation application.
2. Construct battery management system used in renewable energy and electrical transportation application.
3. Demonstrate understanding on the operation principles of various alternative energy storage technologies.

SYNOPSIS

The first part of the course introduces the students on the need for energy storage in the field of renewable energy and electrical transportation. It will then cover on the basics of battery terminologies, components and its operation principles. After that, analysis will be made on different type of batteries in terms of its characteristics and performances. In this course, students will also learn on the basic construction of battery management system using PSCAD software. Finally, students will be exposed as well on the alternative energy storage technologies such as super capacitor, flywheel, caes etc.

REFERENCES

1. Bruno Scrosati, Jurgen Garche and Werner Tilmetz, “Advances in Battery Technologies for Electric Vehicles” Elsevier Ltd., 2015.
2. John g. Hayes & g. Abas goodarzi, electric powertrain: energy systems, power electronics and drives, Wiley, 2018.
3. Muhammad h. Rashid, “power electronics handbook”, 3rd. ed., Elsevier, 2011.

SEMESTER 6

BEEU 3764
BACHELOR DEGREE PROJECT I/
PROJEK SARJANA MUDA I

LEARNING OUTCOMES

Upon completion of this course, students should be able to:

1. Relate previous works and relevant theories using various resources.
2. Propose objectives and scopes of industrial-based or practice-oriented project.
3. Find appropriate methodologies for successful execution of the project.
4. Explain the project execution and findings in oral and written forms effectively.
5. Imitate appropriate existing concepts in engineering technology fields.

SYNOPSIS

The student needs to plan and implement the project individually that related to the respective engineering technology field. The student should implement a project, do the analysis and apply the theory to solve the problems related to topic. At the end, the student should write a problem based learning report that covers problem statement, literature review, methodology to overcome the problem. The student needs to achieve the objective of the project and presented it in the report.

REFERENCES

1. Manual Projek Sarjana Muda (PSM), Fakulti Teknologi Kejuruteraan, Universiti Teknikal Malaysia Melaka.

BEEY 4393
POWER ELECTRONICS SYSTEMS/
SISTEM ELEKTRONIK KUASA

LEARNING OUTCOMES

Upon completion of this course, students should be able to:

1. Analyze the principle operation, characteristics and performance parameters of three phase inverter and multilevel inverter.
2. Construct a design process appropriate switching technique to improve converters performances using simulation / IT tools.
3. Complete the assignment and experiment in group effectively for the given works related to basic power electronics systems.

SYNOPSIS

This subject will cover the principle operation of three-phase uncontrolled/controlled rectifier, isolated dc-dc converter, three phase inverter and multilevel inverter. It also includes the design and analysis of various switching/ modulation techniques and performance analysis of the converter circuits. The design and performance improvement of converters with selection of appropriate switching techniques will be verified via simulation tools (e.g. Pspice and Matlab).

REFERENCES

1. Haitham Abu-Rub, Atif Iqbal, Jaroslaw Guzinski, High Performance Control of AC Drives with Matlab/ Simulink Models, John Wileys & Sons Ltd., 2012.
2. Ned Mohan, Tore M. Undeland, William P. Robbins, Power Electronics-Converters, Applications and Design, 3rd Edition, John Wiley and Sons, 1995.
3. Ioinovici, Adrian, Power electronics and energy conversion systems, John Wiley & Sons, 2013.
4. Fang Lin Luo, Hong Ye. Power electronics: advanced conversion technologies – Circuits, Devices, and Applications, Taylor & Francis, 2010.
5. D S. Sivanagaraju, M. Balasubba Reddy, A. Mallikarjuna Prasad, Power electronics, PHI Learning, 2012.

BEEY 3404
INDUSTRIAL AUTOMATION/
AUTOMASI INDUSTRI

LEARNING OUTCOMES

Upon completion of this course, students should be able to:

1. Apply knowledge of production, automation and Programmable logic controller systems to solve basic industrial automation system problems.
2. Demonstrate competencies in programmable logic controller system experiments and basic industrial automation system applications.
3. Function effectively as a member or a leader in group experiments and assignments.

SYNOPSIS

This subject is intended to expose students with knowledge and skills of basic industrial automation systems consist of automation in production systems, basic elements of an automated system, types and levels of automation, industrial control systems, hardware components for automation and process control, a PLC system, PLC programming languages, PLC interfacing, a basic HMI/ SCADA system, and integration of a basic PLC-HMI/ SCADA system with hardware components as well as to design and develop a basic industrial automation system.

REFERENCES

1. Groover, m. p. (2019), “automation, production systems, and computer-integrated manufacturing”, 5th ed., Pearson.
2. Manesis, s. & Nikolakopoulos, g. (2018), “introduction to industrial automation”, CRC press.
3. Petruzella, f. d. (2016), “Programmable Logic Controllers”, 5th ed., Mcgraw-Hill education.
4. Bolton, w. (2015), “Programmable Logic Controllers”, 6th ed., Newnes.

BEEY 3833
POLISI TENAGA/
ENERGY POLICY

LEARNING OUTCOMES

Upon completion of this course, students should be able to:

1. Evaluate the success criteria and success of RE and sustainable energy development authority.
2. Analyze the Feed in Tariff (FiT) in Malaysia.
3. Develop the monitoring and reporting plan for the energy policy and energy education.
4. Explain the objectives and strategies of national renewable energy policies, act and action plan.

SYNOPSIS

The course reviews the objectives and strategies of renewable energy policies world-wide. It will examine policy drivers, including environmental impact, community service obligations and industry development, as well as policy instruments and how they are applied, including taxation, legislation, tariffs, targets and incentives. The policies and strategies will be illustrated with international case studies of renewable energy programs.

REFERENCES

1. Hamilton, Michael S., Energy Policy Analysis, A Conceptual Framework, M.E. Sharpe, Inc. 2013.
2. Gilbert M. Masters, Renewable and Efficient Electric Power Systems, Wiley, 2005.
3. Pratt, Joseph A. Exxon: Transforming Energy 1973-2005, 2013.

BEEY 3843
REKABENTUK SISTEM PV/
PV SYSTEM DESIGN

LEARNING OUTCOMES

Upon completion of this course, students should be able to:

1. Perform the design and sizing of PV system that includes inverter, solar cable and protection components.
2. Integrate the design of the PV system's Balance of System (BOS) that includes inverter, solar cable and protection components.
3. Explain the impact of PV system towards sustainable development.

SYNOPSIS

This subject introduces students on basic solar engineering and the design and operation principles of solar cells. The students will also learn the design and sizing of PV systems components that include inverter, solar cable and protection devices. System design will focus on grid-connected application, but the design principles of stand-alone PV system will be discussed. Finally, student will evaluate solar PV system's performance using key performance indicator. The course will utilize actual system data available.

REFERENCES

1. SEDA Malaysia, "Grid-Connected Photovoltaic Systems Design Course", 2015.
2. SEDA Malaysia, "Procedure for the Testing and Commissioning of Grid-Connected Photovoltaic Systems in Malaysia, 2015.
3. Global Sustainable Energy Solutions, "Grid-Connected PV Systems Design and Installation", 2012.

BEEY 3853
APLIKASI ELEKTRONIK KUASA/
POWER ELECTRONICS APPLICATION

LEARNING OUTCOMES

Upon completion of this course, students should be able to:

1. Apply the application of power electronics in renewable energy, industrial appliances, consumer goods, transportation and power system.
2. Execute the function and interaction between components and sub-system used in power electronic applications with their limitation.
3. Complete the assignment and experiment on basic power electronics application.

SYNOPSIS

This course covers on various power electronics application such as variable speed drive, renewable energy generation and high voltage direct current (HVDC) system. Students are exposed on the integration and interaction of sub-systems within a larger and complex system. Various case studies are also introduced through lectures and lab demonstration.

REFERENCES

1. Abraham I. Pressman, Switching and Linear Power Supply, Power Converter Design, Hayden Book Company, Inc., 2004.
2. Ali Emadi, Abdolhosein Nasiri, Stoyan B. Bekiarov, Uninterrruptible Power Supplies and Active Filters, CRC PRESS, 2005.
3. Mehrdad Ehsani, Yimin Gao, Sebastien E. Gay, Ali Emadi, Modern Electric, Hybrid Electric, and Fuel Cell Vehicles. CRC PRESS, 2004.
4. N.G Hingorani and L. Gyugyi, Understanding FACTS: Concepts and Technology of Flexible AC Transmission Systems. Piscataway, NJ: IEEE Press, 2000.
5. Muhammad H. Rashid, Power Electronics – Circuits, Devices, and Applications, 4th Edition, Prentice Hall, 2013
6. Hirofumi Akagi, Edson Hirokazu Watanabe, Mauricio Aredes, Instantaneous Power Theory and Applications to Power Conditioning, Wiley-IEEE Press, 2007.
7. Chris Mi, Abul Masrur, david Gao, Hybrid Electric Vehicles: Principles and Applications with practical, John Wiley & Son, 2011.

BEEY 3863
PEMACU MOTOR DAN SISTEM TARIKAN/
MOTOR DRIVE AND TRACTION SYSTEM

LEARNING OUTCOMES

Upon completion of this course, students should be able to:

1. Evaluate power electronics converters and control strategies for DC and AC motor drive system.
2. Conduct the investigation on the performance of DC and AC motor drives in various operating condition.
3. Demonstrate application of DC and AC drives in modern electrified traction system.

SYNOPSIS

This course aims to provide an overview of variable speed drive system employing power electronic control of DC and AC motor. The topics cover the DC motor drive system from a variable DC chopper supply and a fully controlled bridge supply. The AC induction motor, and its operation from a variable frequency variable voltage inverter are also investigated. The students are also exposed on the application of these drives mechanism in the electrified traction systems.

REFERENCES

1. I. Boldea, Syed A. Nasar and S.A. Nasar, Electric drives, CRC/Taylor & Francis, 2nd edition, 2006.
2. Mukhtar Ahmad, High Performance AC Drives: Modelling Analysis and Control, Sponger, 2010.
3. Andre Veltman, Duco W. J. Pulle, R. W. A. A. De Doncker, Fundamentals of electrical drives, Springer, 2007.
4. J. Pachl, Railway Operation and Control. VTD Rail Publishing, Mountlake Terrace (USA) 2004.
5. Bonnett, Clifford F. Practical railway engineering, London: Imperial College Press, 2005.
6. O.S. Lock, Railway Signalling, 3rd Edition, A & C Black, 1993

SEMESTER 7

BEEU 4774
BACHELOR DEGREE PROJECT II /
PROJEK SARJANA MUDA II

LEARNING OUTCOMES

Upon completion of this course, students should be able to:

1. Complete planned project systematically.
2. (Re)construct solutions of broadly-defined engineering problems using relevant tools and techniques.
3. Display self-reliance in achieving the objectives of the project.
4. Demonstrate project results using appropriate techniques with an understanding of it limitations.
5. Explain the project execution and findings in oral and written form effectively.

SYNOPSIS

This is the second part of the bachelor degree project. Students are expected to continue the project performed in bachelor degree project (BEEU 3764) until completion. At the end of the semester, students are required to submit the bachelor degree project report and present their projects for assessment.

REFERENCES

1. Manual Projek Sarjana Muda (PSM), Fakulti Teknologi Kejuruteraan, Universiti Teknikal Malaysia Melaka.

PRE-REQUISITE

BEEU 3764
BACHELOR DEGREE PROJECT I/
PROJECT SARJANA MUDA I

BEEY 4413
ENERGY EFFICIENCY/
KECEKAPAN TENAGA

LEARNING OUTCOMES

Upon completion of this course, students should be able to:

1. Analyze the properties of electrical power management for improving energy efficiency in electrical system.
2. Demonstrate the functionality of important electrical parameters for controlling electrical energy efficiency through experiments in laboratory.
3. Create awareness among colleagues regarding the importance of energy sustainability.

SYNOPSIS

This is an introductory course to the concept of energy efficiency, energy management, energy audit, HVAC system, available energy saving equipment as well as green and renewable energy systems. At the beginning of the course, students will learn on the importance of energy management which relates to the needs of an electrical energy manager as required by the efficient management of electrical energy regulations 2008 (EMEER 2008). practical wise, students will be exposed to several ways to perform energy audit on buildings through the usage of different equipment once they have grasp the understanding of load apportioning and building efficiency index (BEI). Affective wise, students are required to demonstrate their awareness on the subject matters through the assignment which needs to be presented at the end of the course.

REFERENCES

1. Barney L. Capehart Guide to Energy Management, Seventh Edition, 2016
2. Frank Kreith, D.Yogi Goswami, Handbook Of Energy Efficiency And Renewable Energy, Routledge Handbooks Online,. 2015.
3. Gilbert M.Masters, Renewable And Efficient Electric Power Systems, 2nd Edition, Wiley, 2013.

BEEI 3403
POWER DISTRIBUTION SYSTEM DESIGN/
REKA BENTUK SISTEM PENGAGIHAN KUASA

LEARNING OUTCOMES

Upon completion of this course, students should be able to:

1. Design low voltage distribution system based on problem statement or case study given
2. Perform testing on protection and metering equipment based on low voltage distribution design drawing.
3. Conform to the safety and legal requirements for designing and testing of low voltage distribution system.

SYNOPSIS

This course outlines the principles and design of electrical distribution system. There are various issues of distribution system that is covered; including regulations and standards related to electrical installation. Characteristic and specification for circuit breakers, cable size selection, and method of earthing and earthing arrangement are described in detail. Students will also exposed to the use of standard design procedures and type of testing and troubleshooting required for low voltage system.

REFERENCES

1. Akta Bekalan Elektrik 1990 (Akta 447) & Peraturan-Peraturan Elektrik 1994 (Pindaan 2015), 2015.
2. Malaysian Standard International Electrotechnical Commission (MS IEC) 60364, 2015.
3. Boca Raton, The Electric Power Engineering Handbook, 3rd Ed., CRC Press, 2012.
4. H.L Wilis, R.R. Schrieber, Aging Power Delivery Infrastructures, 2nd Ed., CRC Press, 2013.
5. U.A Bakshi, M.V Bakshi, Transmission & Distribution, 2nd Ed., India Technical Pub., 2012.

BEEY 4873
TREND TEKNOLOGI DALAM INDUSTRI/
TECHNOLOGY TREND IN INDUSTRY

LEARNING OUTCOMES

Upon completion of this course, students should be able to:

1. Assess the current renewable energy and electric transportation technologies and applications.
2. Demonstrate renewable energy and electric transportation system applications commonly used in industries.
3. Function effectively as a team in laboratory works/ project/case studies in renewable energy and electric transportation industrial application.

SYNOPSIS

This course provides students an exposure to current trend and development in technologies related to renewable energy and electric transportation in the industries. It may cover topics on the usage of high end equipment, technology development, technology application as well as services and maintenance. Lectures on various topics will be conducted by experienced lecturers in the respected fields and experts from the industry. For the course implementation, each topic will be covered for 3 to 5 weeks, with course works in parallel.

REFERENCES

1. Mertens, k. (2014). Photovoltaics Fundamentals, Technology and Practice, Wiley.
2. O'hayre, r., cha, s. Colella, w. & Prinz, f.b. (2016). Fuel Cell Fundamentals, 3rd edition, Wiley.
3. Lipman, t.e. & weber, a.z. (2018). Fuel Cells and Hydrogen Production, 2nd edition, Springer.

BEEI 4843
KESERASIAN ELEKTROMAGNETIK SISTEM KUASA/
POWER SYSTEMS ELECTROMAGNETIC COMPATIBILITY

LEARNING OUTCOMES

Upon completion of this course, students should be able to:

1. Analyse the technical requirements of testing, shielding, grounding and bonding of EMC for power systems operation.
2. Perform experiments to determine suitable types of EMC mitigation approach for a different power systems scenario.
3. Conform to the safety and legal requirements for EMC for power systems operation.

SYNOPSIS

The general aim of this course is to enable students to identify and examine the main concepts related to the function and design of EMC mitigation for power transmission, distribution and (to a lesser extent) generation systems. Upon completion of the course, students should be able to understand the reasons why power systems EMC are required, the basic philosophies of EMC phenomena, shielding, grounding and bonding, the components involved and how typical EMC mitigation are designed and configured.

REFERENCES

1. Introduction to Electromagnetic Compatibility (EMC), Clayton R. Paul, 2nd edition, Wiley, 2006.
2. Electric machinery fundamentals, Stephen J. Chapman, 5th ed., New York, NY: McGraw-Hill, 2012.
3. Electric machines, Mulukutla S. Sarma, Mukesh K. Pathak., Singapore: Cengage Learning, 2010.
4. Fitzgerald & Kingsley's electric machinery, Stephen D. Umans., 7th ed., New York, NY: McGraw-Hill Companies, 2014.
5. Electric machines, D.P. Kothari, I.J. Nagrath.,4th ed.., New Delhi: Tata McGraw-Hill, 2010 (Rep. 2011).
6. Linear electric machines, drives, and maglevs handbook, Ion Boldea, Boca Raton, FL: CRC Press/ Taylor & Francis, 2013.

BEEY 4903
SISTEM PEMACU MODEN/
MODERN DRIVE SYSTEM

LEARNING OUTCOMES

Upon completion of this course, students should be able to:

1. Apply the principle of vector-controlled and DTC-controlled drive systems in AC machine.
2. Construct the experiment of three phase AC drive system.
3. Demonstrate practical competence on modern AC drive systems.

SYNOPSIS

This course will discuss the electric drives components, machine reference frame principle, vector transformation, direct vector control of synchronous motor and induction motor drives, dynamic modeling of AC motors, three-phase PWM Voltage Source Inverter fed AC motor drives and direct torque induction motor drives. Closed-loop speed control, current control and voltage control strategies including hysteresis current control, ramp-comparison and space-vector modulation. Students will experience POPBL approach in this course.

REFERENCES

1. Boldea, Syed A. Nasar and S.A. Nasar, Electric drives, CRC/Taylor & Francis, 2nd edition, 2006.
2. Mukhtar Ahmad, High Performance AC Drives: Modelling Analysis and Control, Spronger, 2010.
3. Austin Hughes, Electric motor and drives: Fundamentals, types, and application, Newnes, 3rd edition, 2006.
4. Seung-Ki Sul, Control of Electric Machine Drive System, John Wiley & Sons, 2011.
5. Andre Veltman, Duco W. J. Pulle, R. W. A. A. De Doncker, Fundamentals of electrical drives, Springer, 2007.
6. Piotr Wach, Dynamics and control of electrical drives, springer 2011.

BEEY 4913
KENDERAAN ELEKTRIK HIBRID/
HYBRID ELECTRIC VEHICLE

LEARNING OUTCOMES

Upon completion of this course, students should be able to:

1. Accessing the various architectures and working principle of hybrid electric vehicles in term of energy storage and conversion, transmission, and control subsystems.
2. Assemble various component of hybrid electrical vehicle energy management through simulation.
3. Function effectively as a team in analyzing hybrid electric vehicle performances

SYNOPSIS

Introduction to architectures and technologies associated with hybrid electric vehicles including their components and working principle. Specific topics include electric and hybrid electric drive trains, energy storage (batteries/ ultracapacitors, fuel cells), electromechanical energy conversion (induction and permanent magnet motors and generators), power electronics, vehicle-level modeling and control, and optimization.

REFERENCES

1. I. Boldea, Syed A. Nasar and S.A. Nasar, Electric drives, CRC/Taylor & Francis, 3rd edition, 2016.
2. C. Mi, M. Abul Masrur. Hybrid Electric Vehicle: Principles and Applications with Practical Perspectives, 2nd edition, Wiley, 2017
3. S. Onori, L. Serrao, G. Rizzino. Hybrid Electric Vehicles: Energy Management Strategies, Springer, 2016

SEMESTER 8

BEEU 4786
INDUSTRIAL TRAINING/
LATIHAN INDUSTRI

LEARNING OUTCOME
Upon completion of this course, students should be able to:
1. Display technical competencies and skills gained throughout their internship.
2. Prepare a report on the industrial field daily activities in the logbook systematically.
3. Work effectively with staff, colleagues, and other personnel.
4. Practice professional ethics in accordance with industry rules and regulations.

SYNOPSIS
All students are required to undergo industrial training as part of their curriculum to complete four (4) years course for the Bachelor of Engineering Technology. The duration of training is 24 weeks and it will be taken place at the end of the course (semester 8). The students are expected to gain knowledge and enhance their technical skills within industrial environment relevant to their field of study.

REFERENCES
1. UTeM Guideline Handbook for Industrial Training.

BEEU 4796
INDUSTRIAL TRAINING REPORT/
LAPORAN LATIHAN INDUSTRI

LEARNING OUTCOME
Upon completion of this course, students should be able to:
1. Produce industrial training report.
2. Present report orally on working experience.

SYNOPSIS
All students are required to undergo industrial training as part of their curriculum to complete four (4) years course for the Bachelor of Engineering Technology. The duration of training is 24 weeks and it will be taken place at the end of the course (semester 8). The students are expected to gain knowledge and enhance their technical skills within industrial environment relevant to their field of study.

PRE-REQUISITE
Student required to pass Industrial Training BEEU 4786 in order to pass Industrial training report.

REFERENCES
1. UTeM Guideline Handbook for Industrial Training.

ACADEMIC HANDBOOK SESSION 2021/2022
FOR BACHELOR DEGREE PROGRAMMES

COURSE DETAILS FOR JTKEK PROGRAMMES

FTKEE

FACULTY OF ELECTRICAL AND
ELECTRONIC ENGINEERING TECHNOLOGY
UNIVERSITI TEKNIKAL MALAYSIA MELAKA

BEET COURSE CORE COURSES (K)

SEMESTER 1

BEEE 1303
ENGINEERING WORKSHOP I/
BENGKEL KEJURUTERAAN I

LEARNING OUTCOMES

Upon completion of this course, students should be able to:

1. Explain industrial OSHA and industrial practices in the lab activity.
2. Diagnose an electronic circuit using electronic testing equipment.
3. To build the electronic circuit according to IPC standard and project using the appropriate simulation tools.

SYNOPSIS

Introduction to Industrial Safety and Health + Lab Safety, Equipment- theory, testing and circuit diagnostic & Report writing, Component – introduction, theory, assembly and soldering, Simulation tools - MULTISIM – introduction and application, Problem Based Learning (PBL).

REFERENCES

1. Safety and Security Review for the Process Industries: Application of Hazop, PHA, What-If and SVA Reviews/ Dennis P. Nolan, Amsterdam: Elsevier GPP, 2015.
2. Electronics for Electricians/ Stephen L. Herman, Boston, MA: Cengage Learning, 2017.
3. Soldering, Brazing & Welding: A Manual of Techniques/ Derek Pritchard, Wiltshire: The Crowood Press, 2014.
4. Quality and Performance Excellence: Management, Organization, and Strategy/ James R. Evansi, Boston, MA: Cengage Learning, 2017.
5. Quality Assurance and Reliability Engineering / Edited By Michelle Vine, New Jersey: Clanrye International, 2015.

BEEI 1303
ELECTRIC CIRCUIT FUNDAMENTAL/
PENGENALAN LITAR ELEKTRIK

LEARNING OUTCOMES

Upon completion of this course, students should be able to:

1. Apply analytical method and theorem to DC and AC (steady state) circuits in electrical circuit.
2. Conduct experiment on DC and AC (steady state) circuit based on electrical circuit theorem.
3. Participate effectively for any assignment and experiment.

SYNOPSIS

This subject introduces the students to Ohm's Law, Kircchoff's Laws and use them to calculate current, voltage and power in DC / AC (steady state) circuits. Following this the students will learn the analytical methods namely mesh and nodal analysis. The use of theorems like Thevenin, Norton, Superposition and the Maximum Power Transfer will follow next. The applications of the above tools will cover both dc and ac circuits. This subject will be supported by laboratory works to impart to the students some basic practical skills.

REFERENCES

1. BEEI 1303 Electrical Circuit Fundamental Module.
2. K.A. Charles, N.O. Sadiku, Fundamentals of Electric Circuits, 6th Ed. MCgraw Hill, 2016.
3. Robbins and Miller, Circuit Analysis and Practice, 5th Ed., Thomson and Delmar. 2016
4. Nilsson and Riedel, Electric Circuits, 10th Ed., Prentice Hall, 2014.
5. Thomas L. Floyd, Principles of Electric Circuits, 9th Ed Pearson, 2010.

SEMESTER 2

BEEC 1313
PROGRAMMING FUNDAMENTAL/
ASAS PENGATURCARAAN

LEARNING OUTCOMES

Upon completion of this course, students should be able to:

1. Explain the fundamental of programming principles and algorithms of C programming language.
2. Apply C Programming Language to solve given problems.
3. Manipulate C programming structure using programming fundamentals and principles.

SYNOPSIS

This subject will discuss on basic programming principles such as introduction to C programming consists of syntax, variables and basic data type, more fundamentals programming structure such as operator, rules / condition, looping, function, array and sequences. Furthermore, students will be exposed to topics like pointers, structures, file processing and bit manipulations. The subject is a compulsory to build a basic background in programming.

REFERENCES

1. Paul Deitel, Harvey Deitel, “C How to Program 5th Edition”, Pearson Education Inc, 2007.
2. Jeri R. Hanley, Elliot B. Koffman, Problem Solving and Program Design in C, 7th Edition, Pearson Education Inc, 2013.
3. Dan Gookin, “Beginning Programming with C for Dummies”, 2014.

BEEE 1323
ELECTRONIC FUNDAMENTALS/
PENGENALAN ELEKTRONIK

LEARNING OUTCOMES

Upon completion of this course, students should be able to:

1. Apply the semiconductors theory in electronic applications.
2. Construct electronics circuit of diode, BJT and FET.
3. Report the findings orally or in writing by performing assignments/experiments effectively.

SYNOPSIS

This course will discuss: Bohr Atomic Model: valency, period table of elements, trivalent, tetravalent and pentavalent elements, movement electrons in solid: conductor, insulator and semiconductor, bands theory: energy band, conduction band and forbidden band. Doping, p and n materials, pn junction. Silicon Semiconductor Diodes: characteristics and measurement of forward & reverse biased, composite characteristics and load line analysis, clipping and simple rectifier (half & full) circuits, zener diodes characteristics, and simple shunt regulators. Bipolar Junction Transistor: construction and operation of BJT, BJT characteristics and measurement technique, limits of operation, βdc and αdc, DC biasing – DC Load Lines. Amplification of signal. Transistor as a switch. Field Effect Transistor: construction and operation of FET, FET characteristics & diagram, Shockley’s equation, DC biasing – DC Load Lines-Graphical and mathematical approach.

REFERENCES

1. Thomas L. Floyd; Electronic Devices Conventional Current Version, 10th Edition, New York Pearson Education, Inc. 2018.
2. Sean Westcott, Jean Riescher Westcott; Basic Electronics Theory and Practice, Dulles, VA Mercury Learning and Information 2015.
3. Robert L. Boylestad, Louis Nashelsky; Electronic Devices and Circuit Theory, 11th Edition, Upper Saddle River Pearson Education, Inc. 2013.
4. S. O. Kasap; Principles of Electronic Materials and Devices, 4th Edition, New York McGraw Hill Education, 2018.

BEEE 2373
ELECTRICAL TECHNOLOGY/
TEKNOLOGI ELEKTRIK

LEARNING OUTCOMES

Upon completion of this course, students should be able to:

1. Apply the principles of the electrical system.
2. Measure the application of the power system and electrical transmission in single phase and three-phase.
3. Work individually or in groups effectively to perform assignments/tasks given.

SYNOPSIS

This subject will discuss on Alternating Voltage and Current, Phasor, Magnetic Circuit, Electromotive force, magnetic field strength, relation between B and H, Kirchhoff's law magnetic hysteresis, Single Phase Circuit, series resonance, parallel resonance, power factor, transformer, phasor diagram, equivalent circuit voltage regulation and efficiency, O/C and S/C test, Voltage generation and excitation methods, Basic principles of power system, per unit system, electrical transmission.

REFERENCES

1. Hughes E., Electrical Technology, Longman, 12th Edition, 2016.
2. Alexander, Sadiku, Fundamentals of Electric Circuits, Mc-Graw Hill, 4th Edition, 2009.
3. Thomas L. Flyod, Principles of Electric Circuits, 9th Edition, Pearson, 2010.
4. Hadi Saadat, Power System Analysis with Power System Toolbox Software, Mc-Graw Hill, 2ndEdition.
5. Mc Pherson G., Electrical Machine & Transformers, Wiley, 2nd Edition.

BEEE 1313
ENGINEERING WORKSHOP II/
BENGKEL KEJURUTERAAN II

LEARNING OUTCOMES

Upon completion of this course, students should be able to:

1. Construct an electronic circuit using appropriate software.
2. Demonstrate the electrical wiring technique by using appropriate tools.
3. Fabricate Printed Circuit Board (PCB) using appropriate software and equipments.

SYNOPSIS

This subject will discuss on simulation tools that covers the software of MATLAB, PSpice and AutoCad. Domestic Wiring – theory on domestic wiring, wiring diagram and lab practical. PCB circuit design fabrication using the design software of Proteus, practical design of the printed circuit board using the Proteus.

REFERENCES

1. Requirements for Electrical Installations, IET Wiring Regulations, 17th. Ed. 2015, Institution of Engineering and Technology.
2. Introduction to Pspice Using OrCAD for Circuits and Electronics 2004, by Muhammad H. Rashid.
3. Printed Circuit Board (PCB) Fabrication, 2015, K.M. Gupta Nishu Gupta, Scrivener Publishing LLC.
4. MATLAB for Engineers (5th Edition), London: Pearson, 2017, H. Moore
5. MATLAB: Applications for the Practical Engineer, 2014, K. Bennett, In Tech Open Limited

BEEI 1333
ADVANCED ELECTRIC CIRCUIT/
LITAR ELEKTRIK LANJUTAN

LEARNING OUTCOMES

Upon completion of this course, students should be able to:

1. Analyze first order and second order electrical circuit in transient and frequency response.
2. Conduct experiment on frequency response and electrical circuit measurement.
3. Present written and oral communications to document work and experiment results.

SYNOPSIS

This subject exposes student to the application of several tools in analyzing electrical circuits, such as the Laplace transform and two ports network. The students are required to use the tools to analyze transient and frequency response in electrical circuit.

REFERENCES

1. Charles, K.A & Sadiku, N.O (2013). Fundamental of Electric Circuit (5th Ed.). McGraw-Hill.
2. Nilsson, J. W. & Riedel, S. (2015). Electric Circuit (10th Ed.). Prentice Hall.
3. Glisson, T. H. (2011). Introduction to Circuit Analysis and Design. Springer.
4. Hayt, W. H. (2012). Engineering Circuit Analysis (8th Ed.). McGraw-Hill.
5. O'Maley, J. (2011). Basic Electric Circuit. McGraw-Hill.

PRE-REQUISITE

BEEI 1303
ELECTRIC CIRCUIT FUNDAMENTAL/
PENGENALAN LITAR ELEKTRIK

SEMESTER 3

BEEE 2364
CONTROL PRINCIPLES/
PRINSIP KAWALAN

LEARNING OUTCOMES

Upon completion of this course, students should be able to:

1. Demonstrate performance of a design control system.
2. Display respond of gain adjustment compensator in controlling broadly define system.
3. Work individually or in groups effectively to perform assignments/tasks given.

SYNOPSIS

This subject will discuss on introduction to control system, frequency domain modelling, Laplace transform, transfer function, electric network transfer function, translational mechanical system, rotational mechanical system transfer function, time domain modelling, general state space representation, transfer function and state space conversion, time response, poles, zeros and system response, First and Second order systems, under-damped system, reduction of multiple subsystems, blocks diagrams, feedback systems, signal flow graphs, Mason's rule, Routh- Hurwitz criterion and Gain Adjustment compensator design.

REFERENCES

1. Nise, S Norman, Control Systems Engineering, 8th Edition, John Wiley & Sons Inc., United State of America, 2019.
2. Bishop, Dorf, Modern Control Systems, 10th Edition, Prentice Hall, 2008.
3. Smarajit Ghosh, "Control System: Theory and Applications", Pearson India, 2005.

BEEE 2333
ANALOGUE ELECTRONIC DEVICES/
PERANTI ELEKTRONIK ANALOG

LEARNING OUTCOMES

Upon completion of this course, students should be able to:

1. Apply the fundamental of small signal amplifiers using BJT and FETs and Op-amp circuits.
2. Measure response of single stage, multistage amplifiers and basic op-amp circuit.
3. Report the findings orally or in writing by performing assignments/experiments effectively.

SYNOPSIS

This subject will discuss on BJT Transistor modelling, CE, CC and CB configuration, BJT small signal analysis, Feedback configuration, FET small-signal analysis, Frequency response, Bode plot, Bandwidth, Special amplifier: cascade, Darlington, multistage, differential amplifier circuit, Operational amplifiers: inverting, non-inverting, summing and buffer.

REFERENCES

1. Floyd T.L., "Electronic Devices", Ninth Edition, Prentice Hall, 2014.
2. Boylestad R., Nashelsky L., "Electronic Devices and circuit Theory", Eleventh Edition, Prentice Hall Inc., 2014.
3. Floyd T.L., "Electronic Devices", Ninth Edition, Prentice Hall, 2014.
4. Theodore F. Bogart Jr., Jeffrey S. Beasley and Guillermore Rico, "Electronic Devices and Circuits", Sixth Edition, Pearson Education, 2004
5. S.H.Ruslan et.al. "Elektronik II" Penerbitan UTM 1998.

PRE-REQUISITE

BEEE 1323
ELECTRONIC FUNDAMENTALS/
PENGENALAN ELEKTRONIK

BEET 2313
CONTINUOUS SIGNAL & SYSTEM/
ISYARAT & SISTEM BERTERUSAN

LEARNING OUTCOMES

Upon completion of this course, students should be able to:

1. Apply analysis techniques for continuous signal and systems.
2. Display the waveform of continuous signals and systems by using modern tools.
3. Follow the instructions in a guided assignment independently by optimizing available resources.

SYNOPSIS

This subject will cover various topics such as Introduction to Continuous-Time Signals and Systems: Fundamental Concept, Transformations of Continuous-Time Signals, Signal Characteristics, Common Signals, Continuous-Time Systems and Its Properties, Convolution for Continuous-Time LTI Systems, Properties of Convolution, Properties of LTI Systems; Fourier Series: Introduction of continuous Fourier Series and Its Coefficients, Frequency Spectra, Fourier Series Properties; Fourier Transform: Definition, Properties of continuous Fourier Transform, Application of Fourier Transform, Energy and Power Density Spectra; Laplace Transform: Definition, Properties of Laplace Transform, Response of LTI Systems, etc.

REFERENCES

1. M. J. Roberts, Signals and Systems: Analysis Using Transform Methods & Matlab, 3rd Edition, Mcgraw-Hill Education, 2018.
2. Mrinal Mandal, Amir Asif, Continuous and Discrete Time Signals and Systems, Cambridge University Press, 2017.
3. Charles L. Philips, John M.Parr and Eve A. Riskin, Signals, Systems and Transforms, 5th Edition, Pearson, 2014.
4. Alan V. Oppenheim, Alan S. Willsky and S.Hamid Nawab, Signals and Systems, Pearson New International Edition, 2013.
5. Hwei P. Hsu, Schaum's Outline of Signals and Systems, Mcgraw-Hill Education, 2014.

BEEC 2404
DIGITAL ELECTRONIC/
ELEKTRONIK DIGITAL

LEARNING OUTCOMES

Upon completion of this course, students should be able to:

1. Construct digital system using combinational and sequential logic circuits.
2. Assemble fully-function digital logic circuits.
3. Complete given tasks effectively as an individual or in groups.

SYNOPSIS

This subject will cover the topics of transistor- transistor logic. Logic functions, logic diagrams, Karnaugh maps, Boolean algebra, DeMorgan's Theorem. Numerical codes, arithmetic functions. Combinational circuits such as encoders, decoders, multiplexers, de-multiplexers, comparators. This subject also covers the introduction to memory, programmable logic devices and microcomputer systems. Student will learn the topics on latches and flip-flops, flip-flops operating characteristics and applications. Registers and counters, shift registers, synchronous, asynchronous and modulo counters.

REFERENCES

1. Thomas L. Floyd, Digital Fundamentals, 11th Edition, Prentice Hall, 2015
2. Ronald J.Tocci, Neal S.Widmer, Gregory L.Moss, Digital Systems: Principles and Applications, 12th Edition, Pearson Prentice Hall, 2017.
3. William Klietz, Digital Electronic: A Practical Approach with VHDL, 9th Edition, Pearson Prentice Hall, 2012.
4. Roger L Tokheim, Digital Electronic: Principles and Applications, 8th Edition, McGraw-Hill Education, 2013.

SEMESTER 4

BEET 2333
COMMUNICATION PRINCIPLE/
PRINSIP KOMUNIKASI

LEARNING OUTCOMES

Upon completion of this course, students should be able to:

1. Apply the basic principles of analogue modulation system and noise.
2. Manipulate the performance of analogue modulation techniques through experiments that commonly used in telecommunication system.
3. Report effectively an assignment in a group.

SYNOPSIS

This subject will discuss on Introduction to Telecommunication, Linear Modulation, Single Sideband (SSB) Communication Systems, Angle Modulation, Noise and Introduction to Digital Communication.The rationale of offering this subject is as the progression of communication system where students should have knowledge of communication principles and basic skills required by the industry.

REFERENCES

1. Jeffrey S. Beasely, Jonathan D. Hymer, Gary M. Miller, Electronic Communication: a systems approach, Pearson, 2014.
2. Simon Haykin, Michael Moher, Communication systems, John Wiley & Sons, 2010.
3. Wayne Tomasi, Electronics Communications Systems Fundamentals Through Advanced, Prentice Hall, Fifth Edition, 2004.
4. John G. Proakis, Essentials of Communication Systems Engineering, Prentice Hall, 2005.

BEEE 2354
ELECTRONIC SYSTEMS/
SISTEM ELEKTRONIK

LEARNING OUTCOMES

Upon completion of this course, students should be able to:

1. Analyze the characteristic and performance of the electronics devices.
2. Measure the performance of applied electronic circuits through lab sessions.
3. Report the findings orally or in writing by performing assignments/experiments.

SYNOPSIS

This subject will discuss about Electronic Devices: Application of electronic devices such as SCR, SCS, GTO, LASCR, DIAC, TRIAC, UJT and PUT. Filter: filter applications (basic filter concepts, filter response characteristics, active LP filter, active HP filter, active BP filter, active BS filter and filter response measurement). Oscillator circuits: Feedback oscillator principles, oscillators with the RC feedback circuits, LC feedback circuits, crystal oscillator, Astable and Monostable using op-amp, the 555 timer and applications. Power amplifier circuits: Class A, class B and class AB. Power supply: Power supply circuit, IC voltage regulator and application. These topics are very important to students because it gives emphasis on the design of circuits used in electronic systems

REFERENCES

1. R. L. Boylestad, Electronic Devices, 11th Edition, Prentice Hall, 2013.
2. T.L. Floyd, Electronic Devices, 10th Edition, Prentice Hall, 2015
3. W. D. Stanley, Op-Amps. and Integrated Linear Circuit, 4th Edition, Pearson, 2012
4. Zumbahlen Hank, Linear Circuit Design Handbook, Burlington, 2008.

BEET 2324
DATA COMMUNICATION & NETWORKING/
KOMUNIKASI & RANGKAIAN DATA

LEARNING OUTCOMES

Upon completion of this course, students should be able to:

1. Apply the principles of network fundamentals and routing protocols.
2. Manipulate the functionality, technologies and protocols in a converged switched network.
3. Solve a society/environment based assignment using problem-solver techniques.

SYNOPSIS

This subject will explain the role and nature of the main application protocols and their relation to protocols and services provided to them by the lower layers of the network. This subject is technology focused and student thoroughly learn each technology (Routing, switching and WANs).

The rationale of offering this subject is as providing vast knowledge on networking topics, from fundamentals to advanced application and services, while providing hands-on experience and as well as preparation for Certified Cisco Network Associate (CCNA) exams.

REFERENCES

1. F. Kadmin, Data Communicaton & Networking: Fundamentals & Applications, Teaching & Learning Series, FTK,1st Edition, UTeM Press, 2017.
2. Cisco Networking Academy Routing and Switching course material, cisco.netacad.com. 2019.
3. A. Forouzan, Data Communications and Networking 5th Edition, McGraw Hill, 2017.
4. Michelle Vine, Data Communications and Networking, Jersey City, NJ: Clanrye International, 2015.
5. Vilas S. Bagad, and I. A. Dhotre, Data Communication & Networking, 2nd Edition, Pune Technical Pub, 2013
6. W. Stallings, Data & Computer Communication 10th Edition, Pearson, 2013.
7. Jerry FitzGerald, Alan Dennis and Alexandra Durcikova, Business Data Communications and Networking, 13th EMEA edition, 2019.

BEET 2343
DISCRETE SIGNAL & SYSTEM/
ISYARAT & SISTEM DISKRIT

LEARNING OUTCOMES

Upon completion of this course, students should be able to:

1. Apply appropriate concepts and methods in demonstrating discrete signals and systems.
2. Display the sequence of discrete signals by using modern tools.
3. Report effectively an assignment in a group.

SYNOPSIS

The subject will cover various topics such as Introduction to Discrete-Time Signals and Systems: Fundamental Concept, Transformations of Discrete-Time Signals, Signal Characteristics, Common Signals, Discrete -Time Systems and Its Properties; Time-Domain Analysis of Discrete-Time Signals and Systems: Impulse response of a system, Convolution sum, Graphical method for evaluating the convolution sum, Properties of the convolution sum, Impulse response of LTID systems; Discrete-Time Fourier Series And Transform: Discrete-time Fourier series, Fourier transform for aperiodic functions, Existence of the DTFT, DTFT of periodic functions, Properties of the DTFT and the DTFS, etc; Discrete Fourier Transform: Continuous to discrete Fourier transform, Discrete Fourier transform, Spectrum analysis using the DFT, Properties of the DFT, Convolution using the DFT, etc.

REFERENCES

1. Gang Li, Liping Chang, Sheng Li, Signals and Systems: Fundamentals, Tsinghua University Press, 2015.Charles L. Philips, John M. Parr, Eve A. Riskin, Signals, Systems, and Transforms, Fifth Edition, Boston: Pearson, 2014.
2. Singh, Ravish R, Network Analysis and Synthesis, New Delhi, India: Mcgraw Hill Education (India), 2013.
3. Rawat and Tarun Kumar, Digital Signal Processing, Oxford University Press, 2015.
4. Li Tan, Jean Jiang, Digital Signal Processing: Fundamentals and Applications, Elsevier, 2013.

SEMESTER 5

BEET 3353
TELECOMMUNICATION SYSTEM/
SISTEM TELEKOMUNIKASI

LEARNING OUTCOMES

Upon completion of this course, students should be able to:

1. Apply the concept of telecommunication system.
2. Manipulate the concept of telecommunication system.
3. Report effectively in given tasks and assignment by managing different information from multiple resources for commercialization.

SYNOPSIS

This subject will discuss on Radio Spectrum, Broadcasting, PSTN/ISDN, Satellite System, Radar System, Optical Communication and Wireless Communication. The rationale of offering this subject is as providing fundamental knowledge on various types of telecommunication system and as foundation for higher level subjects.

REFERENCES

1. Louis E. Frenzel, “Principles of Electronic Communication Systems 4th Edition”, McGraw-Hill Education, 2015.
2. Jorge Olenewa, “Guide to Wireless Communications 4th edition”, Course Technology, 2016.
3. Gerard Maral Michel Bousquet, “Satellite Communications Systems: Systems, Techniques and Technology 5th Edition”, Wiley India Pvt.Ltd, 2014.
4. T. Viswanathan, Telecommunication Switching Systems and Networks 2nd edition, Prentice-Hall of India, 2015.
5. Rongqing Huiching,” Introduction to Fiber-Optic Communications 1st Edition”, Academic Press, 2019.

BEET 3363
TELECOMMUNICATION ELECTRONIC/
ELEKTRONIK TELEKOMUNIKASI

LEARNING OUTCOMES

Upon completion of this course, students should be able to:

1. Evaluate telecommunication electronics design and its related component.
2. Follow the procedure in measuring the signal of telecommunication electronics design and its related component.
3. Complete a given task using systematic planning in a group.

SYNOPSIS

This subject will discuss on Radio Frequency Amplifiers, Radio Frequency Oscillators, PLLs and Frequency Synthesizers, Transmitter Circuits and Receiver Circuits. The rationale of offering this subject is as the progression of communication system where students should have knowledge of communication electronics and basic skills required by the industry.

REFERENCES

1. Electronic Communication A Systems Approach, Jeffery S. Beasley, 2014.
2. Modern Telecommunications: Basic Principles and Practices, M.J.N. Sibley, 2018.
3. Practical Communication Theory (2nd Edition), Adamy and Dave, 2014.
4. Radio Frequency Interference in Communications Systems, Bruce R. Albert, 2016.

BEET 3373
DIGITAL SIGNAL PROCESSING/
PEMPROSESAN ISYARAT DIGITAL

LEARNING OUTCOMES

Upon completion of this course, students should be able to:

1. Apply appropriate concepts and methods in demonstrating digital signals processing and systems.
2. Organize the implementation of digital signal processing in a system.
3. Report effectively an assignment in a group.

SYNOPSIS

This subject will discuss on Introduction to DSP, discrete-time signals and systems, spectrum of representation of discrete-time signals, discrete Fourier transform, difference equations and discrete-time systems, z-transform and its applications, analysis and design of digital filters and random signals.

REFERENCES

1. El Ali, Taan S., 2012. Discrete Systems and Digital Signal Processing With Matlab 2nd Ed., Crc Press
2. Proakis, J. And Manolakis, D., 2014. Digital Signal Processing 4th Ed., Pearson.
3. Mitra, S.K., 2011. Digital Signal Processing: A Computer-Based Approach, Mcgraw-Hill.
4. Oppenheim, A. V and Schafer, R.W., 2010. Discrete Time Signal Processing, 3rd Ed., Pearson.
5. Oppenheim, A. V and Schafer, R.W., 2015. 2015 Digital Signal Processing.

BEEC 3483
FUNDAMENTAL OF MICROPROCESSOR & MICROCONTROLLER/
ASAS MIKROPEMPROSES & MIKROPENGAWAL

LEARNING OUTCOMES

Upon completion of this course, students should be able to:

1. Evaluate the interfacing circuitry of basic microprocessor microcontroller based systems and its supporting components using assembly language/ high level programming.
2. Manipulate the memory decoding circuit and microcontroller applications.
3. Perform effectively in given tasks and assignment by managing different information from multiple resources for commercialization.

SYNOPSIS

This subject covers basic fundamental of microprocessors and microcontroller, assembly language programming and hardware interfacing. This course is essentially divided into 3 sections. The first part covers on microprocessor / microcontroller-based Systems and Introduction to 68000 Microprocessor and PIC16F877A. The second part deals with some basic topics of microprocessor instruction set and high level language. The last segment examines topics on The 68000 hardware and PIC16F877A architecture, memory system and Input/output system.

REFERENCES

1. Muhammad Ali Mazidi, Danny Causey and Rolin McKinlay, PIC Microcontroller and Embedded Systems: Using Assembly and C for PIC18, MicroDigitalEd; 2nd edition, 2016.
2. R.S. Kaler, Microprocessors and Microcontrollers, K International Publishing House; Second Edition, 2013.
3. Dogan Ibrahim "PIC Microcontroller Projects in C", Newnes, 2014.
4. Alexander G Dean, Embedded Systems Fundamentals with ARM Cortex-M Based Microcontrollers: A Practical Approach, ARM Education Media UK, 2017.
5. Nik Mohd Kamil Bin Nik Yusof, The Microprocessor – Fundamentals Principles of Software and Hardware using 16-Bit Family, Penerbit UMP, 2012.

BEET 3383
ELECTROMAGNETIC/
ELEKTROMAGNETIK

LEARNING OUTCOMES

Upon completion of this course, students should be able to:

1. Apply the knowledge of electromagnetic laws and principles.
2. Construct experimental investigation of wave electromagnetic properties.
3. Display the ability to perform the task given independently by optimizing available resources.

SYNOPSIS

This subject will discuss on Vector analysis: Vector algebra, coordinate system and transformation, vector calculus; Electrostatics: Electrostatic fields, Gauss Law, Poisson's equation, electric fields in material space, electrostatic boundary; Magnetostatics: Magnetostatic fields, Stokes Theorem, Biot-Savart Law, Gauss Law, magnetic forces, material and devices and magnetostatic boundary; Waves: Maxwell's equations, Faraday's Law, time-varying electromagnetic field, induced emf, displacement current. Electromagnetic wave propagation: free space, lossy and lossless dielectric, etc.

REFERENCES

1. M.N.O. Sadiku, Elements of Electromagnetics, 6th. Edition, Oxford University Press, 2015.
2. Ghosh, Shankar Prasad, Electromagnetic Field Theory, Tata McGraw-Hill Education, 2012.
3. Francois Costa, Electromagnetic Compatibility in Power Electronics, Wiley-ISTE, 2014.
4. Kalluri, Dikshitulu K., Electromagnetic Waves, Materials, and Computation with MATLAB, Boca Raton, FL: CRC Press, 2012.
5. Giancoli DC, "Physics for Scientists and Engineers with Modern Physics", 4th edition Pearson Prentice Hall, 2009.

SEMESTER 6

BEEE 4443
QUALITY MANAGEMENT/
PENGURUSAN KUALITI

LEARNING OUTCOMES

Upon completion of this course, students should be able to:

1. Analyze any given problem and solution based on quality theories.
2. Work individually or in groups effectively to perform assignments/tasks given.
3. Study appropriate quality tools to improve the quality of management, process and product in organisation.

SYNOPSIS

This subject will discuss on the different of quality theories for many organisatition, comparisme international quality standard for customer satisfaction. The designing of strategy planning, strategy process and ethic to enhance the quality improvement for process and, product with using quality tools. Six –sigma is using for management to improve the mangement strategy planning.

REFERENCES

1. David L. Geotsch, Stanley B. Davis, Quality Management for Organizational Excellence Introduction to Total Quality, New Jersey Pearson Education, Inc: 8th Edition - 2016.
2. N. Gopalakrrishnan, Simplified Six Sigma Methodology, Tools and Implimentation, Phi Learning, 2012.
3. Roslina Ab. Wahid, Quality Management Principles, Systems and Tools, Uitm Press, Second Edition-2012.
4. Dale H. Besterfield., Quality Management, Pearson, Nine Edition-2014.
5. Duffy, Grace L, The Asq Quality Improvement Pocket Guide Basic History, Concept, Tools and Relationships, Asq Press – 2013.
6. Duffy, Grace L, The Asq Quality Improvement Pocket Guide Basic History, Concept, Tools and Relationships, Asq Press – 2013.

BEET 3403
DIGITAL COMMUNICATION/
KOMUNIKASI DIGITAL

LEARNING OUTCOMES

Upon completion of this course, students should be able to:

1. Evaluate the digital receiver system by taking into consideration the noise performance.
2. Measure the performance of equalization and multiplexing techniques based on Inter Symbol Interference.
3. Report a society/environment-based assignment.

SYNOPSIS

This subject will discuss on Review of Baseband Signalling, BandpassSignalling, Baseband and Bandpass Detection, Equalization, Synchronization, Multiplexing and Multiple Access and Spread Spectrum. The rationale of offering this subject is as the progression of communication system where students should have knowledge of communication principles and basic skills required by the industry.

REFERENCES

1. Mehmet Safak., Digital Communications, 1st Edition, John Wiley & Sons, 2017.
2. Pierre Jarry Jacques Beneat., Digital Communication: Courses and Exercises with Solutions, 1st Edition, Elsevier, 2015.
3. Hugar, Pundaraja & Jakkannavar, Manjunath Kanakappa. Simulation Based Video Compression Through Digital Communication System. International Journal of Research – Granthaalayah, Vol 5. pp. 85-91, 2018.

PRE-REQUISITE

BEET 2333
COMMUCNICATION PRINCIPLE/
PRINSIP KOMUNIKASI

BEET 3393
TELECOMMUNICATION SWITCHING SYSTEM/
SISTEM PENSUISAN TELEKOMUNIKASI

LEARNING OUTCOMES

Upon completion of this course, students should be able to:

1. Evaluate the principle of telecommunication switching system, signalling and unified communication system.
2. Manipulate the application of telecommunication switching system, signalling and unified communication system.
3. Report an ethics/safety related assignment clearly.

SYNOPSIS

This subject will discuss on Introduction & Evolution of Switching System, Public Switched Telephone Network (PSTN), Telecommunication Traffic, Switching Network, Time Division Switching, Telecommunication Signalling and Network. The rationale of offering this subject is as telecommunication switching system is one of the important elements in telecommunication system, students will be analysing the functionality as well as evaluating the network performance as required by the industry.

REFERENCES

1. Subhajit Chatterjee, Anindya Ghosh, "Telecommunications Switching System", Laxmi, 2015.
2. V. Thiagarajan, Manav Bhatnagar, "Telecommunication Switching Systems and Networks", Prentice-Hall India, 2015.
3. Roger L. Freeman, "Fundamental of Telecommunications", 2nd Edition, Wiley-Ieee Press, 2013.
4. Flood, "Telecommunication Switching, Traffic and Networks", Pearson, 2016.
5. K. Chandrashekhar, "Telecommunication and Switching", Technical, 2008.
6. William A. Flanagan, "Voip and Unified Communications Internet Telephony And The Future Voice Network", John Willey & Sons, Inc. 2012.

BEEU 3764
BACHELOR DEGREE PROJECT I/
PROJEK SARJANA MUDA 1

LEARNING OUTCOMES

Upon completion of this course, students should be able to:

1. Relate previous works and relevant theories using various resources.
2. Propose objectives and scopes of industrial-based or practice-oriented project.
3. Find appropriate methodologies for successful execution of the project.
4. Explain the project execution and findings in oral and written forms effectively.
5. Imitate appropriate existing concepts in engineering technology fields.

SYNOPSIS

The student needs to plan and implement the project individually that related to the respective engineering technology field. The student should implement a project, do the analysis and apply the theory to solve the problems related to topic. At the end, the student should write a problem based learning report that covers problem statement, literature review, methodology to overcome the problem. The student needs to achieve the objective of the project and presented it in the report.

REFERENCES

1. Manual Projek Sarjana Muda (PSM), Fakulti Teknologi Kejuruteraan, Universiti Teknikal Malaysia Melaka.

BEET 3414
RF TECHNIQUE & MICROWAVE/
TEKNIK RF & GELOMBANG MIKRO

LEARNING OUTCOMES

Upon completion of this course, students should be able to:

1. Evaluate transmission line circuits of RF system.
2. Construct the design of transmission line circuits for RF system.
3. Report current sustainable technologies and relate to the given assignment.

SYNOPSIS

This subject will discuss on Introduction to RF and Microwave Engineering; Transmission Lines; Microwave Network Analysis; Impedance Matching and Tuning; Power Dividers and Couplers; Microwave Filter and Microwave Amplifier.

REFERENCES

1. Terry V. Edwards, Michael B. Steer, 'Foundations for Microstrip Circuit Design', (Wiley - IEEE) 4th edition, 2016.
2. Roger C. Palmer, "An Introduction to RF Circuit Design for Communication Systems 1st Edition", Wiley Pvt.Ltd, 2016.
3. Frank Gustrau, RF and Microwave Engineering: Fundamentals of Wireless Communications, Prentice-Hall, 2012.

SEMESTER 7

BEEU 4774
BACHELOR DEGREE PROJECT II/
PROJEK SARJANA MUDA II

LEARNING OUTCOMES

Upon completion of this course, students should be able to:

1. Complete planned project systematically.
2. (Re) Construct solutions of broadly-defined engineering problems using relevant tools and techniques.
3. Display self-reliance in achieving the objectives of the project.
4. Demonstrate project results using appropriate techniques with an understanding of it limitations.
5. Explain the project execution and findings in oral and written form effectively.

SYNOPSIS

This is the second part of the Bachelor Degree Project. Students are expected to continue the project done in Bachelor degree Project Part 1 till completion. At the end of the semester students are required to submit the Bachelor Degree Project report both orally and in writing for assessment.

REFERENCES

1. Manual Projek Sarjana Muda (PSM), Fakulti Teknologi Kejuruteraan, Universiti Teknikal Malaysia Melaka.

PRE-REQUISITE

BEEU 3764
BACHELOR DEGREE PROJECT I/
PROJECT SARJANA MUDA I

BEET 4803
SATELLITE COMMUNICATION/
KOMUNIKASI SATELIT

LEARNING OUTCOMES

Upon completion of this course, students should be able to:

1. Evaluate the mechanic orbit, satellite link and noise in satellite communication system.
2. Measure the performance of satellite link and satellite subsystem in telecommunication.
3. Revise sustainable technologies and relate to the given assignment.

SYNOPSIS

This subject will discuss on introduction to satellite communication - frequency allocations, applications, future trends satellite communication; Orbital mechanics and launchers- Orbital Mechanics, Look angle determination; Satellite subsystem - telemetry, tracking, command and monitoring, power systems, communication subsystems, satellite antenna; Satellite Link Design - design of downlink, uplink design, design of satellite links for specific C/N; and Earth station technology.

REFERENCES

1. Louis J. Ippolito Jr, Satellite Communications Systems Engineering: Atmospheric Effects, Satellite Link Design and System Performance, Wiley, Second Edition, 2017.
2. Timothy Pratt, Charles Bostian, Jeremy Allnutt, Satellite Communication, Wiley Publications 2nd Editions, 2003.
3. Wilbur L. Pritchard, Robert A Nelson, Hendri G. Suyderhoud, Satellite Communication Engineering, Pearson Publications, 2003.
4. M. Richharia, Satellite Communication, BSP, 2003.
5. K.N. Raja Rao, Fundamentals of Satellite Communications, PHI, 2004.

BEET 4813
MOBILE COMMUNICATION/
KOMUNIKASI MUDAH ALIH

LEARNING OUTCOMES

Upon completion of this course, students should be able to:

1. Evaluate the concepts, theories and strategies in solving of mobile communication system.
2. Measure the performance of radio wave propagation model.
3. Revise sustainable technologies and relate to the given assignment.

SYNOPSIS

This subject will discuss Introduction to Mobile Communication Systems: Evolution of Mobile Radio Communications, Mobile Communication Standards: Advanced Mobile Phone System (AMPS), Extended Total Access Communications System (ETACS), Global System for Mobile Communication (GSM), General Packet Radio Service (GPRS), Universal Mobile Telecommunication Service (UMTS), Worldwide Interoperability for Microwave Access (WIMAX) and Long Term Evolution (LTE); Cellular Concept: Frequency Reuse, Handoff Strategies, Interference and System Capacity: Co-channel Interference, Adjacent Channel Interference, Cell Splitting, Sectoring; Radio Wave Propagation in Mobile Communication Systems: Introduction to radio wave propagation, Free-space propagation Model, Propagation Mechanisms: Reflection, Diffraction, Scattering, Path Loss Models: Log-distance Path Loss Model, Log-normal Shadowing. Propagation Models: Okumura, Hata Model. Fading and Multipath: Fast Fading, Slow Fading, Doppler Effect; Channel Assignment and Error Control Techniques: Fixed Channel Assignment, Dynamic channel assignment. Error control techniques, Forward Error Correction (FEC), Automatic Repeat Request (ARQ); Convergence of IP Network in Cellular Network: Introduction to Convergence Network, IP Core Network, Integration of IP Core Network in Cellular Network.

REFERENCES

1. Akaiwa & Yoshihiko, Introduction to Digital Mobile Communication, 2nd Edition, Wiley, 2015.
2. Juha Korhonen, Introduction to 4G mobile communications, London: Artech House, 2014.
3. Arokiamary, V. Jeyasri, Mobile Communication: 2nd Edition, India Technical Publications, 2012.

BEET 4823
OPTICAL COMMUNICATIONS & OPTOELECTRONIC/
KOMUNIKASI OPTIK & OPTO ELEKTRONIK

LEARNING OUTCOMES

Upon completion of this course, students should be able to:

1. Evaluate the basic properties of light in semiconductor and various components of optical communication system.
2. Measure the characteristics of laser diode, LED, photo detector and performance of optical network.
3. Revise sustainable technologies and relate to the given assignment.

SYNOPSIS

This subject will discuss on Introduction of Optical Communication System, Light Propagation in Optical Fibre, Transmission Characteristics of Optical Fibres, Optical Sources, Optical Detectors, Direct Detection Receiver Performance and Fibre Optical Network Applications.
The rationale of offering this subject is as the progression of communication system where the existing transmission media has been replaced to fibre optics due to its advantages. Therefore, students should have basic knowledge of optical communication and basic skills required by the industry.

REFERENCES

1. Keiser, Gerd. Optical Fiber Communication, Mc Graw-Hill Education. 5th, 2015.
2. Swayne, Roderick. Recent progress in optical Technology. Clanrye International 2015.
3. Silver, Marko. Optical Fiber Communication Systems. Clanrye International. 2015.
4. J. M. Senior, “Optical Fiber Communications: Principles and Practice”, Prentice Hall, 1993.
5. Petruzellis T. Optoelectronics, Fiber Optics, and Laser Cookbook, McGraw-Hill.
6. J. C. Palais, “Fiber Optic Communications” 5th edition, Prentice hall, Singapore, 2005.

BEET 4833
ANTENNA ENGINEERING/
KEJURUTERAAN ANTENA

LEARNING OUTCOMES

Upon completion of this course, students should be able to:

1. Evaluate the antenna parameters and structures.
2. Measure the performance of antenna structures and network.
3. Revise sustainable technologies and relate to the given assignment.

SYNOPSIS

This course will discuss on Introduction and Fundamentals of Antenna, Antenna Solution using Maxwell Equation, Types of Antenna, Matching and Feeding Networks, Antenna Measurement and Introduction to Radio-wave Propagation.

REFERENCES

1. C.A. Balanis: “Antenna Theory, Analysis & Design”, 4th Edition, John Wiley 2016.
2. Visser, Hubregt J., Antenna Theory and Applications, Chichester: Wiley, 2012.
3. Fang, D. G., Antenna Theory and Microstrip Antennas, Boca Raton, Fl: Crc Press, 2010.
4. Bakshi, Uday A., Antenna and Wave Propagation, Technical Pub., 2011.
5. Zhang, Zhijun, Antenna Design for Mobile Devices, John Wiley & Sons (Asia), 2011.
6. Poisel, Richard A., Antenna Systems and Electronic Warfare Applications, Artech House, 2012.
7. Yadava, R. L., Antenna & Wave Propagation, Phi Learning Pvt. Ltd, 2011.

SEMESTER 8

BEEU 4786
INDUSTRIAL TRAINING/
LATIHAN INDUSTRI

LEARNING OUTCOME
Upon completion of this course, students should be able to:
1. Show technical competencies and skills gained throughout their internship.
2. Prepare a report on the industrial field daily activities in the log book systematically.
3. Communicate effectively with staff, colleagues and other personnel.
4. Practice professional ethics in accordance with industry rules and regulations.

SYNOPSIS
All students are required to undergo industrial training as part of their curriculum to complete four (4) years course for the Bachelor of Engineering Technology. The duration of training is 24 weeks and it will be taken place at the end of the course (semester 8). The students are expected to gain knowledge and enhance their technical skills within industrial environment relevant to their field of study.

REFERENCES
1. UTeM Guideline Handbook for Industrial Training.

BEEU 4796
INDUSTRIAL TRAINING REPORT/
LAPORAN LATIHAN INDUSTRI

LEARNING OUTCOME
Upon completion of this course, students should be able to:
1. Produce industrial training report.
2. Present report orally on working experience.

SYNOPSIS
All students are required to undergo industrial training as part of their curriculum to complete four (4) years course for the Bachelor of Engineering Technology. The duration of training is 24 weeks and it will be taken place at the end of the course (semester 8). The students are expected to gain knowledge and enhance their technical skills within industrial environment relevant to their field of study.

PRE-REQUISITE
Student required to pass Industrial Training BEEU 4786 in order to pass Industrial training report.

REFERENCES
1. UTeM Guideline Handbook for Industrial Training.

BEEE COURSE CORE COURSES (K)

SEMESTER 1

BEEE 1303
ENGINEERING WORKSHOP I/
BENGKEL KEJURUTERAAN I

LEARNING OUTCOMES
Upon completion of this course, students should be able to:
1. Explain industrial OSHA and industrial practices in the lab activity.
2. Diagnose an electronic circuit using electronic testing equipment.
3. To build the electronic circuit according to IPC standard and project using the appropriate simulation tools.

SYNOPSIS
This subject will discuss on introduction to Introduction to Industrial Safety and Health + Lab Safety, Equipment-theory, industrial practices, testing and circuit diagnostic & Report writing, Component – Introduction, theory, assembly and soldering, Simulation tools - MULTISIM – introduction and application, Problem Based Learning (PBL).

REFERENCES
1. Electronics for electricians, Stephen L. Herman, Boston, MA: Cengage Learning, 2017
2. Soldering, brazing & welding: a manual of techniques, Derek Pritchard, Wiltshire: The Crowood Press, 2014.
3. Quality and performance excellence: Management, Organization, and Strategy, James R. Evansl, Boston, MA: Cengage learning, 2017
4. Quality assurance and reliability engineering, edited by Michelle Vine, New Jersey: Clanrye International, 2015.

BEEI 1303
ELECTRICAL CIRCUIT FUNDAMENTAL/
PENGENALAN LITAR ELEKTRIK

LEARNING OUTCOMES
Upon completion of this course, students should be able to:
1. Apply analytical method and theorem to DC and AC (steady state) circuits in electrical circuit.
2. Conduct experiment on DC and AC (steady state) circuit based on electrical circuit theorem.
3. Participate effectively in assigned tasks.

SYNOPSIS
This subject introduces the students to Ohm's Law, Kirchhoff's Laws and use them to calculate current, voltage and power in DC / AC (steady state) circuits. Following this the students will learn the analytical methods namely mesh and nodal analysis. The use of theorems like Thevenin, Norton, Superposition and the Maximum Power Transfer will follow next. The applications of the above tools will cover both dc and ac circuits. This subject will be supported by laboratory works to impart to the students some basic practical skills.

REFERENCES
1. K.A. Charles,N.O. Sadiku, Fundamentals of Electric Circuits,6th Ed. McGraw Hill, 2016.
2. Robbins and Miller, Circuit Analysis and Practice, 5th. Ed., Thomson and Delmar. 2016
3. Nilsson and Riedel, Electric Circuits,10th Ed., Prentice Hall, 2014
4. Thomas L.Floyd, Principles of Electric Circuits, 9th Ed Pearson, 2010.Page Break

SEMESTER 2

BEEE 1313
ENGINEERING WORKSHOP II/
BENGKEL KEJURUTERAAN II

LEARNING OUTCOMES

Upon completion of this course, students should be able to:

1. Construct an electronic circuit using appropriate software.
2. Demonstrate the electrical wiring technique by using appropriate tools.
3. Fabricate Printed Circuit Board (PCB) using appropriate software and equipment's.

SYNOPSIS

This subject will discuss on Simulation tools that covers the software of MATLAB, PSpice and AutoCad. Domestic Wiring – theory on domestic wiring, wiring diagram and lab practical. PCB circuit design fabrication using the design software of Proteus, practical design of the printed circuit board using the proteus.

REFERENCES

1. Introduction to Pspice Using Or CAD for Circuits and Electronics 2004, by Muhammad H. Rashid.
2. Requirements for Electrical Installations, IET Wiring Regulations, 17th. Ed. 2015, Institution of Engineering and Technology.
3. Printed Circuit Board (PCB) Fabrication, 2015, K.M. Gupta Nishu Gupta, Scrivener Publishing LLC.
4. MATLAB for Engineers (5th Edition), London: Pearson, 2017, H. Moore.
5. MATLAB: Applications for the Practical Engineer, 2014, K. Bennett, InTechOpen Limited.

BEEI 1333
ADVANCED ELECTRIC CIRCUIT/
LITAR LANJUTAN ELEKTRIK

LEARNING OUTCOMES

Upon completion of this course, students should be able to:

1. Analyze first order and second order electrical circuit in transient and frequency response.
2. Conduct experiment on frequency response and electrical circuit measurement.
3. Present written and oral communications to document work and experiment results.

SYNOPSIS

This subject expose student to the application of several tools in analysing electrical circuits, such as the Laplace transform and two ports network. The students are required to use the tools to analyse transient and frequency response in electrical circuit.

REFERENCES

1. Charles, K.A & Sadiku, N.O (2013). Fundamental of Electric Circuit (5th ed.). McGraw-Hill.
2. Nilsson, J. W. & Riedel, S. (2015). Electric Circuit (10th ed.). Prentice Hall.
3. Glisson, T. H. (2011). Introduction to Circuit Analysis and Design. Springer.
4. Hayt, W. H. (2012). Engineering Circuit Analysis (8th ed.). McGraw-Hill.
5. O'Maley, J. (2011). Basic Electric Circuit. McGraw-Hill.

PRE-REQUISITE

BEEI 1303
ELECTRICAL CIRCUIT FUNDAMENTAL/
PENGENALAN LITAR ELEKTRIK

BEEE 1323
ELECTRONIC FUNDAMENTALS/
PENGENALAN ELEKTRONIK

LEARNING OUTCOMES

Upon completion of this course, students should be able to:

1. Apply the semiconductors theory in electronic applications.
2. Construct electronics circuit of diode, BJT and FET.
3. Report the findings orally or in writing by performing assignments/experiments effectively.

SYNOPSIS

This course will discuss:

1. Bohr Atomic Model: valency, period table of elements, trivalent, tetravalent and pentavalent elements. Movement electrons in solid: conductor, insulator and semiconductor. Bands theory: energy band, conduction band and forbidden band. Doping, p and n materials, pn junction.
2. Silicon Semiconductor Diodes: characteristics and measurement of forward & reverse biased, composite characteristics and load line analysis, clipping and simple rectifier (half & full) circuits, Zener diode characteristics, and simple shunt regulators.
3. Bipolar Junction Transistor: construction and operation of BJT, BJT characteristics and measurement technique, limits of operation, βdc and αdc, DC biasing – DC load lines. Amplification of signal. Transistor as a switch.
4. Field Effect Transistor: construction and operation of FET, FET characteristics & diagram, Shockley's equation, DC biasing – DC load lines - graphical and mathematical approach.

REFERENCES

1. Thomas L. Floyd; Electronic Devices Conventional Current Version, 10th Edition, New York Pearson Education, Inc. 2018
2. Sean Westcott, Jean Riescher Westcott; Basic Electronics Theory and Practice, Dulles, VA Mercury Learning and Information 2015.
3. Robert L. Boylestad, Louis Nashelsky; Electronic Devices and Circuit Theory, 11th Edition, Upper Saddle River Pearson Education, Inc. 2013.
4. S. O. Kasap; Principles of Electronic Materials and Devices, 4th Edition, New York McGraw Hill Education, 2018.

BEEC 1313
PROGRAMMING FUNDAMENTAL/
ASAS PENGATURCARAAN

LEARNING OUTCOMES

Upon completion of this course, students should be able to:

1. Explain the fundamental of programming principles and algorithms of C programming language.
2. Apply C Programming Language to solve given problems.
3. Manipulate C programming structure using programming fundamentals and principles.

SYNOPSIS

This subject will discuss on basic programming principles such as introduction to c programming syntax, variables and data types, operators, rules and conditions, looping, functions, arrays, file processing, structures, and unions. This subject is compulsory in order to build a solid foundation in programming.

REFERENCES

1. Dan Gookin, "Beginning Programming with C for Dummies", For Dummies, 2014.
2. Jeri R. Hanley, Elliot B. Koffman, Problem Solving and Program Design in C, 7th Edition, Pearson Education Inc, 2013.
3. Paul Deitel, Harvey Deitel, C How to Program 6th Edition, Pearson Education Inc, 2007.

SEMESTER 3

BEEC 1353
ADVANCED PROGRAMMING/
PENGATURCARAAN LANJUTAN

LEARNING OUTCOMES

Upon completion of this course, students should be able to:

1. Apply programming principles and algorithms understanding in object-oriented programming language.
2. Build a reliable program using object-oriented programming to solve complex problems.
3. Construct maintainable object-oriented application composed of several classes.

SYNOPSIS

This subject will discuss about the concept of object-oriented approach by using Java programming language. The student will be able to apply and construct the object-oriented programming basic structures (such as polymorphism, inheritance, encapsulation and abstraction), interface components, exception and handling. The student should be able to develop a Java application. For practical works, Java 7.0 will be used as the programming language while IDE (NetBeans or Eclipse) IDE or console will be used to execute the program.

REFERENCES

1. Dean, J. and Dean, R. (2014) Introduction to Programming with Java: A Problem Solving Approach. Second Edition. New York: Mcgraw-Hill.
2. Liang, Y. D. (2013) Introduction to Java Programming, 9th Edition. Prentice Hall
3. Cadenhead, R. (2013) Sams Teach Yourself Java In 21 Days: Covers Java 7 And Android. 6th Edition. Indianapolis, Ind.: Sams Pub.
4. Schildt, H. And Skrien, D. J. (2013) Java Programming: A Comprehensive Introduction. 1st Edition. New York: Mcgraw-Hill.

PRE-REQUISITE

BEEC 1313
PROGRAMMING FUNDAMENTAL/
ASAS PENGATURCARAAN

BEEE 2333
ANALOGUE ELECTRONIC DEVICES/
PERANTI ELEKTRONIK ANALOG

LEARNING OUTCOMES

Upon completion of this course, students should be able to:

1. Apply the fundamental of small signal amplifiers using BJT and FETs and Op-amp circuits.
2. Measure response of single stage, multistage amplifiers and basic op-amp circuit.
3. Report the findings orally or in writing by performing assignments or experiments effectively.

SYNOPSIS

This course will discuss on Bipolar Junction Transistor (BJT) modelling, CE, CC and CB configuration, BJT small signal analysis, and feedback configuration, FET Small-Signal Analysis, Frequency Response, Bode Plot, Bandwidth, Special Amplifier: Cascade, Cascode, Darlington, Multistage, Differential Amplifier Circuit, Operational Amplifiers: Inverting, Non-Inverting, Summing And Buffer.

REFERENCES

1. Thomas L. Floyd, Electronic devices: conventional current version, 10th edition, New York Pearson Education, Inc. 2018.
2. Boylestad R., Nashelsky L., “Electronic Devices and circuit Theory”, 11th Edition, Prentice Hall Inc., 2014.
3. Floyd T.L., “Electronic Devices”, 9th Edition, Prentice Hall, 2014.
4. Theodore F. Bogart Jr., Jeffrey S. Beasley and Guillermore Rico, “Electronic Devices and Circuits”, 6th Edition, Pearson Education, 2004
5. S.H.Ruslan et.al. “Elektronik II” Penerbitan UTM 1998.

PRE-REQUISITE

BEEE 1323
ELECTRONIC FUNDAMENTALS/
PENGENALAN ELEKTRONIK

BEEC 2404
DIGITAL ELECTRONICS/
ELEKTRONIK DIGITAL

LEARNING OUTCOMES

Upon completion of this course, students should be able to:

1. Construct digital system using combinational and sequential logic circuits.
2. Assemble fully-function digital logic circuits.
3. Complete given tasks effectively as an individual or in groups.

SYNOPSIS

This subject covers the topics of transistor- transistor logic. Logic functions, logic diagrams, karnaugh maps, Boolean algebra, deMorgan's theorem. Combinational circuits such as encoders, decoders, multiplexers, de-multiplexers, comparators. This subject also covers the introduction to memory, programmable logic devices and microcomputer systems. Student will learn the topics on latches and flip-flops, flip-flops operating characteristics and applications. Registers and counters, shift registers, synchronous, asynchronous and modulo counters. Introduction to finite state machine (fsm).

REFERENCES

1. Digital Electronics and Systems – Teaching and Learning Series Faculty of Engineering Technology Module 12 (2015).
2. Thomas L. Floyd, Digital Fundamentals, 11th Edition, Prentice Hall, 2015.
3. Ronald J.Tocci, Neal S.Widmer, Gregory L.Moss, Digital Systems: Principles and Applications, 12th Edition, Pearson Prentice Hall, 2017.
4. William Klietz, Digital Electronic: A Practical Approach with VHDL, 9th Edition, Pearson Prentice Hall, 2012.
5. Roger L Tokheim, Digital Electronic: Principles and Applications, 8th Edition, McGraw-Hill Education, 2013.
6. Marcovitz A. B., Introduction to Logic Design, 3rd Edition, McGraw Hill, 2009.

BEEE 2343
ENGINEERING DRAWING/
LUKISAN KEJURUTERAAN

LEARNING OUTCOMES

Upon completion of this course, students should be able to:

1. Apply mechanical engineering design drawing using Computer Aided Design (CAD).
2. Draw Geometric, orthographic, isometric, sectional, assembly, part and detailed drawings by using CAD based on the given problem.
3. Work individually or in groups effectively to perform assignments/tasks give.

SYNOPSIS

The course concentrates on Computer Aided Design (CAD) software. AUTOCAD engineering drawing software is used to produce standard engineering drawing. The students will be exposed to CAD interface, editing commands, coordinate system, template preparation and layer in order to produce various types of engineering drawings.

REFERENCES

1. Giesecke, F. E., Mitchell, A., Spencer, H. C., Hill, I. L., Dygdon, J. T. and Novak, J. E.,Lockhart S., 2016, Technical Drawing with Engineering Graphics, 15th Ed., Pearson & Prentice Hall, New Jersey.
2. Mark Dix, Paul Riley, 2017, Discovering AutoCAD 2017, Prentice Hall, London.
3. McAdam, D., R. Winn, 2015, Engineering Graphics: a problem-solving approach, 8th Ed., Pearson Education Canada, Toronto.

SEMESTER 4

BEET 2333
COMMUNICATION PRINCIPLE/
PRINSIP KOMUNIKASI

LEARNING OUTCOMES

Upon completion of this course, students should be able to:

1. Apply the basic principles of analogue modulation system and noise.
2. Manipulate the performance of analogue modulation techniques through experiments that commonly used in telecommunication system.
3. Report effectively an assignment in a group.

SYNOPSIS

This subject will discuss on Introduction to Telecommunication, Linear Modulation, Single Sideband (SSB) Communication Systems, Angle Modulation, Noise and Introduction to Digital Communication The rationale of offering this subject is as the progression of communication system where students should have knowledge of communication principles and basic skills required by the industry.

REFERENCES

1. Jeffrey S. Beasely, Jonathan D. Hymer, Gary M. Miller, Electronic Communication: a systems approach, Pearson, 2014.
2. Simon Haykin, Michael Moher, Communication systems, John Wiley & Sons, 2010.
3. Wayne Tomasi, Electronics Communications Systems Fundamentals Through Advanced, Prentice Hall, Fifth Edition, 2004.

BEEE 2354
ELECTRONIC SYSTEMS/
SISTEM ELEKTRONIK

LEARNING OUTCOMES

Upon completion of this course, students should be able to:

1. Analyse the characteristic and performance of the electronics devices.
2. Measure the performance of applied electronic circuits through lab sessions.
3. Report the findings orally or in writing by performing assignments/experiments.

SYNOPSIS

This subject will discuss about Electronic Devices: Application of electronic devices such as SCR, SCS, GTO, LASCR, DIAC, TRIAC, UJT and PUT. Filter: filter applications (basic filter concepts, filter response characteristics, active LP filter, active HP filter, active BP filter, active BS filter and filter response measurement). Oscillator circuits: Feedback oscillator principles, oscillators with the RC feedback circuits, LC feedback circuits, crystal oscillator, Astable and Monostable using op-amp, the 555 timer and applications. Power amplifier circuits: Class A, class B and class AB. Power supply: Power supply circuit, IC voltage regulator and application. These topics are very important to students because it gives emphasis on the design of circuits used in electronic systems

REFERENCES

1. Zumbahlen Hank, Linear Circuit Design Handbook, Burlington, 2008.
2. R. L. Boylestad, Electronic Devices, 11th Edition, Prentice Hall, 2013.
3. T.L. Floyd, Electronic Devices, 10th Edition, Prentice Hall, 2015.
4. W. D. Stanley, Op-Amps. and Integrated Linear Circuit, 4th Edition, Pearson, 2012.

BEEE 2364
CONTROL PRINCIPLES/
PRINSIP KAWALAN

LEARNING OUTCOMES

Upon completion of this course, students should be able to:

1. Demonstrate performance of a design control system.
2. Display respond of gain adjustment compensator in controlling broadly define system.
3. Work individually or in groups effectively to perform assignments/tasks given.

SYNOPSIS

This subject will discuss on introduction to control system, frequency domain modelling, Laplace transform, transfer function, electric network transfer function, translational mechanical system, rotational mechanical system transfer function, time domain modelling, general state space representation, transfer function and state space conversion, time response, poles, zeros and system response, First and Second order systems, under-damped system, reduction of multiple subsystems, blocks diagrams, feedback systems, signal flow graphs, Mason's rule, Routh- Hurwitz criterion and Gain Adjustment compensator design.

REFERENCES

1. Norman S. Nise, Control System Engineering 7th Edition, Addison Wesley Publishing, 2015.
2. N.C Jagan, Control System 3rd Edition, Hyderabad: Bs Publications, 2015.
3. Syed Najib Syed Salim, Control System Engineering, Penerbit Universiti Teknikal Malaysia Melaka, 2010.

BEEE 2373
ELECTRICAL TECHNOLOGY/
TEKNOLOGI ELEKTRIK

LEARNING OUTCOMES

Upon completion of this course, students should be able to:

1. Apply the principles of the electrical system.
2. Measure the application of the power system and electrical transmission in single phase and three-phase.
3. Work individually or in groups effectively to perform assignments/tasks given.

SYNOPSIS

This subject will discuss on Alternating Voltage and Current, Phasor, Magnetic Circuit, Electromotive force, magnetic field strength, relation between B and H, Kirchhoff's law magnetic hysteresis, Single Phase Circuit, series resonance, parallel resonance, power factor, transformer, phasor diagram, equivalent circuit voltage regulation and efficiency, O/C and S/C test, Voltage generation and excitation methods, Basic principles of power system, per unit system, electrical transmission.

REFERENCES

1. Hughes E., Electrical Technology, Longman, 12th Edition, 2016.
2. Alexander, Sadiku, Fundamentals of Electric Circuits, Mc-Graw Hill, 4th Edition, 2009.
3. Thomas L. Flyod, Principles of Electric Circuits, 9th Edition, Pearson, 2010.
4. Hadi Saadat, Power System Analysis with Power System Toolbox Software, Mc-Graw Hill, 2ndEdition.
5. Mc Pherson G., Electrical Machine & Transformers, Wiley, 2nd Edition.

SEMESTER 5

BEEE 3384
INDUSTRIAL CONTROL/
KAWALAN INDUSTRI

LEARNING OUTCOMES

Upon completion of this course, students should be able to:

1. Construct industrial control system using appropriate industrial based approach.
2. Solve the PLC wiring system and programming language for a specific problem based application.
3. Work individually or in groups effectively to perform assignments/tasks given.

SYNOPSIS

This subject will provide the students both solid theoretical concepts related to industrial control system and a practical to the Programmable Logic Controller PLC) which is generally used in the industrial control. Extensive practical-oriented and hands on session will be given using Omron PLC training kit equipment. The graphical programming tools, Grafcet will be introduced in the course.

REFERENCES

1. Rank D. Petruzella. Programmable Logic Controllers, 5th Edition, New York Mcgraw-Hill Education, 2017.
2. W. Bolton. Programmable Logic Controllers, 6th Edition, Elsevier Newnes, 2015.
3. Mikell P. Groover. Automation, Production Systems, And Computer-Integrated Manufacturing, Forth Edition, Pearson, 2015.
4. Khaled Kamel, Programmable Logic Controllers: Industrial Control, 1st Edition, Mcgraw-Hill Education, 2013.

BEEC 3444
MICROPROCESSOR & MICROCONTROLLER TECHNOLOGY/
TEKNOLOGI MIKROPEMPROSES & MIKROPENGAWAL

LEARNING OUTCOMES

Upon completion of this course, students should be able to:

1. Demonstrate a working knowledge of microprocessor and microcontroller architecture and peripheral subsystem.
2. Manipulate the hardware-software functionalities and technologies to solve given task using appropriate techniques and tools.
3. Propose sustainable solutions to given problems.

SYNOPSIS

This subject will provide the students both solid theoretical and practical applications to the microprocessors / microcontrollers based system. Extensive practical-oriented sessions will be given using microprocessor and pic microcontroller involving program development software, chip programming and debugging. Topics covered are microcomputer system & peripheral design, software, and hardware integration; interrupt control system, analog interfacing, subsystems on microprocessor and microcontroller, applications, peripheral devices and system control design.

REFERENCES

1. The microprocessor fundamental principles of software & hardware using 16-bit family. Nik Mohd Kamil Nik Yusoff, Hazizulden Abdul Aziz. Penerbit Universiti Malaysia Pahang (2012).
2. PIC Microcontroller and Embedded System, Using Assembly and C for PIC18. Muhammad Ali Mazidi et. al. Prentice Hall (2010).
3. PIC microcontroller programming. Mohanamba G. CreateSpace Independent Publishing (2015).

BEEE 3394
PROCESS INTRUMENTATION/
PROSES INSTRUMENTASI

LEARNING OUTCOMES

Upon completion of this course, students should be able to:

1. Select an appopriates process measurement of a control system
2. Measure process control response based on instrumentation approach.
3. Report the findings orally or in writing by performing assignments/experiments.

SYNOPSIS

This subject will discuss on process control block diagram, analog and digital processing, sensors: thermal, mechanical, and optical; final control operation, controller principles: discontinuous, continuous, and composite control modes; analog controllers, control-loop characteristics and system stability.

REFERENCES

1. Johnson, C. D., “Process Control Instrumentation Technology”, 8th Ed., Prentice Hall Inc., 2006.
2. Tony R. Kuphaldt, “Lessons in Industrial Instrumentation”, 2016
3. DeSa, Douglas O.J., “Instrumentation Fundamentals for Process Control”, Taylor& Francis, 2001.
4. Morris, Alan S., “Measurement and Instrumentation Principles”, 3rd Ed, Butterworth-Heinemann, 2001.

BEEE 3404
DATA ACQUISITION & SENSORS/
PEROLEHAN DATA & PENDERIA

LEARNING OUTCOMES

Upon completion of this course, students should be able to:

1. Classify the concept of data acquisition system and sensor.
2. Construct data monitoring system by using appropriate data acquisition tools.
3. Report the findings orally or in writing by performing assignments/experiments effectively.

SYNOPSIS

This subject will discuss on introduction on Data Acquisition and Sensor, Data Acquisition Hardware, Analog and Digital Signals, Signal Conditioning, Serial Data Communications, Distributed & Standalone Loggers/Controllers, IEEE 488 Standard, Ethernet & LAN Systems, The Universal Serial Bus (USB), Specific Techniques, The PCMCIA Card Sensor and application, Labview, Interfacing Software and Hardware, Controlling automation system using Labview.

REFERENCES

1. Cornelius T. Leondes, Knowledge-Based Systems Techniques and Applications, 2000 Elsevier Ltd.
2. John Park, Steve Mackay, Practical Data Acquisition for Instrumentation and Control Systems, Elsevier, 2003.
3. Bruce Mihura, LabVIEW for Data Acquisition, Prentice Hall 2001.
4. Kevin James, PC Interfacing and Data Acquisition: Techniques for Measurement, Instrumentation and Control, Newnes 2000.
5. Labview Course Manual, National Instrument 2006.

SEMESTER 6

BEEE 3414
INDUSTRIAL PNUEMATICS/
PNEUMATIK PERINDUSTRIAN

LEARNING OUTCOMES

Upon completion of this course, students should be able to:

1. Evaluate a pneumatic system for specific problem based application.
2. Apply several design techniques in discrete pneumatic system.
3. Work individually or in groups effectively to perform assignments/tasks given.

SYNOPSIS

This subject will discuss on pneumatic components, actuators, directional control valves, pneumatic control configurations, electro-pneumatic components, electro-pneumatic control configuration, basic sequence and cascade design methods of pneumatic and electro-pneumatic systems; compressed air: production, purification and distribution. The test on this technology will be held in this course to ensure the competency level is up to industrial standard.

REFERENCES

1. Ilango, S. Soundararajan, V., Introduction to Hydraulics and Pneumatics, 3rd Ed, Phi Learning Pvt. Ltd., 2017.
2. Joji Parambath, Industrial Hydraulic Systems: Theory and Practice, Universal-Publishers, 2016.
3. Ian C Turner, Engineering Applications of Pneumatics and Hydraulics, Routledge, 2014.
4. Z.L. Lansky, L.F. Schrod, Industrial Pneumatic Control, Marcel Dekker Inc, 1986.

BEEE 3424
EMBEDDED SYSTEMS APPLICATION/
APLIKASI SISTEM TERBENAM

LEARNING OUTCOMES

Upon completion of this course, students should be able to:

1. Analyse suitable microcontrollers to be used in a given scenario and constraints.
2. Construct embedded systems using programmable or reconfigurable devices.
3. Report the findings orally or in writing by performing assignments/experiments.

SYNOPSIS

This course will discuss about embedded system, characteristics & application areas, introduction to digital hardware technologies, introduction to computer systems & architectures, introduction to high level language programming for embedded systems, introduction to interfacing computer systems to external hardware, application-level embedded system design concepts in industrial electronics. These topics are very important to students because it gives emphasis on the design of circuits used in embedded systems.

REFERENCES

1. Dogan Ibrahim “PIC Microcontroller Projects in C”, Newnes, 2014.
2. Elecia White, “Making Embedded Systems: Design Pattern for Great Software”, O” Reilly Media, 2011.
3. Tim Wilmshurst, “Designing Embedded Systems with PIC Microcontrollers, Second Edition: Principles and Applications”, Newnes, 2009.

BEEU 3764
BACHELOR DEGREE PROJECT I/
PROJEK SARJANA MUDA I

LEARNING OUTCOMES

Upon completion of this course, students should be able to:

1. Relate previous works and relevant theories using various resources.
2. Propose objectives and scopes of industrial-based or practice-oriented project.
3. Find appropriate methodologies for successful execution of the project
4. Explain the project execution and findings in oral and written forms effectively.
5. Imitate appropriate existing concepts in engineering technology fields.

SYNOPSIS

The student needs to plan and implement the project individually that related to the respective engineering technology field. The student should implement a project, do the analysis and apply the theory to solve the problems related to topic. At the end, the student should write a problem based learning report that covers problem statement, literature review, methodology to overcome the problem. The student needs to achieve the objective of the project and presented it in the report.

REFERENCES

1. Manual Projek Sarjana Muda (PSM), Fakulti Teknologi Kejuruteraan, Universiti Teknikal Malaysia Melaka.

BEEE 3804
POWER ELECTRONIC/
ELEKTRONIK KUASA

LEARNING OUTCOMES

Upon completion of this course, students should be able to:

1. Evaluate the performance of power semiconductors switches and power electronics converter.
2. Measure power electronic circuitry in laboratory experiments.
3. Demonstrate effective project management skills in solving given problems.

SYNOPSIS

This course will discuss about power electronics fundamentals, protection devices and circuit, diode rectifiers, AC to DC converters (controlled rectifiers), DC to DC converters (DC choppers), switch-mode power supply and DC to AC converters (inverter).

REFERENCES

1. Daniel W. Hart, Power Electronics, Mcgraw-Hill, 2011.
2. Muhammad H. Rashid, “Power Electronics - Circuit, Devices, and Applications”, Harlow Pearson Education, 2014.
3. Muhammad H. Rashid, Spice for Power Electronics And Electric Power, Boca Raton, FL CRCPress, 2012.

BEEC 4814
COMPUTER INTERFACING/
PENGANTARAMUKAAN KOMPUTER

LEARNING OUTCOMES

Upon completion of this course, students should be able to:

1. Evaluate the components and structure of a computer user interface development framework.
2. Construct user interfaces by using appropriate computer user interface development framework.
3. Demonstrate effective project management skills in solving given problems.

SYNOPSIS

This course covers abstractions and implementation techniques for the design of application using computer interfacing. Topics include: microcontroller, features of different I/O peripheral devices and their interfaces, java programming language and interfacing, sensors and actuators, data analysis and controls and various software and hardware tool which significant for computer interfacing. The assigned readings for the course are from current literature. This subject is taken to expose student to java programming language and interfacing computer with other peripherals. Android studio will be used to demonstrate programming and in laboratories session in this subject.

REFERENCES

1. Jonathan W. Valvano (2011), Embedded Microcomputer Systems: Real Time Interfacing, CL-Engineering.
2. Tony Gaddis (2013), Starting Out with Java (5th Edition), Pearson.
3. Y. Daniel Liang (2011), Introduction to Java Programming, Comprehensive.

BEEE 3814
SEMICONDUCTOR INDUSTRIAL PROCESS/
PROSES PERINDUSTRIAN SEMIKONDUKTOR

LEARNING OUTCOMES

Upon completion of this course, students should be able to:

1. Assessing the basic semiconductor manufacturing process and its materials for front end, back end and testing process.
2. Display competency in demonstrating process flow and identifying hazards in semiconductor process.
3. Demonstrate effective project management skills in solving given problems.

SYNOPSIS

This course on semiconductor fabrication focuses on the concept and the basics of semiconductor materials, process technology and the fabrication processes of Integrated Circuits (ICs). Topics covered in this course are as follow Introduction to Microelectronic Fabrication, Cleanroom Technology, Safety & Protocol, Basics of Semiconductor, Wafer Manufacturing, Semiconductor Materials, Wafer Cleaning, Oxidation, Diffusion, Ion Implantation & Annealing, Metallization (CVD and PVD), Etching and Clean Technology

REFERENCES

1. Hwaiyu Geng, CMfgE, P.E. (Palo Alto, California), “Semiconductor Manufacturing Handbook, Second Edition”, McGraw-Hill Education; 2nd edition (October 6, 2017).
2. ICON Group International, “The 2018-2023 World Outlook for Semiconductor and Related Device Manufacturing”, ICON Group International, Inc. (February 7, 2017).
3. Hong Xiao, “3D IC Devices, Technologies, and Manufacturing (SPIE Press Monographs)”, SPIE-The International Society for Optical Engineering (April 30, 2016).
4. Semiconductor Glossary a Resource for Semiconductor Community, 2nd Edition by (author): Jerzy Ruzyllo (Penn State University, USA), November 2016.

5. Semiconductor-Based Sensors, Edited by: Fan Ren (University of Florida, USA) and Stephen J Pearton (University of Florida, USA), Oct 2016.
6. Ivchenko, E. L., "Optical spectroscopy of semiconductor nanostructures", Harrow Alpha Science 2005.

SEMESTER 7

BEEE 4434
INDUSTRIAL AUTOMATION/
AUTOMASI PERINDUSTRIAN

LEARNING OUTCOMES

Upon completion of this course, students should be able to:

1. Evaluate manufacturing operation towards the improvement of its productivity.
2. Display competence in applying appropriate automation techniques to meet process targets.
1. Work individually or in groups effectively to perform assignments/tasks given.

SYNOPSIS

This course is intended as a broad overview of manufacturing operations and some applications of automation technologies in industrial manufacturing. Automation and control technologies topics are: grafcet, branching OR and AND, and ladder diagram conversion. Topics in manufacturing systems are: productivity, production operation and process strategies, production layout analysis, capacity and work measurement in manufacturing. This subject will prepare students with knowledge and practical aspects on industrial manufacturing process and engineering related operations.

REFERENCES

1. Mikell P. Groover, Automation, Production Systems and Computer-Integrated Manufacturing, Fourth Edition, England Pearson Education Limited, 2016
2. William J. Stevenson, Operations Management, McGraw Hill Education, 13th Edition, 2018
3. Jay Heizer & Barry Render, Operations Management, Pearson Prentice Hall, 11th Edition, 2014
4. F. Robert Jacobs & Richard B. Chase, Operations and Supply Chain Management, 13th Edition, McGraw-Hill Irwin, 2011

BEEE 4443
QUALITY MANAGEMENT/
PENGURUSAN KUALITI

LEARNING OUTCOMES

Upon completion of this course, students should be able to:

1. Analyze any given problem and solution based on quality theories.
2. Work individually or in groups effectively to perform assignments/tasks given.
3. Study appropriate quality tools to improve the quality of management, process and product in organisation.

SYNOPSIS

This subject will discuss on the different of quality theories for many organisatition, comparisme international quality standard for customer satisfaction. The designing of strategy planning, strategy process and ethic to enhance the quality improvement for process and, product with using quality tool. Six –sigma being used for management to improve the management strategy planning

REFERENCES

1. N. Gopalakrrishnan, Simplified Six Sigma Methodology, Tools and Implimentation, Phi Learning, 2012.
2. Roslina Ab. Wahid, Quality Management Principles, Systems and Tools, Uitm Press, Second Edition-2012.
3. Dale H. Besterfield., Quality Management, Pearson, Nine Edition-2014.
4. Duffy, Grace L, The ASQ Quality Improvement Pocket Guide Basic History, Concept, Tools and Relationships, Asq Press - 2013.
5. David L. Geotsch, Stanley B. Davis, Quality Management for Organizational Excellence Introduction to Total Quality, New Jersey Pearson Education, Inc: Eight Edition - 2016.

BEEU 4774
BACHELOR DEGREE PROJECT II/
PROJEK SARJANA MUDA II

LEARNING OUTCOMES

Upon completion of this course, students should be able to:

1. Complete planned project systematically.
2. (Re)construct solutions of broadly-defined engineering problems using relevant tools and techniques.
3. Display self-reliance in achieving the objectives of the project.
4. Demonstrate project results using appropriate techniques with an understanding of it limitations.
5. Explain the project execution and findings in oral and written form effectively.

SYNOPSIS

This is the second part of the Bachelor Degree Project. Students are expected to continue the project performed in Bachelor Degree Project (BEEU 3764) until completion. At the end of the semester, students are required to submit the bachelor degree project report and present their projects for assessment.

REFERENCES

1. Manual Projek Sarjana Muda (PSM), Fakulti Teknologi Kejuruteraan, Universiti Teknikal Malaysia Melaka.

PRE-REQUISITE

BEEU 3764
BACHELOR DEGREE PROJECT I/
PROJECT SARJANA MUDA I

BEEE 4814
INDUSTRAL ROBOTIC/
ROBOTIK PERINDUSTRIAN

LEARNING OUTCOMES

Upon completion of this subject, students should be able to:

1. Determine the manipulator coordinate transformation by integrating kinematics parameters of industrial manipulator.
2. Manipulate the robot parameters based on several techniques.
3. Demonstrate effective project management skills in solving given problems.

SYNOPSIS

Topics covered in this course are mechanics and control of mechanical manipulator, coordinate mapping and transformation, forward kinematics, inverse manipulator kinematics, manipulator dynamics, trajectory generation, linear and nonlinear robot control system. As practical engineers, the knowledge and practical aspects regarding an industrial robotics is a must. Most of the plant nowdays are equipped with their own robots.

REFERENCES

1. J.J. Craig, Introduction to Robotics: Mechanics and Control, 4th Ed., Upper Saddle River, NJ, Pearson Prentice Hall, 2018.
2. Saeed B. Niku, Introduction to Robotics: Analysis, Control, Applications, 2nd Edition, Wiley, 2010.
3. Groover, Industrial Robotics. McGraw-Hill, 2012.

BEEE 4824
ELECTRICAL DRIVES & CONTROL/
PEMACU & KAWALAN ELEKTRIK

LEARNING OUTCOMES

Upon completion of this course, students should be able to:

1. Assess the operation and control techniques for AC and DC motor electrical drive.
2. Measure the speed controlling system of AC and DC motors in laboratory experiments.
3. Demonstrate effective project management skills in solving given problems.

SYNOPSIS

This subject will discuss on elements of electric drive systems, electromechanical modelling, basic speed control of dc motors, switching amplifier field current controllers, armature voltage controllers, troubleshooting of dc drives, modelling of permanent magnet brushless dc motor, braking of dc motors, limitation of electric drives, control of ac motor and braking of ac motors.

REFERENCES

1. Theodore Wildi, Electrical Machines, Drives and Power Systems, Prentice Hall, 2014.
2. Norman S. Nise, Control System Engineering, Wiley, 7th Edition, 2014.
3. Mohamed A. El-Sharkawi, Fundamentals of Electric Drives, Brooks/Cole, 2010.

BEEC 4844
IC TESTING/
PENGUJIAN LITAR BERSEPADU

LEARNING OUTCOMES

Upon completion of this course, students should be able to:

1. Evaluate the performance and effectiveness of the IC testing techniques.
2. Perform different techniques of IC testing effectively.
3. Demonstrate effective project management skills in solving given problems.

SYNOPSIS

This course will introduce to the testing techniques and methodology of the integrated circuit. Students will be exposed to different topics such as types of defects and faults in the wafer fabrication, faults detection using various methods, different type of tests, test pattern generation and also design for testability technique. By using the aide of the software, students will learn how to perform an IC testing by using several methods such as scan and bist techniques. Towards the end of this course, the introduction to the board level testing using boundary scan technique will also be covered.

REFERENCES

1. Navabi, Zainalabedin, Digital system test and testable design using HDL models and architectures, NY Springer, 2011
2. Sahu, Partha Pratim, VLSI Design, McGraw Hill, 2013
3. Ming-Bo Lin, Introduction to VLSI systems: a logic, circuit, and system perspective, CRC Press, 2012
4. Lavagno L., Scheffer L., Martin G., EDA for IC system design, verification, and testing, CRC Press, 2006
5. Francis C Wong, Digital Circuit Testing: A Guide to DFT and Other Techniques, Elsevier Science, 2014

SEMESTER 8

BEEU 4786
INDUSTRIAL TRAINING/
LATIHAN INDUSTRI

LEARNING OUTCOME
Upon completion of this course, students should be able to:
1. Show technical competencies and skills gained throughout their internship.
1. Prepare a report on the industrial field daily activities in the log book systematically.
2. Communicate effectively with staff, colleagues and other personnel.
3. Practice professional ethics in accordance with industry rules and regulations.

SYNOPSIS
All students are required to undergo industrial training as part of their curriculum to complete four (4) years course for the Bachelor of Engineering Technology. The duration of training is 24 weeks and it will be taken place at the end of the course (semester 8). The students are expected to gain knowledge and enhance their technical skills within industrial environment relevant to their field of study.

REFERENCES
1. UTeM Guideline Handbook for Industrial Training.

BEEU 4796
INDUSTRIAL TRAINING REPORT/
LAPORAN LATIHAN INDUSTRI

LEARNING OUTCOME
Upon completion of this course, students should be able to:
1. Produce industrial training report.
2. Present report orally on working experience.

SYNOPSIS
All students are required to undergo industrial training as part of their curriculum to complete four (4) years course for the Bachelor of Engineering Technology. The duration of training is 24 weeks and it will be taken place at the end of the course (semester 8). The students are expected to gain knowledge and enhance their technical skills within industrial environment relevant to their field of study.

PRE-REQUISITE
Student required to pass Industrial Training BEEU 4786 in order to pass Industrial training report.

REFERENCES
1. UTeM Guideline Handbook for Industrial Training.

BEEC COURSE CORE COURSES (K)

SEMESTER 1

BEEC 1303
BASIC ELECTRONICS/
ELEKTRONIK ASAS

LEARNING OUTCOMES
Upon completion of this course, students should be able to:
1. Explain basic functions of discrete electronic components, as well as the fundamental of digital electronics.
2. Solve basic electronic circuit's problems using simple and non-complex techniques.
3. Measure the relevant parameter of electronic circuits such as current, voltage and voltage gain.

SYNOPSIS
This course discusses the concept of basic electronic components quantity such as charge, current, voltage, energy and power. It will cover topics on concepts, functions and applications of electronic components such as resistors, inductors, capacitors, diodes, BJT and FET transistors, switch and relays, and also operational amplifiers. Introduction to the digital systems and the display technologies will also be given.

REFERENCES
1. Thomas L. Floyd, 2010, Principles of Electric Circuits, 9th ed., Prentice Hall.
2. Earl Gates, 2014, Introduction to basic electricity and electronics technology, Clifton Park.
3. Soumitra Kumar Madal, 2013, Basic electronics, new Delhi: Tata McGraw Hill.
4. Atul P. Godse, Uday A. Bakshi, 2013, Basic Electronics, Pune, India: Technical Pub.
5. Om Prakash, 2013, Electronics coursebook, Anmol Publicalt.

BEEC 1323
COMPUTER ENGINEERING WORKSHOP I/
BENGKEL KEJURUTERAAN KOMPUTER

LEARNING OUTCOMES
Upon completion of this course, students should be able to:
1. Follow lab manual on basics of electronics components and circuit simulation software.
2. Assemble the alternatives that exist in the selection of hardware, software and computer engineering facilities when implementing a given task.
3. Complete given tasks effectively as an individual or in groups.

SYNOPSIS
This course will provide students with theoretical and practical applications of basic electrical and electronic applications. The practical-oriented sessions will be given using a simulation of Multisim which simulate the theoretical result of basic electrical circuits, power supply and measurement equipment. Other topics covered are basic computer engineering practices including the microcomputer, microcontroller, microprocessor and computer system architecture including some basic programming introduction using Matlab.

REFERENCES
1. Handbook of International Electrical Safety Practices, Peri, Wiley. 2010.
2. Safety and Security Review for The Process Industries: Application Of Hazop, Pha, What-If And Sva Reviews/ Dennis P. Nolan, Amsterdam: Elsevier Gpp, 2015.
3. Audel Guide to the 2011 National Electrical Code: All New Edition (Audel Technical Trades Series) - Paperback (Mar. 1, 2011) by Paul Rosenberg.
4. Electronics for Electricians / Stephen L. Herman, Boston, Ma: Cengage Learning, 2017.

BEEC 1313
PROGRAMMING FUNDAMENTAL/
ASAS PENGATURCARAAN

LEARNING OUTCOMES

Upon completion of this course, students should be able to:

1. Explain the fundamental of programming principles and algorithms of C programming language.
2. Apply C Programming Language to solve given problems.
3. Manipulate C programming structure using programming fundamentals and principles.

SYNOPSIS

This course will discuss on basic programming principles such as introduction to C programming consists of syntax, variables and basic data type, more fundamentals programming structure such as operator, rules / condition, looping, function, array and sequences. Furthermore, students will be exposed to topics like pointers, structures, file processing and bit manipulations. The course is a compulsory to build a basic background in programming.

REFERENCES

1. Paul Deitel, Harvey Deitel; C How to Program International Edition Contributions by Mohit P. Tahiliani - 7th Ed. - Upper Saddle River, N.J Pearson 2013 - How to Program Series.
2. Jeri R. Hanley, Elliot B. Koffman, “Problem Solving and Program Design in C”, 7th Edition, Pearson Education Inc, 2013.
3. Dan Gookin, “Beginning Programming with C for Dummies”, For Dummies, 2014.
4. Michael A. Vine, C Programming 2nd Edition for The Absolute Beginner, Thomson Course Technology, USA, 2008.

SEMESTER 2

BEEI 1303
ELECTRICAL CIRCUIT FUNDAMENTAL/
PENGENALAN LITAR ELEKTRIK

LEARNING OUTCOMES

Upon completion of this course, students should be able to:

1. Apply analytical method and theorem to DC and AC (steady state) circuits in electrical circuit.
2. Conduct experiment on DC and AC (steady state) circuit based on electrical circuit theorem.
3. Participate effectively for any assignment and experiment.

SYNOPSIS

This course introduces the students to Ohm’s Law, Kirchoff’s Laws and use them to calculate current, voltage and power in DC/AC (steady state) circuits. Following this the students will learn the analytical methods namely mesh and nodal analysis. The use of theorems like Thevenin, Norton, Superposition and the Maximum Power Transfer will follow next. The applications of the above tools will cover both dc and ac circuits. This subject will be supported by laboratory works to impart to the students some basic practical skills.

REFERENCES

1. Thomas L. Floyd, Principles of Electric Circuits, 9th Ed., Pearson, 2010.
2. Charles Alexander and Matthew Sadiku, Fundamentals of Electric Circuits, 6th Ed., McGraw Hill, 2016.
3. Robbins and Miller, Circuit Analysis and Practice, 5th. Ed., Thomson and Delmar. 2016.
4. James W. Nilsson and Susan Riedel, Electric Circuits, 10th Ed., Prentice Hall, 2014.

BEEC 1333
COMPUTER ENGINEERING WORKSHOP II/
BENGKEL KEJURUTERAAN KOMPUTER II

LEARNING OUTCOMES

Upon completion of this course, students should be able to:

1. Manipulate prior knowledge of engineering and safety measure to conduct projects.
2. Demonstrate appropriate techniques for solving related industry problem and suggest possible solution.
3. Complete given tasks effectively as an individual or in groups.

SYNOPSIS

This course will provide students with theoretical and practical applications of basic electronic applications. Students will undergo practical-oriented sessions where they will propose their project idea and later design it, simulate it, and later fabricate the PCB and realize the project by manually placing components on the PCB and soldering. Students will also learn how to troubleshoot circuit problems if the circuit cannot run properly. Project outcome will later be presented and evaluated by lecturer/ instructor.

REFERENCES

1. Electrical Safety Handbook 4th Edition, Dennis K. Neitzel (Author), Al Winfield (Author), Mary Capelli-Schellpfeffer, Mcgraw-Hill Education. 2013.
2. Audel Guide to the 2011 National Electrical Code: All New Edition (Audel Technical Trades Series) - Paperback (Mar. 1, 2011) by Paul Rosenberg.
3. EMC and the Printed Circuit Board: Design, Theory and Layout Made Simple, Mark.I, Wiley. 1998.
4. Turbo CAD Deluxe 2D & 3D Power Precision Design by IMSI 2018.
5. Industrial Bioseparations: Principles and Practice by Daniel Forciniti 2008.

BEEC 2373
COMPUTER ORGANIZATION & ARCHITECTURE/
ORGANISASI & SENIBINA KOMPUTER

LEARNING OUTCOMES

Upon completion of this course, students should be able to:

1. Analyze the internal structure and the function of a computer system.
2. Construct assembly language program to accomplish tasks for a given instruction set.
3. Complete given tasks effectively as an individual or in groups.

SYNOPSIS

This course aims primarily to give the students a general understanding of how computer systems work, both internally (ALU, control unit, registers, etc.) and externally (I/O interfaces, networking, etc.). Such understanding will enable the graduates to make intelligent decisions when confronted with computer-related problems at their workplace. The knowledge and skills gained in this course will also enable the graduates to further their studies in the field of computer architecture, organization, and design. This course will provide student with full understanding of the inner-workings of digital computer systems and tradeoffs present at the interface of hardware-software. Students will get an understanding of the design process of a complex hardware system and hands-on experience with computer- aided design tools.

REFERENCES

1. William Stalling, Computer Organization & Architecture: Designing for Performance, 10th Edition, Prentice Hall, 2015.
2. A.P.Godse, D.A.Godse, Computer Organization And Architecture, 4th Edition, Technical Publications, 2013.
3. Linda Null, Julia Lobur, The essentials of Computer Organization and Architecture, 3rd Edition, Jones & Bartlett Learning, 2012.
4. Organization: design principles and applications, 2nd Edition, Tata McGraw-Hill, 2010.

BEEC 1353
ADVANCED PROGRAMMING/
PENGATURCARAAN LANJUTAN

LEARNING OUTCOMES

Upon completion of this course, students should be able to:

1. Apply programming principles and algorithms understanding in object oriented programming language.
2. Build a reliable program using object oriented programming to solve complex problems.
3. Construct maintainable object oriented application composed of several classes.

SYNOPSIS

This course will discuss about the concept of object-oriented approach by using Java programming language. The student will be able to apply and construct the object oriented programming basic structures (such as polymorphism, inheritance, encapsulation and abstraction), interface components, exception and handling. The student should be able to develop a Java application. For practical works, Java 7.0 will be used as the programming language while IDE (NetBeans or Eclipse) IDE or console will be used to execute the program.

REFERENCES

1. Dean, J. And Dean, R. (2014) Introduction to Programming with Java: A Problem Solving Approach. Second Edition. New York: Mcgraw-Hill.
2. Liang, Y. D. (2013) Introduction to Java Programming, 9th Edition. Prentice Hall.
3. Cadenhead, R. (2013) Sams Teach Yourself Java in 21 Days: Covers Java 7 And Android. 6th Edition. Indianapolis, Ind.: Sams Pub.
4. Schildt, H. And Skrien, D. J. (2013) Java Programming: A Comprehensive Introduction. 1st Edition. New York: Mcgraw-Hill.

PRE-REQUISITE

BEEC 1313
PROGRAMMING FUNDAMENTAL/
ASAS PENGATURCARAAN

SEMESTER 3

BEEC 2363
DATA STRUCTURE & ALGORITHM/
STRUKTUR DATA & ALGORITMA

LEARNING OUTCOMES

Upon completing this course, the student should be able to:

1. Apply the concept of data structures and algorithm analysis to optimize the memory and runtime efficiency.
2. Construct an application system using appropriate data structures and algorithms to maximize the performance of the system.
3. Justify the sustainability of the proposed solutions as individual or in a group.

SYNOPSIS

This course will expose the students to the fundamental knowledge of data structures and algorithm analysis. The topics that will be covered in the course include the introduction to data structures and algorithm analysis, fundamental of C++ programming language, object-oriented development, Array, List, Stack, Queue, Trees, Sorting and Searching algorithms. Apart from the theory, students are asked to apply the data structures and algorithms through a small application that is developed in a team. Microsoft Visual Studio C++ will be used as editor for C++ programming languages in this course.

REFERENCES

1. Weiss, Mark A., Data structures and algorithm analysis in C++, International edition Fourth edition, Pearson Education, 2014.
2. Tony Gaddis, Starting Out with C++ from control structures through objects, Ninth edition, Pearson Education, 2018.
3. Michael Main and Walter Savitch, Data Structures and Other Objects Using C++, Fourth Edition, Pearson, 2011.
4. Adam Drozdek, Data Structures and Algorithms in C++, 4th Ed., Cengage Learning, 2013.
5. Varsha H. Patil, Data Structures Using C++, Oxford University Press, 2012.

BEET 2333
COMMUNICATION PRINCIPLE/
PRINSIP KOMUNIKASI

LEARNING OUTCOMES

Upon completion of this course, students should be able to:

1. Apply the basic principles of analogue modulation system and noise.
2. Manipulate the performance of analog modulation techniques through experiments that commonly used in telecommunication system.
3. Report effectively an assignment in a group.

SYNOPSIS

This course will discuss on Introduction to Telecommunication, Linear Modulation, Single Sideband (SSB) Communication Systems, Angle Modulation, Noise and Introduction to Digital Communication. The rationale of offering this subject is as the progression of communication system where students should have knowledge of communication principles and basic skills required by the industry.

REFERENCES

1. Jeffrey S. Beasely, Jonathan D. Hymer, Gary M. Miller, Electronic Communication: a systems approach, Pearson, 2014.
2. Simon Haykin, Michael Moher, Communication systems, John Wiley & Sons, 2010.
3. Wayne Tomasi, Electronics Communications Systems Fundamentals Through Advanced, Prentice Hall, Fifth Edition, 2004.
4. John G. Proakis, Essentials of Communication Systems Engineering, Prentice Hall, 2005.

BEET 2423
SIGNAL & SYSTEMS/
ISYARAT & SISTEM

LEARNING OUTCOMES

Upon completion of this course, students should be able to:

1. Explain the basic concepts and properties of signal and systems.
2. Use appropriate analysis techniques in solving signal and system problems.
3. Conduct experimental works to analyse the performance of signal and system applications.

SYNOPSIS

The course will cover various topics such as Introduction to Continuous-Time Signals and Systems: Fundamental Concept, Transformations of Continuous-Time Signals, Signal Characteristics, Common Signals, Continuous-Time Systems and Its Properties, Convolution for Continuous-Time LTI Systems, Properties of Convolution, Properties of LTI Systems;

REFERENCES

1. Femmam, Smain, Fundamentals of Signals and Control Systems, John Wiley, 2017.
2. Charles L. Philips, John M. Parr, Eve A. Riskin, Signals, Systems, And Transforms, Fifth Edition, Boston: Pearson, 2014.
3. Singh, Ravish R, Network Analysis And Synthesis, New Delhi,India: Mcgraw Hill Education (India), 2013.
4. Rawat and Tarun Kumar, Digital Signal Processing, Oxford University Press, 2015.
5. Li Tan, Jean Jiang, Digital Signal Processing: Fundamentals and Applications, Elsevier, 2013.

BEEE 2373
ELECTRICAL TECHNOLOGY/
TEKNOLOGI ELEKTRIK

LEARNING OUTCOMES

Upon completion of this course, students should be able to:

1. Apply the principles of the electrical system.
2. Measure the application of the power system and electrical transmission in single phase and three-phase.
3. Work individually or in groups effectively to perform assignments/tasks given.

SYNOPSIS

This course will discuss on Alternating Voltage and Current, Phasor, Magnetic Circuit, Electromotive force, magnetic field strength, relation between B and H, Kirchhoff's law magnetic hysteresis, Single Phase Circuit, series resonance, parallel resonance, power factor, transformer, phasor diagram, equivalent circuit voltage regulation and efficiency, O/C and S/C test, Voltage generation and excitation methods, Basic principles of power system, per unit system, electrical transmission.

REFERENCES

1. Hughes E., Hughes Electrical & Electronic Technology, 12th Edition, United Kingdom Pearson Education Limited 2016.
2. Alexander, Sadiku, Fundamentals of Electric Circuits, Mc-Graw Hill, 4th Edition, 2009.
3. Thomas L. Flyod, Principles of Electric Circuits, 9th Edition, Pearson, 2010.
4. Hadi Saadat, Power System Analysis with Power System Toolbox Software, Mc-Graw Hill, 2ndEdition.
5. Mc Pherson G., Electrical Machine & Transformers, Wiley, 2nd Edition.

SEMESTER 4

BEEC 1343
DATABASE MANAGEMENT SYSTEM /
SISTEM PENGURUSAN PANGKALAN DATA

LEARNING OUTCOMES

Upon completion of this course, students should be able to:

1. Explain the concept of database, data modeling (relationship) and SQL statements.
2. Classify database application based on the current problem requirement.
3. Build database application to complete tasks and assignment as individual or in group.

SYNOPSIS

This course will discuss on introduction to database and file management system. It assists the students to form an understanding of data modeling, file management and database system functionality in information system. The students will be introduced to the process of designing, developing and executing database applications. This course focuses on practical skills to create, control and execute statement for database relationship. MySQL Workbench software will be used to design and model the databases for this course.

REFERENCES

1. Oppel, Andrew J. Databases DeMYSTiFied. 2nd Edition. New York, NY: McGraw-Hill, 2011
2. Jeffrey A. Hoffer, Mary Prescott and Heikki Topi. Modern Database Management. 10th Edition. Prentice Hall. 2011
3. Alan Dennis Barbara, Haley Wixom and David Tegarden. Systems Analysis and Design with UML. 4th Edition. Wiley. 2012
4. Peter Rob and Carlos Coronel. Database Systems: Design, Implementation, and Management. Course Technology. 11th Edition. 2015

BEEC 2383
COMPUTER NETWORK & SYSTEM/
SISTEM & RANGKAIAN KOMPUTER

LEARNING OUTCOMES

Upon completion of this course, students should be able to:

1. Explain the fundamentals of computer network technology and its components
2. Analyze the OSI and TCP/IP models, protocols, and the functions of each layer.
3. Manipulate different types of network devices in developing a sustainable network design.

SYNOPSIS

This course will discuss on introduction to computer network and system, networking equipments and data communications, network architecture and protocols, local and wide area networks, client-server computing: web technologies, wireless, mobile computing and mobile data access computer network and system is a program targeted for dynamic digital and communication. Computer network and system is a program targeted for dynamic digital and communication careers. It is strongly emphasis on technical aspect and enables employers to meet the needs of computer networks and system graduates including some of the best platform for many companies specializing in computer networking and system. This unique curriculum balances theory with extensive hands-on experiments, fundamental of iot, and application of iot.

REFERENCES

1. Behrouz A. Forouzan, Data Communication and Networking, 5th Ed. McGraw Hill, 2017.
2. Faurozan, B, Data Communication & Networking, 5th Ed. McGraw Hill, 2017.
3. Vilas S. Bagad, Iresh A. Dhotre, Data Communication and Networking, 2nd Ed. India Technical Pub., 2013.
4. Moussavi, Massoud, Data communication and networking a practical approach, New York, NYbDelmar Cengage Learning, 2011.
5. Douglas Comer, Computer networks and Internets, 6thEd. Prentice Hall 2014.

BEEC 2393
INTERNET TECHNOLOGY & MULTIMEDIA/
TEKNOLOGI INTERNET & MULTIMEDIA

LEARNING OUTCOMES

Upon completion of this course, students should be able to:

1. Apply the concepts, the infrastructure and the protocols of the Internet technology & multimedia.
2. Manipulate the software functionalities, technologies and protocols to design and implement a fully functional internet application.
3. Select the best Internet application and technology for commercialization.

SYNOPSIS

The course provides an introductory knowledge of technologies related to internet applications and services. The students are introduced to internet protocols and their functionalities as well as hardware required to develop and implement internet applications and services. the course is extended by an introduction to concept of human-computer interaction (hci) and its relationship in system development.the topics include the basic understanding of cognitive psychology, user interface design, and interaction design. This course is highly in demand since in the past few years there has been an explosion in the number of people using the internet as well as multimedia. These users expect robust internet design and security and look forward for high quality material to be delivered over the web, including graphics, animation, sound and movie clips.

REFERENCES

1. Jason Lengstof & Phil Leggetter, “Realtime Web Apps with HTML5 WebSocket, PHP and jQuery”, NY Apress 2013.
2. Steve Suehring & Janet Valade, “PHP, MySQL, JavaScript & HTML5 all-in-one for dummies”, John Wiley & Sons 2013.
3. Alexander Dawson, “Future-proof web design a survival guide”, Chichester John Wiley & Sons 2012.

BEEC 2404
DIGITAL ELECTRONIC/
ELEKTRONIK DIGITAL

LEARNING OUTCOMES

Upon completion of this course, students should be able to:

1. Construct digital system using combinational and sequential logic circuits.
2. Assemble fully-function digital logic circuits.
3. Complete given tasks effectively as an individual or in groups.

SYNOPSIS

This course covers the topics of transistor- transistor logic. Logic functions, logic diagrams, karnaugh maps, boolean algebra, demorgan's theorem. Combinational circuits such as encoders, decoders, multiplexers, de-multiplexers, comparators. this subject also covers the introduction to memory, programmable logic devices and microcomputer systems. Student will learn the topics on latches and flip-flops, flip-flops operating characteristics and applications. Registers and counters, shift registers, synchronous, asynchronous and modulo counters. Introduction to finite state machine (fsm).

REFERENCES

1. Thomas L. Floyd, Digital Fundamentals, 11th Edition, Prentice Hall, 2015
2. Ronald J.Tocci, Neal S.Widmer, Gregory L.Moss, Digital Systems: Principles and Applications, 12th Edition, Pearson Prentice Hall, 2017.
3. William Klietz, Digital Electronic: A Practical Approach with VHDL, 9th Edition, Pearson Prentice Hall, 2012.
4. Roger L Tokheim, Digital Electronic: Principles and Applications, 8th Edition, McGraw-Hill Education, 2013.

SEMESTER 5

BEEC 3453
OPERATING SYSTEMS/
SISTEM PENGOPERASIAN

LEARNING OUTCOMES

Upon completion of this course, students should be able to:

1. Explain the major components of an operating system, its responsibilities and aspects.
2. Analyze the structure and the functionality of the operating system.
3. Manipulate operating system theories to solve basic functional kernel problems.

SYNOPSIS

This course introduces the internal operation of modern operating systems. In particular, the topics that will be covered in the course are Fundamental of Operating Systems, Process & threads Management, Concurrency Control, Memory Management, I/O Systems, File Systems, Protection and Security. Linux will be used as operating system for this course.

REFERENCES

1. William Stallings, Operating Systems: Internals and Design Principles 7th Ed., Pearson Education, 2012.
2. Silberschatz, A., Operating system concepts 9th Ed., John Wiley & Sons, 2014.
3. Haldar, S., Operating Systems, Pearson, 2010.
4. Smith R. W., Linux essentials, Wiley Publishing, 2012.
5. Blum R., Linux command line and shell scripting bible (3rd Edition), Wiley Publishing, 2015.

BEEC 3413
DISCRETE MATHEMATICS/
MATEMATIK DISKRIT

LEARNING OUTCOMES

Upon completion of this course, students should be able to:

1. Explain the fundamental concept of discrete mathematics.
2. Solve problems in computer engineering by referring to discrete mathematic theory.
3. Follow the instructions given to create a simple program using discrete mathematics principles.

SYNOPSIS

Topics covered include: functions, relations and sets: functions (one-to-one, onto, inverses, composition), relations (reflexivity, symmetry, transitivity, equivalence relations), discrete versus continuous functions and relations, sets (venn diagrams, complements, cartesian products, power sets), cardinality and countability; basic logics: propositional logic, logical connectives, truth tables, use of logic to illustrate connectives, normal forms (conjunctive and disjunctive), predicate logic, universal and existential quantification, limitations of predicate logic, boolean algebra, applications of logic to computer engineering; proof techniques: notions of implication, converse, inverse, negation, and contradiction, the structure of formal proofs, direct proofs, proof by counterexample, contraposition, and contradiction, mathematical induction and strong induction; basics of counting: permutations and combinations, counting arguments rule of products, rule of sums, the pigeonhole principle, generating functions, applications to computer engineering; graphs and trees: trees, undirected graphs, directed graphs, spanning trees, shortest path, euler and hamiltonian cycles, traversal strategies; recursion: recursive mathematical definitions, developing recursive equations, solving recursive equations, applications of recursion to computer engineering. The subject is to expose student to the basic of problem solving using discrete mathematics. R software will be used as the software tools for demonstration and laboratories sessions.

REFERENCES

1. David j. Hunter (2015). Essentials of discrete mathematics (3rd ed.). Jones and bartlett publishers.
2. Rosen, Kenneth H. (2012), Discrete Mathematics and Its Applications (7th Ed.), Mcgraw-Hill.
3. James L. Hein (2015), Discrete Structures, Logic, And Computability (4th Ed.), Jones & Bartlett Publishers.
4. Alexander Stanoyevitch (2011), Discrete Structures with Contemporary Applications, Chapman and Hall/ Crc.
5. Epp, Susanna S. (2019), Discrete Mathematics with Applications (5th Edition), Cengange Learning.

BEET 3373
DIGITAL SIGNAL PROCESSING/
PEMPROSESAN ISYARAT DIGITAL

LEARNING OUTCOMES

Upon completion of this course, students should be able to:

1. Apply appropriate concepts and methods in demonstrating digital signals processing and systems.
2. Organize the implementation of digital signal processing in a system.
3. Report effectively an assignment in a group.

SYNOPSIS

Topics covered: introduction to DSP, discrete-time signals and systems, spectrum of representation of discrete-time signals, discrete fourier transform, difference equations and discrete-time systems, z-transform and its applications, analysis and design of digital filters and random signals.

REFERENCES

1. El Ali, Taan S., 2012. Discrete Systems and Digital Signal Processing with Matlab 2nd Ed., Crc Press
2. Proakis, J. and Manolakis, D., 2014. Digital Signal Processing 4th ed., Pearson.
3. Mitra, S.K., 2011. Digital Signal Processing: A Computer-Based Approach, McGraw-Hill.
4. Oppenheim, A. V and Schafer, R.W., 2015. 2015 Digital Signal Processing,

PRE-REQUISITE

BEET 2423
SIGNAL & SYSTEMS/ ISYARAT & SISTEM

BEEC 3433
COMPUTER NETWORK & SECURITY/
RANGKAIAN & KESELAMATAN KOMPUTER

LEARNING OUTCOMES

Upon completion of this course, students should be able to:

1. Analyze the appropriate security system mechanism for computer software and computer network.
2. Integrate the suitable components in providing service and security mechanism in the computer and network system.
3. Present the assignment or technical report based on computer and network security issues.

SYNOPSIS

This course will be discussed on how to control failures of confidentiality, integrity and availability in applications, databases, operating systems and networks alike. Beside that students should be able to implement the cyber law to protect their rights. Students also will learn on how to plan the recovery solution if any disaster happens to the computing environment.

REFERENCES

1. William stallings, “computer security: principles and practice”, pearson international edition, 2nd edition, 2012
2. Alfred basta, “computer security & penetration testing”, boston, ma: course technology, 2013
3. Chuck easttom, “computer security fundamentals”, pearson, 2012
4. Douglas jacobson, “computer security literacy: staying safe in digital world”, crc press, 2013
5. Daniel w. Dieterle, “basic security testing with kali linux 2”, createspace independent, 2016

PRE-REQUISITE

BEEC 2383
COMPUTER NETWORK & SYSTEM/
SISTEM & RANGKAIAN KOMPUTER

BEEC 3444
MICROPROCESSOR & MICROCONTROLLER TECHNOLOGY/
TEKNOLOGI MIKROPEMPROSES & MIKROPENGAWAL

LEARNING OUTCOMES

Upon completion of this course, students should be able to:

1. Demonstrate a working knowledge of microprocessor and microcontroller architecture and peripheral subsystem.
2. Manipulate the hardware-software functionalities and technologies to solve given task using appropriate techniques and tools.
3. Present the results in the oral or written forms effectively

SYNOPSIS

This course will provide the students both solid theoretical and practical applications to the microprocessors / microcontrollers based system. Extensive practical-oriented sessions will be given using microprocessor and pic microcontroller involving program development software, chip programming and debugging. Topics covered are microcomputer system & peripheral design, software and hardware integration; interrupt control system, analog interfacing, subsystems on microprocessor and microcontroller, applications, peripheral devices and system control design.

REFERENCES

1. The microprocessor fundamental principles of software & hardware using 16-bit family. Nik Mohd Kamil Nik Yusoff, Hazizulden Abdul Aziz. Penerbit Universiti Malaysia Pahang (2012).
2. PIC microcontroller and embedded systems using assembly and C for PIC18. Muhammad Ali Mazidi et. al. Prentice Hall (2016)
3. PIC microcontroller programming Mohanamba G. CreateSpace Independent Publishing (2015)
4. Microcontroller theory and applications with the PIC18F. M. Rafiquzzaman. Hoboken, NJ John Wiley & Sons (2011)

SEMESTER 6

BEEU 3764
BACHELOR DEGREE PROJECT I/
PROJEK SARJANA MUDA 1

LEARNING OUTCOMES

Upon completion of this course, students should be able to:

1. Relate previous works and relevant theories using various resources.
2. Propose objectives and scopes of industrial-based or practice-oriented project.
3. Find appropriate methodologies for successful execution of the project.
4. Explain the project execution and findings in oral and written forms effectively.
5. Imitate appropriate existing concepts in engineering technology fields.

SYNOPSIS

The student needs to plan and implement the project individually that related to the respective engineering technology field. The student should implement a project, do the analysis and apply the theory to solve the problems related to topic. At the end, the student should write a problem based learning report that covers problem statement, literature review, methodology to overcome the problem. The student needs to achieve the objective of the project and presented it in the report.

REFERENCES

1. Manual Projek Sarjana Muda (PSM), Fakulti Teknologi Kejuruteraan, Universiti Teknikal Malaysia Melaka.

BEEC 3463
SOFTWARE ENGINEERING/
KEJURUTERAAN PERISIAN

LEARNING OUTCOMES

Upon completion of this course, students should be able to:

1. Explain the basic concept, element and uses of software engineering.
2. Evaluate various solutions for a given software engineering problems.
3. Construct UML diagrams in the process of analysis and design.

SYNOPSIS

This course will discuss on Introduction to software development, software engineering and database system; Software lifecycle model, CASE tools, requirement definition and management, requirement analysis, requirement specification document. Software design and modelling; design process, design quality and metrics, design strategy, software testing, database management and query language. Software Project management including estimation and quality management. Unified Modelling Language (UML) is used to design and model in the software development process. For this purpose, Poseidon will be used as the software tools.

REFERENCES

1. Sommerville, I (2016) Software Engineering, 10th Edition: International Edition, Pearson Education
2. IEEE Standards Association, “IEEE Std 12207-2008 Systems and software engineering – Software life cycle processes”, 2008.
3. Sommerville, I (2011) Software Engineering, 9th Edition, Addison Wesley.
4. Pressman, R.S (2015) Software Engineering a Practitioner’s Approach, 8th Edition. McGraw-Hill.
5. CMMI Product Team, “CMMI for Development, Version 1.2”, August 2008.
6. Elmasri, Navathe, (2009) Fundamentals of Database Systems6th Edition. Addison Wesley.

BEEC 3423
COMPUTER SYSTEM ENGINEERING/
KEJURUTERAAN SISTEM KOMPUTER

LEARNING OUTCOMES

Upon completion of this course, students should be able to:

1. Analyze the complexity of the computer system with respect to reliability and performance.
2. Adapt the concept and theory of computer system engineering to solve the given experimental problem
3. Demonstrate proficiency in the computer system problem solving skills.

SYNOPSIS

This course covers topics on the engineering of computer software and hardware systems: techniques for controlling complexity; strong modularity using client-server design, virtual memory, and threads; networks; atomicity and coordination of parallel activities; recovery and reliability; privacy, security, and encryption; and impact of computer systems on society.

Knowledge, understanding, analysis and design abilities are developed principally through lectures and tutorials. Practical and design skills are developed through laboratory work involving problem solving assignments and practical exercises.

REFERENCES

1. Dhillon, B. S. Computer system reliability: safety and usability. Boca Raton, FL: CRC Press, 1st ed, 2013.
2. Umakishore Ramachandran and William D. Leahy. Computer systems: an integrated approach to architecture and operating systems. Boston, MA: Addison-Wesley, 1st ed, 2011.
3. Michael J. Flynn, Wayne Luk. Computer system design: system-on-chip. Hoboken, NJ: Wiley, 1st ed, 2011.

SEMESTER 7

BEEU 4774
BACHELOR DEGREE PROJECT II/
PROJEK SARJANA MUDA II

LEARNING OUTCOMES

Upon completion of this course, students should be able to:

1. Complete planned project systematically
2. (Re)construct solutions of broadly-defined engineering problems using relevant tools and techniques.
3. Display self-reliance in achieving the objectives of the project.
4. Demonstrate project results using appropriate techniques with an understanding of it limitations.
5. Explain the project execution and findings in oral and written form effectively.

SYNOPSIS

This is the second part of the Bachelor Degree Project. Students are expected to continue the project done in Bachelor degree Project Part 1 till completion. At the end of the semester students are required to submit the Bachelor Degree Project report both orally and in writing for assessment.

REFERENCES

1. Manual Projek Sarjana Muda (PSM), Fakulti Teknologi Kejuruteraan, Universiti Teknikal Malaysia Melaka.

PRE-REQUISITE

BEEU 3764
BACHELOR DEGREE PROJECT I/
PROJECT SARJANA MUDA I

BEEE 4443
QUALITY MANAGEMENT/
PENGURUSAN KUALITI

LEARNING OUTCOMES

Upon completion of this course, students should be able to:

1. Analyze any given problem and solution based on quality theories.
2. Work individually or in groups effectively to perform assignments/tasks given.
3. Study appropriate quality tools to improve the quality of management, process and product in organisation.

SYNOPSIS

This course will discuss on the different of quality theories for many organisatition, comparisme international quality standard for customer satisfaction. The designing of strategy planning, strategy process and ethic to enhance the quality improvement for process and, product with using quality tools. Six –sigma is using for management to improve the mangement strategy planning.

REFERENCES

1. Duffy, Grace L, The Asq Quality Improvement Pocket Guide Basic History, Concept, Tools and Relationships, Asq Press - 2013.
2. N. Gopalakrrishnan, Simplified Six Sigma Methodology, Tools and Implimentation, Phi Learning, 201
3. Roslina Ab. Wahid, Quality Management Principles, Systems and Tools, Uitm Press, Second Edition-2012.
4. Dale H. Besterfield., Quality Management, Pearson, Nine Edition-2014.
5. David L. Geotsch, Stanley B. Davis, Quality Management for Organizational Excellence Introduction to Total Quality, New Jersey Pearson Education, Inc: Eight Edition - 2016.

BEEC 4473
EMBEDDED SYSTEM/
SISTEM TERBENAM

LEARNING OUTCOMES

Upon completion of this course, students should be able to:

1. Explain the basic components of an embedded system.
2. Analyze the principles of embedded systems and its communication protocols in order to solve given problems.
3. Manipulate the hardware-software functionalities, technologies and protocols to solve real-life problems.

SYNOPSIS

Topics covered include an overview of embedded system, characteristics & application areas, introduction to assembler-level software and high level language programming for embedded systems, introduction to embedded system hardware, application-level embedded system design concepts in computer engineering. Students will develop practical and theoretical skills for modern software industry to build innovative system using embedded technology. Students will develop essential skills required to create embedded systems which will drive robots and many related applications.

REFERENCES

1. Tahir, Muhammad author and Javed, Kashif, “ARM microprocessor systems Cortex-M architecture, programming, and interfacing”, Boca Raton CRC Press, 2017
2. E. Lipiansky, “Embedded Systems Hardware for Software Engineers”, McGraw-Hill Education, 2012
3. Valvano, Jonathan W., “Embedded microcomputer systems real time interfacing”, Stamford, CT Cengage Learning, 2010

SEMESTER 8

BEEU 4786
INDUSTRIAL TRAINING/
LATIHAN INDUSTRI

LEARNING OUTCOME
Upon completion of this course, students should be able to:
1. Show technical competencies and skills gained throughout their internship.
2. Prepare a report on the industrial field daily activities in the log book systematically.
3. Communicate effectively with staff, colleagues and other personnel.
4. Practice professional ethics in accordance with industry rules and regulations.

SYNOPSIS
All students are required to undergo industrial training as part of their curriculum to complete four (4) years course for the Bachelor of Engineering Technology. The duration of training is 24 weeks and it will be taken place at the end of the course (semester 8). The students are expected to gain knowledge and enhance their technical skills within industrial environment relevant to their field of study.

REFERENCES
1. UTeM Guideline Handbook for Industrial Training.

BEEU 4796
INDUSTRIAL TRAINING REPORT/
LAPORAN LATIHAN INDUSTRI

LEARNING OUTCOME
Upon completion of this course, students should be able to:
1. Produce industrial training report.
2. Present report orally on working experience.

SYNOPSIS
All students are required to undergo industrial training as part of their curriculum to complete four (4) years course for the Bachelor of Engineering Technology. The duration of training is 24 weeks and it will be taken place at the end of the course (semester 8). The students are expected to gain knowledge and enhance their technical skills within industrial environment relevant to their field of study.

PRE-REQUISITE
Student required to pass Industrial Training BEEU 4786 in order to pass Industrial training report.

REFERENCES
1. UTeM Guideline Handbook for Industrial Training.

BEEC 4804
VLSI DESIGN & FABRICATION/
REKA BENTUK & FABRIKASI VLSI

LEARNING OUTCOME

Upon completion of this course, students should be able to:

1. Evaluate solutions to problems in designing IC and its subcomponents by using adequate techniques.
2. Construct logic gates or subsystems circuits by using appropriate tools and techniques in VLSI.
3. Demonstrate effective project management skills in solving given problems.

SYNOPSIS

Topics covered: electronic properties of materials: solid-state materials, electronics and holes doping, acceptors and donors, P- and N-type material, conductivity and resistivity, drift and diffusion currents, mobility and diffusion; function of the basic inverter structure: connectivity, layout, and basic functionality of a cmos inverter, the cmos inverter voltage transfer characteristic (VTC), analysis of the cmos vtc for switching threshold, VOH, VOL, VIH, VIL, and noise margins, effect of changing the inverter configuration on the CMOS VTC, connectivity and basic functionality of a bipolar ECL inverter, connectivity and basic functionality of a bipolar TTL inverter; combinational logic structures: basic CMOS gate design, layout techniques for combinational logic structures, transistor sizing for complex cmos logic devices, transmission gates, architectural building blocks (multiplexers, decoders, adders, counters, multipliers); introduction to chip fabrication process flow and ic packaging process.

REFERENCES

1. Debaprasad Das, VLSI Design, Oxford University Press, 2015.
2. Vilas S. Bagad, VLSI Technology and Design, Technical Pub., 2012.
3. Neil H. E. Waste, David Money Harris, CMOS VLSI Design a Circuits and Systems Perspective, Addison-Wesley, 2011.
4. Ming-Bo Lin, Introduction to VLSI systems : A logic, circuit, and system perspective, CRC Press, 2012.

BEEC 4814
COMPUTER INTERFACING/
PENGANTARAMUKAAN KOMPUTER

LEARNING OUTCOME

Upon completion of this course, students should be able to:

1. Evaluate the components and structure of a computer user interface development framework.
2. Construct user interfaces by using appropriate computer user interface development framework.
3. Demonstrate effective project management skills in solving given problems.

SYNOPSIS

This course covers abstractions and implementation techniques for the design of application using computer interfacing. Topics include: microcontroller, features of different I/O peripheral devices and their interfaces, Java programming language and interfacing, sensors and actuators, data analysis and controls and various software and hardware tool which significant for computer interfacing. This subject is taken to expose student to Java programming language and interfacing computer with other peripherals. Eclipse IDE will be used as the compiler and editor to demonstrate programming and in laboratories session in this subject.

REFERENCES

1. Jonathan W. Valvano (2011), Embedded Microcomputer Systems: Real Time Interfacing, Cl-Engineering.
2. Gaddis, Tony, “Starting Out with Java from Control Structures Through Objects”, 6th Edition, Pearson Education Inc, 2016.
3. Y.Daniel Liang (2014), Introduction To Java Programming, Comprehensive (9th Edition), Prentice Hall.
4. Harpritsandhu (2010), Running Small Motors with Pic Microcontrollers, Mcgraw-Hill/Tab Electronics.

BEEC 4824
IMAGE & VIDEO PROCESSING/
PEMPROSESAN IMEJ & VIDEO

LEARNING OUTCOME

Upon completion of this course, students should be able to:

1. Evaluate appropriate methods, theories and techniques for image processing.
2. Manipulate images using various image processing techniques.
3. Demonstrate effective project management skills in solving given problems.

SYNOPSIS

This course will discuss on Introduction to Image Processing, Two-dimensional signals and systems, Sampling in two dimensions, Two-dimensional discrete transforms, Introduction to 2-D filter design, Multi-resolution image processing, Image Estimation and Restoration, Morphological image processing, Edge detection, Fundamentals of image compression, Video processing and compression.

After learning this subject, students should be able to use point operations, perform basic image filtering, implement multi-resolution and image classification techniques, video filters, and basic algorithms for image and video compression.

REFERENCES

1. Maria Petrou and Costas Petrou, “Image Processing: The Fundamentals”, 2nd Ed, John Wiley & Sons, 2010.
2. John C. Russ, The Image Processing Handbook, 6th Ed., CRC Press, 2011.
3. Milan Sonka and Vaclav Hlavac, “Image Processing, Analysis, and Machine Vision”, 4th Ed., Cengage Learning, 2015.
4. Gonzalez, R.C, Woods, R.E., “Digital image processing”, 3rd Ed., NJ Pearson Prentice Hall,2010

BEEC 4834
REAL TIME SYSTEMS/
SISTEM MASA NYATA

LEARNING OUTCOME

Upon completion of this course, students should be able to:

1. Evaluate solutions to problems related to the real-time system by using knowledge and principles of its basic reference model.
2. Adapt real-time operating system, scheduling techniques and resources to solve the given experimental problem.
3. Demonstrate effective project management skills in solving given problems.

SYNOPSIS

This course introduces the fundamental knowledge of real-time systems. The topics that will be covered in the course are Introduction to Real-Time Systems, A Reference Model of Real-Time Systems, Scheduling Approaches, Clock-Driven Scheduling, Priority-Driven Scheduling for Periodic, Aperiodic and Sporadic Tasks, Resources and Resource Access Control, Model of Multiprocessor and Distributed Systems, Design of Real-Time Communication Protocol and Design of Real-Time Operating System.

REFERENCES

1. Laplante, Philip A, “Real-Time Systems Design and Analysis: Tools for The Practitioner”, Wiley-Ieee Press, 2012.
2. Jiacun Wang, Real-Time Embedded Systems: Quantitative Software Engineering Series, Wiley, 2017.
3. Xiaocong Fan, Real-Time Embedded Systems: Design Principles and Engineering Practices, Newnes, 2015.
4. Hermann Kopetz, Real-Time Systems: Design Principles for Distributed Embedded Application, Springer, 2011.

BEEC 4844
IC TESTING/
PENGUJIAN LITAR BERSEPADU

LEARNING OUTCOME

Upon completion of this course, students should be able to:

1. Evaluate the performance and effectiveness of the IC testing techniques.
2. Perform different techniques of IC testing effectively.
3. Demonstrate effective project management skills in solving given problems.

SYNOPSIS

This course will introduce to the testing techniques and methodology of the integrated circuit. Students will be exposed to different topics such as types of defects and faults in the wafer fabrication, faults detection using various methods, different type of tests, test pattern generation and also design for testability technique. By using the aide of the software, students will learn how to perform an IC testing by using several methods such as SCAN and BIST techniques. Towards the end of this course, the introduction to the board level testing using boundary scan technique will also be covered.

REFERENCES

1. Crouch, Alfred L., Design-for-test for Digial IC's and Embedded Core Systems, NJ Prentice Hall
2. Sahu, Partha Pratim, VLSI Design, McGraw Hill, 2013
3. Ming-Bo Lin, Introduction to VLSI systems: a logic, circuit, and system perspective, CRC Press, 2012
4. Lavagno L., Scheffer L., Martin G., EDA for IC system design, verification, and testing, CRC Press, 2006
5. Godse, Atul P., Balshi Uday A., Linear and Digital IC Applications, Pune Technical Pub, 2008

BEEZ COURSE CORE COURSES (K)

SEMESTER 1

BEEE 1303
ENGINEERING WORKSHOP I/
BENGKEL KEJURUTERAAN I

LEARNING OUTCOMES
Upon completion of this course, students should be able to:
1. Explain industrial OSHA and industrial practices in the lab activity.
2. Diagnose an electronic circuit using electronic testing equipment.
3. To build the electronic circuit according to IPC standard and project using the appropriate simulation tools.

SYNOPSIS
Introduction to Industrial Safety and Health + Lab Safety, Equipment- theory, industrial practices, testing and circuit diagnostic & Report writing, Component – introduction, theory, assembly and soldering, Simulation tools - MULTISIM – introduction and application, Problem Based Learning (PBL).

REFERENCES
1. Safety and Security Review for the Process Industries: Application of HAZOP, PHA, WHAT-IF and SVA Reviewa/ Dennis P. Nolan, Amsterdam: Elsevier GPP, 2015.
2. Electronics for Electricians/ Stephen L. Herman, Boston, MA: Cengage Learning, 2017.
3. Soldering, Brazing & Welding: A manual of Techniques/ Derek Pritchard, Wiltshire: The Crowood Press, 2014.
4. Quality and Performance Excellence: Management, Organization and Strategy / James R. EvansI, Boston, MA: Cengage Learning, 2017.
5. Quality Assurance and Reliability Engineering / edited by Michelle Vine, New Jersey: Clanrye International, 2015.

BEEI 1303
ELECTRIC CIRCUIT FUNDAMENTAL/
PENGENALAN LITAR ELEKTRIK

LEARNING OUTCOMES
Upon completion of this course, students should be able to:
1. Apply analytical method and theorem to DC and AC (steady state) circuits in electrical circuit.
2. Conduct experiment on DC and AC (steady state) circuit based on electrical circuit theorem.
3. Participate effectively in assigned tasks.

SYNOPSIS
This course introduces the students to Ohm's Law, Kirchoff's Laws and use them to calculate current, voltage and power in DC / AC (steady state) circuits. Following this the students will learn the analytical methods namely mesh and nodal analysis. The use of theorems like Thevenin, Norton, Superposition and the Maximum Power Transfer will follow next. The applications of the above tools will cover both dc and ac circuits. This course will be supported by laboratory works to impart to the students some basic practical skills.

REFERENCES
1. BEEI 1303 Electrical Circuit Fundamental Module.
2. K.A. Charles, N.O. Sadiku, Fundamentals of Electric Circuits, 6th Ed., McGraw Hill, 2016.
3. Robbins and Miller, Circuit Analysis and Practice, 5th Ed., Thomson and Delmar, 2016.
4. Nilsson and Riedel, Electric Circuits, 10th Ed., Prentice Hall, 2014.
5. Thomas L. Floyd, Principles of Electric Circuits, 9th Ed., Pearson, 2010.

BEEC 1313
PROGRAMMING FUNDAMENTAL/
ASAS PENGATURCARAAN

LEARNING OUTCOMES

Upon completion of this course, students should be able to:

1. Explain the fundamental of programming principles and algorithms of C programming language.
2. Apply C Programming Language to solve given problems.
3. Manipulate C programming structure using programming fundamentals and principles.

SYNOPSIS

Topics covered: basic programming principles such as introduction to C programming consists of syntax, variables and basic data type, more fundamentals programming structure such as operator, rules / condition, looping, function, array and sequences. The course is compulsory to build a basic background in programming.

REFERENCES

1. Paul Deitel, Harvey Deitel; "C How to Program" International Edition Contributions by Mohit P. Tahiliani – 7th Ed. - Upper Saddle River, N.J. Pearson 2013 – How to Program Series.
2. Jeri R. Hanley, Elliot B. Koffman, Problem Solving and Program Design in C, 7th Edition, Pearson Education Inc, 2013.
3. Dan Gookin, "Beginning Programming with C for Dummies", For Dummies, 2014.

SEMESTER 2

BEEE 1323
ELECTRONIC FUNDAMENTALS/
PENGENALAN ELEKTRONIK

LEARNING OUTCOMES

Upon completion of this course, students should be able to:

1. Apply the semiconductors theory in electronic applications.
2. Construct electronics circuit of diode, BJT and FET.
3. Report the findings orally or in writing by performing assignments/experiments effectively.

SYNOPSIS

This course will discuss:

1. Bohr Atomic Model: valency, period table of elements, trivalent, tetravalent and pentavalent elements. Movement electrons in solid: conductor, insulator and semiconductor, bands theory: energy band, conduction band and forbidden band. Doping, p and n materials, pn junction.
1. Silicon Semiconductor Diodes: characteristics and measurement of forward & reverse biased, composite characteristics and load line analysis, clipping and simple rectifier (half & full) circuits, Zener diodes characteristics, and simple shunt regulators.
2. Bipolar Junction Transistor: construction and operation of BJT, BJT characteristics and measurement technique, limits of operation, βdc and αdc, DC biasing – DC Load Lines. Amplification of signal. Transistor as a switch.
3. Field Effect Transistor: construction and operation of FET, FET characteristics & diagram, Shockley's equation, DC biasing – DC Load Lines - Graphical and mathematical approach.

REFERENCES

1. Thomas L. Floyd; Electronic Devices Conventional Current Version, 10th Edition, New York Pearson Education, Inc. 2018.
2. Sean Westcott, Jean Riescher Westcott; Basic Electronics Theory and Practice, Dulles, VA Mercury Learning and Information 2015.

3. Robert L. Boylestad, Louis Nashelsky; Electronic Devices and Circuit Theory, 11th Edition, Upper Saddle River Pearson Education, Inc. 2013.
4. S. O. Kasap; Principles of Electronic Materials and Devices, 4th Edition, New York McGraw Hill Education, 2018.

BEEE 2343
ENGINEERING DRAWING/
LUKISAN KEJURUTERAAN

LEARNING OUTCOMES

Upon completion of this course, students should be able to:

1. Apply mechanical engineering design drawing using Computer Aided Design (CAD).
2. Draw Geometric, orthographic, isometric, sectional, assembly, part and detailed drawings by using CAD based on the given problem.
3. Work individually or in groups effectively to perform assignments/tasks give.

SYNOPSIS

The course concentrates on Computer Aided Design (CAD) software. AUTOCAD engineering drawing software is used to produce standard engineering drawing. The students will be exposed to CAD interface, editing commands, coordinate system, template preparation and layer in order to produce various types of engineering drawings.

REFERENCES

1. Giesecke, F. E., Mitchell, A., Spencer, H. C., Hill, I. L., Dygdon, J. T. and Novak, J.E., Lockhart S., 2016, Technical Drawing with Engineering Graphics, 15th Ed., Pearson & Prentice Hall, New Jersey.
2. Mark Dix, Paul Riley, 2017, Discovering AutoCAD 2017, Prentice Hall, London.
3. McAdam, D., R. Winn, 2015, Engineering Graphics: a problem-solving approach, 8th Ed., Pearson Education Canada, Toronto.

BEEE 1313
ENGINEERING WORKSHOP II/
BENGKEL KEJURUTERAAN II

LEARNING OUTCOMES

Upon completion of this course, students should be able to:

1. Construct an electronic circuit using appropriate software.
2. Demonstrate the electrical wiring technique by using appropriate tools.
3. Fabricate Printed Circuit Board (PCB) using appropriate software and equipment's.

SYNOPSIS

Simulation tools that covers the software of MATLAB, PSpice and AutoCad. Domestic Wiring – theory on domestic wiring, wiring diagram and lab practical. PCB circuit design fabrication using the design software of Proteus, practical design of the printer circuit board using the proteus.

REFERENCES

1. Requirements for Electrical Installations, IET Wiring Regulations, 17th. Ed. 2015, Institution of Engineering and Technology.
2. Printed Circuit Board (PCB) Fabrication, 2015, K.M. Gupta Nishu Gupta, Scrivener Publishing LLC.
3. MATLAB for Engineers (5th Edition), London: Pearson, 2017, H. Moore.
4. MATLAB: Applications for the Practical Engineer, 2014, K.Bennett, InTechOpen Limited.

BEEZ 1203
AC CIRCUIT ANALYSIS/
ANALISA LITAR AC

LEARNING OUTCOMES

Upon completion of this course, students should be able to:

1. Analyze the principles of the related electrical system applications.
2. Conduct experimental works to analyse the performance and behaviour of electrical system applications.
3. Report the findings orally or in writing by performing assignments/experiments effectively.

SYNOPSIS

This course is divided into two parts. First part of this subject will be focusing on analysis first order of rc and rl circuit, and frequency response. The second part of this subject exposes students to the method of analysis for linear electrical circuits power calculation based on series and parallel branch of rlc elements. Later, student will learn about the concept of single phase and three phase of electrical systems applications followed by the megnetic circuit and single phase transformer. Next student will be introduce to fundamental of dc machine and ac machine.

REFERENCES

1. Charles, K.A & Sadiku, N.O. Fundamental of Electric Circuit (6th Edition). 2017. McGraw-Hill.
2. Hughes, Electrical & Electronics Technology, Pearson, 12th Edition 2016.
3. Thomas L. Flyod, Principles of Electric Circuits, Pearson, 9th Edition, 2011.
4. Nilsson, J. W. & Riedel, S. Electric Circuit. Prentice Hall, 10th Edition, 2015.
5. R. L. Boylestad, Introductory Circuits Analysis, Prentice Hall, 12th Edition, 2011.

SEMESTER 3

BEEE 2333
ANALOGUE ELECTRONIC DEVICES/
PERANTI ELEKTRONIK ANALOG

LEARNING OUTCOMES

Upon completion of this course, students should be able to:

1. Apply the fundamental of small signal amplifiers using BJT and FETs and Op-amp circuits.
2. Measure response of single stage, multistage amplifiers and basic op-amp circuit.
3. Report the findings orally or in writing by performing assignments/experiments effectively.

SYNOPSIS

Topics covered include Bipolar Junction Transistor (BJT) modelling, CE, CC and CB configuration, BJT small signal analysis, and feedback configuration, FET Small-Signal Analysis, Frequency Response, Bode Plot, Bandwidth, Special Amplifier: Cascade, Cascode, Darlington, Multistage, Differential Amplifier Circuit, Operational Amplifiers: Inverting, Non-Inverting, Summing and Buffer.

REFERENCES

1. Thomas L. Floyd, Electronic devices: conventional current version, 10th edition, New York Pearson Education, Inc. 2018.
2. Boylestad R., Nashelsky L., “Electronic Devices and circuit Theory”, 11th Edition, Prentice Hall Inc., 2014.
3. Floyd T.L., “Electronic Devices”, 9th Edition, Prentice Hall, 2014.
4. Theodore F. Bogart Jr., Jeffrey S. Beasley and Guillermore Rico, “Electronic Devices and Circuits”, 6th Edition, Pearson Education, 2004.
5. S.H.Ruslan et.al. “Elektronik II” Penerbitan UTM 1998.

PRE-REQUISITE

BEEE 1323
ELECTRONIC FUNDAMENTALS/
PENGENALAN ELEKTRONIK

BEET 2423
SIGNAL & SYSTEMS/
ISYARAT & SISTEM

LEARNING OUTCOMES

Upon completion of this course, students should be able to:

1. Explain the basic concepts and properties of signal and systems.
2. Use appropriate analysis techniques in solving signal and system problems.
3. Conduct experimental works to analyse the performance of signal and system applications.

SYNOPSIS

The course will cover various topics such as Introduction to Signals and Systems: Fundamental Concept, Transformations of Signals, Signal Characteristics, Common Signals, Systems and Its Properties, Convolution for LTI Systems, Properties of Convolution, Properties of LTI Systems.

REFERENCES

1. Femmam, Smain, Fundamentals of Signals and Control Systems, John Wiley, 2017.
2. Charles L. Philips, John M. Parr, Eve A. Riskin, Signals, Systems, and Transforms, Fifth Edition, Boston: Pearson, 2014.
3. Singh, Ravish R, Network Analysis and Synthesis, New Delhi, India: Mcgraw Hill Education (India), 2013.
4. Rawat and Tarun Kumar, Digital Signal Processing, Oxford University Press, 2015.
5. Li Tan, Jean Jiang, Digital Signal Processing: Fundamentals and Applications, Elsevier, 2013.

BEEC 2404
DIGITAL ELECTRONIC/
ELEKTRONIK DIGITAL

LEARNING OUTCOMES

Upon completion of this course, students should be able to:

1. Construct digital system using combinational and sequential logic circuits.
2. Assemble fully-function digital logic circuits.
3. Complete given tasks effectively as an individual or in groups.

SYNOPSIS

This course covers the topics of transistor- transistor logic. Logic functions, logic diagrams, karnaugh maps, boolean algebra, demorgan's theorem. Combinational circuits such as encoders, decoders, multiplexers, de-multiplexers, comparators. This subject also covers the introduction to memory, programmable logic devices and microcomputer systems. Student will learn the topics on latches and flip-flops, flip-flops operating characteristics and applications. Registers and counters, shift registers, synchronous, asynchronous and modulo counters. Introduction to Finite State Machine (FSM).

REFERENCES

1. Digital Electronics and Systems – Teaching and Learning Series Faculty of Engineering Technology Module 12 (2015).
2. Thomas L. Floyd, Digital Fundamentals, 11th Edition, Prentice Hall, 2015.
3. Ronald J.Tocci, Neal S.Widmer, Gregory L.Moss, Digital Systems: Principles and Applications, 12th Edition, Pearson Prentice Hall, 2017.
4. William Klietz, Digital Electronic: A Practical Approach with VHDL, 9th Edition, Pearson Prentice Hall, 2012.
5. Roger L Tokheim, Digital Electronic: Principles and Applications, 8th Edition, McGraw-Hill Education, 2013.
6. Marcovitz A. B., Introduction to Logic Design, 3rd Edition, McGraw Hill, 2009.

SEMESTER 4

BEEZ 1213
INSTRUMENTATION & MEASUREMENT/
INSTRUMENTASI & PENGUKURAN

LEARNING OUTCOMES

Upon completion of this course, students should be able to:

1. Apply the principle, various terms and standards in measurement.
2. Select the appropriate technique or measurement tool to perform electrical signal measurement.
3. Report the findings orally or in writing by performing assignments/experiments effectively.

SYNOPSIS

This course discusses about units and dimensions, standards, errors, static characteristics, noise and calibration in measurement. It covers most on the measurement devices such as galvanometers, ammeters, voltmeters, wattmeter, temperature, force and torque and pressure measurement as well as accelerator meter. It also introduces oscilloscope and sensors for instrumentation application.

REFERENCES

1. Robert B. Northrop, Introduction to Instrumentation and Measurements, 3rd Ed. CRC Press, 2014.
2. Mohd Azman Abdullah, Measurements & Instrumentation Module 6, Penerbit UTeM 2013.
3. Uday A. Bakshi, Ajay V. Bakshi, Kshiteeja Bakshi, Electronic instrumentation & measurements 4th Ed., Technical Pub. 2013.
4. HS Kalsi, Electronic Instrumentation, 3rd Ed., Tata McGraw Hill, 2010.
5. Daniel K. Fisher, Peter J. Gould, Trends in modern instrumentation, Auris Reference Limited 2017.

BEET 2333
COMMUNICATION PRINCIPLE/
PRINSIP KOMUNIKASI

LEARNING OUTCOMES

Upon completion of this course, students should be able to:

1. Apply the basic principles of analogue modulation system and noise.
2. Manipulate the performance of analogue modulation techniques through experiments that commonly used in telecommunication system.
3. Report effectively an assignment in a group.

SYNOPSIS

This course will discuss on Introduction to Telecommunication, Linear Modulation, Single Sideband (SSB) Communication Systems, Angle Modulation, Noise and Introduction to Digital Communication. The rationale of offering this subject is as the progression of communication system where students should have knowledge of communication principles and basic skills required by the industry.

REFERENCES

1. Jeffrey S. Beasely, Jonathan D. Hymer, Gary M. Miller, Electronic Communication: A Systems Approach, Pearson, 2014.
2. Simon Haykin, Michael Moher, Communication Systems, John Wiley & Sons, 2010.
3. Wayne Tomasi, Electronics Communications Systems Fundamentals Through Advanced, Prentice Hall, Fifth Edition, 2004.

BEEE 2364
CONTROL PRINCIPLES/
PRINSIP KAWALAN

LEARNING OUTCOMES

Upon completion of this course, students should be able to:

1. Demonstrate performance of a design control system.
2. Display respond of gain adjusment compensator in controlling broadly define system.
3. Work individually or in groups effectively to perform assignments/tasks given.

SYNOPSIS

This course will discuss on introduction to control system, frequency domain modelling, Laplace transform, transfer function, electric network transfer function, translational mechanical system, rotational mechanical system transfer function, time domain modelling, general state space representation, transfer function and state space conversion, time response, poles, zeros and system response, First and Second order systems, under-damped system, reduction of multiple subsystems, blocks diagrams, feedback systems, signal flow graphs, Mason's rule, Routh- Hurwitz criterion and Gain Adjustment compensator design.

REFERENCES

1. Norman S. Nise, Control System Engineering 7th Edition, Addison Wesley Publishing, 2015.
2. N.C Jagan, Control System 3rd Edition, Hyderabad: Bs Publications, 2015.
3. Syed Najib Syed Salim, Control System Engineering, Penerbit Universiti Teknikal Malaysia Melaka, 2010.

BEEE 2354
ELECTRONIC SYSTEMS/
SISTEM ELEKTRONIK

LEARNING OUTCOMES

Upon completion of this course, students should be able to:

1. Analyse the characteristic and performance of the electronics devices.
2. Measure the performance of applied electronic circuits through lab sessions.
3. Report the findings orally or in writing by performing assignments/experiments.

SYNOPSIS

This course will discuss about Electronic Devices: Application of electronic devices such as SCR, SCS, GTO, LASCR, DIAC, TRIAC, UJT and PUT. Filter: filter applications (basic filter concepts, filter response characteristics, active LP filter, active HP filter, active BP filter, active BS filter and filter response measurement). Oscillator circuits: Feedback oscillator principles, oscillators with the RC feedback circuits, LC feedback circuits, crystal oscillator, Astable and Monostable using op-amp, the 555 timer and applications. Power amplifier circuits: Class A, class B and class AB. Power supply: Power supply circuit, IC voltage regulator and application. These topics are very important to students because it gives emphasis on the design of circuits used in electronic systems.

REFERENCES

1. W. D. Stanley, Op-Amps. and Integrated Linear Circuit, 4th Edition, Pearson, 2012.
2. R. L. Boylestad, Electronic Devices, 11th Edition, Prentice Hall, 2013.
3. T.L. Floyd, Electronic Devices, 10th Edition, Prentice Hall, 2015.
4. Analog Electronic Circuits /Atul P. Godse, Uday A. Bakshi Pune Technical Pub. 2012.

BEEZ 2404
MICROCONTROLLER TECHNOLOGY/
TEKNOLOGI MIKROPENGAWAL

LEARNING OUTCOMES

Upon completion of this course, students should be able to:

1. Demonstrate a working knowledge of microcontroller architecture and peripheral subsystem.
2. Manipulate the hardware-software functionalities and technologies to solve given task using appropriate techniques and tools.
3. Propose sustainable solutions to given problems.

SYNOPSIS

This course will provide the students both solid theoretical and practical applications to the microcontrollers based system. Extensive practical-oriented sessions will be given using PIC microcontroller involving program development software, chip programming and debugging. Topics covered are microcomputer system & peripheral design, software and hardware integration; interrupt control system, analog interfacing, subsystems on microcontroller, applications, peripheral devices and system control design.

REFERENCES

1. Module 25 - Fakulti Kejuruteraan Elektrik - Microcontroller Technology Theory & Code. Md Sani, Aminurrashid Noordin, Anuar Mohamed Kassim, Ahmad Zaki Shukor/ Penerbit UTeM, 2013.
2. Practical Microcontroller Engineering with ARM Technology/ Ying Bai/ NJ Wiley 2016.
3. Fundamentals Of Digital Logic And Microcontrollers 6th Ed./ M.Rafiquzzaman/ John Wiley & Sons Inc., 2014.
4. Microcontrollers: Architecture, Programming, Interfacing and System Design, Rajkamal, 2nd Ed. Pearson India, 2012.
5. PIC Microcontroller and Embedded System, Using Assembly and C for Pic18. Muhammad Ali Mazidi Prentice Hall, 2010.

SEMESTER 5

BEET 3383
ELECTROMAGNETIC/
ELEKTROMAGNETIK

LEARNING OUTCOMES

Upon completion of this course, students should be able to:

1. Apply the knowledge of electromagnetic laws and principles.
2. Construct experimental investigation of wave electromagnetic properties.
3. Display the ability to perform the task given independently by optimizing available resources.

SYNOPSIS

This course will discussed on Vector analysis: Vector algebra, coordinate system and transformation, vector calculus; Electrostatics: Electrostatic fields, Gauss Law, Poisson's equation, electric fields in material space, electrostaticboundary; Magnetostatics: Magnetostatic fields, Stokes Theorem, Biot-Savart Law, Gauss Law, magnetic forces, material and devices and magnetostatic boundary; Waves: Maxwell's equations, Faraday's Law, time-varying electromagnetic field, induced emf, displacement current. Electromagnetic wave propagation: free space, lossy and lossless dielectric, good conductors, power and Pyonting vector, incident, reflected and refracted wave.

REFERENCES

1. Sadiku M.N.O, Elements of Electromagnetics, 6th Edition, Oxford University Press, 2015.
2. Ghosh, Shankar Prasad, Electromagnetic Field Theory, Tata McGraw-Hill Education, 2012.
3. Francois Costa, Electromagnetic Compatibility in Power Electronics, Wiley-ISTE, 2014.
4. Kalluri, Dikshitulu K., Electromagnetic Waves, Materials, and Computation with MATLAB, Boca Raton, FL: CRC Press, 2012.
5. Giancoli DC, "Physics for Scientists and Engineers with Modern Physics", 4th edition Pearson Prentice Hall, 2009.

BEET 3373
DIGITAL SIGNAL PROCESSING/
PEMPROSESAN ISYARAT DIGITAL

LEARNING OUTCOMES

Upon completion of this course, students should be able to:

1. Apply appropriate concepts and methods in demonstrating digital signals processing and systems.
2. Organize the implementation of digital signal processing in a system.
3. Report effectively an assignment in a group.

SYNOPSIS

Topics covered: Introduction to DSP, discrete-time signals and systems, spectrum of representation of discrete-time signals, discrete fourier transform, difference equations and discrete-time systems, z-transform and its applications, analysis and design of digital filters and random signals.

REFERENCES

1. El Ali, Taan S., 2012. Discrete Systems and Digital Signal Processing with Matlab 2nd Ed., Crc Press.
2. Mitra, S.K., 2011. Digital Signal Processing: A Computer-Based Approach, Mcgraw-Hill.
3. Oppenheim, A. V and Schafer, R.W., 2009. Discrete Time Signal Processing, 3rd Ed., Pearson.
4. Oppenheim, A. V and Schafer, R.W., 2015. 2015 Digital Signal Processing.

BEEC 2383
COMPUTER NETWORK & SYSTEM/
SISTEM & RANGKAIAN KOMPUTER

LEARNING OUTCOMES

Upon completion of this course, students should be able to:

1. Explain the fundamentals of computer network technology and its components
2. Analyse the OSI and TCP/IP models, protocols, and the functions of each layer.
3. Manipulate different types of network devices in developing a sustainable network design.

SYNOPSIS

Topics covered: Overview: Introduction to Computer Network and System, Networking Equipment and Data Communications, Network Architecture and Protocols, Local and Wide Area Networks, Client-Server Computing: Web technologies, Wireless, Mobile Computing and Mobile Data Access Computer Network and System is a program targeted for dynamic digital and communication careers. It is strongly emphasis on technical aspect and enables employers to meet the needs of Computer Networks and System graduates including some of the best platform for many companies specializing in computer networking and system. This unique curriculum balances theory with extensive hands-on experiments. Fundamental of IoT, Application of IoT.

REFERENCES

1. Behrouz A. Forouzan, Data Communication and Networking, 5th Ed. McGraw Hill, 2017.
2. Vilas S. Bagad, Iresh A. Dhotre, Data Communication and Networking, 2nd Ed. India: Technical Pub., 2013.
3. Moussavi, Massoud, Data communication and networking a practical approach, New York, NYbDelmar Cengage Learning, 2011.
4. Douglas Comer, Computer networks and Internets, 6thEd. Prentice Hall 2014.

BEEU 3803
INTEGRATED DESIGN PROJECT/
PROJEK REKABENTUK BERSEPADU

LEARNING OUTCOMES

Upon completion of this course, students should be able to:

1. Design solution by synthesizing electrical engineering technology knowledge that will solve broadly defined engineering technology problem in accordance with relevant standards.
2. Utilize modern engineering technology and IT tools in facilitating solutions to broadly defined engineering technology problem with an understanding of the limitations.
3. Evaluate the impact of the design product, component or processes in term of safety, environmental and sustainability factors.
4. Demonstrate effectively teamwork skill in completing the IDP.
5. Apply project management and financial knowledge effectively in completing the IDP.

SYNOPSIS

Integrated Design Project is a course where students have to design an engineering technology project to solve broadly defined problem. Broadly defined problem is engineering problems which cannot be pursued without a coherent and detailed knowledge of defined aspects of a professional discipline with a strong emphasis on the application of developed technology. The design project activities include project management, project planning, project feasibility study, design selection, design costing and sizing, analysis and evaluation. The course focuses on the implementation and integration of product/conceptual design development to produce a comprehensive final technical report, including engineering proposals and drawings, specifications and bills of quantities, cost estimates of development projects given to students, working in groups. Apart from basic engineering design, students are also required to integrate their knowledge of other engineering disciplines such as (but not limited to) structural analysis and design, including material selections, project scheduling techniques and sustainable development considerations into their overall project work. At the end of this course, the students will be able to comprehend the needs and requirements for product design procedures and are able to appreciate the importance of integration and synthesis of various disciplines of electrical engineering knowledge.

REFERENCES

1. Dieter, G.E. & Schmidt, L.C., Engineering Design, 5th Edition, Mcgraw Hill, 2013.
2. International Engineering Alliance, Graduates Attributes and Professional Competencies, Version 3, June 2013.
3. Theodore R. Bosela Ph.D. PE, Electrical Systems Design 1st Edition, 2003.
4. Ulrich, K.T. & Eppinger, S.D. Product Design and Development, 5th Edition, Mcgraw Hill, 2011.
5. Keith H. Sueker, Power Electronics Design: A Practitioner's Guide, Newnes, 2011.
6. Mahesh Patil, Pankaj Rodey, Control Systems for Power Electronics: A Practical Guide. Springer, 2015.
7. Ziyad Salameh, Renewable Energy System Design, 2014 Elsevier Inc.
8. Malaysian Standard Guidelines. (Can be access via UTeM's Library, Guideline: Http://Bit.Ly/2bcwuvi).

BEET 3353
TELECOMMUNICATION SYSTEM/
SISTEM TELEKOMUNIKASI

LEARNING OUTCOMES

Upon completion of this course, students should be able to:

1. Apply the concept of telecommunication system.
2. Manipulate the concept of telecommunication system.
3. Report effectively in given tasks and assignment by managing different information from multiple resources for commercialization.

SYNOPSIS

This course will discuss on Radio Spectrum, Broadcasting, PSTN/ISDN, Satellite System, Radar System, Optical Communication and Wireless Communication. The rationale of offering this subject is as providing fundamental knowledge on various types of telecommunication system and as foundation for higher level subjects. IP core.

REFERENCES

1. Louis E. Frenzel, "Principles of Electronic Communication Systems 4th Edition", McGraw-Hill Education, 2015.
2. Jorge Olenewa, "Guide to Wireless Communications 4th edition", Course Technology, 2016.
3. Gerard Maral Michel Bousquet, "Satellite Communications Systems: Systems, Techniques and Technology 5th Edition", Wiley India Pvt.Ltd, 2014.
4. T. Viswanathan, Telecommunication Switching Systems and Networks 2nd edition, Prentice-Hall of India, 2015.
5. Rongqing Huiching," Introduction to Fiber-Optic Communications 1st Edition", Academic Press, 2019.

BEET 3413
RF TECHNIQUE AND MICROWAVE/
TEKNIK RF & GELOMBANG MIKRO

LEARNING OUTCOMES

Upon completion of this course, students should be able to:

1. Analyze the performance of transmission line circuits of RF system.
2. Construct the design of transmission line circuits for RF system.
3. Report current sustainable technologies and relate to the given assignment.

SYNOPSIS

This course will discuss on Introduction to RF and Microwave Engineering; Transmission Lines; Microwave Network Analysis; Impedance Matching and Tuning; Power Dividers and Couplers; Microwave Filter and Microwave Amplifier.

REFERENCES

1. Frank Gustrau, RF and Microwave Engineering: Fundamentals of Wireless Communications, Wiley. 2012.
2. Terry C. Edwards, Michael B. Steer, Foundations of Interconnect and Microstrip Circuit Design, (Wiley - Ieee) 4th Edition, 2016.
3. Roger, C. Palmer, An Introduction to RF Circuit Design for Communication System, Copyright, 2016.

BEEZ 4803
ANATOMY AND PHYSIOLOGY/
ANATOMI AND FISIOLOGI

LEARNING OUTCOMES

Upon completion of this course, students should be able to:

1. Perceive terminologies to describe anatomical parts and physiological of biological functions.
2. Dismantling and re-assemble parts and functions of the human body with no errors
3. Report the findings orally and in writing by performing assignments effectively

SYNOPSIS

This course has been designed to introduce the student to human anatomy and physiology. Due to the close interrelationship between structure and function in biological systems, each functional physiology topic will include a brief overview of anatomic structure. The physical and chemical laws that are the basis of the physiological processes and also applications to current biomedical research and clinically relevant situations are discussed.

REFERENCES

1. Human Anatomy & Physiology 10th Ed./ E. N. Marieb and K. Hoehn Pearson, 2015.
2. E.N. Marieb and L. A. Smith, (2018). Human Anatomy and Physiolog Laboratory 12th Ed. Pearson.
3. C.L. Stanfield, (2016). Principles of Human Physiology 6th Ed. Pearson Education.
4. D.U. Silverthorn, (2016). Human Physiology: An Integrated Approach 7th Ed. Pearson Education.
5. F. Martini, M. Timmons, And R. Tallitsch, (2012). Human Anatomy.

BEEZ 4813
MEDICAL IMAGING AND IMAGE PROCESSING/
PENGIMEJAN PERUBATAN DAN PEMPROSESAN IMEJ

LEARNING OUTCOMES

Upon completion of this course, students should be able to:

1. Perceive basic understanding of medical imaging and fundamental image processing techniques.
2. Manipulates imaging concepts and image processing techniques to acquire and process biomedical images.
3. Report current sustainable technologies and relate to the given assignment.

SYNOPSIS

The aim of the course is to show how to extract, model, and analyse information from medical data and applications to help diagnosis, treatment and monitoring of diseases through computer science. Medical image computing is a highly interdisciplinary field involving not only medicine and computer science but also mathematics, biology, statistics, probability, psychology and other fields. The course includes topics in an introduction to the physics and engineering of tomographic imaging devices, medical image analysis: image segmentation, registration, statistical modelling and applications of computational tools for medicine. It will also include selected topics relating to medical image formation. It will be application oriented.

REFERENCES

1. W. Birkfellner, “Applied Medical Image Processing: A Basic Course,” 2nd ed. CRC Press, 2014.
2. K. Najarian and R. Splinter, Biomedical Signal and Image Processing, 2nd ed. CRC Press, 2012.
3. M. Analoui, J. D. Bronzino, and D. R. Peterson, Medical Imaging: Principles and Practices. CRC Press, 2013.
4. I. Bankman, “Handbook of Medical Image Processing and Analysis”, 2nd ed. Elsevier Science Publishing COn Inc, 2011.
5. M. D. Abràmoff, P. J. Magalhães, and S. J. Ram, “Image processing with ImageJ,” Biophotonics International, vol. 11, no. 7. pp. 36–41, 2004.

BEEZ 4923
MICROELECTRONIC FABRICATION/
FABRIKASI MIKROELEKTRONIK

LEARNING OUTCOMES

Upon completion of this course, students should be able to:

1. Ability to explain and construct the essential aspects of the device technology and CMOS process module.
2. Demonstrate ability to identify, analyze and organize major CMOS process and device issues in circuit level.
3. Demonstrate the ability to engage in independent leaning on related topics effectively.

SYNOPSIS

This course focuses on the fabrication process module of the cmos technology. The students should be able to design, produce a mask, prepare the runcard (process flow of the mosfet), fabricate the mosfet, analyze and characterize the devices electrically. The students should also able to understand the important cmos process modules such as well technology, isolation technology, multi level interconnect technology as well as related device issues mainly associated with the device miniaturization.

REFERENCES

1. Introduction to Microelectronic Fabrication/ Richard C. Jaeger Prentice Hall 2002
2. Hong Xiao. (2001). Introduction to Semiconductor Manufacturing Technology. Prentice Hall.
3. Michael Quirk & Julian Serba. (2001). Semiconductor Manufacturing Technology. Prentice Hall
4. R. C. Jaeger, (2002) Introduction to Microelectronic Fabrication, Prentice Hall
5. Stephen A. Campbell (2012). Fabrication Engineering at the Micro and Nanoscale. Oxford University Press

BEEZ 4903
SEMICONDUCTOR PROCESS/
PROSES SEMIKONDUKTOR

LEARNING OUTCOMES

Upon completion of this course, students should be able to:

1. Assessing the basic semiconductor manufacturing process and its materials for front end, back end and testing process.
2. Display competency in demonstrating process flow and identifying hazards in semiconductor process.
3. Demonstrate the ability to engage in independent leaning on related topics effectively.

SYNOPSIS

This course on semiconductor fabrication focuses on the concept and the basics of semiconductor materials, process technology and the fabrication processes of integrated circuits (ics). Topics covered in this course are as follow introduction to microelectronic fabrication, cleanroom technology, safety & protocol, basics of semiconductor, wafer manufacturing, semiconductor materials, wafer cleaning, oxidation, diffusion, ion implantation & annealing, metallization (cvd and pvd), etching and clean technology.

REFERENCES

1. 3d Tcad Simulation for Semiconductor Processes, Devices and Optoelectronics/ Simon Li, Yue Fu/ Springer 2012.
2. Semiconductor Process Reliability in Practice/ Zhenghao Gan, Waisum Wong, Juin J. Liou/ Mcgraw-Hill 2013.
3. Characterization in Silicon Processing/ Editor, Yale Strusser; Series Editors, C. Richard Brundle, Charles A. Evans/ Momentum Press 2010.
4. Characterization in Compound Semiconductor Processing/ Editors, Yale Strausser, Gary E. Mcguire/ Momentum Press 2010.

SEMESTER 6

BEEE 3404
DATA ACQUISITION & SENSORS/
PEROLEHAN DATA & PENDERIA

LEARNING OUTCOMES

Upon completion of this course, students should be able to:

1. Classify the concept of data acquisition system and sensor.
2. Construct data monitoring system by using appropriate data acquisition tools.
3. Report the findings orally or in writing by performing assignments/experiments effectively.

SYNOPSIS

This course will discuss on Introduction on Data Acquisition and Sensor, Data Acquisition Hardware, Analog and Digital Signals, Signal Conditioning, Serial Data Communications, Distributed & Standalone Loggers/Controllers, IEEE 488 Standard, Ethernet & LAN Systems, The Universal Serial Bus (USB), Specific Techniques, The PCMCIA Card Sensor and application, Labview, Interfacing Software and Hardware, Controlling automation system using Labview.

REFERENCES

1. Cornelius T. Leondes, Knowledge – Based Systems Techniques and Applications, 2000 Elsevier Ltd.
2. John Park, Stebe Mackay, Practical Data Acquisition for Instrumentation and Control Systems, Elsevier, 2003.
3. Bruce Mihura, LabVIEW for Data Acquisition, Prentice Hall, 2001.
4. Kevin James, PC Interfacing and Data Acquisition: Techniques for Measurement, Instrumentation and Control, Newnes, 2000.
5. LavView Course Manual, National Instrument, 2006.

BEEU 3764
BACHELOR DEGREE PROJECT I/
PROJEK SARJANA MUDA 1

LEARNING OUTCOMES

Upon completion of this course, students should be able to:

1. Relate previous works and relevant theories using various resources.
2. Propose objectives and scopes of industrial-based or practice-oriented project.
3. Find appropriate methodologies for successful execution of the project.
4. Explain the project execution and findings in oral and written forms effectively.
5. Imitate appropriate existing concepts in engineering technology fields.

SYNOPSIS

The student needs to plan and implement the project individually that related to the respective engineering technology field. The student should implement a project, do the analysis and apply the theory to solve the problems related to topic. At the end, the student should write a problem based learning report that covers problem statement, literature review, methodology to overcome the problem. The student needs to achieve the objective of the project and presented it in the report.

REFERENCES

1. Manual Projek Sarjana Muda (PSM), Fakulti Teknologi Kejuruteraan, Universiti Teknikal Malaysia Melaka.

BEET 4833
ANTENNA ENGINEERING/
KEJURUTERAAN ANTENA

LEARNING OUTCOMES

Upon completion of this course, students should be able to:

1. Evaluate the antenna parameters and structures.
2. Measure the performance of antenna structures and network.
3. Demonstrate awareness and understanding of the safety and legal issues in a given topic/task.

SYNOPSIS

This course will discuss on Introduction and Fundamentals of Antenna, Antenna Solution using Maxwell Equation, Types of Antenna, Matching and Feeding Networks, Antenna Measurement and Introduction to Radio-wave Propagation.

REFERENCES

1. C.A. Balanis: “Antenna Theory, Analysis & Design”, 4th Edition, John Wiley, 2016.
2. Visser, Hubregt J., Antenna Theory and Applications, Chichester: Wiley, 2012.
3. Fang, D.G., Antenna Theory and Microstrip Antennas, Boca Raton, FL: CRC Press, 2010.
4. Bakshi, Uday A., Antenna and Wave Propagation, Technical Pub., 2011.
5. Zhang, Zhijun, Antenna Design for Mobile Devices, John Wiley & Sons (ASIA), 2011.
6. Poisel, Richard A., Antenna Systems and Electronic Warfare Applications, Artech House, 2012.
7. Yadava, R.L., Antenna & Wave Propagation, Phi Learning PVT, LTD, 2011.

BEET 4813
MOBILE COMMUNICATION/
KOMUNIKASI MUDAH ALIH

LEARNING OUTCOMES

Upon completion of this course, students should be able to:

1. Evaluate the concepts, theories and strategies in solving of mobile communication system.
2. Measure the performance of radio wave propagation model.
3. Demonstrate awareness and understanding of the safety and legal issues in a given topic/task.

SYNOPSIS

This subject will discuss Introduction to Mobile Communication Systems: Evolution of Mobile Radio Communications, Mobile Communication Standards: Advanced Mobile Phone System (AMPS), Extended Total Access Communications System (ETACS), Global System for Mobile Communication (GSM), General Packet Radio Service (GPRS), Universal Mobile Telecommunication Service (UMTS), Worldwide Interoperability for Microwave Access (WIMAX) and Long Term Evolution (LTE); Cellular Concept: Frequency Reuse, Handoff Strategies, Interference and System Capacity: Co-channel Interference, Adjacent Channel Interference, Cell Splitting, Sectoring; Radio Wave Propagation in Mobile Communication Systems: Introduction to radio wave propagation, Free-space propagation Model, Propagation Mechanisms: Reflection, Diffraction, Scattering, Path Loss Models: Log-distance Path Loss Model, Log-normal Shadowing. Propagation Models: Okumura, Hata Model. Fading and Multipath: Fast Fading, Slow Fading, Doppler Effect; Modulation and Multiple Access Techniques: Quadrature Phase Shift Keying (QPSK), Quadrature

Amplitude Modulation (QAM), Adaptive Modulation, Frequency Division Multiple Access (FDMA), Time Division Multiple Access (TDMA), Code Division Multiple Access (CDMA), Orthogonal Frequency Division Multiple Access (OFDMA), Single Carrier Frequency Division Multiple Access (SC-FDMA); Channel Assignment and Error Control Techniques: Fixed Channel Assignment, Dynamic channel assignment. Error control techniques, Forward Error Correction (FEC), Automatic Repeat Request (ARQ); Convergence of IP Network in Cellular Network: Introduction to Convergence Network, IP Core Network, Integration of IP Core Network in Cellular Network.

REFERENCES

1. Akaiwa & Yoshihiko, Introduction to Digital Mobile Communication, 2nd Edition, Wiley, 2015.
2. Juha Korhonen, Introduction to 4G mobile communications, London: Artech House, 2014.
3. Arokiamary, V. Jeyasri, Mobile Communication: 2nd Edition, India Technical Publications, 2012.

BEEZ 4823
MEDICAL DEVICES AND INSTRUMENTATION/
PERANTI PERUBATAN DAN INSTRUMENTASI PERUBATAN

LEARNING OUTCOMES

Upon completion of this course, students should be able to:

1. Perceive the concepts and operations of the medical instruments.
2. Dismantling and re-assembling various components of the medical devices with efficiency and no errors.
3. Demonstrate the understanding of responsible professionalism towards society, safety and health.

SYNOPSIS

Description designs and applications of electronic medical instruments for ECG, EEG, EMG, pressure, flow, volume, bio impedance, temperature, concentration, cell count and so on. Including the introduction to clinical analysers and therapeutic device. Origins, physiology and acquisition of biological signals, the use of electrodes and sensors and the processing of analogue and digital biological signals are discussed. Topic on electrical safety of the devices and patients are also included.

REFERENCES

1. BEEZ4823 Medical Devices and Instrumentation Module.
2. L.J. Street, Introduction to Biomedical Engineering Technology, 3rd ed. CRC Press, 2017.
3. A.Y.K. Chan, Biomedical Device Technology, 2nd ed. Charles C Thomas Pub Ltd, 2016.
4. A.B. Ritter, V. Hazelwood, A. Valdevit and A. N. Ascione, Biomedical Engineering Principles, CRC Press, 2011.
5. S. Chatterjee and A. Miller, Biomedical Instrumentation Systems. New York: Delmar Cengage Learning, 2010.
6. WHO, Maintenance and Repair of Laboratory, Diagnostic Imaging and Hospital Equipment, World Health Organization, 1994.

BEEZ 4853
BIOMEDICAL ETHICS, ACTS, STANDARDS & SAFETY/
ETIKA, AKTA, PIAWAI & KESELAMATAN BIOPERUBATAN

LEARNING OUTCOMES

Upon completion of this course, students should be able to:

1. Evaluate problems and scenarios and give recommendation based of learned concepts and ideas.
2. Manipulate learned concepts to solve given ethical, regulations and safety issues.
3. Demonstrate the understanding of responsible professionalism towards society, safety and health.

SYNOPSIS

This course exposes students to the acts, regulations and laws concerning the design, application and use of biomedical devices. It also emphasizes on the biomedical engineering ethics principles and case studies.

REFERENCES

1. D. A. Vallero, Biomedical Ethics for Engineers: Ethics and Decision Making in Biomedical and Biosystem Engineering, Academic Press, 2011.
2. T. L. Beauchamp and J. F. Childress, Principles of Biomedical Ethics, 7th ed. Oxford University Press, 2012.
3. Erlanger Medical Ethics Orientation Manual, Principles of Biomedical Ethics, May 2000.
4. Albert R. Jonsen, The Birth of Bioethics, Hastings Center Report, 1993.
5. Lennart Nordenfelt, Understanding the Concept of Health, Hommage À Wlodek. Philosophical Papers, 2007.
6. R. M. Veatch, A. M. Haddad, and D. C. English, Case Studies in Biomedical Ethics: Decision-making, principles and cases, 2nd ed. Oxford University Press, 2014.
7. Medical Device Regulation 2012
8. Medical Act 2012 (Act 737)
9. Medical Device Authority Act 2012 (Act 738)
10. Electrical equipment in medical practice (TC62)
11. IEC 60601 - Medical Electrical Equipment
12. IEC 61010 - Safety requirements for electrical equipment for measurement, control and laboratory
13. IEC TR 61852 Medical electrical equipment - Digital imaging and communications in medicine (DICOM) - Radiotherapy objects
14. IEC 62353 Medical electrical equipment - Recurrent test and test after repair of medical electrical equipment

BEEZ 4873
VLSI DESIGN/
REKABENTUK VLSI

LEARNING OUTCOMES

Upon completion of this course, students should be able to:

1. Evaluate solutions to problems in designing IC and its subcomponents by using adequate techniques.
2. Construct logic gates or subsystems circuits by using appropriate tools and techniques in VLSI.
3. Demonstrate the ability to engage in independent leaning on related topics effectively.

SYNOPSIS

Topics covered: Electronic properties of materials: Solid-state materials, Electronics and holes Doping, acceptors and donors, p- and n-type material, Conductivity and resistivity, Drift and diffusion currents, mobility and diffusion; Function of the basic inverter structure: Connectivity, layout, and basic functionality of a CMOS inverter, The CMOS inverter voltage transfer characteristic (VTC), Analysis of the CMOS VTC for switching threshold, VOH, VOL, VIH, VIL, and noise margins, Effect of changing the inverter configuration on the CMOS VTC, Connectivity and basic functionality of a Bipolar ECL inverter, Connectivity and basic functionality of a Bipolar TTL inverter; Combinational logic structures: Basic CMOS gate design, Layout techniques for combinational logic structures, Transistor sizing for complex CMOS logic devices, Transmission gates, Architectural building blocks (multiplexers, decoders, adders, counters, multipliers); Sequential logic structures: Storage mechanisms in CMOS logic, Dynamic latch circuits, Static latch and flip-flop circuits, Sequential circuit design.

REFERENCES

1. Vilas S. Bagad, Vlsi Technology and Design, Second Edition, 2012.
2. M. Michael. Vai, Vlsi Design, Hall/Crc, 2017.
3. Ming-Bo Lin, Introduction to Vlsi Systems: A Logic, Circuit, And System Perspective, Crc Press, 2012.
4. Shojiro Asai, Vlsi Design and Test for Systems Dependability, Springer, 2018.

BEEZ 4883
DIGITAL IC DESIGN/
REKABENTUK IC DIGITAL

LEARNING OUTCOMES

Upon completion of this course, students should be able to:

1. Evaluate suitable digital system design to solve engineering problem.
2. Design complete digital system on FPGA by using the HDL.
3. Demonstrate the ability to engage in independent leaning on related topics effectively.

SYNOPSIS

This course provides exposure to digital hardware ic design, which consists of the design entry, simulation and verification of the digital circuits. Students will learn how to design from simple logic gates and combinational logic to more complex circuits by using the hardware description language (HDL). The transformation process from design entry to the physical design will be explained. Moreover, an introduction to the digital circuit timing analysis will also be covered towards the end of this course.

REFERENCES

1. Stephen Brown, Zvonko Vranesic, Fundamentals of Digital Logic with Verilog Design, NY McGraw-Hill Companies, 2014.
2. Michael D.Ciletti, Advanced Digital Design with the Verilog HDL, NJ Pearson Education, 2011.
3. Peter Wilson, Design Recipes for FPGAs using Verilog and VHDL, London Elsevier, 2016.
4. Joseph Cavanagh, Sequential Logic and Verilog HDL Fundamentals, FL CRC Press, 2016.
5. Joseph Cavanagh, Computer Arithmetic and Verilog HDL Fundamentals, FL CRC Press, 2010.

SEMESTER 7

BEEU 4774
BACHELOR DEGREE PROJECT II/
PROJEK SARJANA MUDA II

LEARNING OUTCOMES

Upon completion of this course, students should be able to:

1. Complete planned project systematically.
2. (Re)construct solutions of broadly-defined engineering problems using relevant tools and techniques.
3. Display self-reliance in achieving the objectives of the project.
4. Demonstrate project results using appropriate techniques with an understanding of it limitations.
5. Explain the project execution and findings in oral and written form effectively.

SYNOPSIS

This is the second part of the Bachelor Degree Project. Students are expected to continue the project done in Bachelor degree Project Part 1 till completion. At the end of the semester students are required to submit the Bachelor Degree Project report both orally and in writing for assessment.

REFERENCES

1. Manual Projek Sarjana Muda (PSM), Fakulti Teknologi Kejuruteraan, Universiti Teknikal Malaysia Melaka.

PRE-REQUISITE

BEEU 3764
BACHELOR DEGREE PROJECT I/
PROJECT SARJANA MUDA I

BEEE 4443
QUALITY MANAGEMENT/
PENGURUSAN KUALITI

LEARNING OUTCOMES

Upon completion of this course, students should be able to:

1. Analyse any given problem and solution based on quality theories.
2. Work individually or in groups effectively to perform assignments/tasks given.
3. Study appropriate quality tools to improve the quality of management, process and product in organisation.

SYNOPSIS

This course will discuss on the different of quality theories for many organisation, comparisme international quality standard for customer satisfaction. The designing of strategy planning, strategy process and ethic to enhance the quality improvement for process and, product with using quality tools. Six –sigma being used for management to improve the management strategy planning.

REFERENCES

1. Duffy, Grace L, The Asq Quality Improvement Pocket Guide Basic History, Concept, Tools and Relationships, Asq Press - 2013.
2. N. Gopalakrrishnan, Simplified Six Sigma Methodology, Tools and Implimentation, Phi Learning, 2012
3. Roslina Ab. Wahid, Quality Management Principles, Systems and Tools, Uitm Press, Second Edition-2012.
4. Dale H. Besterfield., Quality Management, Pearson, Nine Edition-2014.
5. Duffy, Grace L, The Asq Quality Improvement Pocket Guide Basic History, Concept, Tools and Relationships, Asq Press – 2013.
6. David L. Geotsch, Stanley B. Davis, Quality Management for Organizational Excellence Introduction to Total Quality, New Jersey Pearson Education, Inc: Eight Edition – 2016.

BEEE 3424
EMBEDDED SYSTEMS APPLICATION/
APLIKASI SISTEM TERBENAM

LEARNING OUTCOMES

Upon completion of this course, students should be able to:

1. Analyse suitable microcontrollers to be used in a given scenario and constraints.
2. Construct embedded systems using programmable or reconfigurable devices.
3. Report the findings orally or in writing by performing assignments/experiments.

SYNOPSIS

This course will discuss about embedded System, characteristics & application areas, introduction to digital hardware technologies, introduction to computer systems & architectures, introduction to assembler-level software and high level language programming for Embedded Systems, introduction to Interfacing Computer Systems to External Hardware, application-level embedded system design concepts in industrial electronics. These topics are very important to students because it gives emphasis on the design of circuits used in embedded systems.

REFERENCES

1. Dogan Ibrahim "PIC Microcontroller Projects in C", Newnes, 2014.
2. Elecia White, "Making Embedded Systems: Design Pattern for Great Software", O'Reilly Media, 2011.
3. Tim Wilmshurst, "Designing Embedded Systems with PIC Microcontrollers, Second Edition: Principles and Applications", Newnes, 2009.
4. Dogan Ibrahim "PIC Microcontroller Projects in C", Newnes, 2014.

BEET 4803
SATELLITE COMMUNICATION/
KOMUNIKASI SATELIT

LEARNING OUTCOMES

Upon completion of this course, students should be able to:

1. Evaluate the mechanic orbit, satellite link and noise in satellite communication system.
2. Measure the performance of satellite link and satellite subsystem in telecommunication.
3. Demonstrate awareness and understanding of the safety and legal issues in a given topic/task.

SYNOPSIS

This course will discuss on introduction to satellite communication - frequency allocations, applications, future trends satellite communication; Orbital mechanics and launchers- Orbital Mechanics, Look angle determination; Satellite subsystem - telemetry, tracking, command and monitoring, power systems, communication subsystems, satellite antenna; Satellite Link Design - design of downlink, uplink design, design of satellite links for specific C/N; and Earth station technology.

REFERENCES

1. Louis J. Ippolito Jr, Satellite Communications Systems Engineering: Atmospheric Effects, Satellite Link Design and System Performance, Wiley, Second Edition, 2017.
2. Timothy Pratt, Charles Bostian, Jeremy Allnutt, Satellite Communication, JWiley Publications 2nd Editions, 2003.
3. Wilbur L. Pritchard, Robert A Nelson, Hendri G. Suyderhoud, Satellite Communication Enginering, Pearson Publications 2003.
4. M. Richharia, Satellite Communication, BSP, 2003
5. K.N.Raja Rao, Fundamentals of satellite Communications, PHI, 2004.

BEEZ 4863
RADIO NAVIGATION/
SISTEM NAVIGASI RADIO

LEARNING OUTCOMES

Upon completion of this course, students should be able to:

1. Develop solutions on radio navigation system problem using various tools and technique.
2. Conduct experimental works to analyse the performance of radio navigation systems.
3. Demonstrate awareness and understanding of the safety and legal issues in a given topic/task.

SYNOPSIS

Introduction to Terrestrial Systems: shape of the Earth, maps and coordinate systems/Datum, distances and direction on the surface of the Earth, errors calculations. Introduction to Radar: continuous scan, radar equations, types of radar dispersion characteristics. Hyperbolic Systems: OMEGA, DECCA, LORAN-C. Direction Finding: frequencies and transmitter, directivity, receiver antenna, accuracies. Aircraft Systems: VHF Omnidirectional Range (VOR), Distance Measuring Equipment (DME), Instrument Landing System (ILS), Microwave Landing System (MLS). Introduction to Satellite Systems: satellite orbits and geometry, satellite navigation principles, error calculations. TRANSIT: satellites, navigation principles, receiver, frequencies, accuracy. Coding of Satellite Signals: spread spectrum, spreading functions, correlation function, generation of the codes, receiver, spread spectrum in NAVSTAR/GPS. NAVSTAR/GPS: satellite orbits, satellites, control segment, navigation messages, receiver, differential GPS, accuracy, integration with other navigation systems. GLONASS: satellite orbits, navigation signals, codes, navigation messages, receiver, accuracy. Other Satellite Navigation Systems: TSIKADA, STARFIX, GEOSTAR/LOCSTAR, NAVSTAR, Galileo, Beidou/ Compass.

REFERENCES

1. Handbook of Global Navigation Satellite Systems / Margaret Ziegler / Clanrye International 2015.
2. Global Navigation Satellite Systems, Inertial Navigation, and Integration /Mohinder S. Grewal, Angus P. Andrews, Chris G. Bartone / Hoboken, NJ John Wiley & Sons 2013.
3. Antennas for Global Navigation Satellite Systems / Xiaodong Chen / John Wiley & Sons 2012.
4. Robotic Navigation and Mapping with Radar /Martin Adams / MA Artech House 2012.
5. Waveform Design and Diversity for Advanced Radar Systems /Edited By Fulvio Gini, Antonio De Maio, Lee Patton/ London Institution of Engineering and Technology 2012.

BEEZ 4843
BIOMEDICAL ENGINEERING MAINTENANCE/ PENYELENGGARAN KEJURUTERAAN BIOPERUBATAN

LEARNING OUTCOMES

Upon completion of this course, students should be able to:

1. Evaluate and determine fault based learned concepts.
2. Manipulates learned concepts in solving problems of the medical devices and electronic circuits.
3. Demonstrate understanding of engineering management principles and importance of economic-decision making.

SYNOPSIS

This course is designed to focus on the ability and skills of the students in identifying and troubleshooting faults in electronic circuits and devices. It also encompasses the ability to select and use suitable equipment for troubleshooting and elementary calibration of devices.

This course will also include:

i. Project management for procurement, equipping, installing, commissioning, decommissioning, testing and handing over of biomedical equipment
ii. A maintenance strategy includes procedures for inspection, as well as preventive and corrective maintenance. Performance inspections ensure that equipment is operating correctly, safety inspections ensure the equipment is safe for both patients and operators, and preventive maintenance (PM) aims to extend the life of the equipment and reduce failure rates.
iii. Troubleshooting the electronic circuit and calibration the medical equipment quality assurance program and building facility for medical equipment.
iv. Students will be taught to develop flow charts and event-tree analysis in fault finding. Students will also be exposed to the principles of innovative problem-solving techniques (TRIZ).

REFERENCES

1. Troubleshooting and Repairing Major Appliances / Eric Kleinert/ Mcgraw-Hill 2013.
2. Electronic Troubleshooting / Daniel Tomal, Agajanian Aram / Mcgraw-Hill 2014.
3. A+ Guide to Hardware Managing, Maintaining, and Troubleshooting /Jean Andrews / Centage Learning 2014.
4. Electrical Equipment Handbook Troubleshooting, Maintenance and Repair /Humphrey Kramer/ London Auris Reference 2012.

BEEZ 4833
BIOMECHANICS/
BIOMEKANIK

LEARNING OUTCOMES

Upon completion of this course, students should be able to:

1. Perceive concepts of mechanical properties and dynamics of the human structure.
2. Assembles procedures in measuring and modelling the human mechanics.
3. Demonstrate the understanding of responsible professionalism towards society, safety and health

SYNOPSIS

The course provides an overview of musculoskeletal anatomy, the mechanical properties and structural behavior of biological tissues, and biodynamics. Specific course topics will include structure and function relationships in tissues and organs; application of stress and strain analysis to biological tissues; analysis of forces in human function and movement; energy and power in human activity; introduction to modelling viscoelasticity. More specifically, it is expected that the student will:

(a). acquire knowledge and experience necessary to structurally, functionally, and mechanically analyse the performer and performance of physical activities;
(b). make appropriate recommendations about modifying performance;
(c). demonstrate how bones, joints, and muscles serve as components of human levers, acting in accordance with the laws of mechanics;
(d). demonstrate the application of knowledge of joint structure, joint stability factors and those factors influencing joint range of motion to the selection of developmental exercises for muscle strengthening, treatment and prevention of sport/athletic injuries;
(e). demonstrate the basic principles of mechanics as they apply to the analysis of human movement; and
(f). be able to approach training, rehabilitation, and/or coaching from an analytical point of view.

REFERENCES

1. N. Özkaya, D. Leger, D. Goldsheyder, and N. Margareta, Fundamentals of Biomechanics: Equilibirium, Motion and Deformation, 4th ed. Springer, 2017.
2. N. Margareta and V. H. Frankel, Basic Biomechanics of Musculoskeletal System, 4th ed. Lippincott Williams & Wilkins, 2012.
3. J. Hamill, K. M. Knutzen, and T. R. Derrick, Biomechanical Basis of Human Movement, 4th ed. Lippincott Williams & Wilkins, 2015.

BEEZ 4913
VLSI ARCHITECTURE/
SENI BINA VLSI

LEARNING OUTCOMES

Upon completion of this course, students should be able to:

1. Select the suitable hardware implementation strategy for IC architectures.
2. Construct digital systems by using adequate implementation techniques.
3. Demonstrate the ability to engage in independent leaning on related topics effectively.

SYNOPSIS

This course will expose to VLSI architecture and hardware implementation techniques for advanced applications. It will cover techniques such as pipelining and parallel processing which are applied in various VLSI applications such as microprocessors, memory hierarchies, digital signal processing and arithmetic operations. Besides, the concept of low-power design of digital systems will also be introduced.

REFERENCES

1. Michael D.Ciletti, Advanced Digital Design with the Verilog HDL, NJ Pearson Education, 2011
2. Joseph Cavanagh, Computer Arithmetic and Verilog HDL Fundamentals, FL CRC Press, 2010.
3. Joseph Cavanagh, Sequential Logic and Verilog HDL Fundamentals, FL CRC Press, 2016.
4. Stephen Brown, Zvonko Vranesic, Fundamentals of Digital Logic with Verilog Design, NY McGraw-Hill Companies, 2014.
5. Peter Wilson, Design Recipes for FPGAs using Verilog and VHDL, London Elsevier, 2016.
6. John E. Ayers, Digital Integrated Circuits Analysis and Design, FL CRC Press, 2010.

BEEZ 4893
DIGITAL IC TESTING/
PENGUJIAN IC DIGITAL

LEARNING OUTCOMES

Upon completion of this course, students should be able to:

1. Evaluate the performance and effectiveness of the IC testing techniques.
2. Perform different techniques of IC testing effectively.
3. Demonstrate the ability to engage in independent leaning on related topics effectively.

SYNOPSIS

This course will introduce to the testing techniques and methodology of the integrated circuit. Students will be exposed to different topics such as types of defects and faults in the wafer fabrication, faults detection using various methods, different type of tests, test pattern generation and also design for testability technique. By using the aide of the software, students will learn how to perform an IC testing by using several methods such as SCAN and BIST techniques. Towards the end of this course, the introduction to the board level testing using boundary scan technique will also be covered.

REFERENCES

1. Navabi, Zainalabedin, Digital System Test and Testable Design using HDL Models and Architectures, NY Springer, 2011
2. Sahu, Partha Pratim, VLSI Design, Mcgraw Hill, 2013
3. Ming-Bo Lin, Introduction to VLSI Systems: A Logic, Circuit, and System Perspective, CRC Press, 2012
4. L. Lavagno, Igor L. Markov, Grant Martin, Louis K. Scheffer, Electronic Design Automation for IC System Design, Verification, and Testing, Taylor & Francis Group, 2017.
5. Francis C Wong, Digital Circuit Testing: A Guide to DFT and Other Techniques, Elsevier Science/ Academic Press, 2014.

SEMESTER 8

BEEU 4786
INDUSTRIAL TRAINING/
LATIHAN INDUSTRI

LEARNING OUTCOME
Upon completion of this course, students should be able to:
1. Show technical competencies and skills gained throughout their internship.
2. Prepare a report on the industrial field daily activities in the log book systematically.
3. Communicate effectively with staff, colleagues and other personnel.
4. Practice professional ethics in accordance with industry rules and regulations.

SYNOPSIS
All students are required to undergo industrial training as part of their curriculum to complete four (4) years course for the Bachelor of Engineering Technology. The duration of training is 24 weeks and it will be taken place at the end of the course (semester 8). The students are expected to gain knowledge and enhance their technical skills within industrial environment relevant to their field of study.

REFERENCES
1. UTeM Guideline Handbook for Industrial Training.

BEEU 4796
INDUSTRIAL TRAINING REPORT/
LAPORAN LATIHAN INDUSTRI

LEARNING OUTCOME
Upon completion of this course, students should be able to:
1. Produce industrial training report.
2. Present report orally on working experience.

SYNOPSIS
All students are required to undergo industrial training as part of their curriculum to complete four (4) years course for the Bachelor of Engineering Technology. The duration of training is 24 weeks and it will be taken place at the end of the course (semester 8). The students are expected to gain knowledge and enhance their technical skills within industrial environment relevant to their field of study.

PRE-REQUISITE
Student required to pass Industrial Training BEEU 4786 in order to pass Industrial training report.

REFERENCES
1. UTeM Guideline Handbook for Industrial Training.

ACADEMIC HANDBOOK SESSION 2021/2022
FOR BACHELOR DEGREE PROGRAMMES

COURSE DETAILS FOR BACHELOR TECHNOLOGY PROGRAMMES

FTKEE

FACULTY OF ELECTRICAL AND
ELECTRONIC ENGINEERING TECHNOLOGY
UNIVERSITI TEKNIKAL MALAYSIA MELAKA

BEEM COURSE CORE COURSES (K)

SEMESTER 1

BEEM 1114
ELECTRICAL SYSTEM DRAFTING AND SIMULATION

LEARNING OUTCOMES

Upon completion of this course, students should be able to:

1. Apply general characteristic of electrical installation into the concepts of Computer Aided Drafting and Orcad drawing.
2. Design electrical installation apparatus for low voltage application.
3. Analyse actual working drawings of electrical project.

SYNOPSIS

The main objective of this course is to expose the Bachelor Technology students with skills of Computer Aided Drafting and its application. This course provides the student an exposure of electrical installation design for low voltage application. It introduces the student for electrical symbol, design lighting and switch socket outlet (S/S/O) required and design schematic diagram for DB, SSB and MSB.

REFERENCES

1. Scott Onstott, AutoCAD 2017 and AutoCAD LT 2017, Wiley Publishing.
2. Panduan Teknik Rekabentuk Elektrik, JKR Elektrik (Edisi 4).
3. OrCAD® CAPTURE Second Edition 31 May 2000, CADENCE PCB Systems Division.
4. Lab Module OrCAD, Engineering Skills (ECT111), UniMAP.

BEEM 1124
TECHNICAL REPORTING

LEARNING OUTCOMES

Upon completion of this course, students should be able to:

1. Ability to reading, interpreting, analysing, and evaluating complex technical and professional documents and visuals.
2. Ability to produce reports and proposal that inform, persuade and provide information.
3. Ability to apply the value of good writing and presenting communications.

SYNOPSIS

Technical reporting course is learning about a formal report designed to convey technical information in a clear an d easily accessible format. Technical report is a document describes the process, progress or result of technical or state of technical problem. It also learns how to make recommendation and conclusions of a project. Technical report is a review process; it is often limited to within the originating organization. Students compose, design, revise, and edit effective reports, descriptions, instructions, and employment documents. Emphasizes precise use of language and graphics to communicate complex technical and procedural information safely, legally and ethically.

REFERENCES

1. Wayne, L. W. (2016). Microsoft Excel 2016. Data Analysis and Bussiness Modeling. Microsoft Press.
2. Holman, J. P. and Holman, B. K. (1996). What Every Engineer Should Know About Excel. CRC Press.
3. Kvaternik, P. (2014). Engineering Calculation Using Microsoft Excel: Learn How to Write Your Own Customized Calculations in Minutes. Primoz Kvaternik, Grsoft Structural Engineering.
4. Mamishev, A. and Surgent, M. (2014). Creating Research and Scientific Documents Using Microsoft Word. Microsoft Press.

5. Vesilind, P. A. (2007). Public Speaking and Technical Writing Skills for Engineering Students. Lakeshore Press.
6. Sobek II, D. K. (2011). Understanding A3 Thinking: A Critical Component of Toyota's PDCA Management System. CRC Press.
7. Duffy, G. L. (2013). Modular Kaizen: Continuous and Breakthrough Improvement. ASQ Quality Press.

BEEM 1135
ELECTRICAL SYSTEM MEASUREMENT & TESTING

LEARNING OUTCOMES

Upon completion of this subject, students should be able to:

1. Demonstrate proper safety procedures industrial project.
2. Ability to evaluate the problem of electrical devices with standard tests and measurements.
3. Ability to analyse the relevant parameter measurement.

SYNOPSIS

This course covers the fundamentals circuit analysis such as Kirchoff's laws, parallel and series circuits. This course provides an introduction to the fundamentals of measurement standards, measurement errors, operation of electrical measuring instruments and their testing and calibration. In addition, this course also covers the used of potentiometer for measurement of resistance and voltmeter and ammeter calibrations. Measuring earth resistance for electrical grounding systems as well as insulation resistance and leakage current test are among the topics that will be covered in this course. Overall, it emphasizes the principles and analytical models used by engineers and technologists to design develop and test electrical systems.

REFERENCES

1. Helfrick, W.D. & Cooper, A.D. (2015). Modern Electronic Instrumentation and Measurement Technology: Pearson India.
2. Khurana, R. (2017). Electronic Instrumentation and Measurement: Vikas Publishing House.
3. Makarov, S. N., Ludwig, R.B, Stephen J. (2016). Practical Electrical EngineeringPractical Electrical Engineering: Springer Publications.

SEMESTER 2

BEEM 1245
SOLAR PV INSTALLATION AND MAINTENANCE

LEARNING OUTCOMES

Upon completion of this subject, students should be able to:

1. Ability to apply the principles of solar PV system technology.
2. Ability to construct PV system configuration.
3. Ability to analyze appropriate system configuration based on solar PV system.

SYNOPSIS

This course will introduce students with terminologies used in photovoltaic (PV) system technology. It will enable student to assess, install and maintain solar PV system configuration for stand-alone and grid-connected power generation based on standard requirement by the agencies involved.

REFERENCES

1. Sulaiman Shaari (2009). Solar Photovoltaic Power: Design and Installation of Stand-Alone Systems.
2. Sustainable Energy Development Authority (SEDA) (2013). Pemasangan dan Penyenggaraan Sistem Solar Fotovolta Tersambung Grid. ISBN: 978-967-10942-6-6.
3. Sustainable Energy Development Authority (SEDA) (2012). Basic Solar Photovoltaic Experiment. ISBN: 978-967-10942-3-5.
4. Sustainable Energy Development Authority (SEDA) (2013). Sistem Solar Fotovolta Tersambung Grid. ISBN: 978-967-10942-5-9.

BEEM 1255
SWITCHBOARD MAINTENANCE AND CALIBRATION

LEARNING OUTCOMES

Upon completion of this subject, students should be able to:

1. Ability to analyze basic principle of operation, construction and connections of a switchboard components and related equipment.
2. Ability to demonstrate the calibration procedures on switchboard equipment using specific parameters.
3. Ability to demonstrate proper safety procedures in maintenance work of switchboard equipment.

SYNOPSIS

The course provides students with knowledge of the functions and operations of circuit breakers and switchboards as well as maintenance of switchboards and associated instruments and relays in order for safe operation of switchboard.

REFERENCES

1. Electronic Instruments and Systems: Principles, Maintenance and Troubleshooting by R. G. Gupta Tata McGraw Hill Edition 2001.

SEMESTER 3

BEEM 1263
PROFESSIONAL PRACTICES

LEARNING OUTCOMES

Upon completion of this subject, students should be able to:

1. Ability to apply the issues and challenges of engineering and technology ethics.
2. Ability to analyse hazards, the function of risk management and occupational safety and health (OSHA).
3. Ability to practice the aspects and procedures of legal on engineering and technology issues.

SYNOPSIS

This course aims to explain the main concepts in engineering and technology ethics, risk management and occupational safety and health as well as to expose the students to basic of law in the engineering and technology context.

REFERENCES

1. Van De Poel, I and Royakkers, L. (2011) Ethics, Technology, and Engineering: An Introduction, Wiley-Blackwell.
2. Winston, M.E., and Edelbach, R.D (2008) Society, Ethics and Technology, Fourth Edition, Cengage Learning.
3. Harrington, J.L. (2008) Technology and Society, Jones & Bartlett Learning.
4. Lee Mei Peng, Detta, I.J. (2005) General Principles of Malaysian Law, Fifth Edition, Oxforf Fajar.
5. Martin, M. and Schinzinger, R. (2004). Ethics in Engineering, McGraw-Hill.
6. Fleddermann, C.B. (2011) Engineering Ethics, 4th Edition, Prentice Hall.
7. Alcorn, P. A. (2001). Practical Ethics for a Technological World. Upper Saddle River, NJ: Prentice Hall.

BEEM 2375
BUILDING ELECTRICAL SYSTEM MAINTENANCE

LEARNING OUTCOMES

Upon completion of this subject, students should be able to:

1. To describe and demonstrate safe practice of electrical systems used in buildings to perform common maintenance tasks.
2. To identify and perform basic preventive and reactive maintenance procedures for residential homes, apartments, and appliances.
3. To apply quantitative methods to common building maintenance tasks.

SYNOPSIS

Tools and Maintenance Tasks introduces and develops knowledge of basic building maintenance tools and materials, applied skills and techniques, industry health and safety standards, and preventive maintenance and troubleshooting practices in the building trades and facilities maintenance fields.

REFERENCES

1. Building Maintenance & Construction, Clifford Rutherford, 2018.
2. The Illustrated Guide to Electrical Building Services, Third Edition, Peter Tse & David Bleicher, 2014
3. Mechanical & Electrical Building Services Engineering Guidelines for Post Primary School Buildings, TGD 003, First Edition, February 2004

BEEM 2385
RENEWABLE ENERGY SYSTEM MAINTENANCE

LEARNING OUTCOMES

Upon completion of this subject, students should be able to:

1. Ability to describe the fundamentals, main characteristics and main components of different renewable energy sources and systems.
2. Ability to perform maintenance activities in a cost effective manner so that meet specific energy demands and have a minimal impact on the environment.
3. Ability to perform simple techno-economical assessments and compare environmental assessments of renewable energy systems.

SYNOPSIS

This course will introduce student to the renewable energy technology sources and sources, main characteristics and main components of the systems. The topics to be covered including Wind Energy, Solar Energy, Hydropower and Fuel cell. Apart of the course implementation, there will be seminar organised related to these renewable energy technology (industrial talk).

REFERENCES

1. Godfrey Boyle, Renewable Energy - Power for a Sustainable Future. Oxford University Press, 2004
2. Principles of Solar Energy, Frank Krieth & John F Kreider, John Wiley, New York
3. Photovoltaics: Design and Installation Manual by Solar Energy International PublishedSeptember by New Society Publishers
4. Wind Energy Handbook by Tony Burton, Nick Jenkins Published by Wiley
5. Fuel Cells: Principles and Applications by VISWANATHAN Published by Universities Press
6. Renewable Energy, Godfrey Boyle Published by Oxford University Press.

BEEM 2395
GENERATOR SYSTEM MAINTENANCE

LEARNING OUTCOMES

Upon completing this subject, the student should be able to:

1. To operate generator system in term of governing, load sharing and synchronizing.
2. To perform maintenance strategy for diesel generator system according to standard.
3. To perform servicing method for diesel generator component parts.

SYNOPSIS

This course consists of three learning section of diesel generator which are system operation, maintenance and service. Before going into the detailed system operation, students will be introduced with what is diesel generator and its function in electrical system. For maintenance section, students will be involved with strategy implemented in maintenance system which consists of preventive maintenance and condition based maintenance. Students also will be exposed to detailed servicing method of diesel generator which is related to fault diagnosis.

REFERENCES

1. Diesel Generator Handbook, LLJ Mahon, 1992.
2. Hydropower advancement project, revision 1.0 12/02/2011 - machine condition monitoring.
3. Synchronous generator (Electric generator handbook), 2015.

SEMESTER 4

BEEM 2405
ELECTRICAL MACHINE & DRIVE SYSTEM INTEGRATION

LEARNING OUTCOMES

Upon completion of this subject, students should be able to:

1. Ability to explain the concepts and techniques used in electrical machines drive system.
2. Ability to build control algorithm of programmable logic control (PLC), microcontroller, and Variable Frequency Drive (VFD).
3. Ability to analyse different approach of drives systems using software tools and the dynamic response and performance.

SYNOPSIS

This course is designed to introduce the student the principles of DC and AC motors drive control. This includes studying the concept of control modes for motor drives, connections and applications. The integration practices among PLC, microcontroller, motors, software, drives, computers, and other industrial equipment will be provided. Lectures and labs will place emphasis on the above items will allow the student to build a working integrated motor drive system throughout the semester.

REFERENCES

1. Frank Petruzella, Programmable Logic Controllers, 5th Edition, USA: McGraw Hill Education., 2017.
2. Muhammad H. Rashid, Power Electronics: Circuit, Devices and Application. 4th Edition. USA: Prentice Hall International., 2013.
3. Austin Hughes, Electric Motor and Drives: Fundamentals, Types and Application. 4th Edition. USA: Newnes., 2013.
4. Jens Weidauer, Electrical Drives: Principles, Planning, Application, Solutions. 5th Edition. UK: Publicis., 2014.
5. Ned Mohan, Electric Machines and Drives. 1st Edition. UK: Wiley., 2012.
6. Theodore Wildi. Electrical Machines, Drives and Power Systems. 6th Edition. UK: Pearson Education Limited.
7. S. K. Pillai. Basics of Electrical Drives. 4th Edition. UK: New Academic Science., 2014.
8. Bimal K. Bose, Power Electronics and Variable Frequency Drives: Technology and Applications. 1st Edition. UK: Wiley IEEE Press., 1997.
9. FRENIC Mini (C2) Series User's Manual.

BEEM 2415
ENERGY EFFICIENCY OPTIMIZATION

LEARNING OUTCOMES

Upon completion of this subject, students should be able to:

1. Ability to understand energy management, standards and safety aspect of efficient electrical energy utilization.
2. Ability to demonstrate the instrument and measurement tools of efficient electrical energy utilization.
3. Ability to evaluate energy saving solution of energy efficient equipment.

SYNOPSIS

This course exposes the students to national and world economic perspectives on energy in term of economics, problems and current status of energy. In addition, safety aspect of electrical equipment's will also be exposed to the student to create awareness and safe working practice. Through plans and operation for energy management and energy efficient equipment's, student will learn on how efficient energy utilization can be achieved. At the end of this course, students will be exposed to the techniques for energy audit such as analysing energy consumptions and identify a solution for energy saving programs.

REFERENCES

1. Frank Kreith & D. Yogi Goswami, "Handbook of Energy Efficiency and Renewable Energy", CRC Press, 2007.
2. Gilbert M. Masters, "Renewable and Efficient Electric Power Systems", Wiley-Interscience, 2004.
3. Joel N. Swisher, Gilberto de Martino Jannuzi, and Robert Y. Redlinger, 'Tools and methods for Integrated Resource Planning: Improving Energy efficiency and protecting the Environment", UNEP Collaborating Centre on Energy and Environment, 2012
4. Wayne C. Turner, 'Energy Management Handbook', Fairmont Press Inc, 2005.
5. Frank Kreith and D. Yogi Goswami, Energy Management and Conservation Handbook, CRC Press, 2008.
6. The Energy Efficiency and Conservation Guidelines Part 1: Electrical Energy - use Equipment, Kementerian Tenaga, Teknologi Hijau dan Air, 2011.

BEEM 2423
COLLEGIALITY INTERACTION AND MANAGEMENT

LEARNING OUTCOMES

Upon completion of this subject, students should be able to:

1. To prepare pedagogical aids including advance organizers.
2. To demonstrate managerial practice and application exercise.
3. To report proper case studies and sample interactions are presented to illustrate concepts and principles.

SYNOPSIS

This subject is required students to carry out practical works in Electrical Workshop in order to gain learning experience in three phase wiring system and construct motor starter circuit. Students will experience designing & performing electrical installation in industrial wiring & motor starter circuit following by inspection & testing steps. Students are also emphasized on the safety and regulatory requirements. Assessment will be conducted on student ability in the functionality, wiring, testing, safety awareness, discipline while carry out the practical tasks.

REFERENCES

1. Friend, Marilyn; Cook, Lynne. (1992) Interactions: Collaboration Skills for School Professionals.
2. Pifer, Meghan J.; Baker, Vicki L. (2013). Managing the Process: The Intradepartmental Networks of Early-Career Academics
3. Robert E. Cipriano (2011). Facilitating a Collegial Department in Higher Education: Strategies for Success 1st Edition
4. Nadja Bieletzki (2018) The Power of Collegiality: A Qualitative Analysis of University Presidents Leadership in Germany (Organization & Public Management)
5. Franklin H. Silverman (2003). Collegiality and Service for Tenure and Beyond: Acquiring a Reputation as a Team Player.

BTMU 2124
CAPSTONE TECHNOPRENEUR 1

LEARNING OUTCOMES

Upon completion of this subject, students should be able to:

1. Apply various financial indicators & tools to prepare for financial information for a new business venture.
2. Acquire skills to analyse financial statements.
3. Display the art of negotiation with investors.

SYNOPSIS

Entrepreneurs need money to start and to grow their business. It is important to understand how revenue is generated, how to source for funds, how to control cash flow, how to assess the succes of the company in monetary terms, and how to value a company for various purposes. The course exposes students to the various financial aspects relating to new ventures. These include approaches to secure start-up capital and venture financing. Students learn about the basic accounting, essential financial indicators, the types of funds available, the different categories of investors, the importance of intellectual property in securing finance, the financial details to be included in a business plan required for investment purpose, valuation of company and the art of negotiation with investors.

REFERENCES

1. NTU (2013). Entrepreneurship & Innovation Asia. Overview. Nanyang Technological University, Singapore: Nanyang Technopreneurship Center.
2. Cremades, A. (2016). The Art of Startup Fundraising. Pitching Investors, Negotiating the Deal, and Everything Else Entrepreneurs Need to Know. Hoboken, NJ: John Wiley & Sons.
3. McKinsey & Co., Koller, T., Goedhart, M. & Wessels, D. (2015). Valuation. Measuring and Managing the Value of Companies, 6th edn. Hoboken, NJ: John Wiley & Sons.
4. Stowe, J. D., Robinson, T. R., Pinto, J. E. & McLeavey, D. W. (2007). Equity Asset Valuation. Hoboken, NJ: John Wiley & Sons.
5. Pereiro, L. E. (2002). Valuation of Companies in Emerging Markets. A Practical Approach. New York: John Wiley & Sons.
6. OECD (2015). Boosting Malaysia's National Intellectual Property System for Innovation. Paris: OECD Publishing.

SEMESTER 5

BEEM 3535
INDUSTRIAL MACHINERY CONTROL SYSTEM DESIGN

LEARNING OUTCOMES

Upon completion of this subject, students should be able to:

1. Ability to select appropriate the PLC central processing unit, input-output system, programming and peripheral devices with respect to designed project and application.
2. Ability to analyse control system problems by utilizing controller system such as P, PI, PID and Ziegler-nichols into water level & flow, temperature and servo motor.
3. Ability to evaluate appropriate input and output devices for selected microcontroller, control system and programmable logic control.

SYNOPSIS

One of the aspects of a good technologies is to have the capability of integrating the hardware and the software, thus an electrical technologist should be competence in programming. This course introduces basic programming using high level language (C language) includes study of PIC microcontroller architecture, its programming using C language and interfacing with input and output devices. This knowledge is gathered and applied to design microcontroller based system. Applying and analyse control system problems by utilizing controller system such as P, PI, PID and Ziegler-Nichols into water level & flow, temperature and servo motor. The course also to understanding of the PLC central processing unit, input-output system, programming and peripheral devices, and programming languages and will developed skills in programming PLC (Omron and Siemens) and applying in industrial PLC.

REFERENCES

1. Deitel and Deitel, Sudin, S., Ahmad, R.B. and Yacob, Y., (2006). C How to Program. Pearson-Prentice Hall.
2. H.W Huang. (2009). PIC Microcontroller: An Introduction to Software and Hardware Interfacing. Thomson & Delmar Learning.
3. Nise, N. S., Control Systems Engineering. 6th Edition. UK: John Wiley., 2010.
4. Ogata, K., Modern Control Systems. 5th Edition. USA: Addison-Wesley Company., 2009.
5. Frank D. Petruzella, Programmable Logic Controller, 4th Edition, McGRAW-HILL Int., 2010.

BEEM 3545
MONITORING SYSTEM INTEGRATION

LEARNING OUTCOMES

Upon completion of this subject, students should be able to:

1. Ability to apply the components and concept used in SCADA system.
2. Ability to construct Human Machine Interface (HMI) in SCADA system and their network communication.
3. Ability to propose the IoT concepts in applications.

SYNOPSIS

The course provides an introduction to the fundamentals of Supervisory Control and Data Acquisition (SCADA), the architecture, the components, Human Machine Interface (HMI) and the applications of SCADA. Students also introduced to the concept of Internet of Things (IoT), network communications and the applications. Lectures and labs will place emphasis on the above items will allow the student to operate the monitoring system and make data analysis throughout the semester.

REFERENCES

1. Ovidiu Vermesan, Peter Friess, Internet of Things – From Research and Innovation to Market Deployment. Denmark: River Publishers.,2014.
2. Practical SCADA system for Industry.Australia: IDC Technologies Pty Ltd., 2011.
3. Product Catalog.Version 1.2: Makina., 2018.
4. IOT SCADA Software Installation and User Manual. Pontedera: Alleantia., 2014.
5. INTERNET OF THINGS: tutorials point (I)., 2016.

BEEM 3554
INDUSTRIAL DATA ANALYSIS

LEARNING OUTCOMES

Upon completion of this subject, students should be able to:

1. Ability to apply knowledge of data analysing technology.
2. Ability to analyse statistical data technology.
3. Ability to evaluate data with graphical analysing method.

SYNOPSIS

The course provides an introduction for Microsoft excel & R software and how to use for statistic academic purposes.

REFERENCES

1. Hothorn, T., & Everitt, B. (2009). A Handbook of Statistical Analyses Using R, Second Edition. A Handbook of Statistical Analyses Using R.
2. Vemuri, V. K. (2018). A first course in statistical programming with R, Second Edition. Journal of Information Technology Case and Application Research, 1–3.
3. Carlberg, C. (2011). Statistical analysis - Microsoft Excel 2010. Pearson.
4. Hansen, M. A. E. (2007). Data Analysia with Excel. Metabolome Analysis - An introduction (Vol. 47).
5. Alfred P.Rovai. (2016). Statistical Fundamental Using Microsoft Excel for Univariate and Bivariate Analysis, Third Edition. Watertree Press LLC.
6. Rohatgi, V. K., & Saleh, A. K. M. E. (2015). An Introduction to Probability and Statistics: Third Edition. An Introduction to Probability and Statistics: Third Edition.
7. Pandis, N. (2016). Correlation and linear regression. American Journal of Orthodontics and Dentofacial Orthopedics.
8. Kerns. (2005). Introduction to Probability and Statistics using R. Technometrics, 47(3), 378–378.
9. Roxy, P., Chris, O., & Jay, D. (2016). Introduction to Statistics & Data Analysis, Fifth Edition. California University of Pennsylvania, California, PA.

BTMU 3134
CAPSTONE TECHNOPRENEUR 2

LEARNING OUTCOMES

Upon completion of this subject, students should be able to:

1. Make use of the business model canvas incorporating human and financial elements.
2. Write a convincing business plan.
3. Motivate all stakeholders and build a cohesive venture team.

SYNOPSIS

The start-up and growth of an enterprise invariably involves both human and financial capital. To manage the increasing pool of human resources and to convince venture capitalists to invest become two main issues especially for growing venture. This course consists of two parts: in the first part, organization and human resource management are introduced; in the second part, the focus is on writing a convincing business plan to attract venture capital investment. When enterprise starts to take shape and grow, more people will be hired, proper organization, team building and human resource management will become important issues. In this course, students will be exposed to the various organizational aspects relevant to new ventures and established companies. These include the pros and cons of the different organization structures, conflicts that may arise among employees, and approaches to building strong teams. Human resource management techniques will also be introduced and discussed.

In the second part of the course, the business model canvas will be described listing the connections among the different components of a business. The value of a business plan and the techniques of writing a business plan will be introduced.

REFERENCES

1. NTU (2013). Entrepreneurship & Innovation Asia. Overview. Nanyang Technological University, Singapore: Nanyang Technopreneurship Center.
2. Cremades, A. (2016). The Art of Startup Fundraising. Pitching Investors, Negotiating the Deal, and Everything Else Entrepreneurs Need to Know. Hoboken, NJ: John Wiley & Sons.
3. McKinsey & Co., Koller, T., Goedhart, M. & Wessels, D. (2015). Valuation. Measuring and Managing the Value of Companies, 6th edn. Hoboken, NJ: John Wiley & Sons.
4. Stowe, J. D., Robinson, T. R., Pinto, J. E. & McLeavey, D. W. (2007). Equity Asset Valuation. Hoboken, NJ: John Wiley & Sons.
5. Pereiro, L. E. (2002). Valuation of Companies in Emerging Markets. A Practical Approach. New York: John Wiley & Sons.
6. OECD (2015). Boosting Malaysia's National Intellectual Property System for Innovation. Paris: OECD Publishing.

SEMESTER 6

BEEM 3664
MAINTENANCE MANAGEMENT SYSTEM (MMS)

LEARNING OUTCOMES

Upon completion of this subject, students should be able to:

1. Ability to demonstrate competency in manage and developing the maintenance activities in industrial environment.
2. Ability to perform maintenance activities in a cost effective manner using appropriate software.
3. Ability to apply of contemporary maintenance management practices.

SYNOPSIS

This course will introduce student to principle of maintenance management system. The topics to be covered including Introduction to Maintenance Management, Reliability performance of production plants, Total Productive Maintenance (TPM), Maintenance methods and techniques and Maintenance Software Application. Apart of the course implementation, there will be an industrial visit to related industries in order to expose student to the actual practices of maintenance management system.

REFERENCES

1. Allan Wilson Asset Maintenance Management; Industrial Press, 2002.
2. Mobley, RK, ed. Maintenance engineering handbook. 8th ed. New York: McGraw-Hill, 2014. ISBN 9780071826617.
3. Total Productive Maintenance, S Borris, McGraw-Hill (2006).
4. Assets maintenance management A guide to developing strategies and improving performance, A Wilson (2007).
5. Reliability-Centred Maintenance, S Moubray, Butterworth and Heinemann (1997).
6. Reliability-Centred Maintenance: Management and Engineering Methods, Anderson, R.T and Neri, L (1990).
7. Introduction to Total Productive Maintenance, S Nakajima, Productivity Press (1988).

BEEM 3674
PROJECT PLANNING AND EXECUTION

LEARNING OUTCOMES

Upon completion of this subject, students should be able to:

1. Create a project budget, control project plan and handle a technical work.
2. Built a team project, create a project and identify the project scope, task, and project schedule by using a Gantt Chart.
3. Evaluate project critical path, analyse the project problems, solve the problems, make decision and complete a report.

SYNOPSIS

The course provides an introduction to the key concepts of planning and executing projects that will identify a factors that lead to project success, and learn how to plan, analyse, and manage projects. Students will be exposed to various challenges to complete their projects.

REFERENCES

1. Rod Baxter (2016), Project Management for Success Handbook: Manage the Project -Ensure the Results – Celebrate Success.Lulu.com.
2. Kory Kogon, Suzette Blakemore, James Wood (2015), Project Management for the Unofficial Project Manager. BenBella Books.
3. Paul Whatley (2014). Project Planning Handbook. Troubador Publishing Ltd.
4. Parviz F. Rad, Vittal S. Anantatmula (2005). Project Planning Techniques. Berrett-Koehler Publishers, Inc.
5. Gregory T. Haugan PhD, PMP (2001). Project Planning and Scheduling. Berrett-Koehler Publishers, Inc.

BEEM 3684
FINAL YEAR PROJECT I

LEARNING OUTCOMES

Upon completion of this subject, students should be able to:

1. Identify issues or problems in industrial technology and propose solutions.
1. Provides proposal for the implementation of Final Year Project.
1. Presents ideas related to research to panel evaluators in more systematic.

SYNOPSIS

This course is for fulfil students with knowledge in conducting research methods, particularly in the field of technical and vocational education in Malaysia. It is important in providing human capital development equivalent with global developments.

REFERENCES

1. Rowena, M., How to write a thesis. 3rd Edition. England: Open University Press, 2011.
2. J S Graustein. How to Write an Exceptional Thesis or Dissertation: A Step-By-Step Guide from Proposal to Successful Defense, Atlantic Publishing Group, 2014.
3. David Evans, Paul Gruba, Justin Zobel. How to write better thesis, Springer, 2014.
4. Jurnal-jurnal akademik.

SHORT SEMESTER

BEEM 3696
FINAL YEAR PROJECT II

LEARNING OUTCOMES

Upon completion of this subject, students should be able to:

1. Identify issues or problems in industrial technology and propose solutions.
2. Provides proposal for the implementation of Final Year Project.
3. Presents ideas related to research to panel evaluators in more systematic.

SYNOPSIS

This course is for fulfil students with knowledge in conducting research methods, particularly in the field of technical and vocational education in Malaysia. It is important in providing human capital development equivalent with global developments.

REFERENCES

1. Rowena, M., How to write a thesis. 3rd Edition. England: Open University Press, 2011.
2. J S Graustein. How to Write an Exceptional Thesis or Dissertation: A Step-By-Step Guide from Proposal to Successful Defense, Atlantic Publishing Group,2014.
3. David Evans, Paul Gruba, Justin Zobel, How to write better thesis, Springer, 2014.
4. Jurnal-jurnal akademik.

SEMESTER 7

BEEM 4112
INDUSTRIAL TRAINING

LEARNING OUTCOME

Upon completion of this subject, students should be able to:

1. Organizes productive work schedule.
2. Presents communication skills and interact effectively in the organization.
3. Practices self -discipline and responsibility attitude working in a team.

SYNOPSIS

This course is to expose students about the real environment working in engineering field. Understand the work culture in the industry and developing students' technical and interpersonal skills as a preparation when serving in industrial environment.

REFERENCES

1. University Industrial Training Guidelines.
2. Faculty Industrial Training Guidelines.
3. University Academic Regulations.

BEEL COURSE CORE COURSES (K)

SEMESTER 1

BEEL1112
TECHNOLOGY SKILL AND DEVELOPMENT IN ELECTRONIC AUTOMATION I

LEARNING OUTCOMES
Upon completion of this subject, students should be able to:
1. Apply a standard practiced of manual technical drawing and able to construct a product using common software (AutoCAD). (PLO1, C3).
2. Apply and construct the basic skills and standard practiced of print circuit board (PCB) layout design using software. (PLO2, P3).
3. Apply a logic system using programmable logic controller (PLC). (PLO3, C4)

SYNOPSIS
The aim of this course is to provide students with basic technical skills in electronic automation. This includes basic knowledge of technical drawing, software based drawing (AutoCAD), Print Circuit Board (PCB) Design and Programmable Logic Controller (PLC).

REFERENCES
1. Technical Drawing 101 with AutoCAD 2018, Jun 26, 2017 by Ashleigh Fuller and Antonio Ramirez.
2. PLC Programming Using RSLogix 500: A Practical Guide to Ladder Logic and the RSLogix 500 EnvironmentOct 20, 2018 by Nathan Clark.
3. Complete PCB Design Using OrCAD Capture and PCB EditorJun 11, 2009 by Kraig Mitzner.

BEEL1125
PRODUCT DEVELOPMENT TECHNOLOGY

LEARNING OUTCOMES
Upon completion of this course, students should be able to:
1. Explain the operational behaviour of circuits components. (C2, PLO1).
2. Demonstrate the ability to construct op-amp based circuits and perform the operation. (P5, PLO2).
3. Verify the working principle of electronic circuits. (A5, PLO3)

SYNOPSIS
This course covers the operational behaviour of circuit components, including resistor, capacitor, inductor, diode, transistor up until integrated circuit (ICs). Important circuits, such as operational amplifier (op-amp) based circuits are also discussed and emphasized. An introduction to digital concept is also covered in this course.

REFERENCES
1. Thomas L. Floyd, Electronic Devices 10th edition, 2018.
2. Robert Boylestad, Electronics Devices and Circuit Theory 11th edition, 2013 by Nathan.

BEEL1135
FLEXIBLE MANUFACTURING SYSTEM I

LEARNING OUTCOMES

Upon completion of this course, students should be able to:

1. Perform advanced PLC Programming using FBD, GrafCET, Structured Text programming language. (P3, PLO2)
2. Apply motion control system related in automation system application. (C3, PLO3)
3. Evaluate various types of sensors, transducers and actuators in automation system integration. (A3, PLO8)
4. Identify type of industrial robotic used in automation system application. (C2, PLO1)

SYNOPSIS

This course will be further advancement related to automation system and integration. The topics will cover on advanced PLC Programming (FBD, Structured Text, GrafCET etc), special motor for motion control (e.g. servo and stepper motor), sensors and transducer (analogue sensor), mechanisms (e.g. gears, bearing, cam and follower, pulley, rack and pinion etc) as well electro-pneumatic and electrohydraulic system. As part of the FMS system, an industrial robotics will also be introduced in the last topic.

REFERENCES

1. Webb John W, Reis Donald A, Programmable Logic Controllers, Phi Learning PVT LTD.
2. Frank Petruzella, Programmable Logic Controllers, McGrawHill.
3. Craig, J.J., Introduction to Robotics Mechanics and Control, 3rd ed., Addison Wesley Longman, 2017.
4. Introduction to Mechatronics and measurement Systems, Alciatore, 2009, 3e, TMH.
5. Mechatronics system design, Devdas shetty & Richard A. Kolk, Thomson, 2007.
6. Industrial Electronics, Thomas E. Kissell, Prentice - Hall Publication.
7. Incremental Motion Control, B. C. Kuo, SRL Publishing Company.
8. Industrial Automated Systems by Terry Bartelt Bird.

BEEL1142
TECHNOLOGY SYSTEM PROGRAMMING I

LEARNING OUTCOMES

Upon completion of this course, students should be able to:

1. Apply the fundamental programming concepts in solving problem using programming tools. (C3, PLO 1)
2. Produce the algorithm appropriate to given problem. (P4, PLO 2)
3. Show the continual desire in developing the algorithm for the given problem. (A3, PLO3)

SYNOPSIS

This course delivers the competency to student in applying the fundamental programming concepts and able to analyse problem and produce the solution using algorithm development tools. Solve the problem using fundamental programming (C or C#). The course will be delivered using the basic programming language that is trending at the current market.

REFERENCES

1. Stuart Reges, Marty Stepp, Allison Obourn, Building Python Programs. Pearson 2019.
2. Miles, Begin to Code with Python, Pearson, 2018.

SEMESTER 2

BEEL1214
TECHNOLOGY SKILL AND DEVELOPMENT IN ELECTRONIC AUTOMATION II

LEARNING OUTCOMES

Upon completion of this course, students should be able to:

1. Describe Boolean functions and logic circuit in digital applications. (PLO1,C2)
2. Construct simple logical operations using combinational and sequential logic circuits. (PLO2, P4)
3. Build the digital logic systems. (PLO3, P4)

SYNOPSIS

This course aims to demystify the digital electronics through hands-on work in the lab creating simple machines with embodied behaviours. This course brings students over the beginner's threshold to a basic understanding of the use, terminology, and potential of digital electronic. The skills and concepts taught in this course are presented from an interdisciplinary approach which merges practices in sciences and technology.

REFERENCES

1. Digital Electronics: Principles and ApplicationsJan 16, 2013 by Roger L Tokheim.
2. Digital Electronics: A Practical Approach with VHDL (9th Edition) Jul 28, 2011 by William Kleitz.
3. Digital Computer ElectronicsJul 1, 2017 by Jerald A Brown Albert P. Malvino.

BEEL1222
NETWORK, SWITCHING AND ROUTING

LEARNING OUTCOMES

Upon completion of this course, students should be able to:

1. Apply the fundamental concept of networking. (C2, PLO1)
2. Set up the local area network and identify the network IP. (C4, PLO2)
3. Develop a small network. (C4, PLO3)

SYNOPSIS

This course covers networking structure, and functions. The course introduces the principles and structure of IP addressing and the fundamentals of networks, switching and routing.

REFERENCES

1. Introduction to Networks, Mark A. Dye, Allan D. Reid, Cisco Press, 5th Printed October 2015;
2. Network Basics, Antoon (Tony) W. Rufi, Rick McDonald, Cisco Press, 1st Printed November 2013.
3. Routing and Switching Essentials, Scott Empson, Cheryl Schmidt, Cisco Press, 2nd Printed July 2014.

BEEL1234
TECHNOLOGY SYSTEM PROGRAMMING II

LEARNING OUTCOMES

Upon completion of this course, students should be able to:

1. Analyse the problem and solve using advance programming in mobile microprocessor. (C4, PLO 1)
2. Produce the program appropriate to the solution suggested. (P4, PLO 2)
3. Show the continual desire in developing the program in solving the problem. (A3, PLO3)

SYNOPSIS

This course delivers the competency to student in developing programs that can provide programmable solution using advance programming. The course will be delivered using the programming language that is trending at the current market. The student can also develop program to utilize the basic mobile input sensors and respond according to the problems.

REFERENCES

1. Sam Key (2015). Python Programming In A Day & Android Programming In A Day. Sam Key.
2. Stuart Re.g.es, Marty Stepp, Allison Obourn (2019) Building Python Programs. Pearson 2019.
3. Miles, Be.g.in to Code with Python, Pearson, 2018

BEEL1243
PROFESSIONAL PRACTICES

LEARNING OUTCOMES

Upon completion of this course, students should be able to:

1. Apply the issues and challenges of engineering and technology ethics. (A3, PLO8).
2. Analyse hazards, the function of risk management and occupational safety and health (OSHA). (C3, PLO3)
3. Practice the aspects and procedures of le.g.al on engineering and technology issues. (P3, PLO2)

SYNOPSIS

This course aims to explain the main concepts in engineering and technology ethics, risk management and occupational safety and health as well as to expose the students to basic of law in the engineering and technology context.

REFERENCES

1. Van De Poel, I and Royakkers, L. (2011) Ethics, Technology, and Engineering: An Introduction, Wiley-Blackwell
2. Winston, M.E., and Edelbach, R.D (2008) Society, Ethics and Technology, Fourth Edition, Cengage Learning
3. Harrington, J.L. (2008) Technology And Society, Jones & Bartlett Learning
4. Lee Mei Peng, Detta, I.J. (2005) General Principles of Malaysian Law, Fifth Edition, Oxforf Fajar.
5. Martin, M. And Schinzinger, R. (2004). Ethics in Engineering, mcgraw-Hill.
6. Fleddermann, C.B. (2011) Engineering Ethics, 4th Edition, Prentice Hall
7. Alcorn, P. A. (2001). Practical Ethics for a Technological World. Upper Saddle River, NJ: Prentice Hall.

SEMESTER 3

BEEL2112
TECHNOLOGY DATA ACQUISITION AND ANALYSIS I

LEARNING OUTCOMES

Upon completion of this course, students should be able to:

1. Define/apply the electronic sensor. (C4, PLO1)
2. Demonstrate electronic instrumentation comprising of sensor. (C4, PLO2)
3. Apply the working principles of measurement and instrumentation. (C6, PLO3)

SYNOPSIS

This course covers the fundamental of electronic instrumentation. This includes the working principle and transduction properties of transducers and sensors. Importance and techniques of signal conditioning is emphasized. Element and principle of data conversion and acquisition and their applications are discussed.

REFERENCES

1. Introduction to Instrumentation and Measurements 3rd Edition, Robert B. Northrop, CRC Press; 3rd edition (March 31, 2017)
2. Smart Sensors for Industrial applications, 1st Edition, Krzysztof Iniewski, CRC Press, Published March 29, 2017.
3. Http://www.ieec.uned.es/investigacion/Dipseil/PAC/archivos/More%20on%20Transducers%20Sensors%20and%20Actuators.pdf

BEEL2125
FLEXIBLE MANUFACTURING SYSTEM II

LEARNING OUTCOMES

Upon completion of this course, students should be able to:

1. Classify automation equipment and assembly systems into different categories. (C2, PLO1)
2. Evaluate FMS concept in a manufacturing environment. (A3, PLO8).
3. Develop an example of a basic manufacturing system's control and monitoring application commonly used in industry using an HMI/SCADA development software. (P4, PLO2)

SYNOPSIS

This course will introduce student to the Flexible Manufacturing System which mostly include of machine cell, consisting of a group of processing stations (usually CNC machine tools), interconnected by an automated material handling and storage system, and controlled by an integrated computer system.

REFERENCES

1. Mikell.P.Groover "Automation, Production Systems and Computer Integrated Manufacturing", Prentice Hall
2. David J. Parrish, "Flexible Manufacturing", Butterworth-Heinemann
3. CAD/CAM – Groover M.P, Zimmers E.W, Prentice Hall
4. Gideon Halevi and Roland Weill, "Principles of Process Planning - A Logical Approach" Chapman & Hall, London
5. Computer Aided Manufacture by Chien Chang and Richard A Wysk, Prentice HALL

BEEL2135
EMBEDDED SYSTEM PROGRAMMING TOOL

LEARNING OUTCOMES

Upon completion of this course, students should be able to:

1. Describe the theory and basic architecture of microcontroller system.
2. Write program into microcontroller.
3. Interface input and output device to microcontroller.

SYNOPSIS

This course emphasizes the role of microcontroller in an automation system. It covers input and output topics as well as memory usage. In addition, this course will also focus on how to program using language C. Meanwhile, the Raspberry Pi will be used as a controller.

REFERENCES

1. Mikell.P.Groover "Automation, Production Systems and Computer Integrated Manufacturing", Prentice Hall
2. David J. Parrish, "Flexible Manufacturing", Butterworth-Heinemann
3. CAD/CAM – Groover M.P, Zimmers E.W, Prentice Hall
4. Gideon Halevi and Roland Weill, "Principles of Process Planning - A Logical Approach" Chapman & Hall, London
5. Computer Aided Manufacture by Chien Chang and Richard A Wysk, Prentice HALL

BEEL2143
NETWORK SECURITY IMPLEMENTATION

LEARNING OUTCOMES

Upon completion of this course, students should be able to:

1. Apply network security principles as well as the tools and configurations available. (PLO1, C3)
2. Monitor, detect, investigate, analyse and respond to security incidents. (PLO2, P4)
3. Implement data confidentiality, integrity, availability and security controls on networks, servers and applications. (PLO3, A3)

SYNOPSIS

This course covers foundational understanding of cybersecurity and how it relates to information and network security. It provides core security skills needed for monitoring, detecting, investigating, analysing and responding to security events, thus protecting systems and organizations from cybersecurity risks, threats and vulnerabilities.

REFERENCES

1. Mary Manjikian, "Cybersecurity Ethics: An Introduction", Fouth edition, Routledge, 2017.
2. Edward G. Amoroso, Matthew E. Amoroso, "An Introduction to Cyber Security", Fouth edition, Routledge, 2017.
3. Charles J. Brooks, Christopher Grow, "Cybersecurity Essentials", Fouth edition, Wiley 2017.
4. William M. Hancock, "Cybersecurity Operations Handbook", Second edition, Digital Press, 2016.

SEMESTER 4

BEEL2214
TECHNOLOGY DATA ACQUISITION AND ANALYSIS II

LEARNING OUTCOMES

Upon completion of this course, students should be able to:

1. List data transfer techniques. (C4, PLO1)
2. Manipulate wired and wireless communication techniques. (P4, PLO2)
3. Develop mobile applications for monitoring and control. (C6, PLO3)

SYNOPSIS

This course covers data transfer, monitoring and control. This includes data transfer techniques using wired and wireless communication technology. Also introduced is development of mobile applications which allow data monitoring and data storage using mobile devices. In addition, elements of modern control systems are introduced. Control techniques of motors are included.

REFERENCES

1. Pethuru Raj and Anupama C. Raman. The Internet of Things. CRC Press. 2017.
2. Arshdeep Bahga and Vijay Madisetti. Internet of Things: A Hands-on Approach. Universities Press. 2015.
3. Norman Nise, Modern Control Engineering, Wiley 2019

BEEL2222
TECHNOLOGY SYSTEM OPTIMIZATION I

LEARNING OUTCOMES

Upon completion of this course, students should be able to:

1. Abililty to explain the theory and basic principle of data communication, network and electronic measurement. (C2, PLO1)
2. Apply data communication tools to understands the principles behind theoretical concepts. (C4, PLO2)
3. Apply the working principles of measurement and instrumentation. (C4, PLO3)
4. Design a small network technology including topology maps or network maps. (C6, PLO3)

SYNOPSIS

This course covers the fundamental of data communication network, measurement and instrumentation. This includes the working with current data network, measurement technique and network technology. System application, configuration and troubleshooting data communication network and electronic measurement is emphasized.

REFERENCES

1. Data and Computer Communications, Tenth Edition, William Stallings, Pearson Education, Inc; (2014)
2. Electronic Test Instruments: Analog and Digital Measurements 2nd Edition, Robert A Witte.
3. Introduction to Instrumentation and Measurements 3rd Edition, Robert B. Northrop, CRC Press; 3rd edition (2017).

BEEL2232
APPLICATION SYSTEM DEVELOPMENT I

LEARNING OUTCOMES

Upon completion of this course, students should be able to:

1. Apply logical database design concept to represent a functioning database. (C3, PLO1)
2. Build a working database using relevant technology according to database standards and procedures. (P3, PLO2)
3. Work independently to solve technical issues arised during database development. (P4, A3, PLO3)

SYNOPSIS

This course provides a foundation in data management concepts and database systems. It includes representing information with the relational database model, manipulating data with an interactive query language (SQL), database development using standard Database Management System, and integration of database to application development.

REFERENCES

1. Ramez Elmasri & Shamkant B. Narathe, 'Fundamentals of Database Systems', 7th Ed., Pearson Education, 2016.
2. David McDonald, 'Database Design', Wiley Encyclopedia of Management, 2015.
3. Adrienne Watt, 'Database Design', BCcampus Open Textbook, 2013.
4. Rod Stephens, 'Beginning Database Design Solutions', John Wiley & Sons, 2011.

BEEL2244
TECHNOLOGY OPERATION MANAGEMENT

LEARNING OUTCOMES

Upon completion of this course, students should be able to:

1. Explain efficiently capacity planning in operation processes of Electronic Industry Automation in order to achieve organization standard, plant location and layout techniques. (PLO 3, C3).
2. Design accurately project scheduling and source allocation in project management using Project Evaluation and Review Techniques (PERT), Critical Path Method (CPM) and Linear Programming. (PLO2, P4)
3. Become aware of their own technical passion, desire and capabilities which are crucial for produce quality products. (PLO5, A3)

SYNOPSIS

Technology Operation Management gives knowledge of concepts and principles for production and operations management in Electronic Industry Automation. This course emphasizes production functions, forecasting techniques, efficiency theory, layout techniques, economics order quantity level, control of source acquisition and project scheduling, and production standard must be complied. This course also provides knowledge and skills in planning, decision and control of production in the Electronic Industry Automation.

REFERENCES

1. Alan Muhlemann, John Oakland, Keith Lockyer; Production & Operations Management, Pitman Publishing, London, United Kingdom, 1992 (rep. 1993)
2. James B. Dilworth, Production & Operations Management; Manufacturing & Services; McGraw Hill International Edition, 5th Edition, 1993. ISBN 0-07-016867-X
3. Roger G. Scroeder, Operations Management: Decision Making in the operations function, Mcgraw Hill international Edition, 1993
4. Williams J. Stevenson, Production/Operations Management, Richard D. Irwin, Inc.Homewood, Illinois, Third Edition, 1990 ISBN 0-256-08029-1/TIE 1097.
5. Fasser, Y., Brettner, D. (2003). Process Improvement in the Electronics Industry, Wiley-Interscience.

SEMESTER 5

BEEL3114
TECHNOLOGY SYSTEM OPTIMIZATION II

LEARNING OUTCOMES

Upon completion of this course, students should be able to:

1. Define and apply the concepts and features of mobile computing technologies and applications. (C4, PLO1)
2. Demonstrate and develop mobile applications by analyzing their characteristic and requirements. (C6, PLO3)
3. Apply the working principles mobile application, embedded system integration and optimisation. (C6, PLO3)

SYNOPSIS

This course will introduce students to the fundamentals mobile application development, embedded system development and integration optimisation. The student will be introducing to method of development framework of mobile applications that can integrate with embedded system application. Students will also be expected to conduct troubleshooting, testing and optimize the embedded system.

REFERENCES

1. Professional Android 4 Application Development, Reto Meier
2. Embedded Android, Karim Yagmour March 2013.
3. App Inventor 2, David Wolber (O'Reilly), 2015
4. Programming Embedded Systems, 2nd Edition by Anthony Massa, Michael Barr.
5. Designing Embedded Systems by John Catsoulis (O'Reilly)

BEEL3124
APPLICATION SYSTEM DEVELOPMENT II

LEARNING OUTCOMES

Upon completion of this course, students should be able to:

1. Apply system analysis and design techniques to develop a working software application. (PLO1, P4)
2. Build an efficent database based on a well-designed data model using cloud data storage technology. (PLO2, C4, P3)
3. Works independently to solve technical issues arise during application system development. (PLO3, A3)

SYNOPSIS

This course focuses on the analysis and development of systems to meet the increasing need for information within organizations. It presents and analyses various topics such as systems development life cycle, analysis and design techniques, software project planning, requirements collection and structuring, process modelling, data modelling, design of interface and data management, system design and implementation, and testing. It also emphasizes on advanced database design techniques as well as implementation on cloud data storage.

REFERENCES

1. Suad Alagić, 'Software Engineering: Specification, Implementation, Verification', Springer, 2017.
2. Martin Kleppmann, 'Designing Data-Intensive Applications', O'Reilly Media, 2016.
3. Ramez Elmasri & Shamkant B. Narathe, 'Fundamentals of Database Systems', 7th Ed., Pearson Education, 2016.
4. Westley Knight, 'UX for Developers', Apress L. P., 2018.
5. Heinrich Hußmann, 'Model-Driven Development of Advanced User Interfaces', Springer, 2013.

BEEL3134
TECHNOLOGY QUALITY MANAGEMENT

LEARNING OUTCOMES

Upon completion of this course, students should be able to:

1. Analyse quality problems effectively using the principles and tools of total quality management in Electronic Industry Automation. (PLO 3, C3).
2. Practice quality control in measures improving products and business performance. (PLO2, P4)
3. Participate actively in quality management project to solve problems in quality management. (PLO5, A3)

SYNOPSIS

This course provides the understanding and knowledge of total quality principles and the use of quality tools to enable students to apply the principles of management, design and production in Electronic Industry Automation. This course covers the introduction to quality and the principles of total quality, its relationship to global competitiveness, ethics and culture in quality management, the 7 quality tools, quality function deployment, continuous improvements, benchmarking, ISO and the implementation aspects of total quality.

REFERENCES

1. Foster, S.Thomos (2010)," Managing Quality" Pearson Education Inc, New Jersey,United States.
2. Tasmin, R. (2013)," Total Quality Management" Penerbit UTHM, Batu Pahat, Malaysia.
3. Ahmad, M.F (2012),"Look East: Total Quality Management Practices Based on Japanese Approach" Penerbit UTHM, Batu Pahat, Malaysia
4. Mauch, P.D. (2010). Quality Management: Theory and Application. Boca Raton, Florida: CRC Press. Call Number: HD62.15 .M38 2010
5. Pekar, J.P. (2009). Business Performance Excellence Through Total Quality Management. 2nd Ed. West Conshohocken, Pennsylvania: ASTM International. Call Number: HD62.15. P44 2009

BEEL2254
TECHNOPRENEUR CAPSTONE I

LEARNING OUTCOMES

Upon completion of this course, students should be able to:

1. Apply various financial indicators & tools to prepare for financial information for a new business venture. (C4, Knowledge)
2. Acquire skills to analyze financial statements. (P5, Entrepreneurial Skills)
3. Display the art of negotiation with investors. (A4, Communication Skills)

SYNOPSIS

Entrepreneurs need money to start and to grow their business. It is important to understand how revenue is generated, how to source for funds, how to control cash flow, how to assess the success of the company in monetary terms, and how to value a company for various purposes. The course exposes students to the various financial aspects relating to new ventures. These include approaches to secure start-up capital and venture financing. Students learn about the basic accounting, essential financial indicators, the types of funds available, the different categories of investors, the importance of intellectual property in securing finance, the financial details to be included in a business plan required for investment purpose, valuation of company and the art of negotiation with investors.

REFERENCES

1. NTU (2013). Entrepreneurship & Innovation Asia. Overview. Nanyang Technological University, Singapore: Nanyang Technopreneurship Center.
2. Cremades, A. (2016). The Art of Startup Fundraising. Pitching Investors, Negotiating the Deal, and Everything Else Entrepreneurs Need to Know. Hoboken, NJ: John Wiley & Sons.
3. McKinsey & Co., Koller, T., Goedhart, M. & Wessels, D. (2015). Valuation. Measuring and Managing the Value of Companies, 6th edn. Hoboken, NJ: John Wiley & Sons.

4. Stowe, J. D., Robinson, T. R., Pinto, J. E. & McLeavey, D. W. (2007). Equity Asset Valuation. Hoboken, NJ: John Wiley & Sons.
5. Pereiro, L. E. (2002). Valuation of Companies in Emerging Markets. A Practical Approach. New York: John Wiley & Sons.
6. OECD (2015). Boosting Malaysia's National Intellectual Property System for Innovation. Paris: OECD Publishing.

SEMESTER 6

BEEL3215
SYSTEM INTEGRATION DESIGNING

LEARNING OUTCOMES

Upon completion of this course, students should be able to:

1. Configure machine and plan-specific HMI tasks using the SCADA software based on the Totally Integrated Automation Portal (TIA Portal). (C4, PLO1)
2. apply and manage the TIA portal and structure of automation system, configuration and parameterization of hardware and PLC programming and SCL Programming. (P4, PLO2)
3. Apply virtual machine and plants concept, IOT, virtual commissioning and integrated energy management. (C6, PLO3)

SYNOPSIS

The aim of this course is to provide students with the technical knowledge and practical experience on Supervisory Control and Data Acquisition (SCADA) in automation technology. SCADA is a system of software and hardware elements that allows industrial organizations to control industrial processes locally or at remote locations as well as monitoring, gathering, and process real-time data.

REFERENCES

1. http://www.siemens.asia/MY/en/about-us/Business/DF-PD/SITRAIN.aspx
2. SCADA: Supervisory Control and Data Acquisition, Stuart A. Boyer, International Society of Automation, 2010
3. Industrial Automation with SCADA: Concepts, Communications and Security, K S Manoj, Notion Press, 2019
4. Handbook of SCADA/Control Systems Security, Robert Radvanovsky, Jacob Brodsky, Published 2016 by Routledge

BEEL3225
MAINTENANCE MANAGEMENT SYSTEM

LEARNING OUTCOMES
Upon completion of this course, students should be able to:
1. Apply of contemporary maintenance management practices. (C3, PLO1)
2. demonstrate competency in manage and developing the maintenance activities in industrial environment. (C4, PLO3)
3. Perform maintenance activities in a cost effective manner using appropriate software. (P4, PLO6)

SYNOPSIS
This course will introduce student to principle of maintenance management system. The topics to be covered including Introduction to Maintenance Management, Reliability performance of production plants, Total Productive Maintenance (TPM), Maintenance methods and techniques and Maintenance Software Application. Apart of the course implementation, there will be an industrial visit to related industries in order to expose student to the actual practices of maintenance management system.

REFERENCES
1. Allan Wilson Asset Maintenance Management; Industrial Press, 2002
2. Mobley, RK, ed. Maintenance engineering handbook. 8th ed. New York: McGraw-Hill, 2014. ISBN 9780071826617.
3. Total Productive Maintenance, S Borris, McGraw-Hill (2006)
4. Assets maintenance management A guide to developing strate.g.ies and improving performance, A Wilson (2007)
5. Reliability-Centred Maintenance, S Moubray, Butterworth and Heinemann (1997)
6. Reliability-Centred Maintenance: Management and Engineering Methods, Anderson, R,T and Neri, L (1990)
7. Introduction to Total Productive Maintenance, S Nakajima, Productivity Press (1988) Press (1988)

BEEL3234
FINAL YEAR PROJECT I

LEARNING OUTCOMES
Upon completion of this course, students should be able to:
1. Identify issues or problems in industrial technology and propose solutions. (PLO1, C6)
2. Provides proposal for the implementation of Final Year Project. (PLO2, P4)
3. Presents ideas related to research to panel evaluators in more systematic. (PLO4, A4)

SYNOPSIS
This course is for fulfil students with knowledge in conducting research methods, particularly in the field of technical and vocational education in Malaysia. It is important in providing human capital development equivalent with global developments.

REFERENCES
1. Rowena, M., How to write a thesis. 3rd Edition, England: Open University Press, 2011.
2. J S Graustein. How to Write an Exceptional Thesis or Dissertation: A Step-By-Step Guide from Proposal to Successful Defense, Atlantic Publishing Group,2014.
3. David Evans, Paul Gruba, Justin Zobel, How to write better thesis, Springer,2014.
4. Jurnal-jurnal akademik

SHORT SEMESTER

BEEL3316
FINAL YEAR PROJECT II

LEARNING OUTCOMES

Upon completion of this course, student should be able to:

1. Identify issues or problems in industrial technology and propose solutions. (PLO1, C6)
2. Provides proposal for the implementation of Final Year Project. (PLO2, P4)
3. Presents ideas related to research to panel evaluators in more systematic. (PLO4, A4)

SYNOPSIS

This course is for fulfil students with knowledge in conducting research methods, particularly in the field of technical and vocational education in Malaysia. It is important in providing human capital development equivalent with global developments.

REFERENCES

1. Rowena, M., How to write a thesis. 3rd Edition, England: Open University Press, 2011.
2. J S Graustein, How to Write an Exceptional Thesis or Dissertation: A Step-By-Step Guide from Proposal to Successful Defense, Atlantic Publishing Group,2014.
3. David Evans, Paul Gruba, Justin Zobel, How to write better thesis, Springer,2014.
4. Jurnal-jurnal akademik

SEMESTER 7

BEEL4112
INDUSTRIAL TRAINING

LEARNING OUTCOMES

Upon completion of this course, students should be able to:

1. Organizes productive work schedule. (PLO1, C5)
2. Presents communication skills and interact effectively in the organization. (PLO4, P4)
3. Practices self-discipline and responsibility attitude working in a team. (PLO8, A5)

SYNOPSIS

This course is to expose students about the real environment working in engineering field. Understand the work culture in the industry and developing students technical and interpersonal skills as a preparation when serving in an educational institute.

REFERENCES

1. University Industrial Training Guidelines.
2. Faculty Industrial Training Guidelines.
3. University Academic Regulations.

ACADEMIC HANDBOOK SESSION 2021/2022
FOR BACHELOR DEGREE PROGRAMMES

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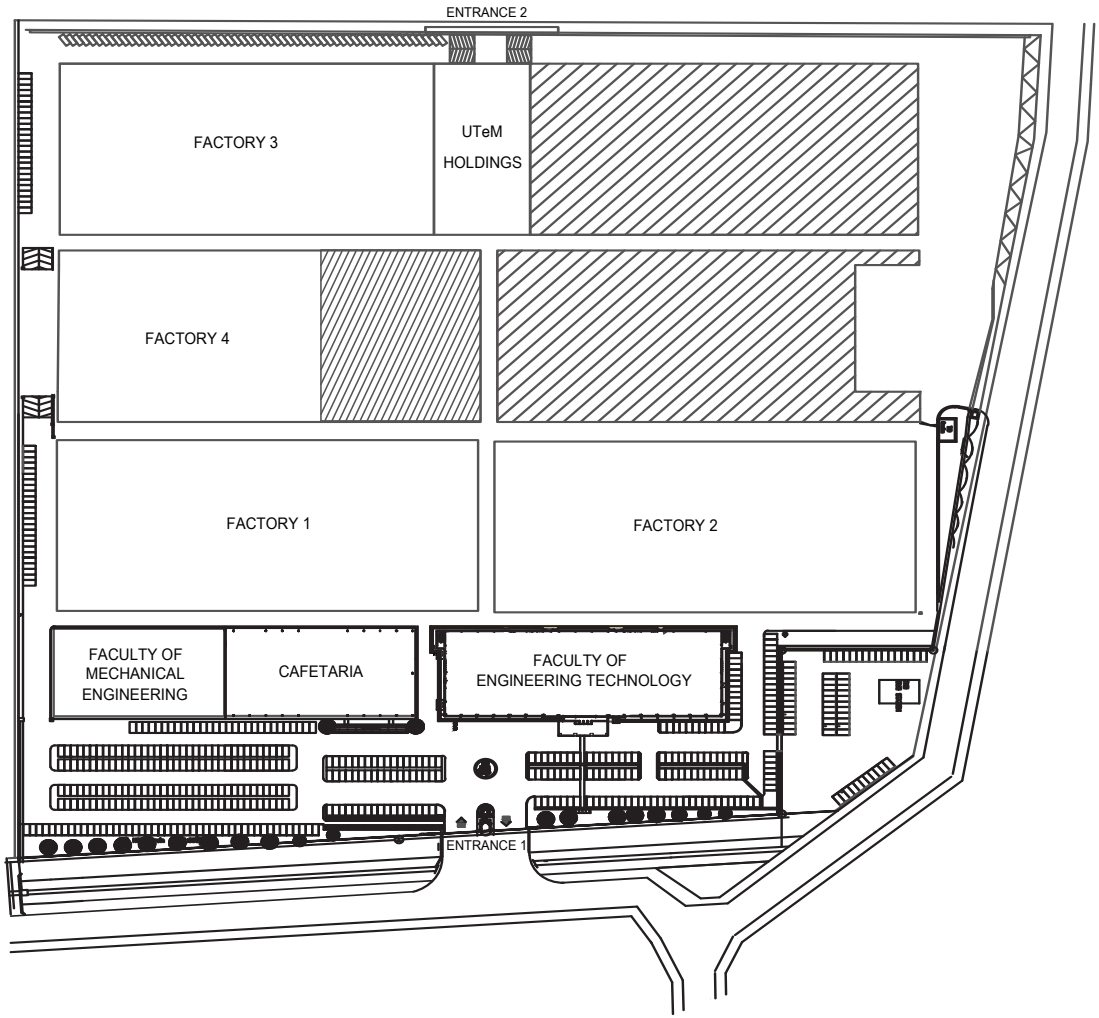
ACADEMIC HANDBOOK SESSION 2021/2022
FOR BACHELOR DEGREE PROGRAMMES

MAP & LOCATIONS

FTKEE

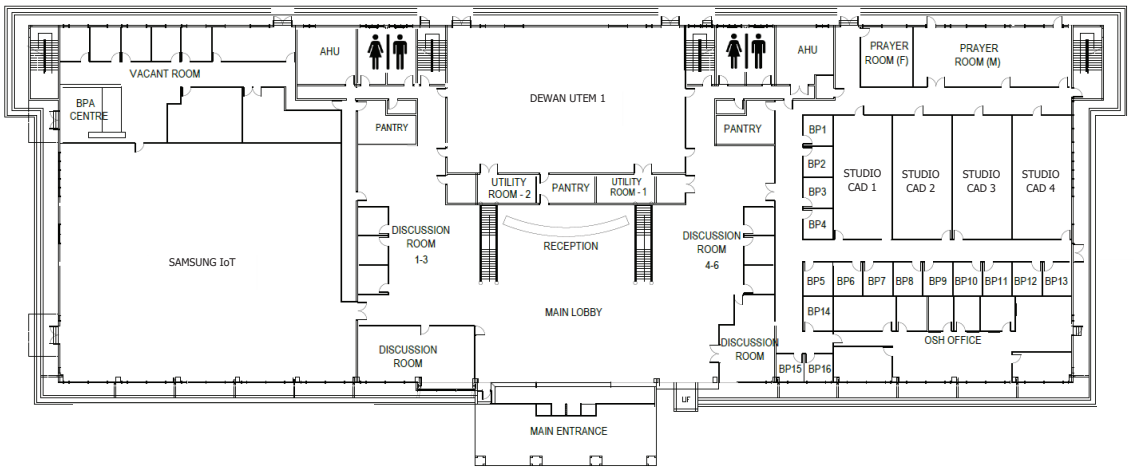
FACULTY OF ELECTRICAL AND
ELECTRONIC ENGINEERING TECHNOLOGY
UNIVERSITI TEKNIKAL MALAYSIA MELAKA

FACULTY OF ENGINEERING TECHNOLOGY ELECTRICAL & ELECTRONICS (FTKEE) ACADEMIC BUILDING



FTKEE LAB LOCATIONS

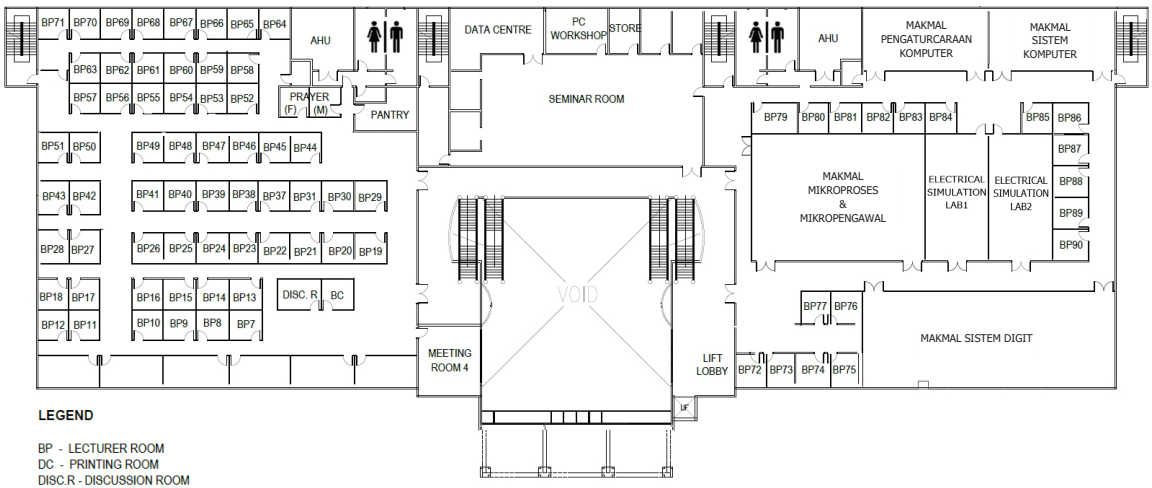
LEVEL G



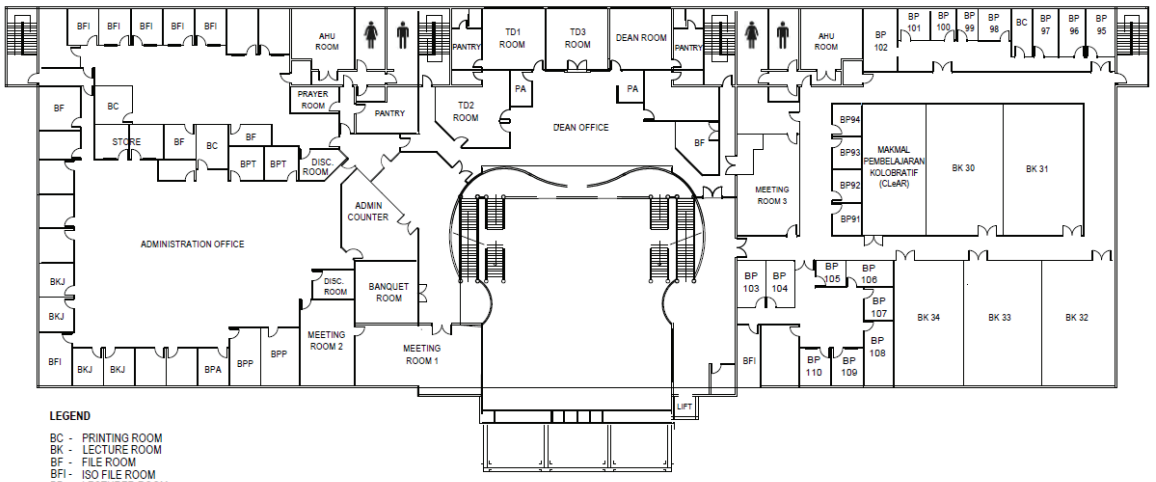
LEGEND:

BP - LECTURER ROOM
BPA - ACADEMIC ADMINISTRATION DEPARTMENT
OSH - OCCUPATIONAL SAFETY AND HEALTH

LEVEL 1


BP71 BP70 BP69 BP68 BP67 BP66 BP65 BP64
AHU
DATA CENTRE
PC WORKSHOP
STORE
AHU
MAKMAL PENGATURCARAAN KOMPUTER
MAKMAL SISTEM KOMPUTER
BP63 BP62 BP61 BP60 BP59 BP58
BP57 BP56 BP55 BP54 BP53 BP52
PRAYER (F) (M)
PANTRY
SEMINAR ROOM
BP79 BP80 BP81 BP82 BP83 BP84
BP85 BP86
BP87
BP88
BP89
BP90
BP51 BP50
BP49 BP48 BP47 BP46 BP45 BP44
MAKMAL MIKROPROSES & MIKROPENGAWAL
ELECTRICAL SIMULATION LAB1
ELECTRICAL SIMULATION LAB2
BP43 BP42
BP41 BP40 BP39 BP38 BP37 BP31 BP30 BP29
BP28 BP27
BP26 BP25 BP24 BP23 BP22 BP21 BP20 BP19
VOID
BP18 BP17
BP16 BP15 BP14 BP13
DISC. R
BC
BP12 BP11
BP10 BP9 BP8 BP7
BP77 BP76
MAKMAL SISTEM DIGIT
MEETING ROOM 4
LIFT LOBBY
BP72 BP73 BP74 BP75
LIFT
LEGEND
BP - LECTURER ROOM
DC - PRINTING ROOM
DISC.R - DISCUSSION ROOM

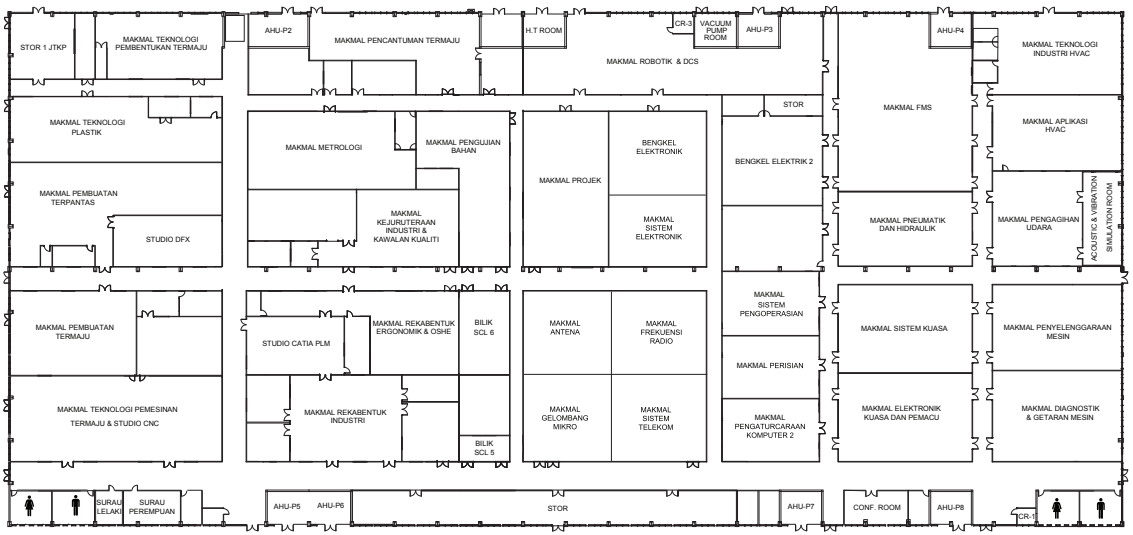
LEVEL 2



LEGEND

BC - PRINTING ROOM
BK - LECTURE ROOM
BF - FILE ROOM
BFI - ISO FILE ROOM
BP - LECTURER ROOM
KJ - HEAD OF DEPARTMENT
KPP - SENIOR REGISTRAR ASSISTANT
PA - PERSONAL ASSISTANT
PP - REGISTRAR ASSISTANT
PPT - ADMIN ASSISTANT OFFICER
TD1 - DEPUTY DEAN (ACADEMIC)
TD2 - DEPUTY DEAN (RESEARCH & NETWORK)
TD3 - DEPUTY DEAN (STUDENT DEVELOPMENT)

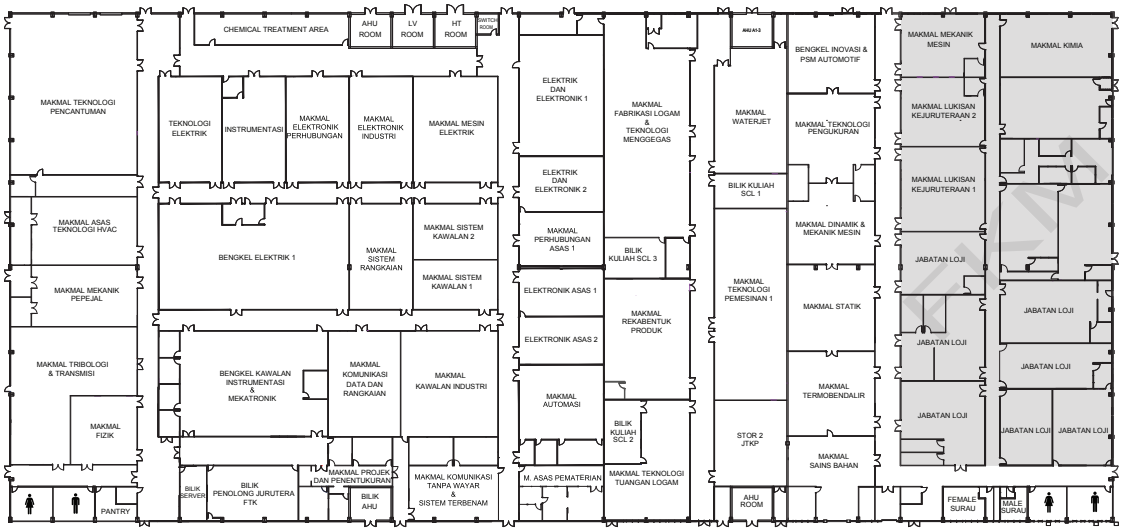
FACTORY 1



LEGEND

AHU - AIR HANDLING UNIT
SCL - STUDENT CENTRED LEARNING
HT - HIGH TENSION

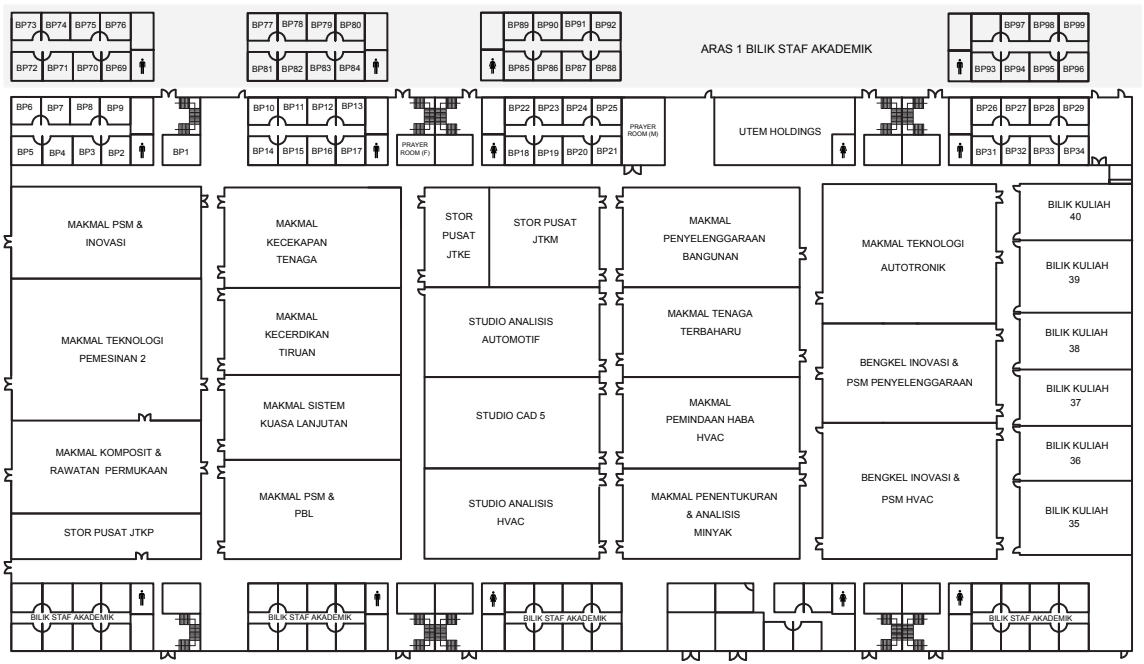
FACTORY 2



LEGEND

AHU - AIR HANDLING UNIT
SCL - STUDENT CENTRED LEARNING
HT - HIGH TENSION
LV - LIGHT VOLTAGE

FACTORY 3



LEGEND

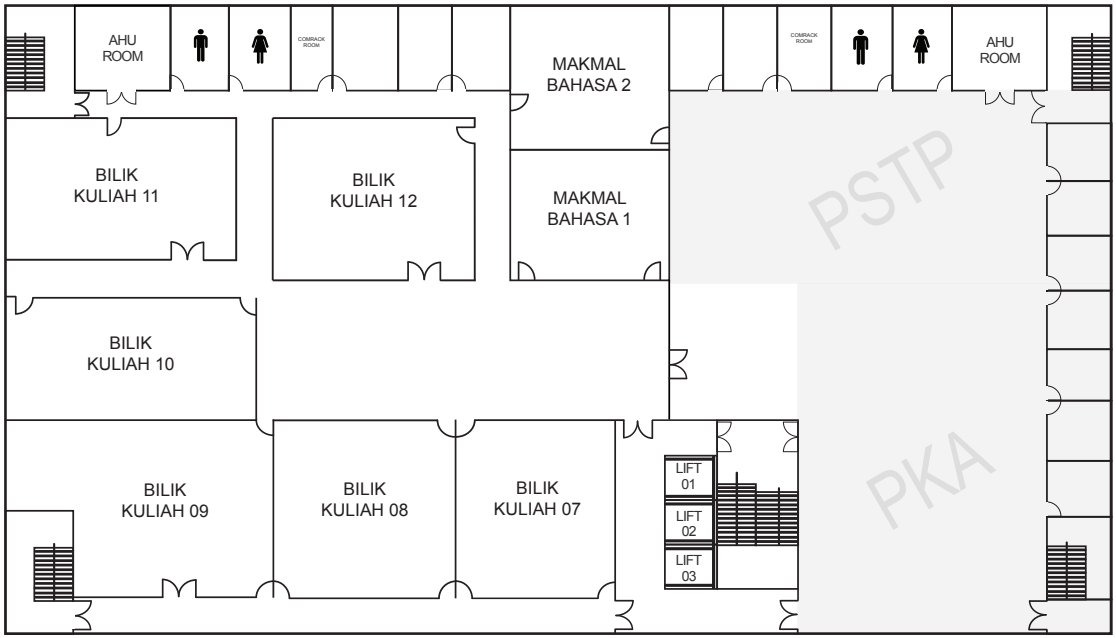
AHU - AIR HANDLING UNIT
SCL - STUDENT CENTRED LEARNING
BP - BILIK PENSYARAH

FACTORY 4

LEGEND :

HT - HIGH TENSION
LV - LIGHT VOLTAGE
BC - BILIK COMRACK
BP - BILIK PENGAJAR

LEVEL 4 (FKM)



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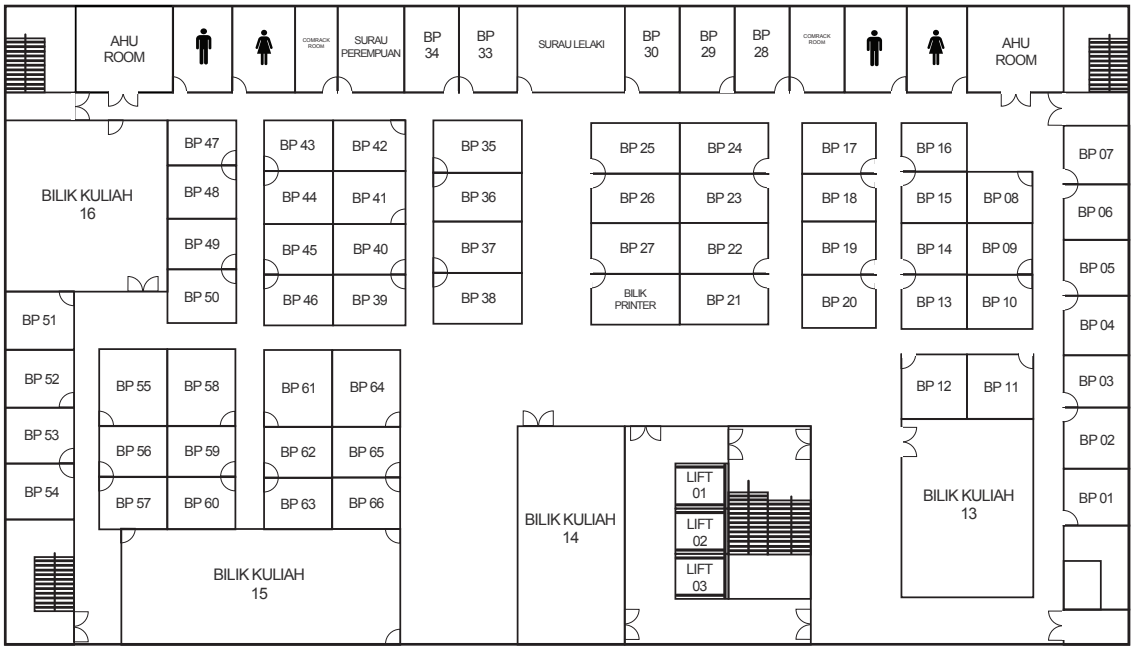

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