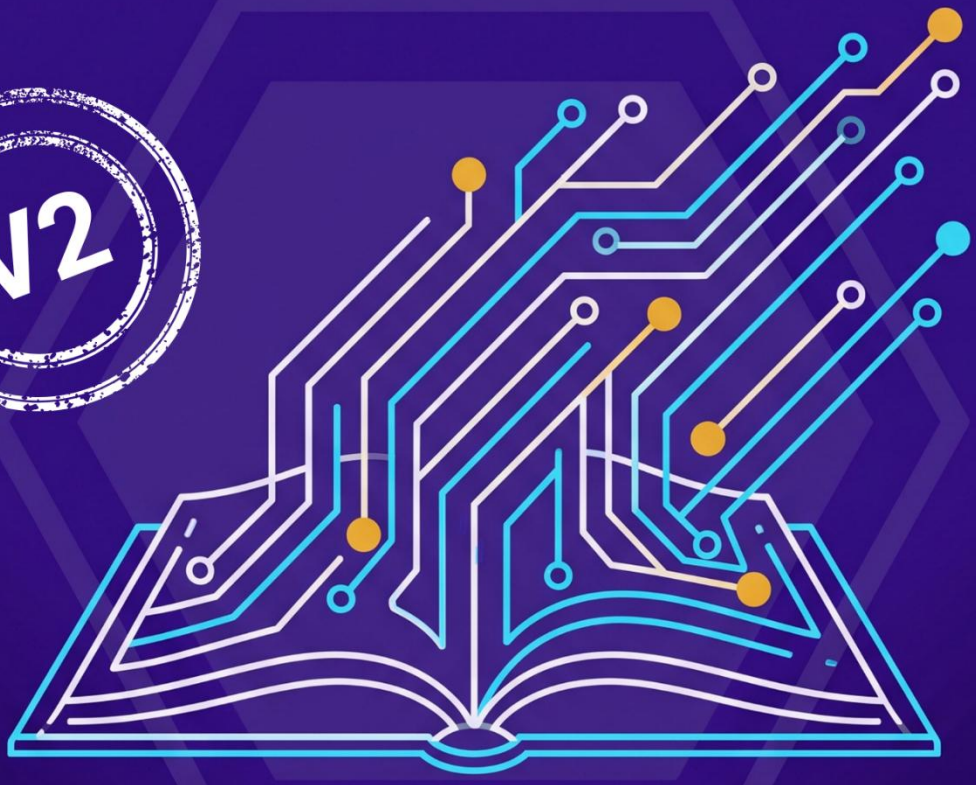
UNIVERSITI TEKNIKAL MALAYSIA MELAKA

FAKULTI TEKNOLOGI DAN KEJURUTERAAN ELEKTRONIK DAN KOMPUTER

Academic Handbook 2026/2027

V2



For Bachelor Degree Programmes

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FTKEK
FAKULTI TEKNOLOGI DAN KEJURUTERAAN
ELEKTRONIK DAN KOMPUTER

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INTRODUCTION

UTeM TOP MANAGEMENT



Professor Datuk Ts. Dr.
Massila Binti Kamalrudin

Vice Chancellor



Professor Dr. Mohd Rizal Bin Salleh

Deputy Vice Chancellor
Academic And International



Professor Dr. Zahriladha Bin Zakaria

Deputy Vice Chancellor
Research And Innovation



Associate Professor Datuk Dr. Sabri Bin Mohamad Sharif

Deputy Vice Chancellor
Student Affairs & Alumni



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Mr. Masdzarif Bin Mahat

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Mrs. Sabarina Binti Abdullah

Bursar



Mrs. Siti Saluwa Binti Jamal

Chief Librarian



Mr. A. Faizal Bin Mohamed

Legal Advisor

VISION, MISION AND MOTTO UTEM

Vision

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

Mission

UTeM is committed to pioneering and contributing 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

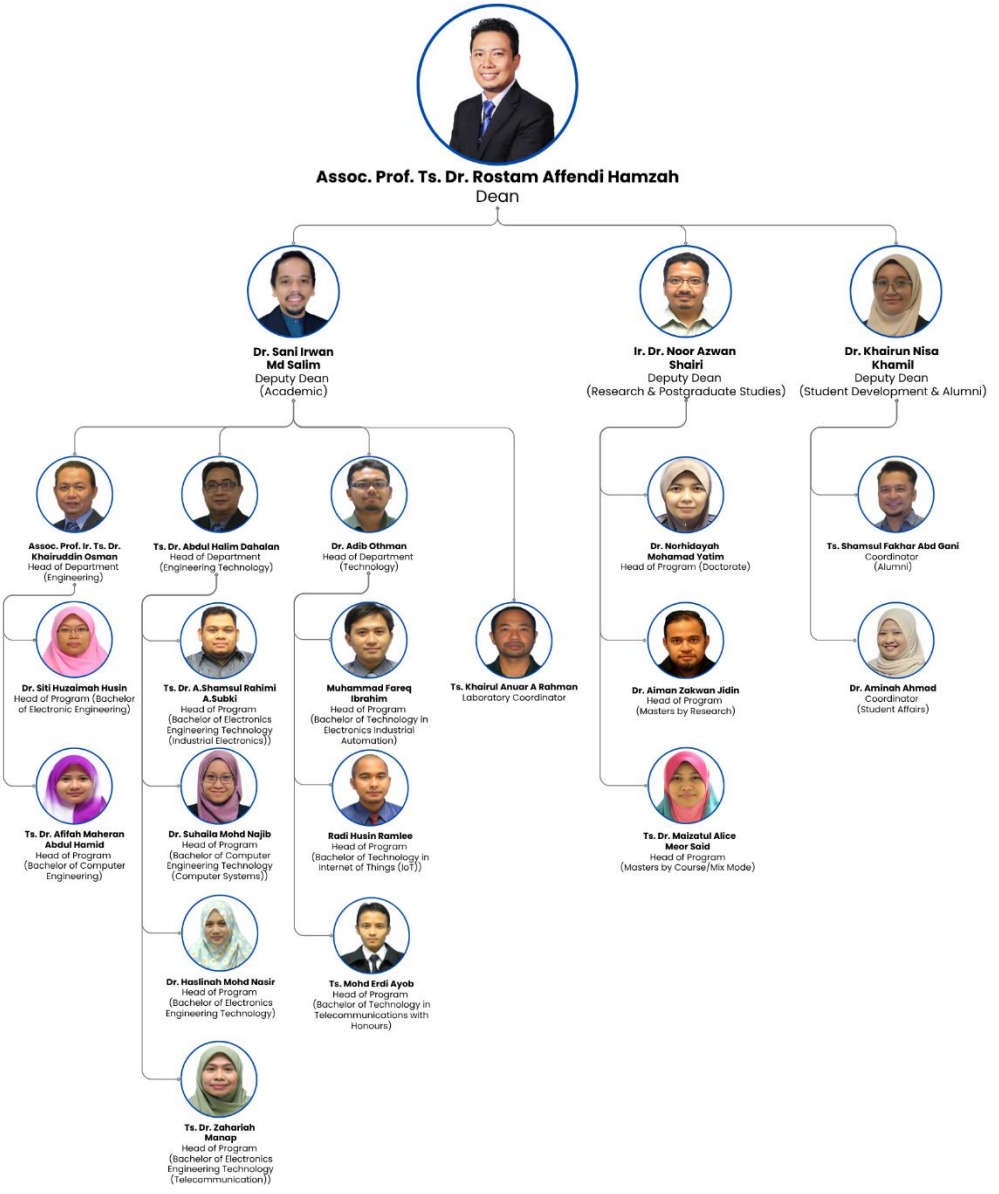
UTeM's Educational Goals

1. To conduct academic and professional programmes 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 and innovative problem-solving, and autonomy in decision-making amongst graduates.
4. To foster research development and innovation activities in collaboration with industries for the development of national wealth.
5. To equip graduates with leadership and teamwork skills as well as develop communication and lifelong learning skills.
6. To develop technopreneurship and managerial skills amongst graduates.
7. To instill an appreciation of the arts and cultural values and awareness of healthy lifestyles amongst graduates.

Objectives

1. To become a creative and innovative learning and knowledge organization that offers practice and application-oriented academic programmes in the fields of engineering and technology.
2. To lead in research, development, innovation, commercialization and consultancy activities based on the needs of the industry.
3. To produce competent graduates with high moral values who will be the preferred choice by the industry.
4. To have competent and highly qualified staff with vast practical experience.
5. To play an effective role as the main impetus to the industrial development of the nation.
6. To establish cooperation and smart partnerships between the university and the industries.
7. To provide infrastructure and a conducive environment to generate and maintain excellence.
8. To implement comprehensive and extensive usage of ICT in both academic activities and management of the university.

FTKEK TOP MANAGEMENT



FTKEK ADMINISTRATION



VISION, MISSION AND MOTTO FTKEK

Vision

To be a leading global academic institution in Technology and engineering, specializing in Electronics and Computer fields.

Mission

FTKEK aims to lead and advance the nation and the world by:

1. Fostering knowledge through innovative education, research, technical expertise, and technopreneurship.
2. Cultivating ethical and professional leaders.
3. Driving sustainable development through strategic community and industry partnerships.

Motto

Forging Excellence Together





Objectives

1. To offer sustainable academic programmes that meet the needs of the global industry.
2. To produce graduates who are competitive, holistic, adaptive and future-proof.
3. To establish strategic relationships with industry partners in research, innovation and skills sharing for mutual excellence.
4. To enhance community activities as well as sharing knowledge and technology transfer to meet the well-being of the global community.
5. To provide state-of-the-art facilities and equipment for teaching, learning, and research purposes and income generation purposes.
6. To empower the competency of academic and non-academic staff to increase productivity and efficiency.
7. Supporting the University Strategic Plan to secure international ranking

FOREWORD BY THE DEAN



Glory be to Allah, the Most Merciful and Gracious. We extend a hearty welcome to everyone joining Universiti Teknikal Malaysia Melaka's (UTeM) Faculty of Electronics and Computer Engineering Technology.

First of all, congratulations on joining our faculty. We are dedicated to assisting you every step of the way as you embark on this exciting and meaningful adventure, which begins with your decision to join us. We are committed to providing an education that pushes the boundaries of what is feasible while also meeting industry objectives. Our programs are therefore designed with the future in mind, integrating state-of-the-art technology such as Industry 4.0 concepts, the Internet of Things (IoT), and artificial intelligence (AI).

We have honored our graduates' accomplishments since the faculty's founding in 2001; many have since made important contributions to their fields. Nearly 100% of our graduates found work immediately after graduation, demonstrating the continued high demand for our graduates. When the time comes, we do not doubt that you will be ready to enter a rewarding profession.

I urge you to seize every opportunity as you begin this new chapter.

Associate Professor Ts Dr Rostam Affendi bin Hamzah


FTKEK

FTKEK: INTRODUCTION

The illustrious history of the Faculty of Electronics and Computer Technology and Engineering (FTKEK) begins in 2000, when Kolej Universiti Teknikal Kebangsaan Malaysia (KUTKM) was founded as the nation's first technical university and its fourteenth public university. The Faculty of Electronic and Computer Engineering (FKEKK), one of the original faculties, was officially established on June 22, 2001, and started operations at a temporary location in Taman Tasik Utama, Ayer Keroh, Melaka.

A major milestone was reached on December 22, 2004, when FKEKK became the first faculty to move to UTeM's permanent main campus in Durian Tunggal, Melaka. The new setting offered modern facilities and cutting-edge amenities, creating an ideal atmosphere for teaching and learning.

KUTKM began playing a crucial role in producing highly qualified and internationally renowned engineers and technicians in high demand in both domestic and foreign sectors when it changed its name to Universiti Teknikal Malaysia Melaka (UTeM) in February 2007.

To establish the Faculty of Electronics and Computer Technology and Engineering (FTKEK), the FKEKK underwent a restructuring on September 15, 2023. This involved the Department of Electronic Engineering Technology (JTKEE) from the Faculty of Electrical and Electronic Engineering Technology (FTKEE) joining the FKEKK. This merger has strengthened our ability to produce graduates with strong foundations in science, mathematics, and electronics. An outcome-based education system will support these graduates and help enhance their technical skills.



Guided by our motto, "Forging Excellence Together," FTKEK continues to play a vital role in developing engineers and technologists with the flexibility to specialize in areas such as industrial electronics, computer engineering, telecommunications, and wireless communication.

FTKEK is led by a dean, supported by three deputy deans, and organized into three key departments: the Department of Engineering, the Department of Engineering Technology, and the Department of Technology.

Together, we strive to provide a comprehensive and forward-thinking educational experience that aligns with the demands of the evolving technological landscape.

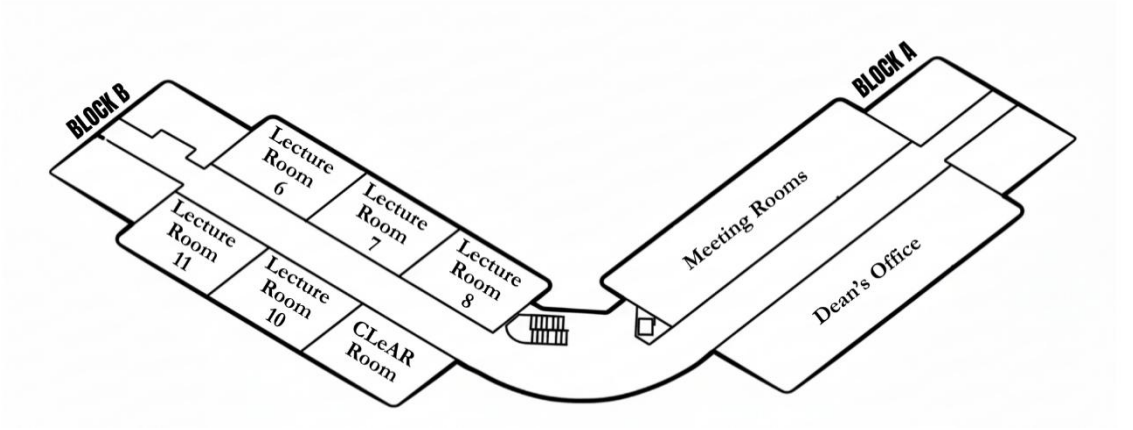
For updates and more information, follow us on social media:

Facebook: @UTeMFTKEK

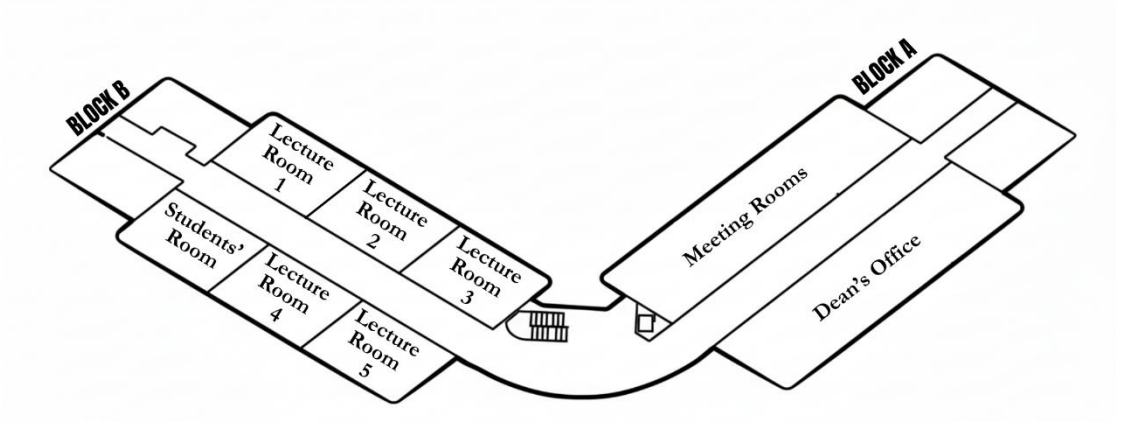
Instagram: @ftkek_utem



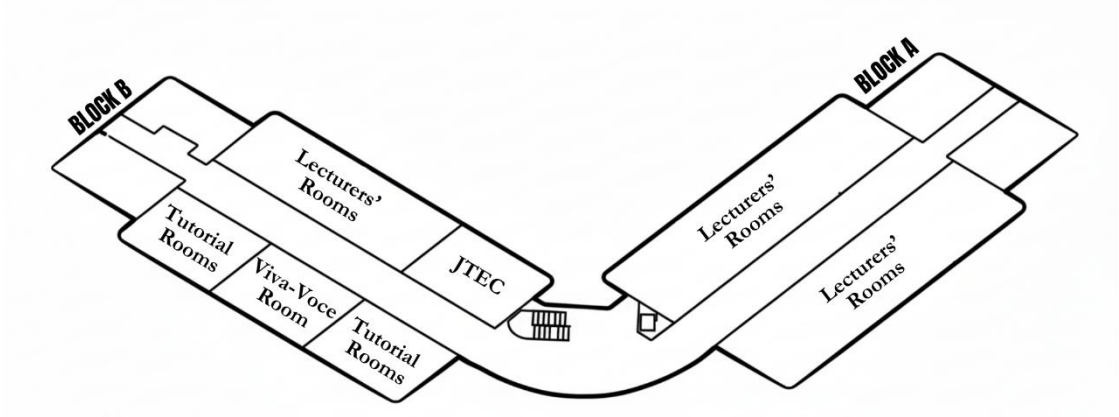
BLOCK A, B - 2nd FLOOR



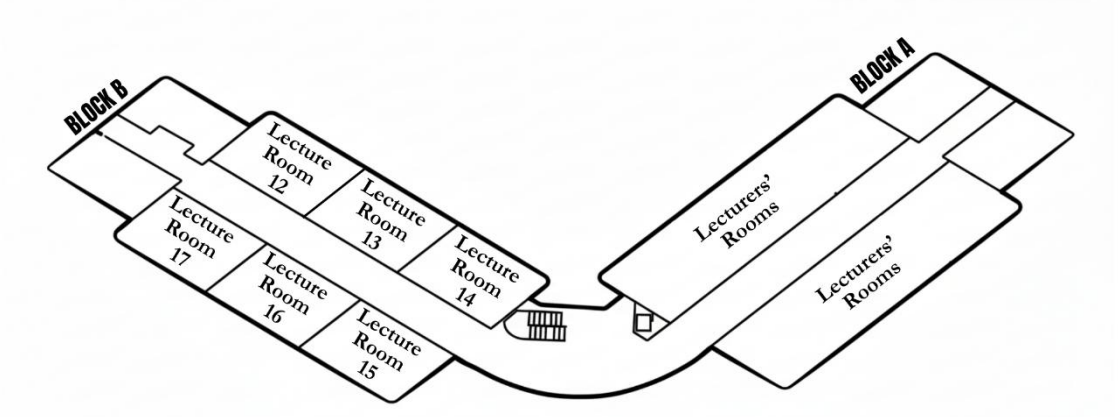
BLOCK A, B - 1st FLOOR



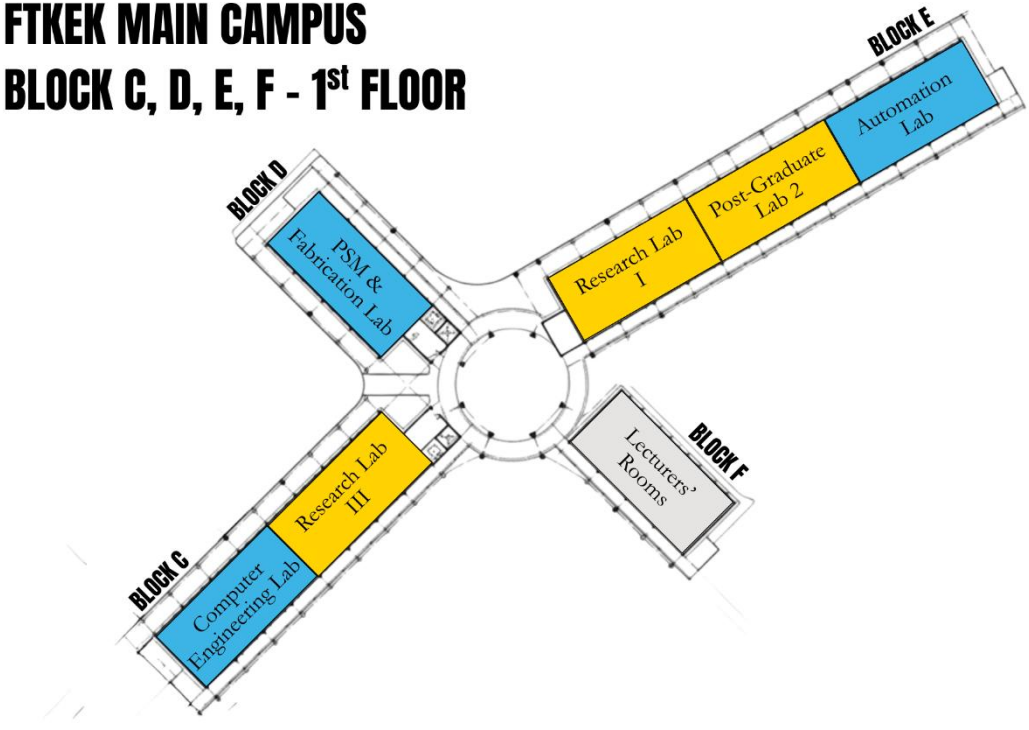
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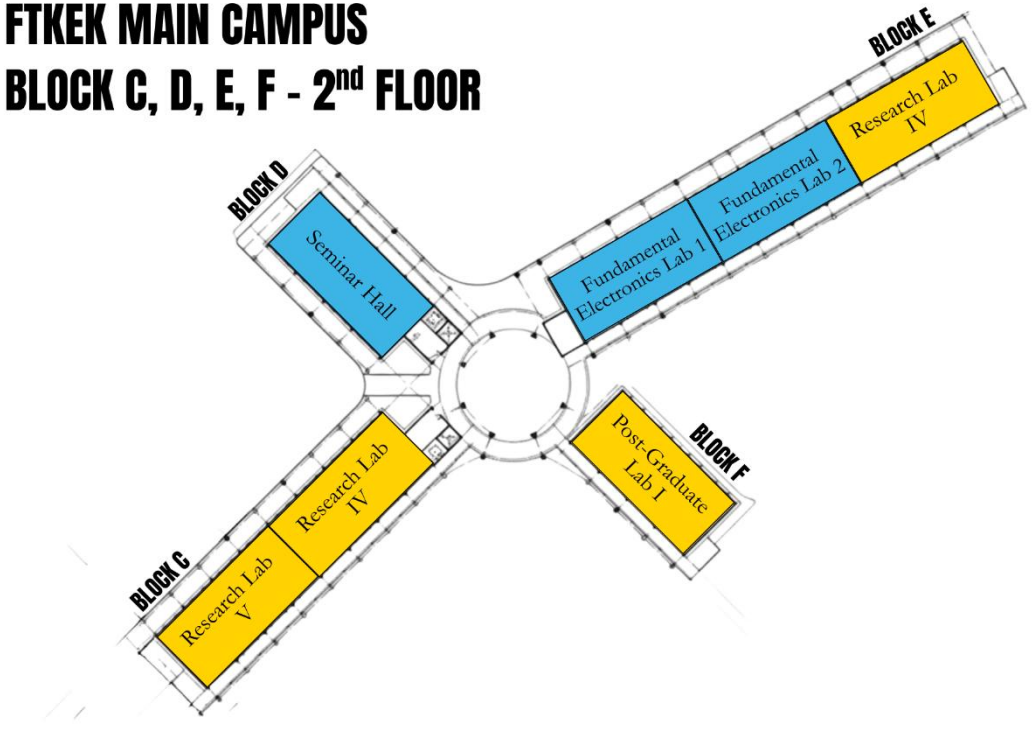
BLOCK A, B - 3rd FLOOR



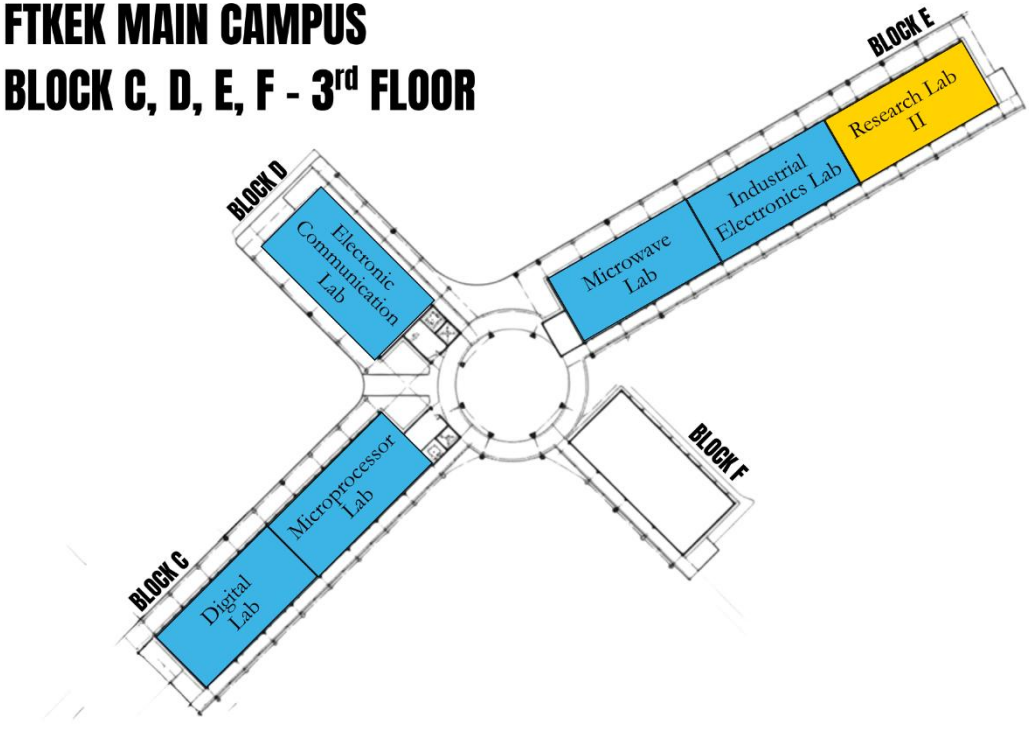
Main Campus Laboratory Blocks 1st Floor



Main Campus Laboratory Blocks 2nd Floor

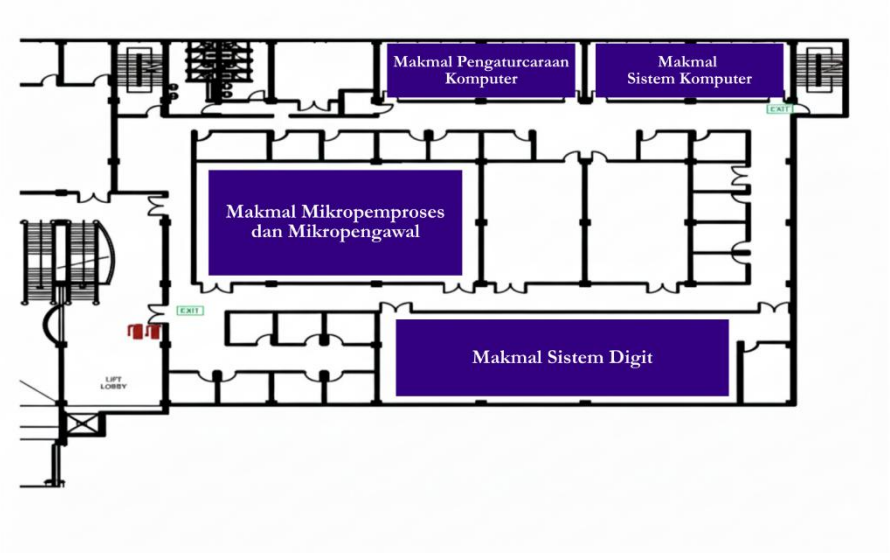


Main Campus Laboratory Blocks 3rd Floor

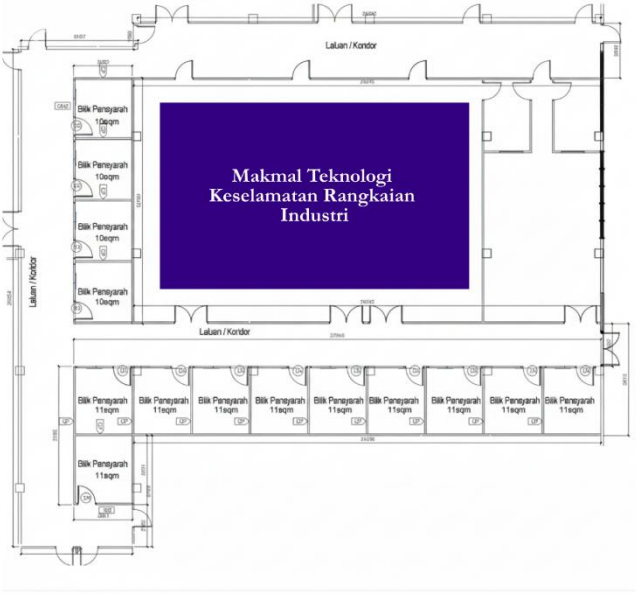


Technology Campus Laboratory Blocks – Admin Block

FTKEK TECHNOLOGY CAMPUS
MAIN BLOCK - 2nd FLOOR - LEFT WING

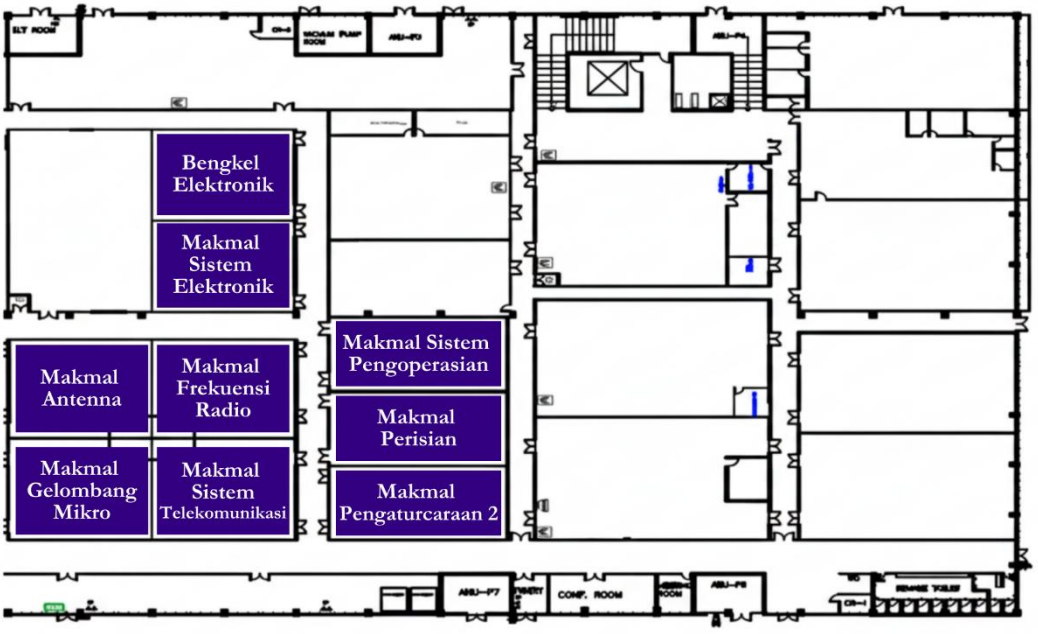


FTKEK TECHNOLOGY CAMPUS
MAIN BLOCK - GROUND FLOOR - LEFT WING



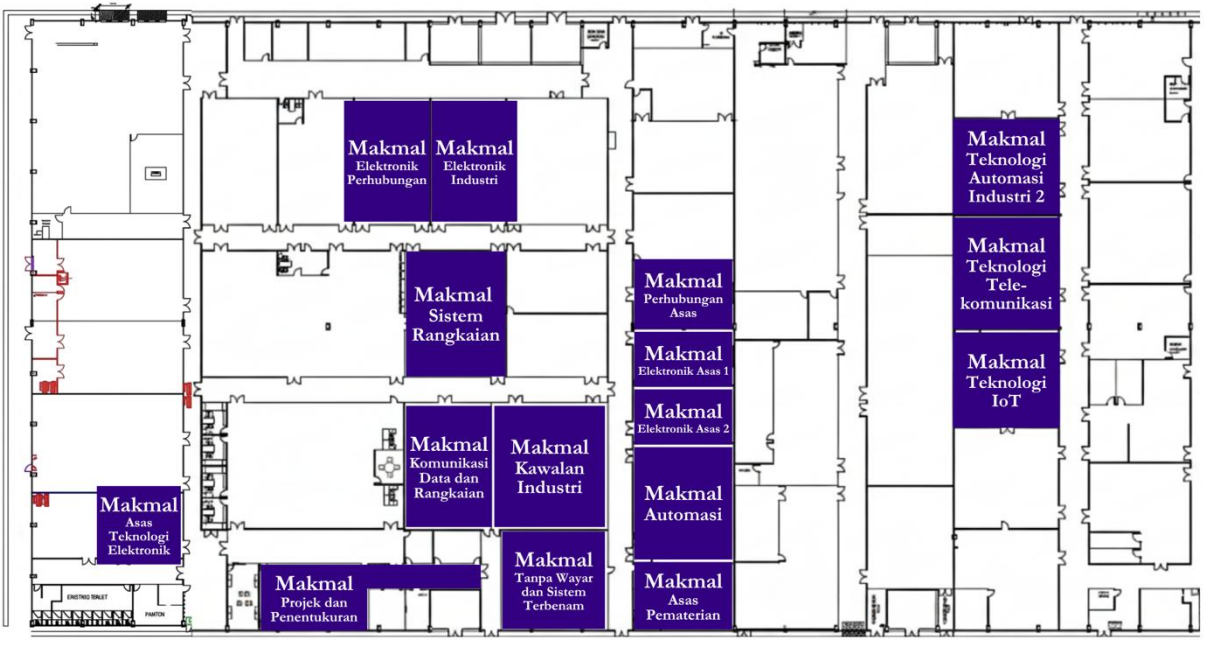
Factory 1 Laboratory

FTKEK TECHNOLOGY CAMPUS
FACTORY 1



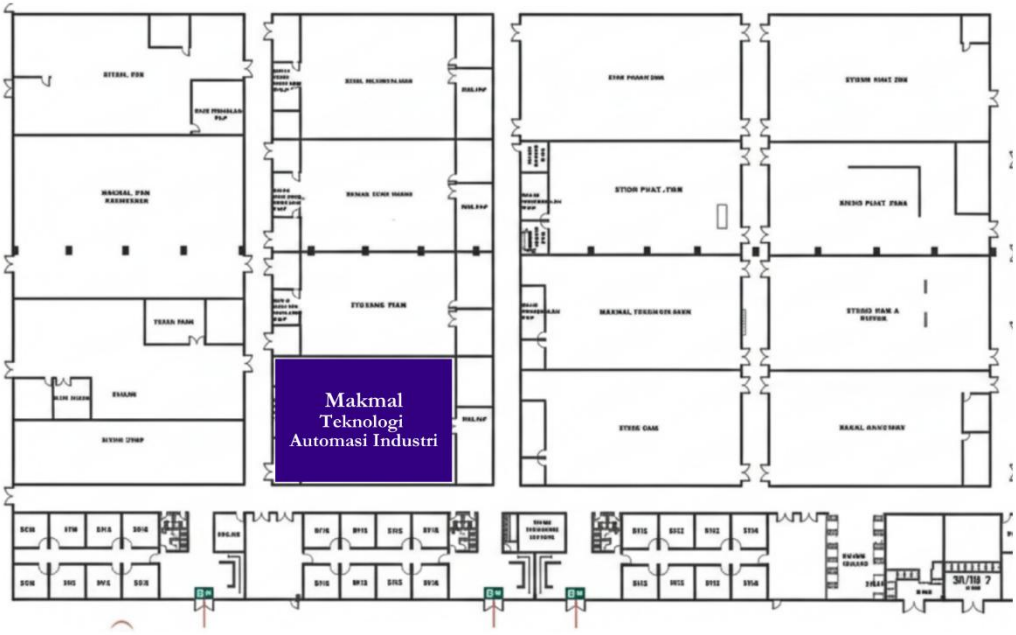
Factory 2 Laboratory

FTKEK TECHNOLOGY CAMPUS
FACTORY 2



Factory 3 Laboratory

FTKEK TECHNOLOGY CAMPUS
FACTORY 3



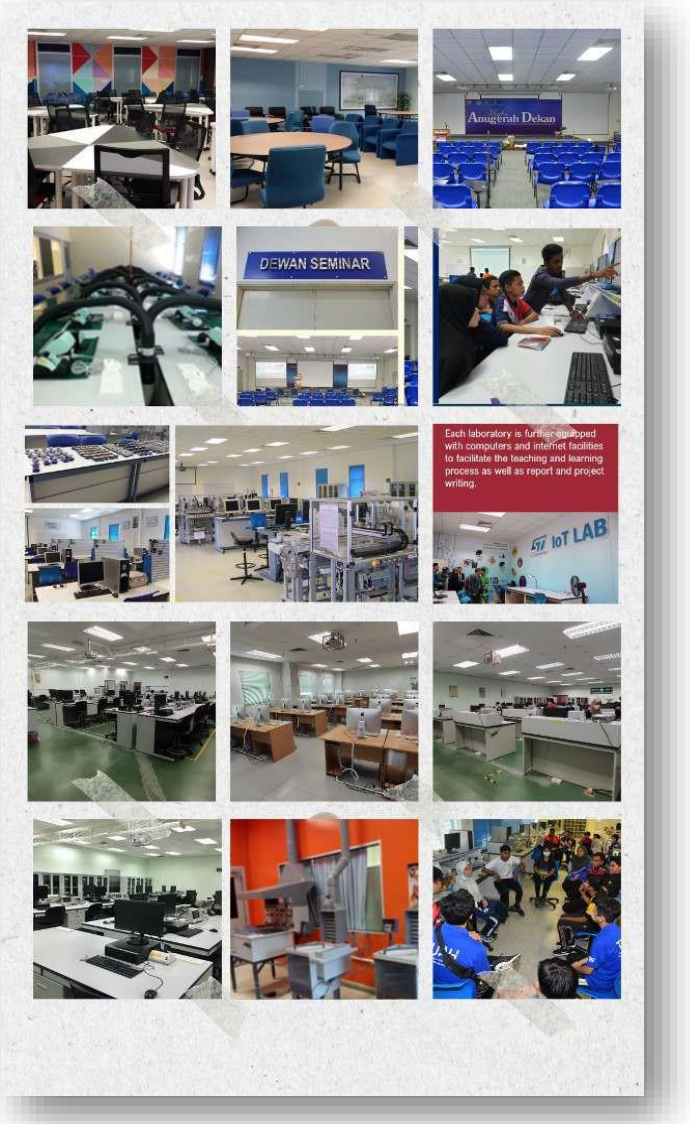
Facilities

All lecture rooms are outfitted with contemporary technology, including laptops and LCD projectors, and can accommodate up to 60 students each. This ensures an engaging, dynamic experience for each session.

The faculty includes 18 laboratories and workshops, each equipped with state-of-the-art, industrial-grade equipment to support practical experience and prepare students for industry requirements. Our laboratories are configured with an ideal ratio of two students per workstation, giving each student substantial opportunity to participate actively in experiments and projects.

FTKEK provides sophisticated collaborative learning environments, exemplified by the CLeAR Room (Collaborative Learning and Research Room), where students can participate in group learning sessions utilizing state-of-the-art resources for an immersive experience.

Furthermore, we have established the BYOD Room (Bring Your Own Device), enabling students to utilize their personal devices during blended learning sessions, thereby augmenting flexibility and engagement in the educational process.



Courses Offered

FTKEK offers the Diploma and Degree Programmes as follows:

1. Bachelor of Electronic Engineering with Honours
2. Bachelor of Computer Engineering with Honours
3. Bachelor of Electronics Engineering Technology (Industrial Electronics) with Honour
4. Bachelor of Computer Engineering Technology (Computer Systems) with Honours
5. Bachelor of Electronics Engineering Technology (Telecommunications) with Honour
6. Bachelor of Electronics Engineering Technology with Honours
7. Bachelor of Technology in Industrial Electronic Automation with Honours
8. Bachelor of Technology in Internet of Things (IoT) with Honours
9. Bachelor of Technology in Telecommunication with Honours

The courses offered are carefully crafted to meet the standards set by the Engineering Accreditation Council (EAC), the Engineering Technology Accreditation Council (ETAC), and the Malaysian Qualifications Agency (MQA). Each course in the program has clearly defined learning outcomes, ensuring that students achieve the desired program outcomes. Theoretical knowledge is delivered through dynamic and interactive methods, including lecture sessions that incorporate problem-based learning, cooperative learning, and active engagement. Laboratory sessions further strengthen this understanding by focusing on analysis and experimental design.

The program emphasizes both self-directed and group learning, especially in laboratory work, problem-based projects, computer-based assignments, engineering practice, industrial training, and the final-year project, which relates to electronic engineering. Student assessments are predominantly based on individual performance, including tests, assignments, project development, oral presentations, reports, and final examinations. Group assessments are derived from laboratory reports, group assignments, and collaborative presentations. The Bachelor's Degree program spans a minimum of 4 years and a maximum of 6 years.

Academic System

UTeM's academic system is based on the semester system, a common practice in all institutions of higher education in Malaysia. The Academic Handbook explains the procedures and university academic rules in force.

SEMESTER I			
Classes	7 weeks		
Semester Break	1 week		
Classes	7 weeks		
Revision Week	1 week		
Final Examination	2 weeks		
Total	18 weeks		
Break Between Semesters	3 weeks		
SEMESTER II			
Classes	7 weeks		
Semester Break	1 week		
Classes	7 weeks		
Revision Week	1 week		
Final Examination	2 weeks		
Total	18 weeks	**OR**	
End of Semester Break	13 weeks	Break Between Semesters	1 week
		SPECIAL SEMESTER	
		Classes and Examination	8 weeks
		End of Semester Break	4 weeks
TOTAL	**52 weeks**	**TOTAL**	**52** weeks

Grading System

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
00 – 39	E	0.0	Fail

Academic Status

A student's achievement is evaluated based on GPA and CGPA. A student's academic status will be provided at the end of each semester as shown below.

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

Academic Achievement

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. These measures reflect the student's academic standing.

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

$$JMN = k_1 m_1 + k_2 m_2 + \cdots k_n m_n$$

Total Calculated Credits,

$$JKK = k_1 + k_2 + \cdots k_n$$

$$GPA = \frac{JMN}{JKK} = \frac{[k_1 m_1 + k_2 m_2 + \cdots k_n m_n]}{[k_1 + k_2 + \cdots k_n]}$$

where : k_n = Credit for COURSE, m_n = Points from the COURSE

Cumulative Grade Point Average (CGPA)

CGPA is the cumulative grade point average for completed semesters. It can be calculated as follows:

$$CGPA = \frac{[JMN_1 + JMN_2 + \cdots JMN_n]}{[JKK_1 + JKK_2 + \cdots JKK_n]}$$

where: JMN_n = Total points obtained in the semester JKK_n = Total credits in the semester.

Award

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

1. must get Good status (KB) in the final semester.
2. has passed all the courses required as listed in the course curriculum.
3. has applied for the award of the degree, approved by the faculty and certified by the Senate.
4. has met all the other University's requirements.

Advisory System

The Academic Advisory System was introduced at the beginning of the faculty's operation. Because the university's academic semester system differs from the system followed by students in schools or matriculation colleges, the Academic Advisory System provides a platform for students to seek advice and guidance in managing their studies at the university. In the semester system, students can determine their academic load according to their ability, within the conditions stipulated by the faculty and academic regulations; as such, students need to plan their studies in a way that best suits them. To support students, each student is assigned an Academic Advisor, an academic staff member well-versed in the Academic System. The Academic Advisor serves as a mentor, advisor, referee, and friend, supporting students with their studies and other academic activities.

Integrated Programme Outcome (IPO) in Advisory System

The Integrated Programme Outcome (IPO) system tracks and evaluates student achievements based on specific Programme Outcomes (POs) aligned with program objectives. At Universiti Teknikal Malaysia Melaka (UTeM), IPO reports provide a visual summary of student performance across these outcomes, helping assess progress and identify areas for improvement. For POs not achieved, Corrective and Quality Improvement (CQI) measures are recommended to ensure students meet the required standards and support overall academic and professional development.

Advisory System and Its Importance

One prominent aspect of the Academic Advisory System is the assignment of Academic Advisors to students, who ought to provide proper advice and guidance to the students in the following:

1. It is not compulsory for the students to take all the courses offered in each semester. Students with good academic standing are encouraged to register for all courses offered. Still, for those with average academic standing, they are advised to take a lighter academic load, a maximum of 12 credits only for those with conditional academic standing, to improve their academic standing for the next semester. Thus, students need to plan their studies and register for appropriate courses each semester according to their ability.

2. The semester system is a flexible education system to cater to students with mixed academic capabilities, including excellent students, average students, and slower learners. This allows everyone to complete their studies successfully within the prescribed time. The Academic Advisory System allows each student to design a study plan to complete their studies successfully.
3. The semester system is a modular system employing the concept of intensive learning and continuous assessment. Therefore, students must adapt to this learning environment and fully utilize the system.
4. In addition to having to adapt to the semester system, the students are also faced with other problems such as culture shock, time management, self-management, and other personal problems, especially for those who are staying away from their parents for the first time.
5. As students progress, due to their academic standings, even if they are from the same cohort, they may not be together for a certain course. In other words, most students may not be together in the same group throughout their studies, and this can be difficult for them to conduct peer groups and course discussions effectively

Roles and Responsibilities

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

Academic Advisor	Student
1. Conduct a meeting with students at least twice every semester. 2. Make sure students understand the academic system in UTeM. 3. Guide and make sure the student's course registration is based on their current academic results. 4. Supervise the student's study progress and guide them in making a good study plan. 5. Ensure the student's record and file are always updated – make sure no COURSE is missed to fulfil the requirement for the award of a bachelor's degree.	1. Always be open-minded when meeting with the academic advisor. 2. Attend meetings conducted by the academic advisor. 3. Regard the academic advisor as a mentor and seek advice on academic matters from them. 4. Learn to have a good understanding of the academic system. 5. Provide a copy of the examination results to the academic advisor for each semester. 6. Get the certification of registration form, copy of certificates, and reference letter from the academic advisor.

Student Society

The Technology and Engineering of Electronics and Computer Student Association (TELeCSA) at FTKEK emphasizes innovation, collaboration, and personal development among students. By organizing various events and workshops, TELeCSA aims to enhance technical skills, promote teamwork, and build a strong sense of community within the university, helping students stay connected and motivated in their academic journey.

Objectives:

1. To expose students to organizational management.
2. To cultivate leadership skills and future potential in various fields.
3. To serve as a liaison between FTKEK students and the Faculty or UTeM management.
4. To organize programs that enhance students' marketability and foster togetherness.

Professional Certification Preparatory Courses

UTEM recognizes the importance of offering academic programs that are not unique but also aligned with industry needs to enhance the graduates' marketability. To meet these goals, the University has integrated Professional Certification Preparatory Courses into all its bachelor's degree programs. These courses aim to provide students with industry-relevant skills, making them more competitive in the job market upon graduation.

The objectives of the Professional Certification Preparatory Courses are:

1. To enhance students' competencies in skills relevant to their future careers.
2. To improve their competitiveness in securing employment after graduation.
3. To support the University's initiative in producing well-rounded, balanced graduates, in line with the first shift of the Malaysia Education Blueprint 2013–2025.

The current list of professional certification preparatory courses offered by the faculty is as follows:

BENG 1020
SMC PLC Pneumatic Certification Course

SYNOPSIS

This course develops theoretical understanding and practical programming skills for industrial automation using the OMRON SYSMAC C200H programmable logic controller. Students examine controller structure, operating principles, memory organisation, and input and output module functions. Students configure hardware requirements and evaluate criteria for selecting controllers that meet specific machine and process requirements. Programming activities develop competence in ladder logic, sequencing, timers, counters, and instructions for performing defined control tasks. The course emphasizes translating operational requirements into appropriate hardware configurations and executable programs. Students integrate these skills to control machines and develop effective practical solutions for industrial automation applications.

BERN1010
Cadence Virtuoso Schematic Professional Certification

SYNOPSIS

This course develops competence in integrated circuit design using the Cadence Virtuoso Design Environment. Students explore analog circuit fundamentals, schematic connectivity, symbol generation, and the organisation of design libraries and cellviews. Students design and simulate digital and analog circuits using schematic capture, Verilog-A models, and SPICE netlists. Hierarchical design techniques and inherited connections help manage complex circuit structures. Students also apply constraint-driven workflows in Schematic XL, creating constraints and propagating design intent to layout. Practical activities integrate environment navigation, circuit construction, simulation, and design management, providing a foundation for further work in custom integrated circuit design and verification.

BERT2110 CISCO Applied Network Systems Professional Certification Preparation

SYNOPSIS

This course develops networking competencies through the Cisco CCNA curriculum: Introduction to Networks; Switching, Routing, and Wireless Essentials; and Enterprise Networking, Security, and Automation. Students build local area networks, implement IP addressing schemes, and configure routers and switches with foundational security measures. Students develop skills in switching, routing, network troubleshooting, and securing wireless local area networks. Learning progresses to enterprise network configuration, troubleshooting, cybersecurity threat identification, and protective measures, alongside introductory automation concepts. Practical networking activities integrate technical knowledge with systematic problem-solving, preparing students for CCNA certification assessment and supporting further development in network administration, infrastructure support, and cybersecurity.

BEEE4210 SMCT-MT1 Practical Mechatronics 1 Certification

SYNOPSIS

This course introduces practical mechatronics by integrating pneumatic mechanisms, electrical control, and programmable logic controllers. Students apply fundamental design concepts to develop mechatronic solutions using electro-pneumatic components and PLC programs. Practical activities involve constructing pneumatic and electro-pneumatic circuits, connecting control components, and programming manipulators to perform specified operating sequences. The course emphasizes understanding how actuators, sensors, valves, and control logic interact within an integrated system. Students translate functional requirements into circuit arrangements and coordinated movements, linking conceptual design with physical implementation. The course develops practical competence in constructing and programming mechatronic systems relevant to industrial automation applications.

BENG 1040
Fiber Optic Technology Competency Certification Preparatory Course

SYNOPSIS

This course develops foundational knowledge and practical competence in optical fiber communication for fixed telecommunications networks. Students examine light transmission principles, fiber characteristics, optical components, and factors affecting communication performance. Using OptiSystem software, students design and simulate fiber optic networks to evaluate system behaviour and inform design decisions. Practical activities develop skills in optical fiber testing, interpreting measurements, analysing network errors, and handling line faults using common instrumentation. The course emphasizes relating theoretical principles to network design and systematic troubleshooting. The course prepares students to apply technical knowledge and diagnostic skills in optical communication system implementation, operation, and maintenance.

BEEE 3210
Programmable Logic Controller (PLC) Level 1 & Level 2 Certification

SYNOPSIS

This course develops practical knowledge and programming skills in programmable logic controllers for industrial automation. Students identify PLC hardware and software components and interpret wiring diagrams for digital and analog input devices. Students configure memory addresses and select appropriate instructions to perform specified control tasks. Learning activities develop competence in ladder diagram programming, including logical operations, sequencing, timing, and counting. Students combine PLC instructions to develop programs for specific industrial automation applications, linking input signals with required control actions. The course integrates hardware understanding, memory addressing, and program development to support practical machine and process automation.


Bachelor of Engineering
Programmes

BACHELOR OF ENGINEERING PROGRAMMES

The Bachelor of Engineering with Honours at Universiti Teknikal Malaysia Melaka (UTeM) offers two specialisations: Electronics Engineering (BERG) and Computer Engineering (BERR). Both pathways prepare students with the theoretical knowledge and practical skills needed for the fast-evolving technology industry.





In the first year, students develop a strong foundation in Engineering Mathematics, Circuit Theory, and Computer Programming—core subjects that support their understanding of electronics and computer technologies. During the second and third years, studies become more specialised: Electronics Engineering focuses on Integrated Circuit Design, Power Electronics, and Telecommunications, while Computer Engineering covers Embedded Systems, Artificial Intelligence, and Network Architecture.

A mandatory 10-week industrial training in the third year provides hands-on experience in professional environments, bridging academic learning with industry practice. In their final year, students choose electives and complete a Final Year Project addressing real-world engineering challenges.

Graduates earn 135 credits and are equipped to work in sectors such as telecommunications, industrial automation, and software engineering. They are also eligible to register with the Board of Engineers Malaysia (BEM), strengthening their professional recognition as competent, industry-ready engineers.

Bachelor of Electronic Engineering with Honours (BERG)

Programme Educational Objectives (PEO) - BERG

1. To achieve career advancement, professionalism, and to pursue lifelong learning in related areas of electronic engineering work or business.
2. To produce creative, innovative, and sustainable solutions to practical electronic engineering problems.
3. To display exemplary interpersonal, leadership, entrepreneurship, and social skills as well as upholding high ethical conducts.

Programme Outcomes (PO) - BERG

PO1	Apply knowledge of mathematics, natural science, computing and engineering fundamentals, and an electronic engineering to develop solutions to complex engineering problems.
PO2	Identify, formulate, research literature and analyse complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences and engineering sciences with holistic considerations for sustainable development.
PO3	Design creative solutions for complex engineering problems and design systems, components or processes to meet identified needs with appropriate consideration for public health and safety, whole-life cost, net zero carbon as well as resource, cultural, societal, and environmental considerations as required.
PO4	Conduct investigation of complex engineering problems using research methods including research-based knowledge, including design of experiments, analysis and interpretation of data, and synthesis of information to provide valid conclusions.
PO5	Create, select and apply, and recognize limitation of appropriate techniques, resources, and modern engineering and IT tools, including prediction and modelling, to **complex engineering problems**.
PO6	Analyse and evaluate sustainable development impacts to society, the economy, sustainability, health and safety, legal frameworks, and the environment, in solving **complex engineering problems.**
PO7	Apply ethical principles and commit to professional ethics and norms of engineering practice and adhere to relevant national and international laws. Demonstrate an understanding of the need for diversity and inclusion.
PO8	Function effectively as an individual, and as a member or leader in diverse and inclusive teams, and in multi-disciplinary, face-to-face, remote and distributed settings.
PO9	Communicate effectively and inclusively on **complex engineering activities** with the engineering community and with society at large, such as being able to comprehend and write effective reports and design documentation, make effective presentations, taking into account cultural, language, and learning differences.
PO10	Apply knowledge and understanding of engineering management principles and economic decision-making and apply these to one's own work, as a member and leader in a team, and to manage projects in multidisciplinary environments.
PO11	Recognise the need for, and have the preparation and ability for i) independent and lifelong learning, ii) adaptability to new and emerging technologies and iii) critical thinking in the broadest context of technological change.

Bachelor of Engineering with Honours

Curriculum Structure BERG

	CODE	COURSE	CATEGORY	CREDIT
SEMESTER 1	BLHW 1772 BLHW 1762*	Philosophy and Current Challenges Philosophy and Current Issues	W	2
	BKKX xxx1	Co-Curriculum I	W	1
	BLHW 1142	English for Academic Purposes	W	2
	BMIG 1313	Engineering Mathematics 1	P	3
	BMIG 1213	Engineering Materials	P	3
	BERG 1132	Engineering Practice	K	2
	BERG 1713	Circuit Theory 1	K	3
TOTAL CREDITS THIS SEMESTER				16
SEMESTER 2	BKKX xxx1	Co-Curriculum II	W	1
	BMKC 1013	Differential Equations	P	3
	BERN 1233	Computer Programming	P	3
	BERG 1413	Digital Electronics	P	3
	BERG 1723	Circuit Theory 2	K	3
	BERG 2123	Fundamental of Electronics	K	3
	BLLW 12X2	Language Electives	W	2
TOTAL CREDITS THIS SEMESTER				18

**Compulsory for International Students*

	CODE	COURSE	CATEGORY	CREDIT
SEMESTER 3	BLHW 2782 BLHW 2762*	Malaysian Nation State Aspiration Malaysian Citra	W	2
	BELG 2443	Engineering Mathematics 2	P	3
	BERG 2183	Instrumentation and Measurement	K	3
	BERG 2413	Electrical Technology	K	3
	BERN 2413	Digital System	K	3
	BERG 2133	Analogue Electronics	K	3
	BERG 2211	Electronic Engineering Lab 1	K	1
TOTAL CREDITS THIS SEMESTER				18
SEMESTER 4	BLLW 2152	Academic Writing	W	2
	BERN 2143	Engineering Statistics	P	3
	BMKU 1313	Engineering Graphics and CAD	P	3
	BERN 2423	Microprocessor Technology	K	3
	BERN 2733	Signals and Systems	K	3
	BERN 2753	Communication Principles	K	3
	BERG 2431	Electronic Engineering Lab 2	K	1
TOTAL CREDITS THIS SEMESTER				18

**Compulsory for International Students*

	CODE	COURSE	CATEGORY	CREDIT
SEMESTER 5	BTMW 4012	Technology Entrepreneurship	W	2
	BERN 3322	Engineer and Society	P	2
	BERG 3213	Engineering Management	K	3
	BERN 3223	Control Principles and Systems	K	3
	BERG 3143	Electronic System Design and Analysis	K	3
	BERG 3743	Electromagnetic Fields and Waves	K	3
	BERG 3211	Electronic Engineering Lab 3	K	1
TOTAL CREDITS THIS SEMESTER				17
SEMESTER 6	BLHW 3162	English for Professional Interaction	W	2
	BLHW 2792	Integrity and Anti-Corruption Course	W	2
	BERN 3863	Integrated Design Project	P	3
	BERN 3763	Digital Signal Processing	K	3
	BERG 3253	IC Design and Process	K	3
	BERG 3343	Power Electronics and Drives	K	3
	BERG 3761	Electronic Engineering Lab 4	K	1
TOTAL CREDITS THIS SEMESTER				17

	CODE	COURSE	CATEGORY	CREDIT
SPECIAL SEM	BERN 3005	Industrial Training	P	5
TOTAL CREDITS THIS SEMESTER				5
SEMESTER 7	BERN 4972	Bachelor Degree Project 1	P	2
	BERG 4131	Engineering Seminar	P	1
	BERG 4333	Artificial Intelligence	K	3
	BERG 4711	Electronic Engineering Lab 5	K	1
	BERX xxx3	Engineering Elective 1	E	3
	BERX xxx3	Engineering Elective 2	E	3
TOTAL CREDITS THIS SEMESTER				13
SEMESTER 8	BERN 4984	Bachelor Degree Project 2	P	4
	BERG 4453	Computer Architecture	K	3
	BERX xxx3	Engineering Elective 3	E	3
	BERX xxx3	Engineering Elective 4	E	3
TOTAL CREDITS THIS SEMESTER				13
TOTAL CREDITS				135

List of Elective Courses

Elective Courses	Programme Specialization			
	Computer Engineering	**Industrial Electronics**	**Telecommunication Engineering**	**Wireless Communication**
Elective 1	BERG 4463 Microcontroller Technology	BERG 4233 Industrial Control	BERG 4773 Telecommunication System Engineering	BERG 4783 Wireless Communication System
Elective 2	BERR 4713 Big Data Analytics	BERG 4243 Industrial Automation	BERG 4793 Microwave Engineering	BERG 4813 Data Communication and Networking
Elective 3	BERR 4743 Computer Vision and Pattern Recognition	BERR 4723 Digital Image Processing	BERG 4823 Digital Communication System	BERG 4833 Antenna and Wave Propagation
Elective 4	BERN 4473 Digital Integrated Circuit Design	BERR 4733 Machine Learning	BERG 4843 Optoelectronics	BERG 4853 Radio Navigation System
	BERR 4533 Embedded Software Design			

List of Language Courses

Code	Courses
BLLW 1282*	Malay 2
BLLW 1212	Arabic 1
BLLW 1222	Mandarin 1
BLLW 1232	Japanese 1
BLLW 1242	Korean 1
BLLW 1252	German 1

**Compulsory for International Students*

Specialization

Students who register for the Bachelor of Electronic Engineering program may specialize either in Industrial Electronics, Computer Engineering, Telecommunication Electronics, or Wireless Communications.

All the undergraduate programs offered by the Faculty of Electronics and Computer Technology and Engineering are accredited and recognized by the Board of Engineers Malaysia (BEM). Graduates from the Bachelor of Engineering programs above may apply to register with the Board of Engineers Malaysia as graduate engineers in the engineering fields.

Degree Awarded	Choice of Field Elective	Field of Registration with BEM
Bachelor of Electronic Engineering with Honours [BERG]	Industrial Electronics	Electronic Engineer
	Computer Engineering	
	Telecommunication Electronics	
	Wireless Communication	

Bachelor of Computer Engineering with Honours (BERR)

Programme Educational Objectives (PEO) - BERR

1. To achieve career advancement, professionalism, and to pursue lifelong learning in related areas of computer engineering work or business.
2. To produce creative, innovative and sustainable solutions to practical computer engineering problems.
3. To display exemplary interpersonal, leadership, entrepreneurship, and social skills as well as upholding high ethical conducts.

Programme Outcomes (PO) - BERR

PO1	Apply knowledge of mathematics, natural science, computing and engineering fundamentals, and **computer engineering** to develop solutions to **complex engineering problems**.
PO2	Identify, formulate, research literature and analyse **complex engineering problems** reaching substantiated conclusions using first principles of mathematics, natural sciences and engineering sciences with holistic considerations for sustainable development.
PO3	Design creative solutions for **complex engineering problems** and design systems, components or processes to meet identified needs with appropriate consideration for public health and safety, whole-life cost, net zero carbon as well as resource, cultural, societal, and environmental considerations as required.
PO4	Conduct investigation of **complex engineering problems** using research methods including research-based knowledge, including design of experiments, analysis and interpretation of data, and synthesis of information to provide valid conclusions.
PO5	Create, select and apply, and recognize limitation of appropriate techniques, resources, and modern engineering and IT tools, including prediction and modelling, to **complex engineering problems.**
PO6	Analyse and evaluate sustainable development impacts to society, the economy, sustainability, health and safety, legal frameworks, and the environment, in solving **complex engineering problems.**
PO7	Apply ethical principles and commit to professional ethics and norms of engineering practice and adhere to relevant national and international laws. Demonstrate an understanding of the need for diversity and inclusion.
PO8	Function effectively as an individual, and as a member or leader in diverse and inclusive teams, and in multi-disciplinary, face-to-face, remote and distributed settings.
PO9	Communicate effectively and inclusively on **complex engineering activities** with the engineering community and with society at large, such as being able to comprehend and write effective reports and design documentation, make effective presentations, taking into account cultural, language, and learning differences.
PO10	Apply knowledge and understanding of engineering management principles and economic decision-making and apply these to one's own work, as a member and leader in a team, and to manage projects in multidisciplinary environments.
PO11	Recognise the need for, and have the preparation and ability for i) independent and life-long learning, ii) adaptability to new and emerging technologies and iii) critical thinking in the broadest context of technological change.

Bachelor of Engineering with Honours

Curriculum Structure BERR

	CODE	COURSE	CATEGORY	CREDIT
SEMESTER 1	BLHW 1772 BLHW 1762*	Philosophy and Current Issues	W	2
	BLLW 1142	English for Academic Purposes	W	2
	BKKX XXX1	Co-Curriculum I	W	1
	BERR 1113	Engineering Mathematics	P	3
	BERN 1233	Computer Programming	P	3
	BERR 1133	Fundamental Electrical and Electronics	K	3
	BERR 1143	Logic Circuit	K	3
TOTAL CREDITS THIS SEMESTER				**17**
SEMESTER 2	BKKX XXX1	Co-Curriculum II	W	1
	BLHW 2782 BLHW 2762*	Malaysian Nation State Aspiration Malaysian Citra	W	2
	BERR 1213	Differential Equations	P	3
	BERN 2413	Digital System	K	3
	BERR 1233	Data Structure and Algorithm	K	3
	BERR 1242	Computer Engineering Practice 1	K	2
	BLLW 1XX2	Language Electives	E	2
TOTAL CREDITS THIS SEMESTER				**16**

**Compulsory for International Students*

	CODE	COURSE	CATEGORY	CREDIT
SEMESTER 3	BLLW 2152	Academic Writing	W	2
	BERR 2113	Linear Algebra and Discrete Mathematics	P	3
	BERR 2133	Computer Network and System	K	3
	BERR 2143	Analog Electronics and Devices	K	3
	BERN 2753	Communication Principles	K	3
	BERN 2423	Microprocessor Technology	K	3
	BERR 2161	Computer Engineering Lab 1	K	1
TOTAL CREDITS THIS SEMESTER				**18**
SEMESTER 4	BERN 2143	Engineering Statistics	P	3
	BERR 2233	Computer Organization and Architecture	K	3
	BERR 2243	Database and Cloud System	K	3
	BERR 2253	VLSI Design	K	3
	BERN 2733	Signals and System	K	3
	BERR 2261	Computer Engineering Laboratory 2	K	1
	BERR 2272	Computer Engineering Practice 2	K	2
TOTAL CREDITS THIS SEMESTER				**18**

	CODE	COURSE	CATEGORY	CREDIT
SEMESTER 5	BLLW 3162	English for Professional Interaction	W	2
	BERR 3113	Electromagnetic	K	3
	BERR 3123	Information Security	K	3
	BERR 3133	Embedded System Design	K	3
	BERR 3143	Artificial Intelligence	K	3
	BERR 3151	Computer Engineering Laboratory 3	K	1
	BLLW XXX2	General Electives	E	2
TOTAL CREDITS THIS SEMESTER				**17**
SEMESTER 6	BERN 3322	Engineer and Society	P	2
	BERN 3863	Integrated Design Project	P	3
	BERR 3213	Operating System	K	3
	BERN 3763	Digital Signal Processing	K	3
	BERN 4473	Digital IC Design	K	3
	BERR 3241	Computer Engineering Laboratory 4	K	1
	BERR 4xx3	Elective 1	E	3
TOTAL CREDITS THIS SEMESTER				**18**

	CODE	COURSE	CATEGORY	CREDIT
SPECIAL SEM	BERN 3005	Industrial Training	P	5
TOTAL CREDITS THIS SEMESTER				**5**
SEMESTER 7	BTMW 4012	Technology Entrepreneurship	W	2
	BERN 4972	Bachelor Degree Project 1	P	2
	BERN 3223	Control Principles and Systems	K	3
	BERR 4xx3	Elective 2	E	3
	BERR 4xx3	Elective 3	E	3
TOTAL CREDITS THIS SEMESTER				**13**
SEMESTER 8	BERN 4984	Bachelor Degree Project 2	P	4
	BMFG 3213	Engineering Economy and Management	P	3
	BERR 4223	High Performance Computing	K	3
	BERR 4xx3	Elective 4	E	3
TOTAL CREDITS THIS SEMESTER				**13**
TOTAL CREDITS				**135**

List of Elective Courses

Elective Courses	Program Specialization Electives		
	Smart Embedded System	**System-on-Chip**	**Computational Intelligence**
Elective 1	BERR 4513 Computer Interfaces	BERR 4613 Analog IC Design	BERR 4713 Big Data Analytics
Elective 2	BERR 4523 Embedded Signal and Power Integrity System	BERR 4623 Low Power System on Chip	BERR 4723 Digital Image Processing
Elective3	BERR 4533 Embedded Software Design	BERR 4633 Mixed Signal System Design	BERR 4733 Machine Learning
Elective 4	BERR 4543 Embedded Wireline and Wireless System	BERR 4643 System-on-Chip Integration and Packaging	BERR 4743 Computer Vision and Pattern Recognition

Language and General Elective Courses

Language Electives	
Code	**Courses**
BLLW 1282*	Malay 2
BLLW 1212	Arabic 1
BLLW 1222	Mandarin 1
BLLW 1232	Japanese 1
BLLW 1242	Korean 1
BLLW 1252	German 1

**Compulsory for International Students*

General Electives	
Code	**Courses**
BLHC 4032	Critical and Creative Thinking
BLHW 2792	Integrity and Anti-Corruption Course

Course Details for Bachelor of Engineering with Honours

University Compulsory Courses (W)

Code	Courses
BKKX xxx1	Co-Curriculum 1 and 2
BLHW 1772 BLHW 1762*	Philosophy and Current Challenges Philosophy and Current Issues
BLHW 2772	Malaysian Nation State Aspiration
BLHW 2792	Integrity and Anti-Corruption Course
BLHW 2762*	Malaysian Citra
BLLW 1142	English for Academic Purposes
BLLW 12x2	Language Electives
BLLW 2152	Academic Writing
BLLW 3162	English for Professional Interaction
BTMW 4012	Technology Entrepreneurship

** Compulsory for International Students*

PLEASE REFER TO THE SCHOOL OF INTERNATIONAL STUDIES AND GLOBAL LANGUAGES (SPAB) AND THE FACULTY OF TECHNOLOGY MANAGEMENT AND TECHNOPRENEURSHIP ACADEMIC HANDBOOK FOR THE SYNOPSIS AND THE DETAILED SYLLABUS FOR THE ABOVE COURSES

Course Code – BERN

BERN 1233
COMPUTER PROGRAMMING

LEARNING OUTCOMES

1. Identify the fundamental principles of problem solving, programming techniques, and structures in program development.
2. Explain the principles of problem solving and programming techniques to solve given problems.
3. Construct computer program code by applying suitable programming structures and techniques.

SYNOPSIS

This course prepares students to enter the world of computer programming using the C++ language by covering the concepts and fundamentals of problem-solving through programming. Topics include programming fundamentals, problem-solving, data types and operators, selection, repetition, functions, arrays, files, structured data, and pointers. At the end of the course, students also use C++ to develop applications.

BERN 2143
ENGINEERING STATISTICS

LEARNING OUTCOMES

1. Apply the concepts of data description, normal and sampling distributions, estimation and hypothesis testing, ANOVA, regression and non-parametric tests to solve mathematical problems.
2. Analyze engineering data using descriptive statistics.
3. Deduce statistical inference for engineering problems by using the techniques of estimation, hypothesis testing, and regression.

SYNOPSIS

This course provides statistical techniques and tools for data analysis. The course begins with data description. Then, students will cover normal and sampling distributions, and estimation and hypothesis testing for one and two populations. It also covers one-way ANOVA, simple linear regression, multiple linear regression, and polynomial regression. Students will also learn non-parametric statistics. Finally, students will apply their statistical knowledge using software to ensure they are well prepared for industry.

BERN 2413
DIGITAL SYSTEM

LEARNING OUTCOMES

1. Analyze the digital system consisting of finite state machine, counter and register.
2. Design complex digital systems for combinational and sequential logic circuits using Hardware Description Language (HDL).

SYNOPSIS

This course discusses digital systems and their applications in engineering. It will cover topics such as flip-flops, counters, shift registers, sequential logic design using Finite State Machines, and Hardware Description Language (HDL) for combinational and sequential logic circuits. These topics are important for students learning digital systems and their applications.

BERN 2423
MICROPROCESSOR TECHNOLOGY

LEARNING OUTCOMES

1. Write, debug and analyse the assembly language programming of microprocessor-based systems.
2. Design electronic circuits that realize microprocessor-based systems.
3. Communicate effectively through effective report writing and oral presentation.

SYNOPSIS

This course covers the concept, hardware, and programming of the ARM Cortex-M3 processor. Topics include an introduction to microprocessors, assembly language programming, and hardware interfacing design between the microprocessor, memory, and input/output devices. This course also covers the evolution of microprocessor architectures, peripherals, and memory-mapped system design. By the end of this course, students should be able to develop a simple microprocessor-based project by integrating software and hardware.

BERN 2733
SIGNALS AND SYSTEMS

LEARNING OUTCOMES

1. Identify the characteristics and properties of various continuous-time and discrete-time signals and systems.
2. Analyze systems with a variety of inputs and responses through Fourier Series, Fourier Transform, and Laplace Transform techniques.

SYNOPSIS

This course introduces the basic concepts and techniques for describing and analyzing continuous-time signals and systems. The course begins by studying the characteristics and properties of various continuous- and discrete-time signals and systems. It then covers representing periodic signals as a Fourier series and using the Fourier and Laplace transforms to analyze continuous-time signals. Students will also use MATLAB to analyze the behaviour of continuous-time signals and systems. This course covers applications of Fourier series, Fourier transforms, and Laplace transforms in circuits. The ideas introduced in this course will be useful for understanding further electronic and electrical engineering courses on control systems, communication systems, power systems, and digital signal processing.

BERN 2753
COMMUNICATION PRINCIPLES

LEARNING OUTCOMES

1. Explain basic principles, components of telecommunication systems, and the effect of noise in telecommunication systems.
2. Analyze the design and performance of various digital modulation formats, linear and angle modulation techniques commonly used in telecommunication systems.
3. Communicate effectively through effective report writing or oral presentation.

SYNOPSIS

This course delivers the principles of communication systems. The course begins with an introduction to telecommunications, including the telecommunication model, transmission modes, and the modulation and demodulation model. Next, students will cover the linear modulation process, including Amplitude Modulation (AM)

principles, AM modulation and transmission, and AM Reception and Demodulation. Students will also study the principles of Single-Sideband Communications Systems (SSB), covering transmission and reception. In addition, students will learn Angle Modulation (AM), covering Frequency Modulation (FM), Phase Modulation (PM), FM/PM Modulation and Transmission, FM/PM Reception and Demodulation, and FM Stereo. In addition, students will learn about noise: sources and representation, noise parameters, and noise analysis in linear and angle modulation. Finally, students will learn about digital communication topics such as Information Capacity, the Hartley and Shannon Limits, digital modulation (amplitude, Frequency, and phase shift keying [ASK, FSK, and PSK]), and digital transmission (pulse modulation, pulse code modulation [PCM], Sampling, and Quantization).

BERN 3005
INDUSTRIAL TRAINING

LEARNING OUTCOMES

1. Apply appropriate techniques and technical knowledge that are relevant to the student's field of study.
2. Demonstrate the ability to adapt to the working environment and practice working efficiently and ethically.
3. Display soft skills, especially communication skills, at all levels.
4. Work effectively as an individual, team member, and leader as well.
5. Acquire new knowledge, engage in lifelong learning, and be aware of new technology.

SYNOPSIS

All bachelor's degree students will be placed in appropriate local industries or government corporations for 10 weeks, normally in the special semester of their third year of study. Students will be exposed to a real-life working environment relevant to their field of study.

BERN 3223
CONTROL PRINCIPLES AND SYSTEMS

LEARNING OUTCOMES

1. Analyze control system problems using appropriate control techniques.
2. Design appropriate controllers for electrical and/or mechanical control systems to achieve the given specifications.
3. Communicate effectively through effective report writing or oral presentation.

SYNOPSIS

Introduction to control systems, frequency domain modeling, Laplace transform, transfer function, electrical network transfer function, translational mechanical system, rotational mechanical system transfer function, time domain modeling, 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, block diagrams, feedback systems, signal flow graphs, Mason's rule, Routh-Hurwitz criterion, Bode plot, gain adjustment compensator, pole placement controller design and last but not least PID controller design. This course exposes students to current industry applications, such as electrical and mechanical system design and control.

BERN 3322
ENGINEER AND SOCIETY

LEARNING OUTCOMES

1. Apply ethical principles and commitment to professional ethics, responsibilities and norms of engineering practice.
2. Apply reasoning informed by contextual knowledge to assess health, safety and legal issues and their subsequent responsibilities, relevant to professional practice.
3. Understand the needs for sustainable development and the impact of engineering solutions on society and the environment.
4. Communicate effectively through effective report writing or oral presentation.

SYNOPSIS

This course will discuss issues that are related to the engineering profession. It will cover topics such as personal ethics, professional ethics, code of ethics, ethics dealing with human relations, professionalism, BEM, IEM, regulations on professional conduct, route to professional status, engineers as an employee or employer, decision making, ethical considerations, competence of practicing engineering, safety issues, and related laws, health issues in the profession, safety and health management systems, accountability, general liability, engineer's legal liability specified in contract law, the environment, sustainability, etc. These issues will be examined and applied to daily contextual situations based on the existing laws, manuals, guidelines, and case studies.

BERN 3763
DIGITAL SIGNAL PROCESSING

LEARNING OUTCOMES

1. Apply digital signal processing concepts in discrete-time signals & systems, spectrum representations, random signals, and multimedia applications.
2. Analyze the spectrum representation, impulse response, and signal flow graph using difference equations; determine stability using the z-transform; and design digital filters based on basic filter concepts.
3. Communicate effectively through effective report writing or oral presentation.

SYNOPSIS

This course prepared students to enter the world of digital signal processing (DSP) by covering the concepts behind digital signal transformation, filter design, and random signals. The topics include discrete-time signals and systems, spectrum representation of discrete-time signals, the discrete Fourier transform, difference equations and discrete-time systems, the z-transform and its applications, analysis and design of digital filters, and random signals. By the end of the course, students are also exposed to digital signal processing techniques in audio/video, biomedical, and telecommunication applications.

BERN 3863
INTEGRATED DESIGN PROJECT

LEARNING OUTCOMES

1. Design solutions by synthesizing electronic engineering knowledge that will solve complex electronic engineering problems in accordance with relevant standards.
2. Utilize modern engineering and IT tools in facilitating

solutions to complex electronic engineering problems with an understanding of the limitations.
3. Evaluate the project design and solution in terms of societal and health factors with ethical consideration.
4. Evaluate the impact of the design product, component, or processes in terms of safety, environmental, and sustainability factors.
5. Apply ethical principles and commit to the professional ethics, responsibilities, and norms of engineering practices.
6. Demonstrate effective teamwork skills in completing the IDP.
7. Demonstrate effective oral and written communication skills suitable for professional practice.
8. Apply project management and financial knowledge effectively in completing the IDP.
9. Engage in independent and lifelong learning in the broadest context of technological change.

SYNOPSIS

Integrated Design Project is a course in which students design an electronic engineering project, including project management, project planning, project feasibility study, design selection, design costing and sizing, and analysis and evaluation. The course focuses on implementing and integrating product/conceptual design development to produce a comprehensive final technical report, including engineering proposals and drawings, specifications and bills of quantities, and cost estimates for development projects assigned to students working in groups. Beyond basic electronic design, students must also integrate knowledge from other engineering disciplines, including (but not limited to) circuit analysis and design, component selection, project scheduling techniques, and sustainable development considerations, into their overall project work. By the end of this course, students will be able to understand the needs and requirements for product design procedures and appreciate the importance of integrating and synthesizing knowledge from various disciplines of electronic engineering.

BERN 4473
DIGITAL INTEGRATED CIRCUIT DESIGN

LEARNING OUTCOMES

1. Analyse combinational and sequential logic circuits and registers in integrated circuit technology.
2. Design logic circuits and registers based on digital circuit modelling.
3. Communicate effectively through effective report writing or oral presentation.

SYNOPSIS

This course introduces basic techniques of modern digital modelling for Integrated Circuit (IC) design. The course begins with a historical perspective on the evolution of Integrated Circuit technology. The course covers combinational and sequential logic design using Hardware Description Language (HDL) to help students develop the technical skills to design, analyse, and verify the functionality of digital circuits. Students will also learn Register Transfer Level (RTL) abstraction to create high-level circuit representations. To ensure the gate-level design behaves the same as the RTL version, the course will discuss structured approaches to improve synthesis quality. Finally, the course covers timing analysis for combinational and sequential circuits. By the end of this course, students will have gained the required fundamental knowledge in IC design, which is crucial for semiconductor industry applications.

BERN 4972
BACHELOR DEGREE PROJECT 1

LEARNING OUTCOMES

1. Apply engineering knowledge to determine the objectives for the project, which relate to the work done before, including basic theory as well as the approach to be used.
2. Apply ethical principles and commit to professional conduct during project execution & presentation.
3. Communicate effectively through formal engineering report presentation both orally and in writing.
4. Ability to plan and manage project activities and estimate costs.
5. Engage in independent search and synthesis of technical information from reliable sources.

SYNOPSIS

This module is the preliminary part of the Bachelor's Degree Final Year Project. Students are required to produce a project proposal and commence preliminary research and development work before the end of the semester. Preliminary work may include, for instance, circuit design simulation, modelling, and development of simple electronic circuits to test the concept. Final Year Projects are not limited to laboratory-based or faculty projects; students are also encouraged to consider industrial case studies or solving industrial problems encountered during their internship across different industries related to electronic engineering.

BERN 4984
BACHELOR DEGREE PROJECT 2

LEARNING OUTCOMES

1. Analyse the problem statement of the project & identify a possible solution.
2. Design and develop solutions to complex engineering problems to meet desired needs.
3. Investigate, analyse, and interpret the results of complex engineering problems using proper research methods to provide valid conclusions.
4. Apply appropriate modern techniques and proper use of engineering tools to solve complex engineering problems.
5. Identify and assess societal, health, safety, legal, and cultural issues, and the consequent responsibility relevant to professional engineering practice.
6. Evaluate the project design and solution in terms of environment and sustainability.
7. Apply ethical principles and commit to professional conduct during project execution & presentation.
8. Communicate effectively through formal engineering report presentation both orally and in writing.
9. Engage in independent search and synthesis of technical information from reliable sources.

SYNOPSIS

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

Course Code – BERG

BERG 1132
ENGINEERING PRACTICE

LEARNING OUTCOMES

1. Apply knowledge of engineering fundamentals to various basic modules of electronics towards solving complex engineering problems.

2. Apply appropriate techniques, resources, and modern engineering and IT tools to complex engineering activities.
3. Demonstrate effective teamwork in completing the given group project

SYNOPSIS

This course aims to deliver current technology and applications in engineering practice. The course begins with the Occupational Safety and Health Administration, including its history, background, functions, and OSH regulations in Malaysia. Students will then be introduced to simulation tools, including the Multisim simulator for analogue and digital circuits. This course also covers the use of instrumentation such as multimeter, function generator, DC power supply, and oscilloscope. Students will also learn soldering and desoldering techniques for electronic components on a strip board. Finally, students will learn PCB design and fabrication, including designing the PCB in PROTEUS software before transferring it to PCB layout. UV etching technique will be used in this PCB fabrication process. Then, students will complete a mini project in which they are required to design and construct the PCB board. These topics will develop students' engineering skills, which they will use in the electrical and electronic manufacturing field.

BERG 1413
DIGITAL ELECTRONICS

LEARNING OUTCOMES

1. Describe the number system, basic concepts, and terminology of digital circuits that form complex electronic systems.
2. Analyze the basic digital circuits based on combinational and sequential components.

SYNOPSIS

This course aims to develop knowledge, understanding, and application of digital electronics. The course begins with the introductory concepts of digital technology, number systems, and codes. It then explores logic gates and Boolean algebra. It then introduces combinational logic circuits and their functions. Students will also be introduced to latches and flip-flops. Finally, the course introduces integrated circuit technology, including semiconductor technology for the project assignment. This course will also expose the students to current applications in the digital electronics industry.

BERG 1713
CIRCUIT THEORY 1

LEARNING OUTCOMES

1. Classify sinusoidal waveforms and apply circuit analysis techniques to solve basic DC circuit and a terminated two-port network.
2. Analyze DC circuit problems through the application of circuit analysis techniques and theorems.

SYNOPSIS

This course introduces an overview of electrical engineering, covering fundamental concepts and circuit analysis techniques. The topics include SI units, charge and current, voltage, power and energy, and circuit elements. Circuit laws and theorems covered are Ohm's Law, Kirchhoff's Laws, nodal analysis, nodal analysis with voltage sources, mesh analysis, mesh analysis with current sources, linearity property, superposition, source transformation, Thevenin's Theorem, Norton's Theorem, and maximum power transfer. Network topology concepts include nodes, branches and loops, series resistors and voltage division, parallel resistors and current division, and Wye-Delta transformation. AC

circuit analysis topics include introduction to sinusoids, phasors, phasor relationships for circuit elements, impedance and admittance, and impedance combinations. The course concludes with two-port network parameters covering impedance, admittance, hybrid, and transmission parameters. These fundamental concepts apply to electrical circuit analysis.

BERG 1723
CIRCUIT THEORY 2

LEARNING OUTCOMES

1. Apply knowledge of mathematics and circuit theorems to solve Direct Current (DC) and Alternating Current (AC) electric circuits as well as Alternating Current (AC) power problems.
2. Analyze sinusoidal steady-state conditions, transient response, and frequency response of the circuits.

SYNOPSIS

This course provides the basic electrical circuit theorems and applications for solving DC and AC circuit problems. This course will discuss capacitors and inductors, series and parallel circuits of capacitors and inductors; first- and second-order circuits, step response of the circuits; steady-state analysis; AC power analysis, average power, RMS values, power factor; frequency response, transfer function and Bode Plot, series and parallel resonance and filters. All of these circuit theorems can be applied in filter design.

BERG 2123
FUNDAMENTALS OF ELECTRONICS

LEARNING OUTCOMES

1. Explain the principle knowledge of semiconductor materials, the characteristics and applications of electronic devices.
2. Analyze electronic circuit problems using appropriate theory.

SYNOPSIS

This course discusses the Bohr Atomic Model, covering valency, the Periodic Table of Elements, and trivalent, tetravalent, and pentavalent elements. It also covers electron movement in solids, including conductors, insulators, and semiconductors, and Band Theory, including energy bands, conduction bands, and forbidden bands. Further topics include doping, P- and N-type materials, and PN junction. Diode topics covered include the diode equation, dynamic resistance, diode equivalent circuits, and silicon semiconductor diodes, including characteristics and measurement of forward- and reverse-biased operation, composite characteristics and load-line analysis, clipping, clamping, and simple rectifier (half- and full-wave) circuits, Zener diode characteristics, and simple regulators. Bipolar Junction Transistor (BJT) topics cover BJT construction and operation, BJT characteristics and measurement techniques, limits of operation, βDC and αDC, and DC biasing with DC load lines. Field Effect Transistor (FET) topics cover FET construction and operation, FET characteristics and diagrams, Shockley's Equation, and DC biasing with DC load lines. The course concludes with Metal Oxide Semiconductor Field-Effect Transistor (MOSFET), covering construction, operation, and DC characteristics. Students will also be exposed to industry applications related to semiconductor devices such as transistor operation, design, and analysis of DC biasing configurations.

BERG 2133
ANALOG ELECTRONICS

LEARNING OUTCOMES

1. Analyze the gain and the frequency response of single-stage and multistage audio amplifiers using both BJT, FETs, and MOSFETs, including analysis at mid-band, low, and high frequencies, as well as op-amp circuits and differential amplifiers.
2. Design single-stage or multistage amplifiers of BJT, FETs, and MOSFETs as well as power amplifier circuits.
3. Communicate effectively through effective report writing or oral presentation.

SYNOPSIS

This course aims to develop knowledge, understanding, and application of analogue electronic circuits. The course begins with BJT Transistor modelling and CE, CC, and CB configurations, then moves to BJT small-signal amplifier analysis, including FET and MOSFET, and continues with power amplifier classes A, AB, B, and C. The course also covers frequency response, Bode plots, and circuit stability. The course also covers amplification circuit techniques such as cascade, cascode, Darlington, Multistage Amplifiers, Differential amplifier circuits, and, not least, Feedback Amplifiers. Students will also design amplifier circuits for the project assignment. This course will also expose students to current industry applications, such as very low-signal amplification through instrument amplifiers.

BERG 2183
INSTRUMENTATION AND MEASUREMENT

LEARNING OUTCOMES

1. Describe the principle, various terms, and standards in measurement.
2. Explain the principle, operation, function, and application of measurement devices and transducers or sensors.
3. Apply the suitable bridge techniques to measure component values such as resistance, inductance, and capacitance.
4. Explain the operation, function, and application of the transducers/sensors.

SYNOPSIS

This course discusses units and dimensions, standards, errors, static characteristics, noise, and calibration in measurement. It covers most measurement devices, such as galvanometers and sensors for instrumentation applications.

BERG 2211
ELECTRONIC ENGINEERING LAB 1

LEARNING OUTCOMES

1. Conduct investigation into DC circuit problems and applications.
2. Measure experimental performance using fundamental electronic equipment.
3. Present experimental findings in the form of standard engineering reports.
4. Demonstrate information management skills by providing relevant theoretical principles for the experiment and addressing the problem with potential solutions, engaging in independent and lifelong learning.

SYNOPSIS

This laboratory course covers selected topics from three core subjects. From BERN 2413 Digital System: combinational logic circuits, counter circuits, and sequential circuits. From BERG 1713 Circuit Theory 1: DC analysis covering Ohm's Law and Kirchhoff's Laws, Superposition Theorem, and Thevenin & Norton's Theorem. From BERG 2123 Fundamentals of Electronics: diode applications, BJT characteristics, and Field-Effect Transistor (FET).

BERG 2413
ELECTRICAL TECHNOLOGY

LEARNING OUTCOMES

1. Classify the fundamental principle of various types of electric machines.
2. Analyse the performance of three-phase electrical systems, magnetic circuits, and electrical power systems using appropriate circuit laws.

SYNOPSIS

This course covers the main components of electrical technology, including three-phase systems, magnetic circuits, electric machines, and power system analysis. The course begins with balanced three-phase circuits for star and delta connections. The course will cover magnetic circuit analysis. The course reviews the principles and performance analysis of transformers and AC and DC machines in detail. This course also emphasizes power system analysis using the voltage-drop and per-unit methods. This course will also expose students to current applications and developments in electrical technology.

BERG 2431
ELECTRONIC ENGINEERING LAB 2

LEARNING OUTCOMES

1. Investigate experimental results using appropriate experimental methods and provide critical analysis and discussion.
2. Apply appropriate techniques, manipulate and analyze experimental data to solve complex engineering problems.
3. Demonstrate good communication, leadership, and teamwork skills through experimental work.
4. Demonstrate information management skills by providing relevant theoretical principles for the experiment and addressing the problem with potential solutions, engaging in independent and lifelong learning.

SYNOPSIS

This laboratory course covers selected topics from three core subjects. From BERG 1723 Circuit Theory 2: series RC and RL circuits, AC power, and step response of RLC circuits. From BERG 2133 Analog Electronics: common-emitter BJT amplifier and common-source JFET amplifier frequency response. From BERN 2413 Digital System: combinational logic circuits, counter circuits, and sequential circuits.

BERG 3143
ELECTRONIC SYSTEM DESIGN AND ANALYSIS

LEARNING OUTCOMES

1. Analyze electronic systems such as power supplies, operational amplifiers, oscillators, waveform generators, filters, and ADC/DAC circuits.
2. Design circuits for electronic systems such as power supplies, operational amplifiers, oscillators, waveform

generators, filters, and ADC/DAC circuits.
3. Communicate effectively through effective report writing or oral presentation.

SYNOPSIS

This course aims to develop knowledge, understanding, and application of electronic systems. This course will cover regulated power supply, ripple voltage, filters and voltage regulation, regulators, introduction to switching regulator, discrete, integrated circuit regulator, operational amplifiers, RC phase shift oscillator, Wien bridge oscillator, tuned oscillator, crystal oscillator, 555 timers, active filters, filter design criteria, higher order Butterworth, switched capacitor filters, data conversion, analog-to-digital converter (ADC) and digital-to-analog converter (DAC). This course will expose students to current industry applications, such as electronic circuits in signal processing and conditioning systems.

BERG 3211
ELECTRONIC ENGINEERING LAB 3

LEARNING OUTCOMES

1. Investigate experimental results using appropriate experimental methods and provide critical analysis and discussion.
2. Measure experimental performance using fundamental electronic equipment or software.
3. Present experimental findings in the form of standard engineering reports.
4. Demonstrate information management skills by providing relevant theoretical principles for the experiments and addressing the problem with potential solutions.

SYNOPSIS

This laboratory course covers selected topics from three core courses. From BERG 2413 Electrical Technology: three phase circuit analysis using MATLAB/Simulink, open and short circuit test on single-phase transformer and DC motor analysis using MATLAB/Simulink. From BERN 2423 Microprocessor Technology: Getting started with KEIL MDK, arithmetic logical branch instructions and memory access and GPIO. From BERN 2753 Communication Principles: Amplitude Modulation (AM), Frequency Modulation (FM), and Frequency Shift Keying (FSK).

BERG 3213
ENGINEERING MANAGEMENT

LEARNING OUTCOMES

1. Ability to understand and apply specific knowledge of project management and economic decision-making to engineering projects or business ventures.
2. Communicate effectively through report writing or oral presentation.

SYNOPSIS

This course covers project management and engineering economics in any organisation. Engineering economics covers topics such as the time value of money and interest relationships, engineering economy factors, nominal and effective interest rates, and worth analysis, which help define project criteria engineers and project managers use to select the best economic choice among alternatives. In addition, this course will discuss concepts and processes in project management and risk management. Risk management incorporates probability and statistics in evaluating alternatives. This allows management to determine the probability of a project's success or failure.

BERG 3253
IC DESIGN AND PROCESS

LEARNING OUTCOMES

1. Analyze IC design technology, structure of CMOS devices, fabrication, operations, characteristics, and packaging process.
2. Design transistor-level logic and layout for CMOS technology.
3. Communicate effectively through effective report writing or oral presentation.

SYNOPSIS

This course will also expose students to current applications and developments in networking technologies. This course will expose students to current Integrated Circuit (IC) practical design in industry, covering: Introduction to IC Design, CMOS Characteristics and Analysis, CMOS Circuits and Logic Design, IC Layout and Design, and IC Fabrication and Process Technology. In detail, Introduction to IC Design covers the history of microelectronics, the IC design hierarchy and roadmap, and IC design technologies (CMOS, Bipolar, and BiCMOS). For CMOS Characteristics and Analysis, the course covers topics such as a review of the MOS transistor, the concept of the PN junction, IV and CV characteristics, non-ideal IV, and the DC response of a CMOS inverter. Next, in CMOS Circuits and Logic Design, students cover design representations, MOS transistors and switches, and CMOS logic. This continues with IC Layout and Design, where design rules and considerations, CMOS inverter layout, stick diagrams, Euler paths, layout design and mask layout, and multi-cell layout are explained in detail. At the end of the course, they will learn about IC Fabrication and Process Technology, covering silicon semiconductor manufacturing technology, semiconductor device fabrication, IC fabrication process and steps, SiO_2 patterning, LOCOS/STI, basic CMOS technology, and cross-section.

BERG 3343
POWER ELECTRONICS AND DRIVES

LEARNING OUTCOMES

1. Solve the calculation and application problems of converters and motor drive circuits.
2. Design and analyze a suitable converter to meet the operational requirements of an application.
3. Communicate effectively through effective report writing or oral presentation.

SYNOPSIS

This course delivers the fundamentals of power electronics and its application in electrical drives. The course begins with AC-to-DC conversion, including basic rectifiers with different loads: half-wave rectifiers and full-wave rectifiers. Then, it continues with DC-to-DC conversion, which includes non-isolated DC-DC topologies - buck, boost, buck-boost, continuous-mode, and discontinuous-mode operation. Students also learn DC-to-AC conversion, including basic inverter topologies (basic bridge, full bridge, and three-phase) and modulation and harmonics issues for square wave and PWM. Later, the course introduces drive principles, including elements of electrical drives, an overview of DC and AC drives, torque equations, load-torque components, torque characteristics, and four-quadrant operation. Then, students learn speed control of DC motors, including shunt (separately excited) motors and series motors. It continues with speed control of induction motors and braking of DC motors.

Finally, students can apply the knowledge from this course in various industrial applications such as automotive systems, automation systems, and manufacturing machinery.

BERG 3743
ELECTROMAGNETIC FIELDS AND WAVES

LEARNING OUTCOMES

1. Apply the principles of electrostatics, magnetostatics, time-varying fields, and electromagnetic wave propagation.
2. Analyze the principles of electrostatics, magnetostatics, time-varying fields, and electromagnetic wave propagation.

SYNOPSIS

This course discusses electromagnetic fields and waves. It will cover topics such as Vector Analysis: vector algebra, coordinate systems and transformations, and vector calculus; Electrostatics: electrostatic fields, Gauss's Law, Poisson's Equation, electric fields in material space, and electrostatic boundary conditions; Magnetostatics: magnetostatic fields, Stokes' Theorem, Biot-Savart Law, Gauss's Law, magnetic forces, materials and devices; Waves: Maxwell's Equations, Faraday's Law, time-varying electromagnetic fields, and electromagnetic wave propagation. These topics will be examined and applied in assignments.

BERG 3761
ELECTRONIC ENGINEERING LAB 4

LEARNING OUTCOMES

1. Investigate experimental results using appropriate experimental methods and provide critical analysis and discussion.
2. Measure experimental performance using fundamental electronic equipment or software.
3. Present experimental findings in the form of standard engineering reports.
4. Demonstrate information management skills by providing relevant theoretical principles for the experiment and addressing the problem with potential solutions, engaging in independent and lifelong learning.

SYNOPSIS

This laboratory course covers selected topics from two core subjects. From BERN 3223 Control Principles and Systems: transfer function and system response, state-space representation, system response, and reduction of multiple systems and Mason's Rule. From BENT 4733 Digital Signal Processing: sampling of continuous-time signals, Discrete Fourier Transform (DFT), Z-Transform, and digital filter design.

BERG 4131
ENGINEERING SEMINAR

LEARNING OUTCOMES

1. Identify the professional engineering knowledge, practices, and responsibilities.
2. Collect and sort relevant information about the given technical talk.
3. Discuss current engineering issues and practices that impact engineering professionals.

SYNOPSIS

This course aims to expose students to common engineering practices in industry and instil a passion for lifelong learning. Speakers are invited from both industry and academic societies related to current developments in professional engineering issues in related engineering fields. Faculty alumni

are also invited to brief students on their career development after graduation to motivate them.

BERG 4233 INDUSTRIAL CONTROL

LEARNING OUTCOMES

1. Analyze and interpret the function and operation of an industrial control system with suitable signal conditioning and transmission, industrial process technique, and controller operation.
2. Design and develop signal conditioning circuits, industrial process instruments, and controller operation examples using Programmable Logic Controller (PLC) ladder diagrams and pneumatics to solve industrial control problems.
3. Communicate effectively through report writing or oral presentation.

SYNOPSIS

This course introduces industrial control systems, which can be classified by motion or process, and as open- or closed-loop. The course also covers industrial control elements, feedback control, the dynamic response of a closed-loop system, and feed-forward control mechanisms. The course also covers P&ID diagrams, followed by signal conditioning and signal transmission using various conversion methods. Isolation circuits and cabling are important for ensuring signal integrity. The course also covers industrial process techniques and instrumentation, including components such as sensors, transducers, and actuators. It also covers controller operation based on analog and digital signals, particularly programmable logic controllers (PLCs). Industrial control networks are also covered at the end of the
course.

BERG 4243 INDUSTRIAL AUTOMATION

LEARNING OUTCOMES

1. Analyze concepts of automation, basic robotics, and their relationship in the manufacturing system.
2. Design a robotic manipulator according to the desired performance specifications.
3. Communicate effectively through effective report writing or oral presentation.

SYNOPSIS

This course exposes students to current robotic applications in industry. The course presents the basic principles of industrial automation and robotics systems, along with key concepts and components. Students will also gain an understanding of the automation system design process as it relates to robotic system design. The course places strong emphasis on robotic systems because they are a primary element of modern automation processes. In addition, students will learn to select and determine key components for an efficient automation system through hardware and software approaches in assigned work.

BERG 4333 ARTIFICIAL INTELLIGENCE

LEARNING OUTCOMES

1. Analyze the implementation of artificial intelligence techniques such as fuzzy logic algorithms, neural networks, and machine learning in problem solving.
2. Design an intelligent system to achieve predetermined specifications.

3. Communicate effectively through effective report writing or oral presentation.

SYNOPSIS

This course discusses topics related to Artificial Intelligence (AI) in domestic and engineering industries. Students will be exposed to an overview, history, the need for AI, and its application areas. The course then covers Fuzzy Logic, including an introduction to fuzzy sets and Fuzzy Logic Control Systems, along with recent applications such as Fuzzy Logic in expert systems and energy conversion. Next, the course covers Machine Learning, including Linear Regression (one-variable and multivariable), Logistic Regression, and Regularisation. Students will then explore Neural Networks, covering forward and backpropagation. The course continues with error analysis and the trade-off between precision and recall. Subsequently, students will learn about Unsupervised Learning, covering Support Vector Machines, confusion tables, clustering, dimensionality reduction, Principal Component Analysis (PCA), anomaly detection, large-scale machine learning (Stochastic Gradient Descent convergence), and MapReduce and data parallelism. These topics will be implemented in industry and domestic applications such as autonomous controllers and manufacturing.

BERG 4453
COMPUTER ARCHITECTURE

LEARNING OUTCOMES

1. Determine the critical functions and the main processor architecture of computer hardware, including its memory and storage.
2. Analyze the functions of an operating system, the software development process, and other related components.

SYNOPSIS

This course delivers the fundamentals of computer architecture. The course begins with an introduction to computers, including System-on-Chip (SoC) architecture, Raspberry Pi, Harvard architecture, and Von Neumann architecture. Students will understand how a computer system works, both internally — covering the ALU, control unit, registers, and related components — and externally, covering I/O interfaces, networking, and related components. This understanding will enable graduates to make informed decisions when confronted with computer-related problems in the workplace. The knowledge and skills gained in this course will also enable graduates to further their studies in computer architecture, organisation, and design. Students will then explore detailed topics in electronic memory, ARM processors, and programming processes. The course also covers operating systems, including their history, OS basics, kernels, firmware, and Raspberry Pi OS. Finally, students will learn about wired and wireless Ethernet, which are widely used in computer communication and networking.

BERG 4463
MICROCONTROLLER TECHNOLOGY

LEARNING OUTCOMES

1. Analyze the programming technique and peripheral specifications required to operate a microcontroller architecture function.
2. Design and develop a working microcontroller-based system with peripheral device interface.
3. Demonstrate effective communication skills through project presentation and portfolio compilation.

SYNOPSIS

This course covers current microcontroller technology and

applications. The course begins with an introduction to microcontroller systems, the internal architecture of the microcontroller, programming design and development software, the design configuration and peripheral interfacing of the application system, the integration of software and hardware subsystems, and the development of a system for Internet of Things applications. The course emphasizes design synthesis of software and hardware elements to enable a wide range of IoT solutions.

BERG 4711
ELECTRONIC ENGINEERING LAB 5

LEARNING OUTCOMES

1. Investigate experimental results using appropriate experimental methods and provide critical analysis and discussion.
2. Apply appropriate techniques, manipulate and analyze experimental data to solve complex engineering problems.
3. Demonstrate good communication, leadership, and teamwork skills through experimental work.
4. Demonstrate information management skills by providing relevant theory principles for the experiment and addressing the problem with potential solutions, engaging in independent and lifelong learning.

SYNOPSIS

This course covers topics from two engineering electives (depending on the students' selected track). Every elective will cover FOUR (4) experiments, set up to strengthen the fundamental theory of the course. Electives covered in this course are BERG 4463 Microcontroller Technology, BERN 4473 Digital Integrated Circuit Design, BERG 4233 Industrial Control, BERG 4243 Industrial Automation, BERG 4773 Telecommunication System Engineering, BERG 4793 Microwave Engineering, BERG 4783 Wireless Communication System, BERG 4813 Data Communication and Networking.

BERG 4773
TELECOMMUNICATION SYSTEM ENGINEERING

LEARNING OUTCOMES

1. Analyze broadcasting and telecommunication switching systems.
2. Design a satellite communication system, radar system, and optical communication system.
3. Report and work efficiently on any assignment given in a group.

SYNOPSIS

This course discusses radio spectrum: introduction to frequency spectrum, allocations, and international standard, broadcasting: tv broadcasting and digital broadcasting system, (DAB and DVB), mobile broadcasting system, satellite tv, satellite system: satellites (LEO, MEO, GEO), ground station, propagation delay, azimuth, VSAT, direct broadcast and link budget, radar system: introduction, principles and applications, types of radar, transmitter and receiver, scan and detection, distractor, PSTN/ISDN: circuit and packet switching system and technology, frame relay, ATM, DSL, mobile switching centre, WLL, network architecture, telephony telecommunication traffic, and optical communication: history, advantages, fiber optic types and classification, optical communication system and transmission characteristic, light propagation, losses, light sources, detector, link budget, applications. These topics will be applied in the design of telecommunication services and integration with other devices.

BERG 4783
WIRELESS COMMUNICATION SYSTEMS

LEARNING OUTCOMES

1. Analyze and classify the various standards and models used in wireless communication systems.
2. Develop a model of wireless communication systems and analyze their operation.
3. Communicate effectively through effective report writing or oral presentation.

SYNOPSIS

This course aims to provide knowledge and understanding of current and future wireless communication systems. The course begins with an introduction to wireless communication systems, covering their definition, trends, and evolution. The course describes various types of mobile radio communications and other wireless systems, such as cordless telephone systems, paging systems, and cellular telephone systems. Next, the course covers the cellular concept, especially for terrestrial communications, in detail. Subtopics include frequency reuse, interference (including co-channel and adjacent-channel interference), system capacity, channel planning, trunking and grade of service, handoff mechanisms, and improving coverage and capacity through cell splitting, sectoring, and repeaters. Propagation aspects are then covered under mobile radio propagation models, which encompass the free-space propagation model, ground reflection model, and basic propagation mechanisms — reflection, diffraction, and Fresnel zone, scattering, multipath propagation, link budget, outdoor propagation models including the Okumura model, small-scale fading covering slow and fast fading, Doppler frequency shift, time delay spread, and propagation path loss. The course also covers key multiple-access techniques, including Frequency Division Multiple Access (FDMA), Time Division Multiple Access (TDMA), Code Division Multiple Access (CDMA), and Orthogonal Frequency-Division Multiple Access (OFDMA). The final part of the course covers existing and future wireless systems and standards, including the evolution of generation standards and applications from 1G to 5G; Global System for Mobile (GSM), covering services, features, the radio subsystem, channel types, system architecture of generation standards, and 3GPP. Students will also be exposed to cellular system design and link budget through assignments. This course will also expose students to current wireless communication implementations by telecommunication operators, covering cell planning and wireless services.

BERG 4793
MICROWAVE ENGINEERING

LEARNING OUTCOMES

1. Analyze the microwave transmission line problems and S-parameters of RF/microwave front-end passive and active devices.
2. Design the passive and active RF/microwave components to fulfil the desired specifications.
3. Communicate effectively through effective report writing or oral presentation.

SYNOPSIS

This course will introduce students to the broad area of RF & microwave engineering. This course covers topics including an introduction to RF and microwave engineering, waveguides and transmission lines, planar transmission lines, impedance matching and tuning, microwave network analysis, microwave filters, microwave amplifiers, and power dividers

and couplers. It covers the basic concepts and skills typically expected of a well-qualified entry-level engineer in the RF & microwave field.

BERG 4813
DATA COMMUNICATION AND NETWORKING

LEARNING OUTCOMES

1. Analyze internetworking, open system interconnection, network routing, and topology. Network protocols, private and public data networks, and LAN, MAN, and WAN systems.
2. Design network routing and topology, and network protocols for data communication and networking.
3. Communicate effectively through effective report writing or oral presentation.

SYNOPSIS

This course covers internetworking, including an introduction to protocols, architecture, and the OSI model; packet-based data communication networks; Open Systems Interconnection; and application-oriented protocols, session layers, presentation layers, and application layers. Network routing and topology topics include routing, transport, TCP, UDP, and topology design. Network protocols covered include TCP/IP, IPv4, IP multicasting, Ethernet, Token Ring, intranet, and IPv6. The course also introduces private and public data networks and their characteristics. The course discusses LAN, MAN, and WAN systems in terms of their principles, architecture, and applications. These topics will be examined and applied to current situations based on existing technologies, manuals, guidelines, and issues.

BERG 4823
DIGITAL COMMUNICATION SYSTEMS

LEARNING OUTCOMES

1. Analyze various baseband and passband digital signaling techniques in a bandlimited AWGN channel.
2. Design a digital communication system by taking into consideration the noise performance and channel bandwidth requirement.
3. Communicate effectively through effective report writing or oral presentation.

SYNOPSIS

The outcome of this course is to deliver knowledge and understanding of current and future digital communication systems. The course begins with an introduction to digital communication systems. The course also covers various types of pulse modulation techniques. The course then covers the basics of digital implementation, including the sampling theorem, sample-and-hold, time-division multiplexing, Pulse Code Modulation (PCM), quantisation noise, companding, line coding, intersymbol interference, the Nyquist theorem, differential PCM, delta modulation, overload noise, adaptive delta modulation, and time-division multiplexing. Next, the course will cover the principles of passband signalling and digital modulation techniques. Then, the course evaluates digital communication performance by studying the statistical properties of noise, especially Gaussian noise. It then covers detecting binary signals in Gaussian noise and using the error function to determine the probability of error. Various types of channel coding will be investigated. The course will cover various types of synchronisation, such as carrier phase estimation (Maximum-Likelihood, Phase-Locked Loop) and symbol timing estimation (Maximum-Likelihood and Non-Decision-Directed Estimation). Finally, the course covers spread spectrum systems. This course will also expose students to current wired and wireless digital communication implementations by telecommunication operators, such as digital data transmission.

BERG 4833
ANTENNA AND WAVE PROPAGATION

LEARNING OUTCOMES

1. Analyze the principles of antennas, types of antennas, the matching concept, and types of wave propagation.
2. Design and evaluate the matching network and antenna structure to satisfy the desired requirements.
3. Communicate effectively through effective report writing or oral presentation.

SYNOPSIS

This course introduces the basic concepts of antenna and propagation fundamentals and shows the application in practical examples. The course covers basic antenna parameters and antenna analysis using Maxwell's equations, the design of matching and feeding networks, array antennas, microwave antennas, and broadband antennas. Design principles for designing various types of antennas will be taught throughout the course. The basic concept of antenna measurements will also be discussed. Finally, students will be exposed to the techniques for estimating the propagation performance of a communication channel in the final topics of this course.

BERG 4843
OPTOELECTRONICS

LEARNING OUTCOMES

1. Analyze optoelectronics component specifications and characteristics.
2. Design optoelectronics components for communication applications.
3. Communicate effectively through effective report writing or oral presentation.

SYNOPSIS

This course provides thorough knowledge, understanding, and application of basic laws and phenomena in optoelectronics. This course reviews the properties of light and discusses light propagation in optical fiber, including Acceptance Angle, Refractive Index, Numerical Aperture, Skew Rays, Total Internal Reflection, Phase and Group Velocity, Snell's Law, TE and TM Modes, Single- and Multimode Waveguides, Step-Index Fiber, and Graded-Index Fiber. In addition, the course will examine optical fiber transmission characteristics, including signal attenuation, absorption, scattering losses, radiative losses, signal distortion, modal dispersion, and intramodal dispersion. The course will also introduce optical sources and detectors. In addition, the course will characterize and analyze fiber optic components and applications. Students will complete optoelectronics-based project assignments. This course will also equip students with knowledge of design criteria for various types of optoelectronic devices, helping them meet the demands of the growing semiconductor optoelectronics industry.

BERG 4853
RADIO NAVIGATION SYSTEM

LEARNING OUTCOMES

1. Analyze the structures, characteristics, limitations, and usage of various navigation systems.
2. Develop an error model in the systems presented by means of reducing the effects of errors when systems are used in practice.
3. Communicate effectively through effective report

writing or oral presentation.

SYNOPSIS

This course will discuss navigation fundamentals, including the geometry of Earth, the geoid (mean sea level), the ellipsoid, the World Ellipsoid (WGS 84), the derivation of generalized spherical coordinates, dead reckoning, and best-estimate position. Air navigation: navigation organizational framework, units and conversions, north, lines of position, position fix, and air navigation system requirements. Relative navigation systems: NDB/ADF, VOR, DVOR, TACAN, DME. Absolute navigation systems: LORAN-C, INS, multi-DME. GPS: principle, satellite position determination, signal format, autocorrelation and spectral density, PN code generation, GPS codes, receivers, and GPS errors.

Course Code – BERR

BERR 1113 ENGINEERING MATHEMATICS

LEARNING OUTCOMES

1. Use the techniques of calculus, multiple integrals, vector-valued functions, and vector calculus to solve mathematical problems.
2. Solve engineering problems by using the knowledge of multivariable functions, multiple integrals, vector-valued functions, and vector calculus.

SYNOPSIS

This course discusses advanced calculus for engineering students, covering the following topics. Single Variable Functions: limits and continuous functions, techniques of differentiation and integration. Multivariable Functions: limits and continuous functions, partial derivatives, and the chain rule. Multiple Integrals: double integrals over rectangular and non-rectangular regions, polar coordinates, triple integrals, and triple integrals in cylindrical coordinates. Vector-Valued Functions: motion in space, unit tangent vector, unit normal vector, binormal vector, curvature, and torsion. Vector Calculus: vector fields, line integrals, Green's Theorem, curl and divergence, parametric surfaces and their areas, surface integrals, Stokes' Theorem, and the Divergence Theorem. The mathematical techniques discussed in this course will be applied in other engineering-related courses.

BERR 1133 FUNDAMENTAL ELECTRICAL AND ELECTRONICS

LEARNING OUTCOMES

1. Describe the basic electrical and electronics knowledge to solve series and parallel connections in DC and AC circuits.
2. Analyze the principal knowledge of semiconductor properties and devices for diodes.

SYNOPSIS

This course aims to provide knowledge, understanding, and application of fundamental electrical and electronic concepts. The course begins with an introduction to electrical systems. Then, students will study Direct Current (DC) circuits and Alternating Current (AC) characteristics. In addition, the course introduces semiconductors to provide a strong understanding of modern and advanced electronic devices.

BERR 1143 LOGIC CIRCUIT

LEARNING OUTCOMES

1. Describe the number system, basic concepts, and

terminology of digital circuits that form complex electronic systems.
2. Analyze the basic circuits based on combinational and sequential components.

SYNOPSIS

This course aims to provide knowledge, understanding, and application of digital electronics. The course begins with the introductory concepts of digital technology, number systems, and codes. Then, it explores logic gates and Boolean algebra. It also introduces combinational logic circuits and their functions. Students will also learn about latches and flip-flops. This course also exposes students to current applications in the digital electronics industry.

BERR 1213
DIFFERENTIAL EQUATIONS

LEARNING OUTCOMES

1. Use the knowledge of first- and second-order linear differential equations, Laplace transform, Fourier series, Fourier transform, and partial differential equations to deal with mathematical problems.
2. Solve engineering or applied problems that involve first- and second-order linear differential equations, Laplace transform, Fourier series, Fourier transform, and partial differential equations

SYNOPSIS

This course discusses differential equations for engineering students. It will cover the following topics: first- and second-order linear differential equations, Laplace transform, Fourier series, Fourier transform, and partial differential equations. The mathematical techniques discussed in this course will be used in other engineering-related courses.

BERR 1233
DATA STRUCTURE AND ALGORITHM

LEARNING OUTCOMES

1. Explain and analyse the concept of data structures, algorithm analysis, and efficiency using various data structure algorithms.
2. Design and organize tasks using data structure algorithms for the given problems.
3. Apply appropriate techniques and modern engineering tools to construct data structure applications based on specific requirements.

SYNOPSIS

This course introduces students to the fundamentals of data structures and algorithm analysis. Topics covered include an introduction to data structures and algorithms, algorithm analysis covering Big-O notation, efficient coding approaches, C++ fundamentals, introduction to Object-Oriented Programming (OOP), abstract data types, and data structures and implementations covering arrays, linked lists, stacks, queues, and trees, as well as algorithms covering sorting and searching. In addition to theory, students must apply data structures and algorithms through a small application based on specific requirements.

BERR 1242
COMPUTER ENGINEERING PRACTICE 1

LEARNING OUTCOMES

1. Apply fundamental engineering knowledge for basic electronic equipment usage.
2. Demonstrate appropriate engineering techniques using

modern tools for electronics circuit design and development process.

SYNOPSIS

This course covers four modules: Occupational Safety and Health Administration (OSHA), Instrumentation and Measurement, Introduction to Arduino (hardware board and Arduino IDE), and Introduction to EasyEDA Software. The OSHA module ensures students understand laboratory safety and health regulations. The Instrumentation and Measurement module familiarises students with basic electronics equipment. The Introduction to Arduino module familiarises students with Arduino hardware I/O and Arduino IDE. The Introduction to EasyEDA Software module enables students to understand electronics circuit design and development processes. The course assessment consists of two lab tests and one mini project. Overall, this course will help students familiarise themselves with electronics equipment, Arduino hardware and IDE software, and project development.

BERR 2113 LINEAR ALGEBRA AND DISCRETE MATHEMATICS

LEARNING OUTCOMES

1. Describe the fundamental concepts of linear algebra and discrete mathematics topics.
2. Solve mathematical problems that involve matrices, vector spaces, logic, graphs, and trees.
3. Apply the knowledge of linear algebra and discrete mathematics in engineering problems.

SYNOPSIS

This course introduces linear algebra and discrete mathematics, covering topics such as matrices and systems of linear equations, eigenvalues and eigenvectors, and vector spaces. Students will also cover propositional and predicate logic and graphs. The course applies mathematical knowledge using MATLAB to solve engineering problems.

BERR 2133 COMPUTER NETWORK AND SYSTEM

LEARNING OUTCOMES

1. Explain the fundamental concepts in computer networks and systems.
2. Analyze the mechanisms defined by the respective TCP/IP layers (Ethernet, WLAN, IPv4, TCP, UDP, connection establishment, encryption).

SYNOPSIS

This course introduces the fundamentals of computer networks and systems, covering network concepts including data communications, protocols, standards, network topologies, and performance measures. The Data Link Layer topics cover Ethernet, framing, error detection and correction, and medium access control. The Network Layer topics include packet switching, logical addressing, delivery, forwarding, routing, ARP, and ICMP. The Transport Layer covers connection-oriented TCP, connectionless UDP, and SCTP. The course concludes with the Application Layer, covering application layer protocols including DNS, client-server, peer-to-peer, the web, electronic mail, multimedia, DHCP, Telnet, and FTP.

BERR 2143 ANALOG ELECTRONICS AND DEVICES

LEARNING OUTCOMES

1. Analyze single-stage and multistage amplifiers at mid-band, low, and high frequencies.
2. Design and measure the response of single-stage audio amplifiers using BJT, FETs, and Op-Amp circuits.

3. Communicate effectively through effective report writing or oral presentation.

SYNOPSIS

This course aims to develop knowledge, understanding, and application of analogue electronic circuits. This course introduces the concept of the Bipolar Junction Transistor (BJT): construction and operation of the BJT, BJT characteristics and measurement technique, limits of operation, βdc & αdc, DC biasing - DC load lines, Field Effect Transistor (FET): construction & operation of FET, FET characteristics & diagram, Shockley's equation, DC biasing – DC load line. The course also covers frequency response, Bode plots, circuit stability, and operational amplifiers. This course will expose students to industry applications related to semiconductor devices, such as transistor operation, design, and analysis of DC biasing configurations.

BERR 2161
COMPUTER ENGINEERING LAB 1

LEARNING OUTCOMES

1. Investigate experimental results using appropriate experimental methods and provide critical analysis and discussion.
2. Measure experimental performance using fundamental computer/electronic equipment or tools.
3. Present experimental findings in the form of standard engineering reports.
4. Demonstrate information management skills by providing relevant theory principles for the experiment and addressing the problem with potential solutions that engage in independent and lifelong learning.

SYNOPSIS

This laboratory course covers selected topics from three core subjects. From BERR 2143 Analog Electronics and Devices: common-emitter BJT amplifier in AC analysis, common-source JFET amplifier in AC analysis, and operational amplifier. From BERR 2133 Computer Network and Systems: basic connectivity implementation, building a switch-router network using IPv4 and IPv6, and configuring routers for Syslog, NTP, and SSH operations. From BERN 2423 Microprocessor Technology: getting started with Keil MDK, arithmetic, logical, and branch instructions, and memory access and GPIO.

BERR 2233
COMPUTER ORGANIZATION AND ARCHITECTURE

LEARNING OUTCOMES

1. Explain fundamentals of computer design, memory, cache, multithreading, and superscalar processors.
2. Categorize and analyze instruction set operations, pipeline, and architecture on a simple processor core.

SYNOPSIS

This course primarily aims to give students a general understanding of how computer systems work, both internally (ALU, control unit, registers, etc.) and externally (I/O interfaces, networking, etc.). This understanding will enable graduates to make informed decisions when confronted with computer-related problems in the workplace. The knowledge and skills gained in this course will also enable graduates to further their studies in computer architecture, organization, and design.

BERR 2243
DATABASE AND CLOUD SYSTEM

LEARNING OUTCOMES

1. Explain the major components and their query language of a modern database system.
2. Design a cloud-based solution including various internet protocols, the interaction, manipulation, and optimization of a database system.
3. Utilize a suitable platform to develop and deploy a cloud-based database and application.

SYNOPSIS

This course introduces modern database systems, including the relational model, physical database design, and cloud storage management systems. It also emphasises key database query language techniques, such as query and transaction management, and optimisation. Recent cloud management system topics include disk group management and database security. Optimisation in cloud computing involves maximising throughput and ensuring consistency across servers and clusters via database management tools. The course will expose students to identifying appropriate database and internet protocols and evaluating specifications based on task requirements.

BERR 2253
VLSI DESIGN

LEARNING OUTCOMES

1. Formulate and analyze CMOS digital electronics circuits, including logic components and interconnects between them.
2. Design the CMOS circuits that realize specified digital functions.
3. Communicate effectively through report writing or oral presentation.

SYNOPSIS

This course will cover basic theories and techniques of digital VLSI design in CMOS technology. Course topics for VLSI design include an introduction to IC; MOS Transistor theory; circuit characterization and analysis; CMOS circuits and logic design; CMOS logic and layout; CMOS design rules; static and dynamic logic structures; circuit simulation and testing; and VLSI Architecture.

BERR 2261
COMPUTER ENGINEERING LAB 2

LEARNING OUTCOMES

1. Investigate experimental results using appropriate experimental methods and provide critical analysis and discussion.
2. Measure experimental performance using fundamental computer/electronic equipment or tools.
3. Present experimental findings in the form of standard engineering reports.
4. Demonstrate information management skills by providing relevant theory principles for the experiment and addressing the problem with potential solutions that engage in independent and lifelong learning.

SYNOPSIS

This course covers topics in Computer Organization and Architecture, Database and Cloud, and VLSI Design with the following items: simulation and assembly language, upgrading a simple hypothetical computer, stack pointer, database development and management with SQL, Windows Azure SQL database query & deployment of applications to the Cloud, CMOS inverter schematic, CMOS layout design and design of CMOS combinational logic.

BERR 2272
COMPUTER ENGINEERING PRACTICE 2

LEARNING OUTCOMES

1. Apply fundamental engineering knowledge for basic Python programming usage.
2. Demonstrate appropriate engineering techniques using modern tools for the algorithm development process.
3. Demonstrate effective teamwork skills in completing the project.

SYNOPSIS

This is an introductory course to Python programming for beginners. It starts with basic programming concepts and is carefully designed to define terms when they are first used and develop each new concept in a logical progression. Larger pieces, like recursion and object-oriented programming, are divided into a sequence of smaller steps and introduced over several chapters—the course ends with how to wrap useful programming libraries (C/C++) with Python bindings.

BERR 3113
ELECTROMAGNETIC

LEARNING OUTCOMES

1. Understand the fundamental principles of electromagnetism.
2. Apply the fundamental theories to design issues of high-speed printed circuit boards (PCBs).

SYNOPSIS

This course introduces the fundamentals of Electromagnetic (EM) topics, namely Electrostatic Fields covering Gauss's Law and Poisson's Equation; magnetostatic fields covering Ampere's Law and the Biot-Savart Law; time-varying EM fields covering Faraday's Law and Maxwell's Equations; and EM wave propagation. These fundamental theories are applied to understand EM applications in high-speed printed circuit board (PCB) design, addressing issues such as clock design, grounding, component placement for compact multi-wireless systems on board, trace routing, chassis construction, and cabling (wireline).

BERR 3123
INFORMATION SECURITY

LEARNING OUTCOMES

1. Explain and elaborate on information security as risk management and the implications of hostile users and misuse cases.
2. Analyze issues that are related to strategy and tactical design in information security.

SYNOPSIS

Throughout this course, students will learn to exploit well-known computer software vulnerabilities that involve security breaches and denial of service (DoS). The course will then study the use of hash, secret key, and public key throughout the evolution and implementation of cryptography algorithms (symmetric and asymmetric). The paper will also discuss securing physical access and networks using VLANs, virtual private networks (VPNs), IPsec, and Transport Layer Security (TLS). The course will also analyze trusted computing approaches using secure storage, trusted hardware, and biometric systems, as well as trade-offs in security implementation (cost, information value, and circumvention difficulty). The course will discuss in detail cybersecurity frameworks commonly applied to industrial control systems

(non-regulated, i.e., ISO/IEC:27001, ISA/IEC:62443).

BERR 3133
EMBEDDED SYSTEM DESIGN

LEARNING OUTCOMES

1. Analyze the embedded system peripheral and interface requirements to propose a reliable solution.
2. Design, simulate, and construct an embedded system solution and analyze the overall design performance.
3. Communicate effectively through effective report writing or oral presentation.

SYNOPSIS

This course focuses on the ARM microprocessor architecture and its dedicated development board. Topics include an overview of embedded systems; characteristics & application areas; an introduction to computer systems & architectures; an introduction to assembler-level software and high-level language programming for embedded systems; an introduction to embedded system hardware; and application-level embedded system design concepts in industrial electronics.

BERR 3143
ARTIFICIAL INTELLIGENCE

LEARNING OUTCOMES

1. Analyze the implementation of AI using machine learning techniques and deep learning in problem-solving.
2. Design an intelligent system to achieve predetermined specifications by applying the elements of design and principles.
3. Communicate effectively through effective report writing or oral presentation.

SYNOPSIS

This course will discuss topics related to artificial intelligence (AI) and machine learning; students will be exposed to an overview, history, why AI is needed, and the application areas involved. The course will explain three underlying areas of the AI domain: fuzzy logic and population-based optimization techniques. Next, the course covers learning methods, including linear regression (one- and multivariable) and logistic regression with regularization. Under the same machine learning methods. Students will cover neural networks, including forward and backpropagation algorithms. The course continues with error analysis and the trade-off between precision and recall. Eventually, students will learn about deep learning, specifically Deep Neural Networks and Convolutional Neural Networks (CNN). Popular architectures will also be covered.

BERR 3151
COMPUTER ENGINEERING LAB 3

LEARNING OUTCOMES

1. Investigate experimental results using appropriate experimental methods and provide critical analysis and discussion.
2. Apply appropriate techniques, manipulate and analyze experimental data to solve complex engineering problems.
3. Demonstrate the values of engineering practice and ethical behaviour.
4. Demonstrate information management skills by providing relevant theoretical principles for the experiment and addressing the problem with potential

solutions, engaging in independent and lifelong learning.

SYNOPSIS

This laboratory course covers selected topics from three core subjects. From BERR 3123 Information Security: transposition and Vigenère cipher, and cryptography and remote access tools. From BERR 3143 Artificial Intelligence: Fuzzy Logic and Neural Networks. From BERR 3133 Embedded System Design: ARM Mbed and STM32F411RE Nucleo Board, MEMS sensors, Wi-Fi module, and IoT dashboard

BERR 3213
OPERATING SYSTEM

LEARNING OUTCOME

1. Analyze and evaluate the need for a real-time operating system compared to other systems.
2. Design an embedded real-time operating system.
3. Communicate effectively through effective report writing or oral presentation.

SYNOPSIS

Develop a thorough understanding of the principles behind the structure and operation of real-time operating systems. The functionality of operating systems will be covered at the beginning of the COURSE. The course will then cover fundamentals of concurrent systems (e.g., Tasks/Processes/Threads, Time-slicing and Process states, Context switching, Interprocess communication (interrupts vs. pooling), scheduling, the use of semaphores for process synchronization and the creation of critical sections, and potential deadlock). The course will cover the required timing analysis of how an embedded real-time operating system (RTOS) meets hard real-time constraints.

BERR 3241
COMPUTER ENGINEERING LAB 4

LEARNING OUTCOMES

1. Investigate experimental results using appropriate experimental methods and provide critical analysis and discussion.
2. Measure experimental performance using fundamental electronic equipment.
3. Present experimental findings in the form of standard engineering reports.
4. Demonstrate information management skills by providing relevant theoretical principles for the experiments and addressing the problem with potential solutions, engaging in independent and lifelong learning.

SYNOPSIS

This course covers BERN 4473 Digital Integrated Circuit Design, BERN 3763 Digital Signal Processing, and BERR 3213 Operating System. Students will be exposed to the detailed topics in these courses and carry out the lab experiments in the following areas: combinational circuit design with Xilinx Vivado, arithmetic circuit and logic circuit, signal representation using Fourier series and transform, embedded system toolchain & FreeRTOS task creation, FreeRTOS interrupt & signaling, and Mbed OS interrupt handling & mutex. Nine laboratory sessions will be conducted through the semester as listed: operating system 1, combinational circuit design with Xilinx Vivado, discrete Fourier Transform (DFT), operating system 2, RTL simulation and implementation, Z-transform, operating

system 3, timing synthesis and analysis, digital filter design.

BERR 4223
HIGH PERFORMANCE COMPUTING

LEARNING OUTCOME

1. Apply the design of parallel and distributed systems to solve complex engineering problems by integrating principles from the architecture of high-performance computing.
2. Analyze findings to solve complex engineering problems in high-performance computing through the optimization of computing tasks and investigation of traditional and cloud-based HPC platforms.

SYNOPSIS

This course provides an essential overview of high-performance computing, highlighting its crucial role in addressing complex computational challenges. By covering the historical development, fundamental principles, and architectures of HPC, as well as hands-on programming with OpenMP and MPI, students gain a solid understanding of the parallel computing techniques needed to maximize performance and scalability. The curriculum explores the detailed aspects of shared and distributed systems. It also covers the effective use of cloud resources for HPC and the importance of efficient resource management and performance evaluation. As the course progresses, it examines the transformative potential of Exascale and quantum computing in driving technological advances. Students will gain the technical skills needed to optimize HPC capabilities and understand its significant impact on the future of computing.

BERR 4513
COMPUTER INTERFACES

LEARNING OUTCOMES

1. Analyze the design of modern microprocessor system architecture to work with PCI Express, USB peripherals, RS232, UART, SPI, I2C, CAN, and ARM Advanced Microcontroller Bus Architecture (AMBA).
2. Design the bus commands, protocols, and various programming aspects required to deploy the interfaces for the embedded system project.
3. Communicate effectively through effective report writing or oral presentation.

SYNOPSIS

Students will be exposed to various high-end and widely used embedded system bus protocols such as RS232, UART, I2C, SPI, CAN BUS, USB, PCI, PCIe, and ARM AMBA. Project-oriented laboratories that focus on the implementation details of embedded system bus protocols will give students hands-on experience with industry applications of those buses.

BERR 4523
EMBEDDED SIGNAL AND POWER INTEGRITY SYSTEM

LEARNING OUTCOMES

1. Analyze the signal and power integrity issues in High-Speed Printed Circuit Board (HSPCB).
2. Design an embedded HSPCB with optimal signal and power integrity handling performance.
3. Communicate effectively through effective report writing or oral presentation.

SYNOPSIS

This subject covers the theory, fundamental knowledge, calculations, and analysis of signal integrity (SI) and power integrity (PI) in High-Speed Printed Circuit Board (HSPCB) design for industry applications. Students will be introduced to the definitions of SI and PI, Electromagnetic Compatibility (EMC), and their interrelationships in handling HSPCB. Transmission Line (TL) topics include TL characteristics and trace interconnects on PCBs; calculating and determining critical length; intrinsic impedance; TL parameters and types in PCBs; TL termination; PCB issues; reflection coefficient; and termination techniques. Differential signalling topics include the principles and advantages of differential signalling, benefits of differential signals, noise-immunity enhancement, and spin-count reduction. The course concludes with Power Integrity in DC analysis and Power Integrity in AC analysis.

BERR 4533
EMBEDDED SOFTWARE DESIGN

LEARNING OUTCOMES

1. Describe the philosophy, architecture, and secure application of embedded software design.
2. Design and develop the embedded software by using a suitable toolset based on the analysis of the user requirements.
3. Communicate effectively through effective report writing or oral presentation.

SYNOPSIS

Embedded systems applications in different environments (e.g., television, medical equipment, smartphones) differentiate embedded software design and development from desktop software, especially in user requirements, operating systems, real-time systems, concurrent systems, and software development tools. This course aims not only to introduce embedded software design concepts but also to provide hands-on experience in embedded system software design and development, from modeling user requirements with modeling languages to designing embedded applications and developing the final embedded system.

BERR 4543
EMBEDDED WIRELINE AND WIRELESS SYSTEM

LEARNING OUTCOMES

1. Analyze suitable techniques for wireline/wireless system problems.
2. Design embedded wireline/wireless communication system protocols.
3. Communicate effectively through effective report writing or oral presentation

SYNOPSIS

This course introduces the fundamentals of embedded wireline and wireless communication systems. Topics covered include communication network standards, Local Area Network (LAN) and Ethernet, copper-based and fibre-based communication media, cellular and satellite communication, wireless LAN and LoRa, and short-range wireless Personal Area Network (PAN). The course concludes with an integration topic addressing the challenges and trade-offs in selecting wired and wireless technologies for embedded systems.

BERR 4613
ANALOG IC DESIGN

LEARNING OUTCOMES

1. Analyze high-frequency concepts of single-stage

amplifiers, voltage and current reference circuits, and noise characteristics associated with differential amplifiers.
2. Design analog integrated circuits with emphasis on the feedback circuits at the transistor level.
3. Communicate effectively through effective report writing or oral presentation.

SYNOPSIS

This course is a general introduction to analogue integrated circuit design. It will cover the following areas: use of IDS equations in circuit calculations; use of large signal models to calculate and design transistor biasing; use of small signal models to calculate gain-bandwidth, transfer functions; the operation & use of analogue circuit building blocks; current sources/sinks, simple amplifiers, differential stages, output stages, basic op-amp design, gain and phase margin, stability, compensation, more advanced op-amp concepts, effects on performance caused by temperature changes, etc.; parasitic components and their importance for circuit modelling; sources of noise and distortion in MOS analogue circuits.

BERR 4623
LOW POWER SYSTEM ON CHIP

LEARNING OUTCOMES

1. Analyze the classification required in determining the circuit performance in terms of clock, flip-flop, power distribution, and deep submicron interconnect.
2. Design the system-on-chip architecture.
3. Communicate effectively through effective report writing or oral presentation.

SYNOPSIS

This course covers system-on-chip design, including design methodology, IP design, and platform-based design. This course will also cover key elements of chip design, such as sequential circuits, clock trees, low-power design, power distribution, and deep-submicron interconnects.

BERR 4633
MIXED SIGNAL SYSTEM DESIGN

LEARNING OUTCOMES

1. Analyze the mixed-signal building blocks and be able to relate the results to the fundamentals and the circuit topology.
2. Design and simulate different architectures of basic mixed-signal circuits.
3. Communicate effectively through effective report writing or oral presentation.

SYNOPSIS

This course provides a general introduction to mixed-signal system design. It will cover the following areas: analog & mixed-signal CMOS fundamentals, current mirror, bias structures, CMOS reference circuits, operational amplifiers to perform various signal processing functions, making them essential components for interfacing, conditioning, and processing analog signals in mixed-signal systems; data converter fundamentals including analog-to-digital (ADC) and digital-to-analog (DAC) converter parameters and characteristics; Nyquist rate of ADC converters; Nyquist rate of DAC converters; oversampling converters; outlook of more mixed-signal building blocks.

BERR 4643
SYSTEM ON CHIP INTEGRATION AND PACKAGING

LEARNING OUTCOMES

1. Analyze the architecture and design issues of current

System-on-Chip (SoC) embedded systems.
2. Design packaging solutions based on fundamental concepts and related challenges.
3. Communicate effectively through effective report writing or oral presentation.

SYNOPSIS

This course focuses on embedded systems and System-on-Chip (SoC) design, providing an overview of the architecture and design issues of present-day SoCs. It also explores hardware-software co-design. Certain chapters detail the design methodology and validation process for logic cores, while another chapter emphasizes the importance of lead-free materials in IC assembly and packaging. The course covers the IC assembly process flow and highlights interconnection technology and packaging options for SoCs. Students will develop the skills necessary to succeed in this field through the comprehensive coverage of SoC design and packaging technology.

BERR 4713
BIG DATA ANALYTICS

LEARNING OUTCOMES

1. Analyze big data analytics techniques in solving various applications using statistical and predictive analytics tools.
2. Design big data applications by exploring the steps including data collection, model evaluation, security, and performance.
3. Communicate effectively through effective report writing or oral presentation.

SYNOPSIS

This course introduces basic techniques and principles of Big Data analytics processes to improve access, security, and performance, including statistical and Machine Learning methods to transform hypotheses into predictions. Topics covered include basic Big Data principles and data collection, analysing and building predictive models, network infrastructure, performance, and security. At the end of the course, students are also exposed to statistical analysis and predictive language tools such as R and RapidMiner, with applications in business intelligence, decision-making, classification, and prediction.

BERR 4723
DIGITAL IMAGE PROCESSING

LEARNING OUTCOMES

1. Analyze the digital-image-related problems and apply digital image processing concepts in the spatial or frequency domain to solve them.
2. Design image processing algorithms to meet specific requirements using different implementation approaches.
3. Communicate effectively through well-structured report writing or presentation

SYNOPSIS

This course introduces the fundamentals of digital image processing, covering key topics such as image representation, sampling, and quantisation. Students will explore image enhancement techniques, including intensity transformations, spatial and frequency domain filtering, and image restoration for noise removal and motion blur correction. Key topics also include geometric transformation, colour image processing, and lossless and lossy image compression algorithms. The course also covers wavelet transforms and other image transformation methods. Students will be introduced to image

processing tools such as MATLAB or OpenCV and learn to apply theoretical approaches to implementation to solve real-world problems based on specific requirements.

BERR 4733
MACHINE LEARNING

LEARNING OUTCOMES

1. Analyze the machine learning techniques to solve various classification and regression problems.
2. Design a solution using machine learning techniques to solve various classification and regression problems.
3. Communicate effectively through effective report writing or oral presentation.

SYNOPSIS

This course provides an in-depth exploration of Machine Learning techniques, focusing on supervised, unsupervised, and reinforcement learning. Students will learn key supervised learning techniques, including classification methods such as Support Vector Machines, Discriminant Analysis, Naïve Bayes, Nearest Neighbour, and Neural Networks, as well as regression techniques such as Linear Regression, Ensemble Methods, and Decision Trees. For unsupervised learning, the course will cover clustering techniques including Hidden Markov Models, K-Means, and Gaussian Mixture Models. Additionally, the Course will introduce Reinforcement Learning. Practical applications of these techniques will be explored through assignments involving smart systems, text understanding, computer vision, brain-computer interfaces, audio processing, and other real-world areas, providing hands-on experience in building intelligent systems.

BERR 4743
COMPUTER VISION AND PATTERN RECOGNITION

LEARNING OUTCOMES

1. Apply adequate techniques and analyze the requirements of a computer vision and/or pattern recognition system to meet the desired performance.
2. Design a classification system and/or computer vision system which can solve engineering problems with specific performance requirements.
3. Communicate effectively through effective report writing or oral presentation

SYNOPSIS

Computer vision mainly involves processing and analyzing images for applications such as object detection, segmentation, and vision-based learning. Pattern recognition, on the other hand, is more of a subset of machine learning. This course introduces current technologies and applications through practical, real-world problems and solution techniques (algorithms) in computer vision and pattern recognition (CVPR). Topics include an overview of computer vision and pattern recognition; image representation; enhancement and restoration; feature extraction; segmentation; classification and recognition; and stereo and 3D reconstruction. CVPR has various applications in many areas, including robotics and control systems.

Other Course Code

BMIG 1213
ENGINEERING MATERIALS

LEARNING OUTCOMES

1. Explain the basic concepts of engineering materials in terms of atomic bonding arrangements.
2. Determine the properties of engineering materials based on their structure.

3. Analyze the properties of engineering materials for selection of processing methods.

SYNOPSIS

This course introduces basic concepts of engineering materials, covering an introduction to engineering materials, interatomic bonding, crystalline structure and imperfections, and diffusion in solids. It also introduces binary phase diagrams. It also explains different types of engineering materials (i.e., metals, ceramics, polymers, composites, and functional materials), their mechanical properties, basic processing, and applications.

BMIG 1313
ENGINEERING MATHEMATICS 1

LEARNING OUTCOMES

1. Describe the fundamental concepts of matrices, eigenvalues and eigenvectors, complex numbers, interpolation, differentiation, integration and vector-valued functions.
2. Solve the mathematical problems that involve matrices, eigenvalues and eigenvectors, complex numbers, interpolation, differentiation, integration and vector-valued functions by using an appropriate technique.
3. Apply the knowledge of engineering mathematics to solve engineering problems.

SYNOPSIS

This course blends analytical and numerical approaches, mainly focusing on matrices, nonlinear equations, eigenvalues and eigenvectors, complex numbers, interpolation, differentiation, integration, and vector-valued functions.

BMKC 1013
DIFFERENTIAL EQUATIONS

LEARNING OUTCOMES

1. Describe the basic concept of first- and second-order differential equations, Laplace transform, and Fourier series.
2. Select an appropriate technique to solve problems involving differential equations.
3. Apply the concept of differential equations in solving engineering problems.

SYNOPSIS

This course provides an introduction to differential equations and their applications. Students are introduced to first-order differential equations and solve them using analytical methods for separable and linear equations, as well as numerical methods such as Euler's method and the second-order Runge-Kutta method. Upon completion, students are introduced to second-order linear differential equations with constant coefficients and learn methods of solving them and their applications. The course is extended to the following chapters, which include Laplace transforms, Fourier series, and partial differential equations, and solving using numerical methods, including finite difference methods (parabolic and hyperbolic).

BMKU 1313
ENGINEERING GRAPHICS AND CAD

LEARNING OUTCOMES

1. Explain the engineering graphics fundamentals.
2. Construct technical drawings using manual sketching and computer-aided design.
3. Communicate by using engineering drawings.

Bachelor of Engineering with Honours

SYNOPSIS

The course will help students understand the importance of engineering graphics as a communication tool among engineers. Students will learn the fundamentals of engineering graphics, including manual sketching, geometric dimensioning and tolerancing, graphic projections, sectioning, and engineering drawings. Students will develop visualization skills by constructing technical drawings using manual sketches and computer-aided design (CAD) software. The course includes both lecture and practical sessions in which students will be guided in presenting and interpreting engineering drawings.


Bachelor of
Engineering Technology
Programmes

BACHELOR OF ENGINEERING TECHNOLOGY PROGRAMMES

The Bachelor of Engineering Technology with Honours program at FTKEK offers a comprehensive pathway for students to develop strong technical skills and practical knowledge in various fields, including Electronics, Industrial Electronics, Telecommunications, and Computer Systems. This multidisciplinary program is designed to meet the evolving needs of the engineering technology industry, preparing students to excel in roles that require a deep understanding of both theoretical and applied engineering concepts.



In the first year, students from all specializations share a common foundation that includes essential courses such as Technical Mathematics, Basic Electronics, Engineering Workshops, and Programming Fundamentals. These courses equip students with the fundamental knowledge required for more specialized study as they progress through the program. The curriculum also integrates courses that focus on professional development, such as English for Academic Purposes and Philosophy and Current Issues, ensuring students are well-rounded and prepared for global challenges.

From the second year onward, students begin to specialize in their chosen fields:

1. Computer Engineering Technology (Computer Systems) (BERC) includes courses such as Data Structures, Microprocessor and Microcontroller Technology, and Operating Systems, preparing students for careers in system development and IT-related industries.

2. Electronics Engineering Technology (Industrial Electronics) (BERE) focuses on areas such as Embedded Systems, Process Instrumentation, and Industrial Automation, giving students the skills to work in automation and manufacturing environments.
3. Electronics Engineering Technology (Telecommunications) (BERT) offers courses on Telecommunication Systems, Digital Communication, and RF and Microwave Techniques, equipping students for roles in network and communications infrastructure.
4. Electronics Engineering Technology (BERZ) provides students with expertise in Circuit Analysis, Signal Processing, and Instrumentation, fostering their capabilities in various electronics industries

Throughout the program, students gain practical experience through Integrated Design Projects and Capstone Projects, which allow them to apply theoretical knowledge to real-world challenges. In their final year, students complete an industrial training placement, giving them invaluable exposure to professional work environments and allowing them to establish industry connections.

A total of 140-141 credits is required for graduation, with the structure emphasizing not only technical proficiency but also professional ethics, entrepreneurship, and lifelong learning. Graduates of this program are well- equipped to take on roles as technologists, system engineers, and industry specialists in fields such as electronics, telecommunications, and computer systems. The program's holistic approach ensures that students are adaptable, innovative, and capable of contributing to both local and global technological advancements

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

Programme Educational Objectives (PEO) - BERC

PEO1	To produce engineering technologists who are creative and innovative to practice in computer engineering technology fields.
PEO2	To produce engineering technologists who are able to engage with continuous professional development and constantly adapt to evolving technologies
PEO3	To produce engineering technologists who are able to demonstrate professional ethics, interpersonal, entrepreneurial skills and leadership to meet the needs of the society

Programme Outcomes (PO) – BERC

PO1	Apply knowledge of mathematics, natural science, computing and engineering fundamentals and computer engineering technology to defined and applied engineering procedures, processes, systems or methodologies.
PO2	Identify, formulate, research literature and analyse broadly-defined engineering problems reaching substantiated conclusions using analytical tools appropriate to their discipline or area of specialisation with considerations for sustainable development in **computer engineering technology.**
PO3	Design solutions for broadly-defined engineering technology problems and contribute to the design of systems, components or processes to meet identified needs with appropriate consideration for public health and safety, whole-life cost, net zero carbon as well as resource, cultural, societal, and environmental considerations as required.
PO4	Conduct investigations of broadly-defined engineering problems; locate, search and select relevant data from codes, data bases and literature, design and conduct experiments to provide valid conclusions.
PO5	Select and apply, and recognize limitations of appropriate techniques, resources, and modern engineering and IT tools, including prediction and modelling, to broadly-defined engineering problems.
PO6	Analyze and evaluate sustainable development impacts to: society, the economy, sustainability, health and safety, legal frameworks, and the environment, in solving broadly-defined engineering problems.
PO7	Understand and commit to professional ethics and norms of engineering technology practice and adhere to relevant national and international laws. Demonstrate an understanding of the need for diversity and inclusion.
PO8	Function effectively as an individual, and as a member or leader in diverse and inclusive teams and in multi-disciplinary, face-to-face, remote and distributed settings.
PO9	Communicate effectively and inclusively on broadly defined engineering activities with the engineering community and with society at large, by being able to comprehend and write effective reports and design documentation, make effective presentations, taking into account cultural, language, and learning differences.
PO10	Apply knowledge and understanding of engineering management principles and economic decision-making to one's own work, as a member and leader in a team and to manage projects in multidisciplinary environments.
PO11	Recognize the need for, and have the ability for i) independent and life-long learning and ii) critical thinking in the face of new specialist technologies.
PO12	Demonstrate ability to engage effectively in self-improvement initiatives for career, professional or educational goals and engage in entrepreneurial activities.

Curriculum Structure - BERC

	CODE	COURSE	CATEGORY	CREDIT	PRE-REQUISITE
SEMESTER 1	BELG 1013	Technical Mathematics	P	3	
	BERE 1013	Technical Physics	P	3	
	BERT 1303	Electrical Circuit Fundamental	K	3	
	BERC 1323	Computer Engineering Workshop I	K	3	
	BERC 1313	Programming Fundamental	K	3	
	BKKX XXX1	Co-curriculum I	W	1	
	BLHW 1772 BLHW 1762*	Philosophy and Current Challenges Philosophy and Current Issues	W	2	
TOTAL CREDITS THIS SEMESTER				**18**	
SEMESTER 2	BMIG 1023	Calculus for Technology	P	3	
	BERC 1303	Basic Electronics	K	3	
	BERC 1333	Computer Engineering Workshop II	K	3	
	BERC 2373	Computer Organization & Architecture	K	3	
	BERC 1353**	Advanced Programming	K	3	BERC 1313
	BLLW 1142	English for Academic Purposes	W	2	
	BLHW 2722 BLLW 1282*	Malaysian Nation State Aspiration Malay 2	W	2	
TOTAL CREDITS THIS SEMESTER				**19**	

* For international students

** Pre-requisite course

	CODE	COURSE	CATEGORY	CREDIT	PRE-REQUISITE
SEMESTER 3	BMKG 2033	Applied Calculus For Technology	P	3	
	BERC 2363	Data Structure & Algorithm	K	3	
	BERT 2333	Communication Principle	K	3	
	BERT 2423	Signal & Systems	K	3	
	BERE 2373	Electrical Technology	K	3	
	BLLW 12X2	Third Language	W	2	
	BKKX XXX1	Co-curriculum II	W	1	
TOTAL CREDITS THIS SEMESTER				**18**	
SEMESTER 4	BERG 2043	Statistical Methods	P	3	
	BERC 1343	Database Management System	K	3	
	BERC 2383	Computer Network & System	K	3	
	BERC 2393	Internet Technology & Multimedia	K	3	
	BERC 2403	Digital Electronic	K	3	
	BLLW 2152	Academic Writing	W	2	
	BLHW 2792	Integrity and Anti-Corruption Course	W	2	
TOTAL CREDITS THIS SEMESTER				**19**	

* For international students

** Pre-requisite course

	CODE	COURSE	CATEGORY	CREDIT	PRE-REQUISITE
SEMESTER 5	BERC 3453	Operating Systems	K	3	
	BERU3803	Integrated Design Project	K	3	
	BERT 3373**	Digital Signal Processing	K	3	BERT 2423
	BERC 3433**	Computer & Network Security	K	3	BERC2383
	BERC 3444	Microprocessor & Microcontroller Technology	K	4	
	BLLW 3162	English for Professional Interaction	W	2	
	BLHC 4032 BLHW 2762*	Critical and Creative Thinking Malaysian Citra	W	2	
TOTAL CREDITS THIS SEMESTER				**20**	
SEMESTER 6	BERU 3764	Bachelor Degree Project I	K	4	
	BERC 3463	Software Engineering	K	3	
	BERC 3423	Computer System Engineering	K	3	
	BTMW 4012	Technology Entrepreneurship	W	2	
	BERX X8X3	Elective I	E	3	
	BERX X8X3	Elective II	E	3	
TOTAL CREDITS THIS SEMESTER				**18**	

* For international students

** Pre-requisite course

	CODE	COURSE	CATEGORY	CREDIT	PRE-REQUISITE
SEMESTER 7	BERU 4053	Engineering Ethics & OSHE	P	3	
	BERU 4774**	Bachelor Degree Project II	K	4	BERU 3764
	BERE 4443	Quality Management	K	3	
	BERC 4473	Embedded System	K	3	
	BERX X8X3	Elective III	E	3	
TOTAL CREDITS THIS SEMESTER				**16**	
SEMESTER 8	BERU48812	Industrial Training	K	12	
TOTAL CREDITS THIS SEMESTER				**12**	
TOTAL CREDITS				**140**	

Credit Hour Structure

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

Category	Code	Total Credit
Programme	P	18
Course	K	81
University Compulsory	W	20
Industrial Training	K	12
Elective	E	9
GRAND TOTAL		140

List of Elective Courses

For Elective I, II & III, students may choose any THREE (3) courses from the following list.

CODE	COURSE
BERC 4803	VLSI Design & Fabrication
BERC 4813	Computer Interfacing
BERC 4823	Image & Video Processing
BERC 4833	Real Time Systems
BERC 4843	Integrated Circuit Testing
BERE 3823	Artificial Intelligence

Bachelor Of Electronics Engineering Technology (Industrial Electronics) With Honours (BERE)

Programme Educational Objectives (PEO) - BERE

PEO1	To produce engineering technologists who are creative and innovative to practice in electronic engineering technology fields.
PEO2	To produce engineering technologists who are able to engage with continuous professional development and constantly adapt to evolving technologies
PEO3	To produce engineering technologists who are able to demonstrate professional ethics, interpersonal, entrepreneurial skills and leadership to meet the needs of the society

Programme Outcomes (PO) – BERE

PO1	Apply knowledge of mathematics, natural science, computing and engineering fundamentals and **electronic engineering technology (industrial electronics)** to defined and applied engineering procedures, processes, systems or methodologies**.**
PO2	Identify, formulate, research literature and analyse broadly-defined engineering problems reaching substantiated conclusions using analytical tools appropriate to their discipline or area of specialisation with considerations for sustainable development in **electronic engineering technology (industrial electronics)**
PO3	Design solutions for broadly-defined engineering technology problems and contribute to the design of systems, components or processes to meet identified needs with appropriate consideration for public health and safety, whole-life cost, net zero carbon as well as resource, cultural, societal, and environmental considerations as required.
PO4	Conduct investigations of broadly-defined engineering problems; locate, search and select relevant data from codes, data bases and literature, design and conduct experiments to provide valid conclusions.
PO5	Select and apply, and recognize limitations of appropriate techniques, resources, and modern engineering and IT tools, including prediction and modelling, to broadly-defined engineering problems.
PO6	Analyze and evaluate sustainable development impacts to: society, the economy, sustainability, health and safety, legal frameworks, and the environment, in solving broadly-defined engineering problems.
PO7	Understand and commit to professional ethics and norms of engineering technology practice and adhere to relevant national and international laws. Demonstrate an understanding of the need for diversity and inclusion.
PO8	Function effectively as an individual, and as a member or leader in diverse and inclusive teams and in multi-disciplinary, face-to-face, remote and distributed settings.
PO9	Communicate effectively and inclusively on broadly defined engineering activities with the engineering community and with society at large, by being able to comprehend and write effective reports and design documentation, make effective presentations, taking into account cultural, language, and learning differences.
PO10	Apply knowledge and understanding of engineering management principles and economic decision-making to one's own work, as a member and leader in a team and to manage projects in multidisciplinary environments.
PO11	Recognize the need for, and have the ability for i) independent and life-long learning and ii) critical thinking in the face of new specialist technologies.
PO12	Demonstrate ability to engage effectively in self-improvement initiatives for career, professional or educational goals and engage in entrepreneurial activities.

Curriculum Structure - BERE

	CODE	COURSE	CATEGORY	CREDIT	PRE-REQUISITE
SEMESTER 1	BELG 1013	Technical Mathematics	P	3	
	BERE 1013	Technical Physics	P	3	
	BERE 1303	Engineering Workshop I	K	3	
	BERT 1303	Electrical Circuit Fundamental	K	3	
	BERC 1313	Programming Fundamental	K	3	
	BLHW 1772 BLHW 1762*	Philosophy and Current Challenges Philosophy and Current Issues	W	2	
	BKKX XXX1	Co-curriculum I	W	1	
TOTAL CREDITS THIS SEMESTER				**18**	
SEMESTER 2	BMIG 1023	Calculus for Technology	P	3	
	BERE 1313	Engineering Workshop II	K	3	
	BERE 1323	Electronic Fundamentals	K	3	
	BERT 1333**	Advanced Electrical Circuit	K	3	BERT 1303
	BERC 1353**	Advanced Programming	K	3	BERC 1313
	BLLW 1142	English for Academic Purposes	W	2	
	BKKX XXX1	Co-curriculum II	W	1	
TOTAL CREDITS THIS SEMESTER				**18**	

* For international students

** Pre-requisite course

	CODE	COURSE	CATEGORY	CREDIT	PRE-REQUISITE
SEMESTER 3	BMKG 2033	Applied Calculus for Technology	P	3	
	BERE 2333**	Analogue Electronic Devices	K	3	BERE 1323
	BERE 2343	Engineering Drawing	K	3	
	BERE 2373	Electrical Technology	K	3	
	BERC 2403	Digital Electronic	K	3	
	BLLW 2152	Academic Writing	W	2	
	BLHC 4032	Critical and Creative Thinking	W	2	
	BLHW 2762*	Malaysian Citra			
TOTAL CREDITS THIS SEMESTER				**19**	
SEMESTER 4	BERG 2043	Statistical Methods	P	3	
	BERT 2333	Communication Principle	K	3	
	BERE 2353	Electronic Systems	K	3	
	BERE 2363	Control Principles	K	3	
	BERC 3483	Fundamental of Microprocessor & Microcontroller	K	3	
	BLHW 2792	Integrity and Anti-Corruption Course	W	2	
	BLLW 1XX2	Third Language	W	2	
TOTAL CREDITS THIS SEMESTER				**19**	

* For international students

** Pre-requisite course

	CODE	COURSE	CATEGORY	CREDIT	PRE-REQUISITE
SEMESTER 5	BERE 3384	Industrial Control	K	4	
	BERE 3394	Process Instrumentation	K	4	
	BERE 3404	Data Acquisition & Sensors	K	4	
	BERE 3424	Embedded Systems Application	K	4	
	BLLW 3162	English for Professional Interaction	W	2	
	BLHW 2722	Malaysian Nation State Aspiration	W	2	
	BLLW 1282*	Malay 2			
TOTAL CREDITS THIS SEMESTER				**20**	
SEMESTER 6	BERE 3414	Industrial Pneumatics	K	4	
	BERU 3803	Integrated Design Project	K	3	
	BERU 3764	Bachelor Degree Project I	K	4	
	BTMW 4012	Technology Entrepreneurship	W	2	
	BERX XXX4	Elective I	E	4	
TOTAL CREDITS THIS SEMESTER				**17**	

* For international students

** Pre-requisite course

	CODE	COURSE	CATEGORY	CREDIT	PRE-REQUISITE
SEMESTER 7	BERU 4053	Engineering Ethics & OSHE	P	3	
	BERE 4434	Industrial Automation	K	4	
	BERE 4443	Quality Management	K	3	
	BERU 4774**	Bachelor Degree Project II	K	4	BERU 3764
	BERX XXX4	Elective II	E	4	
TOTAL CREDITS THIS SEMESTER				**18**	
SEMESTER 8	BERU48812	Industrial Training	K	12	
TOTAL CREDITS THIS SEMESTER				**12**	
TOTAL CREDITS				**141**	

** Pre-requisite course

Credit Hour Structure

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

Category	Code	Total Credit
Programme	P	18
Course	K	81
University Compulsory	W	20
Industrial Training	K	12
Elective	E	6
GRAND TOTAL		141

List of Elective Courses

For Elective I students may choose any ONE (1) COURSE from the following list.

CODE	COURSE
BERE 3804	Power Electronic
BERC 4814	Computer Interfacing
BERE 3814	Semiconductor Industrial Process
BERE 3824	Artificial Intelligence Application

For Elective II, students may choose any ONE (1) COURSE from the following list.

CODE	COURSE
BERE 4814	Industrial Robotic
BERE 4824	Electrical Drives & Control
BERC 4844	IC Testing

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

Programme Educational Objectives (PEO) - BERT

PEO1	To produce engineering technologists who are creative and innovative to practice in electronic engineering technology fields.
PEO2	To produce engineering technologists who are able to engage with continuous professional development and constantly adapt to evolving technologies.
PEO3	To produce engineering technologists who are able to **demonstrate professional ethics, interpersonal, entrepreneurial skills and leadership** to meet the needs of the society.

Programme Outcomes (PO) – BERT

PO1	Apply knowledge of mathematics, natural science, computing and engineering fundamentals and **electronic engineering technology (telecommunications)** to defined and applied engineering procedures, processes, systems or methodologies.
PO2	Identify, formulate, research literature and analyse broadly-defined engineering problems reaching substantiated conclusions using analytical tools appropriate to their discipline or area of specialisation with considerations for sustainable development in **electronics engineering technology (telecommunications).**
PO3	Design solutions for broadly-defined engineering technology problems and contribute to the design of systems, components or processes to meet identified needs with appropriate consideration for public health and safety, whole-life cost, net zero carbon as well as resource, cultural, societal, and environmental considerations as required.
PO4	Conduct investigations of broadly-defined engineering problems; locate, search and select relevant data from codes, data bases and literature, design and conduct experiments to provide valid conclusions.
PO5	Select and apply, and recognize limitations of appropriate techniques, resources, and modern engineering and IT tools, including prediction and modelling, to broadly-defined engineering problems.
PO6	Analyze and evaluate sustainable development impacts to: society, the economy, sustainability, health and safety, legal frameworks, and the environment, in solving broadly-defined engineering problems.
PO7	Understand and commit to professional ethics and norms of engineering technology practice and adhere to relevant national and international laws. Demonstrate an understanding of the need for diversity and inclusion.
PO8	Function effectively as an individual, and as a member or leader in diverse and inclusive teams and in multi-disciplinary, face-to-face, remote and distributed settings.
PO9	Communicate effectively and inclusively on broadly defined engineering activities with the engineering community and with society at large, by being able to comprehend and write effective reports and design documentation, make effective presentations, taking into account cultural, language, and learning differences.
PO10	Apply knowledge and understanding of engineering management principles and economic decision-making to one's own work, as a member and leader in a team and to manage projects in multidisciplinary environments.
PO11	Recognize the need for, and have the ability for i) independent and life-long learning and ii) critical thinking in the face of new specialist technologies.
PO12	Demonstrate ability to engage effectively in self-improvement initiatives for career, professional or educational goals and engage in entrepreneurial activities

Curriculum Structure - BERT

	CODE	COURSE	CATEGORY	CREDIT	PRE-REQUISITE
SEMESTER 1	BELG 1013	Technical Mathematics	P	3	
	BERE 1013	Technical Physics	P	3	
	BERT 1303	Electrical Circuit Fundamental	K	3	
	BERE 1303	Engineering Workshop I	K	3	
	BLHW 2722	Malaysian Nation State Aspiration	W	2	
	BLLW 1282*	Malay 2			
	BLHW 1772 BLHW 1762*	Philosophy and Current Challenges Philosophy and Current Issues	W	2	
	BKKX XXX1	Co-curriculum I	W	1	
TOTAL CREDITS THIS SEMESTER				**17**	
SEMESTER 2	BMIG 1023	Calculus for Technology	P	3	
	BERC 1313	Programming Fundamental	K	3	
	BERE 1313	Engineering Workshop II	K	3	
	BERT 1333**	Advanced Electrical Circuit	K	3	BERT 1303
	BERE 1323	Electronic Fundamentals	K	3	
	BERE 2373	Electrical Technology	K	3	
	BLLW 1142	English for Academic Purposes	W	2	
TOTAL CREDITS THIS SEMESTER				**20**	

* For international students

** Pre-requisite course

	CODE	COURSE	CATEGORY	CREDIT	PRE-REQUISITE
SEMESTER 3	BMKG 2033	Applied Calculus for Technology	P	3	
	BERE 2333**	Analogue Electronic Devices	K	3	BERE 1323
	BERC 2403	Digital Electronic	K	3	
	BERE 2363	Control Principles	K	3	
	BERT 2333	Communication Principle	K	3	
	BLLW 2152	Academic Writing	W	2	
TOTAL CREDITS THIS SEMESTER				**17**	
SEMESTER 4	BERG 2043	Statistical Methods	P	3	
	BERE 2353	Electronic Systems	K	3	
	BERT 2324	Data Communication & Networking	K	4	
	BERT 3403**	Digital Communication	K	3	BERT 2333
	BERT 2423	Signal & Systems	K	3	
	BLLW 1XX2	Third Language	W	2	
	BKKX XXX1	Co-curriculum II	W	1	
TOTAL CREDITS THIS SEMESTER				**19**	

** Pre-requisite course

	CODE	COURSE	CATEGORY	CREDIT	PRE-REQUISITE
SEMESTER 5	BERT 3353	Telecommunication System	K	3	
	BERC 3483	Fundamental of Microprocessor & Microcontroller	K	3	
	BERT 3363	Telecommunication Electronic	K	3	
	BERT 3373	Digital Signal Processing	K	3	
	BERT 3383	Electromagnetic	K	3	
	BTMW 4012	Technology Entrepreneurship	W	2	
	BLLW 3162	English for Professional Interaction	W	2	
TOTAL CREDITS THIS SEMESTER				**19**	
SEMESTER 6	BERU 3803	Integrated Design Project	K	3	
	BERE 4443	Quality Management	K	3	
	BERT 3393	Telecommunication Switching System	K	3	
	BERU 3764	Bachelor Degree Project I	K	4	
	BERT 3414	RF Technique & Microwave	K	4	
	BLHW 2792	Integrity and Anti-Corruption Course	W	2	
TOTAL CREDITS THIS SEMESTER				**19**	

	CODE	COURSE	CATEGORY	CREDIT	PRE-REQUISITE
SEMESTER 7	BERU 4053	Engineering Ethics & OSHE	P	3	
	BERU 4774**	Bachelor Degree Project II	K	4	BERU 3764
	BERT 48X3	Elective I	E	3	
	BERT 48X3	Elective II	E	3	
	BERT 48X3	Elective III	E	3	
	BLHC 4032	Critical and Creative Thinking	W	2	
	BLHW 2762*	Malaysian Citra			
TOTAL CREDITS THIS SEMESTER				**18**	
SEMESTER 8	BERU 48812	Industrial Training	K	12	
TOTAL CREDITS THIS SEMESTER				**12**	
TOTAL CREDITS				**141**	

* For international students

** Pre-requisite course

Credit Hour Structure

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

Category	Code	Total Credit
Programme	P	18
Course	K	82
University Compulsory	W	20
Industrial Training	K	12
Elective	E	9
GRAND TOTAL		141

List of Elective Courses

For Elective I, II and III students may choose any THREE (3) courses from the following list.

CODE	COURSE
BERT 4803	Satellite Communication
BERT 4813	Mobile Communication
BERT 4823	Optical Communications & Optoelectronic
BERT 4833	Antenna Engineering
BERE 3823	Artificial Intelligence

Bachelor Of Electronics Engineering Technology With Honours (BERZ)

Programme Educational Objectives (PEO) - BERZ

PEO1	To produce engineering technologists who are creative and innovative to practice in electronic engineering technology fields.
PEO2	To produce engineering technologists who are able to engage with continuous professional development and constantly adapt to evolving technologies
PEO3	To produce engineering technologists who are able to demonstrate professional ethics, interpersonal, entrepreneurial skills and leadership to meet the needs of the society

Programme Outcomes (PO) – BERZ

PO1	Apply knowledge of mathematics, natural science, computing and engineering fundamentals and electronic engineering technology to defined and applied engineering procedures, processes, systems or methodologies.
PO2	Identify, formulate, research literature and analyse broadly-defined engineering problems reaching substantiated conclusions using analytical tools appropriate to their discipline or area of specialisation with considerations for sustainable development in electronics engineering technology.
PO3	Design solutions for broadly-defined engineering technology problems and contribute to the design of systems, components or processes to meet identified needs with appropriate consideration for public health and safety, whole-life cost, net zero carbon as well as resource, cultural, societal, and environmental considerations as required.
PO4	Conduct investigations of broadly-defined engineering problems; locate, search and select relevant data from codes, data bases and literature, design and conduct experiments to provide valid conclusions.
PO5	Select and apply, and recognize limitations of appropriate techniques, resources, and modern engineering and IT tools, including prediction and modelling, to broadly-defined engineering problems.
PO6	Analyze and evaluate sustainable development impacts to: society, the economy, sustainability, health and safety, legal frameworks, and the environment, in solving broadly-defined engineering problems.
PO7	Understand and commit to professional ethics and norms of engineering technology practice and adhere to relevant national and international laws. Demonstrate an understanding of the need for diversity and inclusion.
PO8	Function effectively as an individual, and as a member or leader in diverse and inclusive teams and in multi-disciplinary, face-to-face, remote and distributed settings.
PO9	Communicate effectively and inclusively on broadly defined engineering activities with the engineering community and with society at large, by being able to comprehend and write effective reports and design documentation, make effective presentations, taking into account cultural, language, and learning differences.
PO10	Apply knowledge and understanding of engineering management principles and economic decision-making to one's own work, as a member and leader in a team and to manage projects in multidisciplinary environments.
PO11	Recognize the need for, and have the ability for independent and life-long learning and critical thinking in the face of new specialist technologies.
PO12	Demonstrate ability to engage effectively in self-improvement initiatives for career, professional or educational goals and engage in entrepreneurial activities

Curriculum Structure – BERZ

	CODE	COURSE	CATEGORY	CREDIT	PRE-REQUISITE
SEMESTER 1	BELG 1013	Technical Mathematics	P	3	
	BERE 1013	Technical Physics	P	3	
	BERT 1303	Electrical Circuit Fundamental	K	3	
	BERE 1303	Engineering Workshop I	K	3	
	BERC 1313	Programming Fundamental	K	3	
	BLHW 1772 BLHW 1762*	Philosophy and Current Challenges Philosophy and Current Issues	W	2	
TOTAL CREDITS THIS SEMESTER				**17**	
SEMESTER 2	BMIG 1023	Calculus for Technology	P	3	
	BERZ 1203	AC Circuit Analysis	K	3	
	BERE 1313	Engineering Workshop II	K	3	
	BERE 2343	Engineering Drawing	K	3	
	BERE 1323	Electronic Fundamentals	K	3	
	BKKX XXX1	Co-curriculum I	W	1	
	BLLW 1142	English for Academic Purposes	W	2	
TOTAL CREDITS THIS SEMESTER				**18**	

	CODE	COURSE	CATEGORY	CREDIT	PRE-REQUISITE
SEMESTER 3	BMKG 2033	Applied Calculus for Technology	P	3	
	BERE 2333**	Analogue Electronic Devices	K	3	BERE 1323
	BERC 2403	Digital Electronic	K	3	
	BERT 2423	Signal & Systems	K	3	
	BERZ 1213	Instrumentation & Measurement	K	3	
	BLLW 2152	Academic Writing	W	2	
	BKKX XXX1	Co-curriculum II	W	1	
TOTAL CREDITS THIS SEMESTER				**18**	
SEMESTER 4	BERG 2043	Statistical Methods	P	3	
	BERT 2333	Communication Principle	K	3	
	BERE 2353	Electronic Systems	K	3	
	BERE 2364	Control Principles	K	4	
	BERC 2383	Computer Network & System	K	3	
	BLLW 1XX2	Third Language	W	2	
	BLHW 2792	Integrity and Anti-Corruption Course	W	2	
TOTAL CREDITS THIS SEMESTER				**20**	

** Pre-requisite course

	CODE	COURSE	CATEGORY	CREDIT	PRE-REQUISITE
SEMESTER 5	BERT 3383	Electromagnetic	K	3	
	BERU 3803	Integrated Design Project	K	3	
	BERZ 2404	Microcontroller Technology	K	4	
	BERT 3373**	Digital Signal Processing	K	3	BERT 2423
	BLHW 2722 BLLW 1282*	Malaysian Nation State Aspiration Malay 2	W	2	
	BERX XXX3	Elective I	E	3	
TOTAL CREDITS THIS SEMESTER				**18**	
SEMESTER 6	BERE 3404	Data Acquisition & Sensors	K	4	
	BERU 3764	Bachelor Degree Project I	K	4	
	BLLW 3162	English for Professional Interaction	W	2	
	BTMW 4012	Technology Entrepreneurship	W	2	
	*BERX XXX3	Elective II	E	3	
	*BERX XXX3	Elective III	E	3	
TOTAL CREDITS THIS SEMESTER				**18**	

* For international students

** Pre-requisite course

	CODE	COURSE	CATEGORY	CREDIT	PRE-REQUISITE
SEMESTER 7	BERU 4053	Engineering Ethics & OSHE	P	3	
	BERE 3424	Embedded Systems Application	K	4	
	BERE 4443	Quality Management	K	3	
	BERU 4774**	Bachelor Degree Project II	K	4	BERU 3764
	BLHC 4032 BLHW 2762*	Critical and Creative Thinking Malaysian Citra	W	2	
	BLHW 2752	Elective IV	E	3	
TOTAL CREDITS THIS SEMESTER				**19**	
SEMESTER 8	BERU 48812	Industrial Training *Latihan Industri*	K	12	
TOTAL CREDITS THIS SEMESTER				**12**	
TOTAL CREDITS				**140**	

* For international students

** Pre-requisite course

Credit Hour Structure

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

Category	Code	Total Credit
Programme	P	18
Course	K	78
University Compulsory	W	20
Industrial Training	K	12
Elective	E	12
GRAND TOTAL		140

List of Elective Courses

For Elective I, students may choose any ONE (1) course from the following list.

CODE	COURSE
BERT 3353	Telecommunication System
BERT 3413	RF Technique & Microwave
BERZ 4803	Anatomy & Physiology
BERZ 4813	Medical Imaging and Image Processing
BERZ 4923	Microelectronic Fabrication
BERZ 4903	Semiconductor Process

For each Elective II and III, students may choose any ONE (1) courses from the following list.

CODE	COURSE
BERT 4813	Mobile Communication
BERT 4833	Antenna Engineering
BERZ 4823	Medical Devices and Instrumentation
BERZ 4853	Biomedical Ethics Acts, Standards & Safety
BERZ 4873	VLSI Design
BERZ 4883	Digital IC Design

For Elective IV, students may choose any ONE (1) course from the following list.

CODE	COURSE
BERT 4803	Satellite Communication
BERZ 4863	Radio Navigation System
BERZ 4843	Biomedical Engineering Maintenance
BERZ 4833	Biomechanics
BERZ 4913	VLSI Architecture
BERZ 4893	Digital IC Testing
BERE 3823	Artificial Intelligence

Courses Details For Bachelor of Engineering Technology With Honours

University Compulsory Courses (W)

Code	Courses
BKKX xxx1	Co-Curriculum 1 and 2
BLLW 12x2	Language Electives
BLLW 1142	English for Academic Purposes
BLHW 1772 BLHW 1762*	Philosophy and Current Challenges Philosophy and Current Issues
BLHW 2792	Integrity and Anti-Corruption Course
BLLW 2152	Academic Writing
BLHW 2762*	Malaysian Citra
BLHW 2722	Malaysian Nation State Aspiration
BLLW 3162	English for Professional Interaction
BTMW 4012	Technology Entrepreneurship

* University compulsory courses to be taken by international students

PLEASE REFER TO SCHOOL OF INTERNATIONAL STUDIES AND GLOBAL LANGUAGES (SPAB) AND FACULTY OF TECHNOLOGY MANAGEMENT AND TECHNOPRENEURSHIP ACADEMIC HANDBOOK FOR THE SYNOPSIS AND THE DETAILS SYLLABUS FOR THE ABOVE COURSES

BERU 3764
BACHELOR DEGREE PROJECT I

LEARNING OUTCOMES

1. Evaluate appropriate methodologies for successful execution of the project.
2. Imitate appropriate existing concepts in engineering technology fields.
3. Explain the project execution and findings in oral and written forms effectively.
4. Relate previous works and relevant theories using various resources.
5. Propose and manage project using appropriate ideas and resources.

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.

BERU 3803
INTEGRATED DESIGN PROJECT

LEARNING OUTCOMES

1. Design solution by synthesizing electronic/computer 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, throughout service learning, component or processes in term of society, environmental and sustainability factors.
4. Demonstrate effectively teamwork skill through service learning.
5. Demonstrate effective oral/written communication skills in problem solving through service learning.
6. Apply project management and financial knowledge effectively through service learning.
7. Demonstrate the ability to compare a product through market survey, as part of product development or entrepreneurial projects, reflecting an understanding of commercialization processes and strategies for product advancement

SYNOPSIS

Integrated Design Project is a project-based course that enables students to apply and integrate engineering technology knowledge to develop solutions for broadly defined engineering problems. These problems require the synthesis of multidisciplinary engineering principles, systematic problem-solving approaches, and the practical application of appropriate technologies. The course covers the complete engineering design process, including service learning, project planning, project management, feasibility analysis, concept generation and selection, design costing, sizing, implementation, testing, and performance evaluation. Working in teams, students are required to design and develop an engineering technology solution while preparing comprehensive technical documentation, including engineering proposals, technical drawings, specifications, bills of quantities, and cost estimates. In addition to core engineering design principles, students are expected to integrate knowledge from relevant engineering disciplines,

such as material selection, structural and system design considerations, project scheduling, sustainability, and professional engineering practices. The course also emphasizes effective teamwork, communication, and project execution in addressing real-world engineering challenges. Upon completion of the course, students will be able to understand the requirements of engineering design procedures and appreciate the importance of integrating and synthesizing knowledge from various engineering disciplines to develop practical, sustainable, and innovative engineering technology solutions. This course supports and is aligned with Sustainable Development Goals (SDGs) – SDG9; Industry, Innovation and Infrastructure, and SDG12; Responsible Consumption and Production.

BERU 4053
ENGINEERING ETHICS AND OSHE

LEARNING OUTCOMES

After completing the course, students will 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 course provides a comprehensive exploration of professional ethics, Occupational Safety and Health Engineering (OSHE), and sustainable development tailored for electronic engineering technology students. Designed to foster responsible engineering practices, the course equips students with foundational moral frameworks, systematic problem-solving techniques, and statutory knowledge required to navigate modern engineering challenges. A central pillar of the curriculum is aligned with United Nations Sustainable Development Goal 7 (SDG 7: Affordable and Clean Energy), emphasizing the crucial role of electronic engineering technologists in advancing clean energy transitions, energy efficiency, and modern power systems.

BERU 4774
BACHELOR DEGREE PROJECT II

LEARNING OUTCOMES

1. (Re)construct solutions of broadly-defined engineering problems using relevant tools and techniques.
2. Complete planned project systematically.
3. Demonstrate project results using appropriate techniques with an understanding of it limitations.
4. Evaluate sustainable development impacts to society, the economy, sustainability, health and safety.
5. Display professional ethics and responsibilities in the execution of the project.
6. Explain the project execution and findings in oral and written form effectively.
7. Display self-reliance in achieving the objectives of the project.
8. Demonstrate the ability to compare a product through market survey, as part of product development or entrepreneurial projects, reflecting an understanding of commercialization processes and strategies for product advancement.

SYNOPSIS

This is the second part of the bachelor degree project. Students are expected to continue the project performed in bachelor degree project (BERU 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.

BERU 48812
INDUSTRIAL TRAINING

LEARNING OUTCOME

1. Show 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.
5. Produce industrial training report.
6. 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.

Course Code – BERC

BERC 1303
BASIC ELECTRONICS

LEARNING OUTCOMES

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. Examine relevant parameter of electronic circuits such as current, voltage and voltage gain.

SYNOPSIS

This course introduces the fundamental principles, components, devices, and applications of basic electronics. It covers basic electrical quantities and circuit principles, passive electronic components, semiconductor diodes, bipolar junction transistors (BJT), field-effect transistors (FET), operational amplifiers, and electronic display technologies. Students will study the operating principles, characteristics, circuit configurations, and practical applications of these electronic devices, including rectifiers, transistor switching and amplification, and operational amplifier circuits. Laboratory, tutorial, and practical activities provide hands-on experience in electronic component identification, circuit construction, measurement, testing, troubleshooting, and analysis. The course develops fundamental knowledge and practical skills required to analyse and apply basic electronic circuits and devices in electronic engineering technology applications. This course supports and is aligned with sustainable development goals (SDGs) – SDG7; affordable and clean energy.

BERC 1313
PROGRAMMING FUNDAMENTAL

LEARNING OUTCOMES

1. Explain the fundamental of programming principles and algorithms of C programming language.
2. Apply C programming language to solve given problems.
3. Develop C program based on given task and requirement.

SYNOPSIS

This course will discuss on fundamental programming concepts and problem-solving techniques using the C programming language. It covers algorithms, pseudocode, flowcharts, basic C syntax, data types, variables, constants, operators, input/output operations, and preprocessor

directives. Students develop programming skills through character and string manipulation, selection and repetition control structures, functions, recursion, and modular programming. The course also introduces one- and multidimensional arrays, sorting, pointers, pointer arithmetic, and parameter passing. Advanced topics include file processing, structures, typedef, and unions. Through lectures, tutorials, laboratory activities, tests, and assignments, students develop the ability to design, implement, test, and solve computational problems using structured c programs. This course supports and is aligned with sustainable development goals (SDGs) – SDG9; Industry, Innovation And Infrastructure. The course is a compulsory to build a basic background in programming.

BERC 1323
COMPUTER ENGINEERING WORKSHOP

LEARNING OUTCOMES

1. Construct experimental investigation of basic electronic components.
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 introduces students to the fundamentals of industrial practices and engineering tools used in electronic engineering technology. It covers electrical and electronic safety, workplace hazard identification and risk assessment, quality control tools, and the DMAIC methodology. Students gain practical experience in operating electronic test and measurement equipment, including multimeters, power supplies, oscilloscopes, and function generators. The course also develops students' competencies in circuit simulation and analysis using Multisim and in solving engineering problems using MATLAB and Simulink. Laboratory activities, technical assessments, and a mini project provide opportunities to apply safety practices, measurement techniques, simulation tools, data analysis, teamwork, and technical communication in electronic engineering applications.

BERC 1333
COMPUTER ENGINEERING WORKSHOP II

LEARNING OUTCOMES

1. Explore 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 provides students with theoretical and practical applications of basic electronics. Students will undergo practical-oriented sessions where they propose a project idea, design and simulate it, and subsequently fabricate a PCB to realize the project through manual component placement and soldering. Students will also learn how to troubleshoot circuit problems if the design does not function properly. Finally, the project outcome will be presented and evaluated by the course instructor.

BERC 1343
DATABASE MANAGEMENT SYSTEM

LEARNING OUTCOMES

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 is an introduction to database and file management systems. It assists students to form an understanding of data modelling, file management, and database system functionality in information systems. Students are introduced to the process of designing, developing and executing database applications. The course focuses on practical skills to create, control and execute statements for database relationships, and on sound database design that removes redundant data so that storage and computing resources are used efficiently. MySQL workbench is used to design and model the databases for this course. This course supports and is aligned with the sustainable development goals (SDGs) - SDG12: responsible consumption and production.

BERC 1353
ADVANCED PROGRAMMING

LEARNING OUTCOMES

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 provides a comprehensive introduction to the object-oriented programming concepts, basics of a Java program, and introduction to objects and classes. Students will transition from foundational Java language basics to the complex and functional Java Methods and Classes. The curriculum begins with Java language basics including Java reserved words, identifiers, data types, arithmetic operators, Type conversion (Casting), String class, packages, arrays, control structures of selection and repetition that enables to creating a Java program. The second half of the course shifts toward creating classes and methods, establishing an understanding of polymorphism in Java that includes inheritance and interfaces, overriding and hiding methods, and methods overloading. The final part includes Java collection framework and exception handling. The curriculum culminates in constructing object-oriented Java application to solve real-world problems. This course supports and is aligned with Sustainable Development Goals (SDGs) – SDG9; Industry, Innovation and Infrastructure.

BERC 2363
DATA STRUCTURE & ALGORITHM

LEARNING OUTCOMES

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 provides a comprehensive introduction to the data structure and algorithm analysis, data traversing and shifting using arrays in single and multidimensional arrays, introduction to stack data structure using push and pop operations, and converting infix expression into postfix and prefix notation, as well as using stack structure to evaluate postfix expressions. The second half of the course introduces linear queue data structure and its operations and using queue to evaluate prefix expressions. The course then introduces linear list operations to create, add, and delete items, as well

as introducing node and linked list, introduction to general tree and binary tree which leads to traversals and operations of binary search tree. The course then shifts toward several sorting and searching algorithms. Sorting algorithms includes insertion sort, quick sort, bubble sort, selection sort and merge sort. The final part introduces searching algorithm including linear and binary search. The curriculum culminates in constructing application system using appropriate data structures and algorithms to maximize the performance of the system.

BERC 2373
COMPUTER ORGANIZATION & ARCHITECTURE

LEARNING OUTCOMES

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 provides a comprehensive introduction to the fundamental principles, analysis, and design of modern computer systems. Students will transition from foundational concepts of computer architecture and organization to the complexities of high-performance hardware, memory design, and instruction-level parallelism. The curriculum begins with a historical overview and foundational concepts of system interconnection structures and bus timing. It moves systematically through the hierarchy and design elements of memory systems, emphasizing logical/physical caches, semiconductor memories, and raid organizations. Advanced input/output techniques, including programmed I/O, interrupt-driven systems, and direct memory access (DMA), are evaluated. Computer arithmetic representations of integers and real numbers under the IEEE 754 standard are thoroughly explored. The second half of the course focuses on operating system memory management techniques (swapping, partitioning, paging, and segmentation) and details of internal CPU structure and registers. The curriculum culminates in a critical comparison of CISC and RISC philosophies, register window optimization, instruction-level parallelism, superscalar design, and Flynn's taxonomy of multi-processor structures.

BERC 2383
COMPUTER NETWORK & SYSTEM

LEARNING OUTCOMES

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 various network devices to develop a sustainable network design that emphasizes resource efficiency.

SYNOPSIS

This course provides a comprehensive foundation in the principles, architectures, and protocols of modern computer networks based on the OSI and TCP/IP reference models. It examines end-to-end data communication processes, starting from physical media and signal encoding to data link controls such as CSMA/CD and CSMA/CA. Core network layer topics include ipv4 and ipv6 addressing, VLSM subnetting, address resolution protocol (ARP), essential IP services such as dynamic host configuration protocol (DHCP) and network address translation (NAT/PAT), and fundamental routing principles. Additionally, the curriculum covers transport protocols (TCP and UDP), process port addressing, key application layer services (HTTP, DNS, FTP, SMTP), wireless lan standards (IEEE 802.11), and emerging internet

of things (IoT) security challenges. Practical laboratory sessions reinforce theoretical concepts through network design, IP addressing implementation, and device configuration utilizing physical networking hardware, including real routers and switches.

BERC 2393
INTERNET TECHNOLOGY & MULTIMEDIA

LEARNING OUTCOMES

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

This course provides introductory knowledge of technologies related to internet applications and services. Students are introduced to internet protocols and their functionalities, as well as the hardware required to develop and implement these applications and services. This course is highly relevant due to the explosive growth in internet and multimedia usage in recent years. Users expect robust internet design and security, along with high-quality content delivered over the web, including graphics, animation, sound, and video clips.

BERC 2403
DIGITAL ELECTRONIC

LEARNING OUTCOMES

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

SYNOPSIS

This course provides a comprehensive introduction to the fundamental principles, analysis, and design of digital systems. Students will transition from foundational mathematical concepts to the complex and functional digital hardware/simulation. The curriculum begins with number system, binary arithmetic, logic gates and Boolean Algebra, moving systematically through the introductory to combinational logic circuits using standard gates and Medium Scale Integrated (MSI) components. The second half of the course shifts toward sequential logic circuits, establishing an understanding of latches, flip-flops, counters, and registers. The curriculum culminates in the design of Finite State Machines (FSMs) utilizing Mealy and Moore architectures to solve real-world problems and introduces semiconductor memory structures and programmable logic devices (CPLDs/FPGAs). This course supports and is aligned with Sustainable Development Goals (SDGs) – SDG9; Industry, Innovation and Infrastructure.

BERC 3423
COMPUTER SYSTEM ENGINEERING

LEARNING OUTCOMES

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 computer system technologies.

SYNOPSIS

This course introduces core principles for engineering complex computer systems. Students explore strategies for

managing complexity through abstraction, client-server modularity, virtual memory, thread scheduling, and network protocol layering. Hands-on laboratories reinforce practical skills in memory management, CPU scheduling, DNS configuration, and cryptographic security protocols. Additionally, the curriculum addresses system reliability, atomicity, and computing ethics. Aligning with SDG 12 the course emphasizes resource-efficient software design and hardware resource optimization.

BERC 3433
COMPUTER & NETWORK SECURITY

LEARNING OUTCOMES

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 concerning digital infrastructure resilience and sustainability.

SYNOPSIS

This subject covers the fundamental concepts of computer and network security, including confidentiality, integrity, and availability, as well as common vulnerabilities, attacks, and security threats. Students will learn techniques for secure system design, software protection, cryptography, web security, authentication, and network defence. Practical activities will provide students with skills to identify, analyse, and mitigate security vulnerabilities. The subject also introduces incident response and disaster recovery to support the protection and resilience of computing environments.

BERC 3444
MICROPROCESSOR & MICROCONTROLLER TECHNOLOGY

LEARNING OUTCOMES

1. Demonstrate a working knowledge of microprocessor and microcontroller architecture and peripheral subsystem.
2. Develop a fully functional microcontroller/ microprocessor-based system to solve given problems.
3. Demonstrate understanding on the impact of sustainable solutions in microcontroller technology.

SYNOPSIS

This course provides an in-depth exploration of the architecture, programming, and hardware integration of microprocessors and microcontrollers. Designed for electronic engineering technology students, the curriculum is divided into two comprehensive modules: the PIC16F877A microcontroller and the Motorola 68000 microprocessor. Students will investigate core architectural concepts including RISC vs. CISC and Harvard vs. Von-Neumann architectures. Through theoretical lectures and hands-on laboratory sessions, students will learn to program in assembly language and develop integrated software-hardware solutions. Key topics include memory organization, interrupt control systems, timer operations, analog-to-digital converters (ADC), pulse-width modulation (PWM), and the interfacing of peripheral devices such as lcds, sensors, and actuators. In the latter half of the course, students will design functional memory and I/O systems for the 68000 microprocessors. The course culminates in a practical group project where students must design, implement, and present a complete embedded system solution. This course supports and is aligned with sustainable development goals (SDGs) – SDG9; industry, innovation and infrastructure.

BERC 3453
OPERATING SYSTEMS

LEARNING OUTCOMES

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. Construct experimental investigation of basic operating system problems.

SYNOPSIS

This course introduces the internal operation of modern operating systems. Students examine the fundamentals of operating systems before moving on to process and thread management, concurrency control, memory management, input/output systems, file systems, and protection and security. The structure and functionality of each subsystem are analysed so that students can reason about scheduling, synchronisation, virtual memory, and storage behaviour in real systems. Laboratory work is carried out on Linux, where students investigate operating system behaviour experimentally using system utilities, the command line, and shell scripting. This course supports and is aligned with the sustainable development goals (SDGs) - SDG9: industry, innovation and infrastructure.

BERC 3463
SOFTWARE ENGINEERING

LEARNING OUTCOMES

1. Explain the basic concept, element and uses of software engineering.
2. Evaluate various solutions for a given software engineering problem.
3. Construct UML diagrams in the process of analysis and design.

SYNOPSIS

This course provides a comprehensive introduction to the fundamental principles, processes, and design of software systems. Students will transition from foundational project planning to complex and functional software architecture. The curriculum begins with software process models, requirement elicitation, and specification, moving systematically through the introductory to software design using standard architectural views and patterns. The second half of the course shifts toward software quality, establishing an understanding of verification, validation, software testing, and reliability. The curriculum culminates in software evolution utilizing maintenance and re-engineering principles to solve real-world problems and introduces software management frameworks and emerging technologies (security and service-oriented engineering). This course supports and is aligned with sustainable development goals (SDGs) – SDG12; responsible consumption and production.

BERC 3483
FUNDAMENTAL OF MICROPROCESSOR & MICROCONTROLLER

LEARNING OUTCOMES

1. Demonstrate a working knowledge of microprocessor and microcontroller architecture and peripheral subsystem
2. Develop a fully functional microcontroller/ microprocessor-based system to solve given problems.
3. Demonstrate effective project management skills in solving given problems.

SYNOPSIS

This course covers the fundamentals and applications of microprocessors and microcontrollers, focusing on the 68000-hardware architecture and PIC microcontrollers. Students explore assembly language programming, address

decoding, memory and I/O organization, and hardware-software integration. Key peripheral topics include interrupt control systems, pulse-width modulation (PWM), and interfacing with components like LCDS, shift registers, and DC motors through hands-on laboratory exercises. This course supports SDG7 by training students to optimize micro-driven systems for affordable, clean, and energy-efficient design.

BERC 4473
EMBEDDED SYSTEM

LEARNING OUTCOMES

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

This course provides a comprehensive foundation in the principles, architecture, software development, and hardware interfacing of modern embedded systems. Emphasizing the arm microcontroller architecture, students examine micro-architectural components including registers, flag logic, stack pointers, timers, counters, interrupt handling, and serial communication modules. The syllabus bridges software and hardware through embedded software development process tailored for resource-constrained targets. Students analyze hardware subsystem design covering power management, signal conditioning, analog-to-digital converters (ADC), display modules, sensor interfacing, and standard industrial communication buses (UART, I2C, CAN and others) across various microcontroller platforms. This course supports and is aligned with sustainable development goals (SDGs) – SDG7: affordable and clean energy.

BERC 4803
VLSI DESIGN & FABRICATION

LEARNING OUTCOME

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

This course provides a comprehensive foundation in integrated circuit (IC) design, layout, and manufacturing technologies, focusing on complementary metal-oxide-semiconductor (CMOS) integrated circuits. Students explore the complete microelectronics design pipeline - from semiconductor physics and transistor-level behaviour to full custom physical layout, subsystem implementation, semiconductor fabrication flows, and advanced IC packaging. Emphasis is placed on understanding dc and transient response, noise margins, parasitic capacitance, and dynamic power dissipation. The curriculum integrates modern industry drivers, such as low-power IC design strategies, while addressing sustainability goals (SDG 7: affordable and clean energy) through energy-efficient circuit design. Through hands-on laboratory sessions, students gain practical experience in schematic capture, circuit simulation, and characterization of fundamental logic gates and arithmetic subsystems.

BERC 4813
COMPUTER INTERFACING

LEARNING OUTCOME

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 introduces the abstractions and implementation techniques used to design computer interfacing applications. Topics include microcontroller fundamentals; the features and characteristics of various input/output peripheral devices and their interfaces; the Java programming language and its application to hardware interfacing; sensors and actuators; and the data acquisition, control, and software and hardware tools that are central to computer interfacing. Assigned readings are drawn from current literature, keeping the course aligned with contemporary practice in the field. The subject exposes students to Java programming and to the practical challenges of interfacing computers with peripheral devices, with Android Studio used throughout lectures and laboratory sessions to demonstrate these concepts hands-on. This course supports and is aligned with Sustainable Development Goals (SDGs) – SDG9; Industry, Innovation and Infrastructure.

BERC 4823
IMAGE & VIDEO PROCESSING

LEARNING OUTCOME

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 provides fundamental knowledge of image and video processing. Students are introduced to two-dimensional signals and systems, sampling in two dimensions, two-dimensional discrete transforms, filter design, multiresolution image processing, image estimation and restoration, morphological image processing, edge detection, image compression, and video processing and compression. Students will also learn to perform point operations, basic image filtering, multiresolution processing, image classification, video filtering, and fundamental image and video compression algorithms. This course supports and is aligned with sustainable development goals (SDGs) – SDG12; responsible consumption and production.

BERC 4833
REAL TIME SYSTEMS

LEARNING OUTCOME

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 provides a comprehensive study of the principles, analytical models, and design methodologies for deterministic real-time systems (RTS). Students examine time-critical architectures, contrasting hard and soft real-time constraints, reference models, and periodic task execution. Key topics include static and dynamic scheduling algorithms (clock-driven, rate monotonic, deadline monotonic, EDF, and LST), aperiodic and sporadic task server management, and time demand analysis (TDA). The course further addresses

synchronization and resource sharing under pre-emption—focusing on priority inheritance, priority ceiling, and stack-based protocols to prevent priority inversion and deadlocks. Finally, practical implementation within real-time operating system (RTOS) architectures and real-time communication protocols are explored. This course supports and is aligned with sustainable development goals (SDGs) – SDG9; industry, innovation and infrastructure.

BERC 4843
IC TESTING

LEARNING OUTCOME

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. This course supports and is aligned with Sustainable Development Goals (SDGs) – SDG12; Responsible Consumption and Production.

Course Code – BERE

BERE 1013
TECHNICAL PHYSICS

LEARNING OUTCOMES

1. Apply the physics concept systematically 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 provides students in the Electronic Engineering Technology program with a solid foundation in fundamental physics and experimental methodology. Designed to bridge basic physical principles with engineering applications, the curriculum covers four primary domains: Classical Mechanics, Fluid Mechanics, Electricity & Magnetism, and Waves, Acoustics & Optics. Beginning with measurement precision, unit conversions, and vector kinematics, students explore translational dynamics through Newton's Laws, static equilibrium, simple harmonic motion, and work-energy conservation. The course then introduces fluid statics, covering pressure, buoyancy, and fluid principles. The second half focuses on core electromagnetic concepts—including electrostatic fields, Coulomb's Law, electrical resistance, resistivity, power, and magnetic forces on moving charges and current-carrying conductors—establishing physical foundations for circuit analysis and sensor technologies. Finally, the curriculum addresses wave propagation, acoustic intensity scales (decibels), the Doppler effect, and geometrical optics (reflection, refraction, and Snell's Law).

BERE 1303
ENGINEERING WORKSHOP I

LEARNING OUTCOMES

1. Demonstrate understanding of the industrial safety and health in the lab activities.
2. Diagnose electronic circuits using electronic testing equipment.
3. Construct electronic circuits according to IPC standard using appropriate tools.

SYNOPSIS

This course discusses on introduction to industrial safety and health + lab safety, equipment theory, industrial practices, testing, and circuit diagnostic & report writing. Moreover, the students will be exposed to electronic components which cover the introduction, theory, assembly and soldering, simulation tools - MULTISIM – introduction and application, Problem Based Learning (PBL). This course supports and is aligned with Sustainable Development Goals (SDGs) – SDG12; Responsible Consumption and Production.

BERE 1313
ENGINEERING WORKSHOP II

LEARNING OUTCOMES

1. Utilize appropriate simulation tools to solve basic electronic problems.
2. Install electrical wiring and conduct testing by using appropriate techniques with consideration of safety and health issues.
3. Fabricate Printed Circuit Board (PCB) using appropriate tools.

SYNOPSIS

This course will discusses 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. This course supports and is aligned with Sustainable Development Goals (SDGs) – SDG12; Responsible Consumption and Production.

BERE 1323
ELECTRONIC FUNDAMENTALS

LEARNING OUTCOMES

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 introduces semiconductor devices and their applications in electronic circuits. Topics include semiconductor physics, energy band theory, charge carriers, p-n junctions, diodes, Zener diodes, BJTs, and FETs. Focus will be on device characteristics, DC biasing, load line analysis, switching, and small-signal amplification. Laboratory activities provide practical experience in circuit analysis, measurement, biasing, and troubleshooting of basic analogue circuits.

BERE 2333
ANALOGUE ELECTRONIC DEVICES

LEARNING OUTCOMES

1. Apply the fundamentals of small signal amplifiers using BJT and FETs and Op-amp circuits.
2. Construct experimental investigation on output response of single-stage and multistage amplifiers, and basic op-amp circuits.

3. Report the findings orally or in writing by performing assignments or experiments effectively.

SYNOPSIS

This course provides a comprehensive study of analogue electronic circuits, focusing primarily on small-signal amplifier design, frequency response, and feedback topologies using both Bipolar Junction Transistors (BJTs) and Field-Effect Transistors (FETs). Students will analyse fundamental amplifier parameters including voltage, current, and power gains, as well as input/output impedances using equivalent AC small-signal models. The syllabus covers diverse amplifier configurations, multistage amplifiers (BJT, FET, and hybrid combinations), and the high/low frequency dynamics affecting amplifier stability and response (Bode plots, Miller effect capacitance). Advanced topics include operational amplifier (Op-Amp) fundamentals, common-mode rejection ratio (CMRR), feedback topologies, and special compound configurations. Practical laboratory sessions emphasize modern computer-aided simulation tools (Multisim) alongside hardware measurement techniques to design, test, and evaluate analogue circuits. This course supports and is aligned with Sustainable Development Goals (SDGs) – SDG9; Industry, Innovation and Infrastructure.

BERE 2343
ENGINEERING DRAWING

LEARNING OUTCOMES

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.

BERE 2353
ELECTRONIC SYSTEMS

LEARNING OUTCOMES

1. Analyse the characteristic and performance of the electronics devices.
2. Measure the performance of applied electronic circuits through lab sessions.
3. Demonstrate understanding on the impact of sustainable solutions in electronic systems.

SYNOPSIS

This course discusses 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 Mono-stable 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.

BERE 2363
CONTROL PRINCIPLES

LEARNING OUTCOMES

1. Apply fundamental control system principles to solve engineering system problems.
2. Conduct experimental investigations to analyse the performance of control systems in broadly defined engineering problems.
3. Demonstrate effective project management skills in solving given problems.

SYNOPSIS

This course introduces the fundamental principles and applications of control systems in electronic and engineering technology. It covers the concepts of open-loop and closed-loop control systems, system response characteristics, and the objectives of control system analysis and design. Students are introduced to mathematical modelling of physical systems using transfer functions in the frequency domain and state-space representation in the time domain, with applications to electrical, translational mechanical, and rotational mechanical systems. The course further develops student's understanding of time response characteristics, including first-order and second-order systems, and the effects of system poles and zeros on system performance. Techniques for analysing and simplifying multiple subsystems using block diagrams, signal flow graphs, and Mason's rule are also covered. System stability is evaluated using the Routh-Hurwitz criterion, while frequency-domain analysis is introduced through Bode plots, gain margin, phase margin, and gain adjustment compensation. Laboratory activities provide hands-on experience in modelling, analysing, simulating, and evaluating control systems using appropriate engineering software and experimental methods. Through lectures, tutorials, laboratory work, and assessments, students develop the ability to apply control system concepts to analyse engineering problems and propose appropriate control solutions for electronic, electrical, and electromechanical applications

BERE 2373
ELECTRICAL TECHNOLOGY

LEARNING OUTCOMES

1. Apply fundamental electrical principle to analyze and solve problem within electrical circuits and systems.
2. Construct experimental investigation of power systems and electrical transmissions in single phase and three-phase.
3. Work individually or in groups effectively to perform assignments/tasks given.

SYNOPSIS

This course introduces students to the fundamental principles governing alternating current (AC) circuits, electrical power systems, and electromechanical energy conversion devices. The first phase of the curriculum establishes a rigorous foundation in steady-state AC analysis, covering generation of alternating electromotive force, phasor manipulation, and the behaviour of RLC networks in series and parallel resonance topologies. Students will also investigate power dynamics (P, Q and S components) and power factor correction methodologies. The second phase transitions from abstract circuit networks to industrial electrical infrastructure. Students will explore single-phase transformers covering equivalent circuits, flux leakage, open-circuit/short-circuit testing, voltage regulation, and efficiency before expanding their scope to balanced three-phase systems and basic grid transmission architecture using the per-unit system. The final segment of the course demystifies the structural and operational mechanics of AC and DC rotating electrical machines. Concluding with industrial compliance and regulatory

BERE 3384
INDUSTRIAL CONTROL

LEARNING OUTCOMES

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 course introduces the principles and applications of industrial control systems with emphasis on discrete control, Programmable Logic Controllers (PLC), sensors, actuators, and industrial automation. Students are exposed to the operation and application of switches, relays, solenoids, motors, pneumatic devices, and industrial sensors. The course develops practical skills in electrical ladder diagrams, PLC programming using timers, counters, and other control functions, as well as structured control system design using GRAFCET. Practical laboratory activities and project-based learning are incorporated to provide hands-on experience in designing, implementing, and evaluating industrial control applications. The course also promotes efficient resource utilization and sustainable industrial practices through effective control and automation, supporting Sustainable Development Goal 12 (SDG 12); Responsible Consumption and Production.

BERE 3394
PROCESS INTRUMENTATION

LEARNING OUTCOMES

1. Examine appropriate process measurement of a control system.
2. Construct experimental investigation on process control response based on instrumentation measurement.
3. Report the findings orally or in writing by performing assignments/experiments.

SYNOPSIS

This course introduces the principles of process instrumentation and control. It covers process control fundamentals and process instrumentation documentation, including Process Flow Diagrams (PFD) and Piping and Instrumentation Diagrams (P&ID). It also exposes students to various process instrumentation and sensing technologies for measuring pressure, level, flow, and temperature. The course also covers signal conditioning, final control elements, control valves, controller modes, PID control, control-loop characteristics, system stability, and process control loop tuning. This course supports and is aligned with Sustainable Development Goals (SDGs) – SDG12; Responsible Consumption and Production through the application of process control and instrumentation for efficient and sustainable industrial processes.

BERE 3404
DATA ACQUISITION & SENSORS

LEARNING OUTCOMES

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 introduces the fundamental principles and applications of data acquisition (DAQ) systems and sensors. It covers DAQ hardware and software, sensors and

transducers, signal classification, signal conditioning, noise and interference reduction, field wiring, and data communication interfaces. The course also introduces distributed and standalone data loggers and controllers. Practical implementation of data acquisition systems is developed using LabVIEW, including data capture, processing, visualization, storage, file I/O, debugging, waveform analysis, and automation control. Laboratory exercises and project-based activities provide hands-on experience in integrating sensors, DAQ hardware, communication interfaces, and software for real-world measurement, monitoring, and control applications. This course supports and is aligned with Sustainable Development Goals (SDGs) – SDG12; Responsible Consumption and Production.

BERE 3414
INDUSTRIAL PNUEMATICS

LEARNING OUTCOMES

1. Design 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 course introduces the principles and applications of pneumatic and electro-pneumatic systems in industrial environments. The course covers compressed-air properties and applications, pneumatic components, actuators, directional control valves, pneumatic control configurations, electro-pneumatic components, and electro-pneumatic control configurations. Students are introduced to basic sequence, GRAFCET, pneumatic cascade, and electro-pneumatic cascade design techniques for developing control solutions based on specified operating requirements. The course also covers the fundamentals of compressed-air production, treatment, and distribution. This course supports and is aligned with Sustainable Development Goals (SDGs) – SDG9; Industry, Innovation and Infrastructure.

BERE 3424
EMBEDDED SYSTEM APPLICATION

LEARNING OUTCOMES

1. Analyse the architecture, components, and operation of embedded systems in meeting application requirements.
2. Construct embedded systems using programmable or reconfigurable devices.
3. Demonstrate understanding on the impact of sustainable solutions in embedded system application.

SYNOPSIS

This course introduces the fundamental concepts, design principles, and applications of embedded systems based on microcontroller technology. It develops students' understanding of processor architecture, hardware-software integration, input/output control, timing, interrupts, communication, and interfacing techniques for embedded applications. Students are exposed to the design and programming of embedded systems for sensing, control, actuation, and data communication, with emphasis on real-time operation and practical system development. The course also introduces emerging technologies in embedded systems, including the integration of Internet of Things (IoT) and Artificial Intelligence (AI) for the development of smart, connected, and intelligent embedded applications. The course contributes to SDG 9 (Industry, Innovation and Infrastructure) by equipping students with the knowledge and skills to develop innovative and efficient embedded system solutions.

BERE 3804
POWER ELECTRONIC

LEARNING OUTCOMES

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 introduces the fundamental principles and applications of power electronics, with emphasis on power semiconductor devices, switching characteristics, losses, ratings, and protection. The course covers the analysis, operation, and design of major power electronic converters, including AC-DC rectifiers, non-isolated and isolated DC-DC converters, switch-mode power supplies, DC-AC inverters, and AC voltage controllers. Various switching and modulation techniques, including pulse-width modulation (PWM), are introduced for controlling power conversion and improving converter performance. Practical laboratory activities and project-based learning provide hands-on experience in analysing, designing, simulating, implementing, and evaluating power electronic converter circuits for practical engineering applications. The course also promotes efficient power conversion and energy utilization through power electronic technologies, supporting Sustainable Development Goal 7 (SDG 7); Affordable and Clean Energy.

BERE 3814
SEMICONDUCTOR INDUSTRIAL PROCESS

LEARNING OUTCOMES

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 provides a comprehensive study of end-to-end semiconductor manufacturing, bridging cleanroom operations, Front-of-Line (FOL) wafer fabrication, End-of-Line (EOL) advanced packaging, and post-assembly IC testing. Designed to mirror real-world OSAT (Outsourced Semiconductor Assembly and Test) and foundry manufacturing environments, students explore fundamental solid-state principles before progressing to full-scale fabrication steps including photolithography, deposition, etching, back grinding, and wafer dicing. Emphasis is placed on practical hands-on experience in cleanroom protocols, safety, and equipment parameter optimization using precision tooling such as the DISCO DAD 3350 automatic dicing saw. Advanced packaging modules cover die attach methods, wire bonding metallurgy, moulding, plating, and environmental protection (MSL). Additionally, students examine quality inspection frameworks—such as shear/pull testing, delamination checks, and reject criteria—alongside automated testing protocols (MBT, temperature-sorted final test, burn-in). This course supports and is aligned with Sustainable Development Goals (SDGs) – SDG12; Responsible Consumption and Production.

BERE 3823
ARTIFICIAL INTELLIGENCE

LEARNING OUTCOMES

1. Determine the artificial intelligent method to solve engineering problem.
2. Demonstrate ability to compose appropriate artificial intelligent toolbox.
3. Demonstrate effective project management skills in solving given problems.

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 AI 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 appropriate tools such as Simulink/MATLAB.

BERE 3824
ARTIFICIAL INTELLIGENCE APPLICATION

LEARNING OUTCOMES

1. Determine the artificial intelligent method to solve engineering problem.
2. Demonstrate ability to compose appropriate artificial intelligent toolbox.
3. Demonstrate effective project management skills in solving given problems.

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 AI 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 appropriate tools such as Simulink/MATLAB.

BERE 4434
INDUSTRIAL AUTOMATION

LEARNING OUTCOMES

1. Evaluate manufacturing operation towards the improvement of its productivity.
2. Display competence in applying appropriate automation techniques to meet process targets.
3. Work individually or in groups effectively to perform assignments/tasks given.

SYNOPSIS

The course covers the fundamentals of automation and production systems, PLC programming and control methodologies, productivity improvement, operations and process strategies, facility layout design, capacity planning, and work measurement. Emphasis is placed on integrating automation technologies with manufacturing operations to achieve improved productivity, efficiency, quality, and competitiveness in industrial environments. Students develop both theoretical understanding and practical competencies through laboratory activities and project-based applications. This subject will prepare students with knowledge and practical aspects on industrial manufacturing process and engineering related operations. This course supports and is aligned with Sustainable Development Goals (SDGs) – SDG9; Industry, Innovation and Infrastructure.

BERE 4443
QUALITY MANAGEMENT

LEARNING OUTCOMES

1. Analyse any given problem and solution based on quality theories.
2. Demonstrate the understanding of professional ethics and responsibilities in quality management.
3. Apply appropriate quality tools to improve the quality of management, process and product in organisation.

SYNOPSIS

This course examines various quality theories and international standards essential for achieving customer satisfaction across diverse organizational contexts. Students will explore strategic quality planning, focusing on leadership, professional ethics, and the strategic processes necessary to drive continuous improvement in both products and services. The curriculum emphasizes practical application using quality tools, including the Seven Basic Quality Control (7QC) tools and Total Quality Management (TQM) principles. Additionally, the course incorporates Six Sigma methodologies, such as the DMAIC framework and Failure Mode and Effects Analysis (FMEA), to refine management strategies and enhance overall organizational excellence. This course supports and is aligned with Sustainable Development Goals (SDGs) – SDG7; Affordable and Clean Energy

BERE 4814
INDUSTRAL ROBOTICS

LEARNING OUTCOMES

1. Determine the industrial robot manipulator configurations, coordinate transformations and kinematic modelling principles.
2. Develop and validate industrial robot manipulator models through kinematic analysis and simulation to evaluate robot motion
3. Demonstrate effective project management skills in solving given problems.

SYNOPSIS

This course introduces the fundamental concepts of industrial robotics for engineering technology applications. Students learn various robot manipulator configurations, coordinate transformations, Denavit–Hartenberg (DH) modelling, forward and inverse kinematics, and basic trajectory planning through robot simulation. The course also introduces manipulator dynamics and robot control concepts to provide a broad understanding of industrial robotic systems. Students apply these concepts through simulation activities and a team-based project that develops a robotic solution for a real-world engineering problem while incorporating project management and sustainability considerations. This course supports and is aligned with Sustainable Development Goals (SDGs) – SDG9; Industry, Innovation and Infrastructure

BERE 4824
ELECTRICAL DRIVES & CONTROL

LEARNING OUTCOMES

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 course provides a comprehensive introduction to the elements of electric drive systems, electromechanical modelling and basic speed control of dc motors. Students will

expose to the switching amplifier field current controllers, armature voltage controllers, troubleshooting of dc drives. The second half of the course student acquire in braking of dc motors, limitation of electric drives, control of ac motor and braking of ac motors. The curriculum culminates in the modelling of permanent magnet brushless dc motor and other types of motor such as servo motor and stepper motor. This course supports and is aligned with Sustainable Development Goals (SDGs) – SDG7; Affordable and Clean Energy

Course Couse – BERT

BERT 1303
ELECTRICAL CIRCUIT FUNDAMENTAL

LEARNING OUTCOMES

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 students to Ohm's Law and Kirchhoff's Laws to calculate current, voltage, and power in DC and AC (steady state) circuits. Following this, students will learn key analytical methods, namely mesh and nodal analysis. The use of circuit theorems such as Thevenin, Norton, Superposition, and Maximum Power Transfer will follow next. The application of these tools covers both DC and AC circuits. This subject is supported by laboratory work to impart essential practical skills to students.

BERT 1333
ADVANCED ELECTRICAL CIRCUIT

LEARNING OUTCOMES

1. Analyse 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

The course provides students with advanced knowledge and analytical skills in electrical circuit analysis. It covers the analysis of first-order and second-order circuits, transient and frequency responses, resonance, filter circuits, and two-port network. Students are required to apply appropriate engineering principles and analytical techniques to analyse circuit behaviour and solve electrical circuit problems.

BERT 2324
DATA COMMUNICATION & NETWORKING

LEARNING OUTCOMES

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 course delivers an applied, industry-aligned study of modern computer networking architectures, protocols, and hardware configurations essential for electronic and telecommunication engineering technology. Built upon the OSI and TCP/IP reference frameworks, the curriculum guides students from foundational network access protocols

and IPv4/IPv6 subnetting through enterprise-grade routing, switching, and WAN technologies. Through integrated hands-on laboratories and CLI-based configurations, students acquire practical competencies in network operating systems, VLAN implementation, dynamic routing protocols (Single and Multi-Area OSPF), Access Control Lists (ACLs), DHCP, NAT, and WAN connectivity options, preparing them for professional engineering roles and CCNA-equivalent standards. This course supports and is aligned with Sustainable Development Goals (SDGs) – SDG12; Responsible Consumption and Production.

BERT 2333
COMMUNICATION PRINCIPLE

LEARNING OUTCOMES

1. Apply the basic principles of analogue modulation system and noise.
2. Construct experimental investigation on analog modulation techniques through experimental works.
3. Demonstrate understanding of the societal and global issues in radio communication technology.

SYNOPSIS

This course offers an applied study of electronic communication systems, spanning fundamental analog principles through to modern digital techniques and guided transmission media. Students explore basic telecommunications models, decibel power calculations (dB, dBm, Bel), spectrum allocation, and channel capacity principles. The core of the course provides coverage of analog modulation systems including Amplitude Modulation (AM), Single-Sideband (SSB), and Angle Modulation (FM and PM). Students analyze transmitter structures, receiver architectures (such as TRF, Superheterodyne, and PLL-based receivers), and modulation/demodulation hardware circuits. Furthermore, the course evaluates system degradation due to noise, introduces digital baseband communication via Pulse Code Modulation (PCM), and concludes with fundamental transmission line theory, impedance matching, and Standing Wave Ratio (SWR) calculations.

BERT 2423
SIGNAL AND SYSTEMS

LEARNING OUTCOMES

1. Explain the basic concepts and properties of signals and systems.
2. Apply appropriate analysis techniques to solve problems in signals and system.
3. Conduct experimental investigations using signals and systems techniques.

SYNOPSIS

This course covers the fundamental principles and analytical techniques for continuous-time and discrete-time signals and Linear Time-Invariant (LTI) systems. Key topics include signal transformations, LTI system properties, convolution, Fourier Series (FS/DTFS), Fourier Transforms (FT/DTFT), and Laplace Transforms with s-domain circuit applications. The course also examines continuous-to-discrete data conversion through the Nyquist-Shannon Sampling Theorem, aliasing mitigation, and signal reconstruction, alongside practical applications supporting modern industrial infrastructure (UN SDG 9). Integrated software laboratories utilize MATLAB for signal visualization, spectral analysis, and system modelling.

BERT 3353
TELECOMMUNICATION SYSTEM

LEARNING OUTCOMES

1. Apply the principles of telecommunication systems to analyse basic communication system configurations.

2. Apply the principles of telecommunication systems to analyse basic communication system configurations.
3. Demonstrate the ability to engage in independent learning on related topics effectively.

SYNOPSIS

This course introduces the fundamental principles, concepts, and applications of telecommunication systems, covering radio spectrum and wave propagation, broadcasting systems, switching systems, satellite communication systems, radar systems, optical communication systems, and wireless communication systems. Emphasis is placed on understanding system architectures, operating principles, transmission media, signal propagation, key system parameters, and practical applications of modern telecommunication technologies. The course provides students with foundational knowledge and analytical skills to understand and evaluate various telecommunication systems and their role in enabling reliable, efficient, and interconnected communication. The course supports Sustainable Development Goal 9 (SDG 9): Industry, Innovation and Infrastructure by promoting knowledge and understanding of communication technologies that contribute to resilient infrastructure, technological innovation, and sustainable digital connectivity.

BERT 3363 TELECOMMUNICATION ELECTRONIC

LEARNING OUTCOMES

1. Evaluate telecommunication electronics design and its related component.
2. Construct experimental investigation on the telecommunication electronics design and calculations.
3. Complete a given task using systematic planning in a group.

SYNOPSIS

This subject covers the fundamental principles and practical applications of telecommunication electronics, with emphasis on radio frequency (RF) amplifiers, RF oscillators, phase-locked loops (PLLs), frequency synthesizers, transmitter circuits, and receiver circuits. Students will develop an understanding of the operation, analysis, design, and performance of essential electronic circuits used in modern telecommunication systems.

BERT 3373 DIGITAL SIGNAL PROCESSING

LEARNING OUTCOMES

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 course provides fundamental concepts, analytical tools, and practical design techniques of Digital Signal Processing (DSP), designed for electronic engineering technology students. Students begin with a review of signals, systems, and the Nyquist-Shannon sampling theorem, progressing to core analytical tools including the z-transform, difference equations, and signal flow graphs. A significant emphasis is placed on the analysis, design, and implementation of Infinite Impulse Response (IIR) and Finite Impulse Response (FIR) digital filters using methods such as bilinear transformation and windowing. The course concludes with real-world applications in speech, image, and telecommunications, alongside an introduction to stochastic processes, random signals, and correlation. Laboratory sessions and tutorials reinforce theoretical concepts through hands-on signal analysis, filter design, and computational tools.

BERT 3383
ELECTROMAGNETIC

LEARNING OUTCOMES

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

SYNOPSIS

This subject 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, 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, good conductors, power and Poynting vector, incident, reflected and refracted wave.

BERT 3393
TELECOMMUNICATION SWITCHING SYSTEM

LEARNING OUTCOMES

1. Distinguish the principles of telecommunication switching system, signalling and unified communication system.
2. Construct the application of telecommunication switching system, signalling and unified communication system.
3. Demonstrate effective project management skills in solving given problems.

SYNOPSIS

This course discusses the 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 course 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.

BERT 3403
DIGITAL COMMUNICATION

LEARNING OUTCOMES

1. Analyse the digital receiver system by taking into consideration the noise performance.
2. Construct experimental investigation on the equalization and multiplexing techniques.
3. Demonstrate understanding of the impact of the digital communication towards society/environment.

SYNOPSIS

This course provides a comprehensive study of the fundamental principles, analysis, and implementation of digital communication systems. Students will develop their understanding from the review of baseband signalling concepts toward the analysis of bandpass transmission and digital receiver performance. The curriculum begins with Pulse Code Modulation (PCM), including sampling, quantization, encoding, pulse shaping, and delta modulation, before progressing to digital baseband and bandpass signalling techniques. The course then covers baseband and bandpass detection, noise performance, matched filtering,

and digital receiver analysis. Students will further explore equalization, synchronization, multiplexing techniques, and multiple access methods, followed by the analysis of spread-spectrum communication systems. Practical and experimental activities are incorporated to strengthen students' ability to investigate equalization and multiplexing techniques and to relate theoretical concepts to real communication-system applications. The course also emphasizes the impact of digital communication technologies on society, industry, and infrastructure, in alignment with Sustainable Development Goal 9 (SDG 9): Industry, Innovation and Infrastructure.

BERT 3414
RF TECHNIQUE AND MICROWAVE

LEARNING OUTCOMES

1. Analyse 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 provides an in-depth exploration into the fundamental principles, analysis, and design of radio frequency (RF) and microwave engineering systems. The curriculum begins with an introduction to RF frequencies and their practical applications, moving systematically through transmission line theory, encompassing TEM, strip line, and microstrip line architectures. Students will transition from foundational wave theories to advanced microwave network analysis, utilizing impedance and admittance matrices, scattering matrices, ABCD matrices, and signal flow graphs. The second half of the course shifts toward practical design and implementation, establishing a strong understanding of impedance matching and tuning techniques using lumped elements, single and double stubs, and quarter-wave transformers. The curriculum culminates in the analysis and design of critical passive and active components, including power dividers, directional couplers, microwave filters, and single-stage transistor amplifiers. Furthermore, this course supports and is aligned with Sustainable Development Goals (SDGs) – SDG 7; Affordable and Clean Energy, by fostering the design of highly efficient transmission circuits and exploring current sustainable technologies within RF systems.

BERT 4803
SATELLITE COMMUNICATION

LEARNING OUTCOMES

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 provides an application-oriented foundation in the analysis, design, and execution of contemporary satellite systems. Bridging physical principles with modern space technology, the course prepares engineering technology students to address the demands of evolving global telecommunication infrastructure. Students explore orbital mechanics, launch dynamics, look angles, and space segment architectures including TT&C, software-defined payloads, active phased arrays, and SmallSat/CubeSat platforms. A core focus is RF link design, where students gain proficiency in modelling noise temperature, figure of merit (G/T), atmospheric attenuation, and uplink/downlink budgets for targeted C/N ratios. Ground segment engineering is covered via earth station architectures and flat-panel user terminals. Aligned with SDG9 (Industry, Innovation, and

Infrastructure), the course highlights satellite technology in bridging the digital divide, integrating Non-Terrestrial Networks (NTN) with 5G/6G, and understanding space sustainability, debris mitigation, and legal frameworks.

BERT 4813
MOBILE COMMUNICATION

LEARNING OUTCOMES

1. Evaluate the concepts, theories and strategies 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 course covers the architectural evolution, physical layer mechanics, and network convergence of modern cellular communication systems (1G to 5G/Beyond). Key topics include cellular system design, Erlang B trunking theory, interference mitigation, HetNet deployment, large/small-scale radio propagation modeling, channel assignment, and error control strategies. It also highlights the convergence of cellular networks with IP core architectures, IMS (VoLTE/VoNR), 5G network slicing, and edge computing applications in line with UN SDG9. Integrated practical modules feature real-world radio base station evaluations, indoor/outdoor mobile network parameter measurements, and propagation simulations.

BERT 4823
OPTICAL COMMUNICATIONS AND OPTOELECTRONIC

LEARNING OUTCOMES

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. Demonstrate understanding on the impact of sustainable solutions in optical communication technology.

SYNOPSIS

This course provides a comprehensive foundation in the principles, components, and performance metrics of modern optical communication systems and optoelectronic devices. Students will explore fundamental light propagation dynamics within optical waveguides, analysing geometric optics, mode theory, attenuation mechanisms, and dispersion phenomena. The curriculum covers core optoelectronic components, including optical sources (LEDs and Laser Diodes), optical detectors (PIN and Avalanche Photodiodes), amplifiers, passive optical devices, and fiber optic cabling techniques. Emphasis is placed on system design and link evaluation, enabling students to construct and analyse optical power budgets, rise-time budgets, and system noise characteristics. Through integrated lab modules, students will measure device characteristics, model digital fiber systems, and evaluate optical network performance. Additionally, the course incorporates discussions on standard engineering practices, safety protocols, and legal considerations relevant to fiber optic infrastructure deployment.

BERT 4833
ANTENNA ENGINEERING

LEARNING OUTCOMES

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 provides a comprehensive foundation in the principles, design, characterization, and practical applications of modern antenna systems and radio-wave propagation. Students will explore fundamental antenna parameters, wave radiation theory via Maxwell's equations, impedance matching techniques, and major antenna classifications—including wire, broadband, array, microstrip, and microwave antennas. The syllabus further addresses standardized antenna measurement techniques, radio-wave propagation mechanisms, and emerging applications. Emphasis is placed on energy-efficient antenna design, low-loss feeding networks, and microwave detection system to minimize power consumption and foster sustainable, eco-friendly wireless technologies. Through structured laboratory experiments and Project-Oriented Problem-Based Learning (POPBL), students develop practical competencies in designing, measuring, and evaluating sustainable antenna architectures. This course incorporates the core concepts of SDG 7; Affordable and Clean Energy.

Course Code – BERZ

BERZ 1203
AC CIRCUIT ANALYSIS

LEARNING OUTCOMES

1. Analyse 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 course will be focusing on analysis first order of RC and RL circuit, and frequency response. The second part of this course 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 magnetic circuit and single phase transformer. Next student will introduce to fundamental of DC machine and AC machine.

BERZ 1213
INSTRUMENTATION & MEASUREMENT

LEARNING OUTCOMES

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 introduces the principles and applications of electrical and electronic measurement systems. It covers measurement standards, errors and statistical analysis, noise in measurement, analog and electronic measuring instruments, oscilloscopes, DC and AC bridges, and electronic sensors. Students are exposed to the operating principles, characteristics, selection, and practical application of measurement instruments for measuring electrical signal and physical quantities. Laboratory and practical activities provide hands-on experience in instrument operation, measurement techniques, data analysis, and evaluation of measurement accuracy and reliability for electronic engineering technology applications. This course supports and is aligned with Sustainable Development Goals (SDGs) – SDG7; Affordable and Clean Energy.

BERZ 2404
MICROCONTROLLER TECHNOLOGY

LEARNING OUTCOMES

1. Demonstrate a working knowledge of microcontroller
2. Develop a fully functional microcontroller-based system to solve given problems.
3. Demonstrate understanding on the impact of sustainable solutions in microcontroller technology.

SYNOPSIS

This course provides a foundational and practical exploration of microcontroller-based systems, focusing on the Peripheral Interface Controller (PIC) architecture. It bridges the gap between hardware architecture and software development, beginning with core concepts such as RISC/CISC paradigms, Harvard architecture, memory organization, and instruction pipelines. To address the critical demands of modern engineering technology, a strong emphasis is placed on developing robust programming and troubleshooting skills. Students will progress from foundational Assembly language to embedded C programming, learning to manipulate I/O ports, arithmetic/logic instructions, and memory banks. Through intensive, hands-on laboratory sessions, students will design, wire, and write code to interface the microcontroller with real-world peripherals. Key interfacing topics include timers, interrupt control systems, Analog-to-Digital Converters (ADC), sensors, motor controls (DC, Stepper, PWM), and user interfaces (LCD and keypads). The course culminates in an applied project where students must conceptualize, build, program, and systematically troubleshoot a complete functional embedded system. This course supports and is aligned with Sustainable Development Goals (SDGs) – SDG9; Industry, Innovation and Infrastructure.

BERZ 4803
ANATOMY AND PHYSIOLOGY

LEARNING OUTCOMES

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 current sustainable technologies and relate to the given assignment.

SYNOPSIS

This course is 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.

BERZ 4813
MEDICAL IMAGING AND IMAGE PROCESSING

LEARNING OUTCOMES

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

This course introduces the extraction, modelling and analysis of information from medical images to support disease diagnosis, treatment and monitoring. Medical image computing is an interdisciplinary field integrating medicine, computer science, mathematics, biology, statistics and related disciplines. Students are introduced to the physics and engineering principles of major medical imaging modalities, medical image formation and representation, and image analysis techniques including enhancement, restoration, segmentation, feature extraction, registration and basic classification. Selected applications of machine learning in medical image analysis are also introduced. The course emphasizes practical, application-oriented use of computational tools for medical imaging.

BERZ 4823
MEDICAL DEVICES AND INSTRUMENTATION

LEARNING OUTCOMES

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

This course provides introduction to biomedical instrumentation and medical devices, focusing on the principles, applications, and measurement techniques used in healthcare. It covers biomedical electrodes, sensors and transducers, biopotential measurements such as ECG, EEG, EOG and EMG, and the measurement of cardiovascular, digestive and sensory system parameters. The course also introduces biomedical imaging systems including X-ray, CT, MRI and ultrasound, as well as diagnostic and therapeutic devices such as defibrillators, pacemakers, ventilators, haemodialysis systems, surgical lasers and infusion pumps. Basic biomedical signal processing, clinical analysers, medical equipment testing, and emerging healthcare technologies including hospital information systems, PACS, DICOM and telemedicine are also discussed. Practical laboratory activities and projects provide students with hands-on experience in the application and evaluation of biomedical instrumentation in clinical and healthcare environments.

BERZ 4833
BIOMECHANICS

LEARNING OUTCOMES

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 behaviour 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.

BERZ 4843
BIOMEDICAL ENGINEERING MAINTENANCE

LEARNING OUTCOMES

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

As biomedical technology in clinical care becomes more complex, clinical professionals and support staff must know how to keep patients safe and equipment working in the clinical environment. This course includes integrated approaches to manage and troubleshoot biomedical equipment in healthcare organizations. This course is designed to focus on the skills of the students in identifying and troubleshooting faults in electronic circuits and biomedical devices. It also encompasses the ability to select suitable equipment for troubleshooting and elementary calibration of devices for a precise and accurate diagnosis. This course will also include project management for procurement, equipping, installing, commissioning, decommissioning, testing, and handing over of biomedical equipment. 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 equipment's life and reduce failure rates.

BERZ 4853
BIOMEDICAL ETHICS, ACTS, STANDARDS AND SAFETY

LEARNING OUTCOMES

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 explores ethical frameworks, regulatory standards, and electrical safety in biomedical engineering. Students examine core ethical theories, professional codes of conduct, and moral decision-making models. The curriculum addresses medical device regulations, safety acts, and device compliance.

BERZ 4863
RADIO NAVIGATION

LEARNING OUTCOMES

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.

BERZ 4873
VLSI DESIGN

LEARNING OUTCOMES

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

This course introduces the fundamental principles and design methodologies of very large-scale integration (VLSI) circuits. It covers the evolution, classification, fabrication, applications and design hierarchy of integrated circuits using CMOS, bipolar and BiCMOS technologies. Students will study transistor switching behaviour and the design of complementary CMOS combinational and sequential circuits, including complex logic gates, latches and flip-flops. The course also addresses physical IC design through layout design rules, stick diagrams, mask layouts, Euler paths and multi-cell layouts. MOSFET characteristics and CMOS inverter performance are analysed in terms of operating regions, threshold voltage, current–voltage and capacitance–voltage characteristics, voltage transfer characteristics, noise margins, propagation delay, rise and fall times, and power consumption. At the subsystem level, students will explore design constraints, abstraction levels, finite-state machines, adders and multiplier architectures. Tutorials, laboratory activities and project-based learning develop practical skills in constructing, analysing and evaluating VLSI circuits using appropriate design tools and techniques.

BERZ 4883
DIGITAL IC DESIGN

LEARNING OUTCOMES

1. Evaluate suitable digital system design to solve engineering problems.
2. Design complete digital system 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. This course supports and is aligned with Sustainable Development Goals (SDGs) – SDG12; Responsible Consumption and Production.

BERZ 4893
DIGITAL IC TESTING

LEARNING OUTCOMES

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 provides a comprehensive exploration of test engineering, fault modelling, and Design-for-Testability (DFT) methodologies in modern digital Integrated Circuit (IC) design and manufacturing. Students will examine the entire IC lifecycle—from initial design flow to post-fabrication automated test equipment (ATE) operations—with an emphasis on industrial digital testing techniques. Key topics include structural vs. functional testing, parametric evaluations, defect and fault modelling (stuck-at, delay, fault equivalence/dominance), automatic test pattern generation (ATPG) algorithms, and scan-based design architectures (full/partial scan, compression). Furthermore, the curriculum covers memory testing (MBIST, fault models, March algorithms), logic Built-In Self-Test (BIST) utilizing Linear Feedback Shift Registers (LFSR), IEEE 1149.1 Boundary Scan architecture, and post-silicon reliability stress methodologies (burn-in, infant mortality, and voltage stress). Aligned with industrial practices and UN SDG 12 (Responsible Consumption and Production) through yield optimization and waste reduction, this course prepares students for key engineering roles in semiconductor test, DFT implementation, and product reliability engineering.

BERZ 4903
SEMICONDUCTOR PROCESS

LEARNING OUTCOMES

1. Assessing 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.

BERZ 4913
VLSI ARCHITECTURE

LEARNING OUTCOMES

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.

BERZ 4923
MICROELECTRONIC FABRICATION

LEARNING OUTCOMES

1. 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 introduces the principles and processes involved in microelectronic fabrication, covering both front-end-of-line (FEOL) and back-end-of-line (BEOL) technologies. Students will study semiconductor materials and device properties, including energy-band concepts and charge carriers, before examining standard CMOS process flows, device cross-sections, MOS transistor structures, and design rules. The course also covers key CMOS process integration modules, including well formation, device isolation, gate-oxide integrity, metallization, multilevel dielectrics, planarization, contacts, and vias. Device miniaturisation challenges, particularly short-channel and hot-carrier effects, are also discussed. Through lectures, tutorials, laboratory activities, device characterisation, and presentations, students will develop the ability to analyse CMOS fabrication processes and evaluate process-related device performance and reliability issues.


Bachelor of Technology
Programmes

BACHELOR OF TECHNOLOGY PROGRAMMES

The Bachelor of Technology with Honours program at FTKEK offers a multidisciplinary approach, preparing students for dynamic careers in Industrial Electronic Automation (BERL), Internet of Things (BERV), and Telecommunications (BERW). The program provides a solid foundation in technical knowledge and hands-on skills, equipping students to solve complex problems in these growing fields.

In the first year, students from all specializations are introduced to the core fundamentals, including Technical Mathematics, Circuit Development, and Computer Programming. Courses such as Technology System Programming and Digital Systems ensure students develop essential skills required for higher-level subjects.

Specializations:

1. **Industrial Electronic Automation (BERL)** focuses on industrial processes, automation, and system integration. Students will study topics such as Flexible Manufacturing Systems, Technology Data Acquisition, and Embedded System Programming, providing a pathway into automation, control systems, and manufacturing industries.
2. **Internet of Things (BERV)** emphasizes IoT technologies, covering subjects like IoT Wireless Communication, Single-Chip Microcomputer and Sensor Technology, and IoT System Integration. This specialization prepares students to contribute to the growing field of IoT, with applications in smart cities, healthcare, and manufacturing.
3. **Telecommunications (BERW)** focuses on communication systems, including Mobile Communication Technology, Wireless Network Planning, and Packet Transfer Technology. Graduates will be equipped to work in telecommunications infrastructure, network design, and mobile technology development.

Throughout the program, students will engage in Capstone Projects, System Design tasks, and real-world problem-solving ensure students are equipped not only with technical skills but also with soft skills such as activities to ensure a practical, industry-relevant education. The program also incorporates work-based learning opportunities, where entrepreneurship, communication, and professional ethics. By the end of the program, students gain direct experience through industrial placements. graduates will be well-prepared to enter a wide range of engineering technology careers, ready to tackle the challenges of a rapidly evolving industry.





Bachelor of Technology in Industrial Electronic Automation with Honours (BERL)

Programme Educational Objectives (PEO)

PEO1	To produce industrial electronic automation technologist who can perform automation tasks and solve problems in automation work.
PEO2	To produce technopreneurs in electronic related technology.
PEO3	To produce relevant, respected and referred professionals in industrial electronic automation technology.

Programme Outcomes (PO)

PO1	Apply knowledge of technology fundamentals to broadly-defined procedures processes, systems and methodologies in industrial electronic automation.
PO2	Able to suggest and apply latest tools and techniques to solve broadly-defined problems.
PO3	Demonstrate strong analytical and critical thinking skills to solve broadly-defined problems in industrial electronic automation.
PO4	Able to communicate and articulate effectively in both verbal and written among technologist communities and society at large.
PO5	Demonstrate understanding of the societal related issues and the consequent responsibilities relevant to broadly-defined technology practices.
PO6	Recognize the needs for professional development and to engage independent lifelong learning in specialist technologists.
PO7	Demonstrate an awareness of management and technopreneurship practices in real perspective.
PO8	Demonstrate professionalism and social and ethical consideration.
PO9	Demonstrate leadership quality, mentoring and work effectively in diverse teams.

Curriculum Structure – BERL

	CODE	SUBJECT	CATEGORY	CREDIT	PRE-REQUISITE
SEMESTER 1	BLHW 1772	Philosophy And Current Challenges	W	2	
	BTMW 1112	Basic Entrepreneurship	W	2	
	BLLW 1142	English for Academic Purpose	W	2	
	BERL 1112	Technology Skill and Development in Electronic Automation I	P	2	
	BERL 1125	Product Development Technology	P	5	
	BERL 1135	Flexible Manufacturing System I	P	5	
	BERL 1142	Technology System Programming I	P	2	
TOTAL CREDITS THIS SEMESTER				**20**	
SEMESTER 2	BLLW 1XX2	Third Language	W	2	
	BLLW 2152	Academic Writing	W	2	
	BERL 1214	Technology Skill and Development in Electronic Automation II	P	4	BERL 1112
	BERL 1222	Network, Switching and Routing	P	2	
	BERL 1234	Technology System Programming II	P	4	BERL 1142
	BERL 1243	Professional Practices	P	3	
TOTAL CREDITS THIS SEMESTER				**17**	

	CODE	SUBJECT	CATEGORY	CREDIT	PRE-REQUISITE
SEMESTER 3	BLHW 2722	Malaysian Nation State Aspiration	W	2	
	BKKX XXX1	Co-Curriculum I	W	1	
	BERL 2112	Technology Data Acquisition and Analysis I	P	2	
	BERL 2125	Flexible Manufacturing System II	P	5	BERL 1135
	BERL 2135	Embedded System Programming Tool	P	5	
	BERL 2143	Network Security Implementation	P	3	
TOTAL CREDITS THIS SEMESTER				**18**	
SEMESTER 4	BKKX XXX1	Co-Curriculum II	W	1	
	BERL 2214	Technology Data Acquisition and Analysis II	P	4	BERL 2112
	BERL 2222	Technology System Optimization I	P	2	
	BERL 2232	Application System Development I	P	2	
	BERL 2244	Technology Operation Management	P	4	
	BTMW 2124	Technopreneur Capstone I	P	4	
TOTAL CREDITS THIS SEMESTER				**17**	

	CODE	SUBJECT	CATEGORY	CREDIT	PRE-REQUISITE
SEMESTER 5	BLLW 3162	English for Professional Interaction	W	2	
	BERL 3114	Technology System Optimization II	P	4	BERL 2222
	BERL 3124	Application System Development II	P	4	BERL 2232
	BERL 3215	System Integration Designing	P	5	
	BTMW 3134	Technopreneur Capstone II	P	4	BTMW 2124
TOTAL CREDITS THIS SEMESTER				**19**	
SEMESTER 6	BERL 3134*	Technology Quality Management	P	4	
	BERL 3225*	Maintenance Management System	P	5	
	BERP 3234*	Final Year Project I	P	4	
TOTAL CREDITS THIS SEMESTER				**13**	
SPECIAL SEM	BERP 3316*	Final Year Project II	P	6	BERP 3234
TOTAL CREDITS THIS SEMESTER				6	
SEMESTER 7	BERP 41112*	Industrial Training	P	12	
TOTAL CREDITS THIS SEMESTER				**12**	
TOTAL CREDITS				**122**	

* Courses that will be implemented as Work Based Learning (WBL)

Credit Hour Structure

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

Category	Code	Total Credit
University Compulsory	W	16
Programme	P	94
Industrial Training	P	12
GRAND TOTAL		122

Bachelor of Technology in Internet of Things (IoT) with Honours (BERV)

Programme Educational Objectives (PEO)

PEO1	To produce competent Internet of Things technologist that perform Internet of Things related work.
PEO2	To produce professionals that is ethical and aware of social needs and career development.
PEO3	To produce leaders with entrepreneurial skills

Programme Outcomes (PO)

PO1	Apply knowledge of technology fundamentals to broadly-defined procedures processes, systems and methodologies in the Internet of Things technology.
PO2	Propose and employ current tools and techniques to resolve broadly-defined problems.
PO3	Demonstrate deep investigative and significant thinking abilities to solve broadly-defined problems in the Internet of Things technology.
PO4	Communicate effectively and flexibly in oral and written language for social, academic and professional purposes.
PO5	Illustrate the understanding of corresponding issues related to society and the subsequent responsibilities to the broadly-defined technology practices.
PO6	Acknowledge the requirement of professional establishment and to employ independent continuing learning in the Internet of Things technology
PO7	Illustrate consciousness of management and technopreneurship routine in real perspective.
PO8	Illustrate ethical awareness and professionalism.
PO9	Illustrate leadership character, mentoring and work efficiently in diverse teams.

Curriculum Structure - BERV

	CODE	SUBJECT	CATEGORY	CREDIT	PRE-REQUISITE
SEMESTER 1	BLHW 1772	Philosophy And Current Challenges	W	2	
	BKKX XXX1	Co-Curriculum I	W	1	
	BERW 1075	Introduction To Communication Technology	P	5	
	BERV 1313	Computer Programming	P	3	
	BERW 1033	Circuit Development And Testing	P	3	
	BERV 1115	Digital System	P	5	
TOTAL CREDITS THIS SEMESTER				**19**	
SEMESTER 2	BLLW 1142	English For Academic Purposes	W	2	
	BKKX XXX1	Co-Curriculum II	W	1	
	BERW 1055	System Development And Planning	P	5	
	BERV 1125	Single-Chip Microcomputer And Sensor	P	5	
	BERV 1145	Identification Technology Of Internet Of Things	P	5	
TOTAL CREDITS THIS SEMESTER				**18**	
SPECIAL SEM	BLHW 2722	Malaysian Nation State Aspiration	W	2	
	BERX XXX5	Technology Elective 1	E	5	
TOTAL CREDITS THIS SEMESTER				**7**	

	CODE	SUBJECT	CATEGORY	CREDIT	PRE-REQUISITE
SEMESTER 3	BERW 2115	Capstone Project 1	P	5	
	BERV 2135	Embedded Interface Technology	K	5	
	BERV 2215	IoT Short-Range Wireless Communication Technology	K	5	
	BERX XXX5	Technology Elective 2	E	5	
TOTAL CREDITS THIS SEMESTER				**20**	
SEMESTER 4	BERW 2125	Capstone Project 2	P	5	BERW 2115
	BERV 2325	Sensor Micro Operating System	K	5	
	BERV 2225	IoT Long-Distance Wireless Communication Technology	K	5	
	BERX XXX5	Technology Elective 3	E	5	
TOTAL CREDITS THIS SEMESTER				**20**	
SPECIAL SEM	BLLW 2152	Academic Writing	W	2	
	BERP 3164	Final Year Project 1	P	4	
TOTAL CREDITS THIS SEMESTER				**6**	

	CODE	SUBJECT	CATEGORY	CREDIT	PRE-REQUISITE
SEMESTER 5	BLLW 3162	English For Profession Interaction	W	2	
	BTMW 4012	Technology Entrepreneurship	W	2	
	BERP 3176	Final Year Project II	P	6	BERP 3164
	BERV 3415	IoT Project Planning	P	5	
	BERV 3435	IoT System Integration	P	5	
TOTAL CREDITS THIS SEMESTER				**20**	
SEMESTER 6	BERP 32112	Industrial Training	P	12	
TOTAL CREDITS THIS SEMESTER				**12**	
TOTAL CREDITS				**122**	

Credit Hour Structure

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

Category	Code	Total Credit
University Compulsory	W	14
Programme	P	36
Course	K	45
Industrial Training	P	12
Elective	E	15
GRAND TOTAL		122

Elective Courses

	CODE	COURSE
Technology Elective 1	BERW 1305	Computer Network
	BERV 3315	Information Security
Technology Elective 2	BERW 1095	Data Communication Technology
	BERW 2815	Packet Transfer Technology
Technology Elective 3	BERW 2835	Wireless Network Planning And Optimization
	BERW 2865	Communication Technology Design, Estimate And Budget

Bachelor of Technology in Telecommunications with Honours (BERW)

Programme Educational Objectives (PEO)

PEO1	To produce competent telecommunication technologist that perform telecommunication related work.
PEO2	To produce professionals that is ethical and aware of social needs and career development.
PEO3	To produce leaders with entrepreneurial skills

Programme Outcomes (PO)

PO1	Apply knowledge of technology fundamentals to broadly-defined procedures processes, systems and methodologies in the telecommunication technology.
PO2	Propose and employ current tools and techniques to resolve broadly-defined problems.
PO3	Demonstrate deep investigative and significant thinking abilities to solve broadly-defined problems in the telecommunication technology.
PO4	Communicate effectively and flexibly in oral and written language for social, academic and professional purposes.
PO5	Illustrate the understanding of corresponding issues related to society and the subsequent responsibilities to the broadly-defined technology practices.
PO6	Acknowledge the requirement of professional establishment and to employ independent continuing learning in the telecommunication technology
PO7	Illustrate consciousness of management and technopreneurship routine in real perspective.
PO8	Illustrate ethical awareness and professionalism.
PO9	Illustrate leadership character, mentoring and work efficiently in diverse teams.

Curriculum Structure – BERW

	CODE	SUBJECT	CATEGORY	CREDIT	PRE-REQUISITE
SEMESTER 1	BLLW 1142	English For Academic Purposes	W	2	
	BKKX XXX1	Co-Curriculum I	W	1	
	BERW 1305	Computer Network	P	5	
	BERV 1313	Computer Programming	P	3	
	BERW 1033	Circuit Development and Testing	P	3	
	BERW 1045	Signals Analysis and Systems Testing	K	5	
TOTAL CREDITS THIS SEMESTER				**19**	
SEMESTER 2	BERW 1055	System Development and Planning	P	5	
	BERW 1065	Analog and Digital Communication System	K	5	
	BERW 1075	Introduction To Communication Technology	P	5	
	BERW 1085	Data Communication Technology	K	5	
TOTAL CREDITS THIS SEMESTER"				**20**	
SPECIAL SEM	BLHW 1772	Philosophy And Current Challenges	W	2	
	BERW 1095	Data Communication Technology	P	5	
TOTAL CREDITS THIS SEMESTER				**7**	

	CODE	SUBJECT	CATEGORY	CREDIT	PRE-REQUISITE
SEMESTER 3	BLHW 2722	Malaysian Nation State Aspiration	W	2	
	BLLW 2152	Academic Writing	W	2	
	BERW 2115	Capstone Project 1	P	5	
	BERW 2105	Modern Mobile Communication Technology	K	5	
	BERW 28X5	Technology Elective 1	E	5	
TOTAL CREDITS THIS SEMESTER				**19**	
SEMESTER 4	BLLW 3162	English For Profession Interaction	W	2	
	BKKX XXX1	Co-Curriculum II	W	1	
	BERW 2125	Capstone Project 2	P	5	
	BERW 28X5	Technology Elective 2	E	5	
	BERW 28X5	Technology Elective 3	E	5	
TOTAL CREDITS THIS SEMESTER				**18**	
SPECIAL SEM	BTMW 4012	Technology Entrepreneurship	W	2	
	BERP 3164	Final Year Project 1	P	4	
TOTAL CREDITS THIS SEMESTER				**6**	

	CODE	SUBJECT	CATEGORY	CREDIT	PRE-REQUISITE
SEMESTER 5	BERP 3176	Final Year Project II	P	6	
	BERW 3135	Communication Project Management & Supervision	K	5	
	BERW 3145	Mobile Communication Indoor Coverage Project	K	5	
	BERW 3155	5G Mobile Communication Technology	K	5	
TOTAL CREDITS THIS SEMESTER				**21**	
SEMESTER 6	BERP 32112	Industrial Training	P	12	
TOTAL CREDITS THIS SEMESTER				**12**	
TOTAL CREDITS				**122**	

Credit Hour Structure

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

Category	Code	Total Credit
University Compulsory	W	14
Programme	P	36
Course	K	45
Industrial Training	P	12
Elective	E	15
GRAND TOTAL		122

Elective Courses

	CODE	COURSE	SPECIALIZATION
Technology Elective 1	BERW2815	Packet Transfer Technology	5G COMMUNICATION MANAGEMENT
	BERW2825	WLAN Wireless Communication Technology	
	BERW2835	Wireless Network Planning and Optimization	
Technology Elective 2	BERW2845	Integrated Cabling Design and Testing	5G COMMUNICATION TECHNOLOGY
	BERW2855	Data Network Development and Planning	
Technology Elective 3	BERW2865	Communication Technology Design, Estimate and Budget	

Course Code – BERL

BERL 1112
TECHNOLOGY SKILL AND DEVELOPMENT IN ELECTRONIC AUTOMATION I

LEARNING OUTCOMES

1. Demonstrate general knowledge and how to use Computer Aided Design (CAD) tool and PCB software to produce technical and electronic circuit drawings.
2. Construct a technical drawing and electronic circuit diagram using Computer Aided Design (CAD) or PCB software.
3. Present and report findings orally or in writing by performing project effectively.

SYNOPSIS

The aim of this course is to provide students with general knowledge of technical and electronic circuit drawing by using AutoCAD and PCB software. The students will be introduced to AutoCAD interface, basic editing command, coordinate system, template preparation, layers, orthographic drawing, and isometric drawing to produce various types of technical drawing. This course also includes PCB fabrication process.

BERL 1125
PRODUCT DEVELOPMENT TECHNOLOGY

LEARNING OUTCOMES

1. Apply the knowledge of passive and active electronic components.
2. Construct electronic circuits and performs its operation.
3. Act as a team member in completing tasks.

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.

BERL 1135
FLEXIBLE MANUFACTURING SYSTEM I

LEARNING OUTCOMES

1. Apply the key concepts of automation technology principle, components, and control system.
2. Construct and integrate automation control system application.
3. Report findings orally or in writing by performing assignments/experiments effectively.

SYNOPSIS

This course will further advancement related to the automation system and integration. The topics will cover advanced PLC programming (FBD, Structured Text, Graph, etc); basic electrical & electronic circuitry; electromechanical; pneumatics and electro-pneumatic systems.

BERL 1142
TECHNOLOGY SYSTEM PROGRAMMING I

LEARNING OUTCOMES

1. Apply the fundamental programming concepts to solve programming problems.
2. Construct an appropriate algorithm for a given problem using programming tools.
3. Report findings orally or in writing by performing assignments or experiments effectively.

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.

BERL 1214
TECHNOLOGY SKILL AND DEVELOPMENT IN ELECTRONIC AUTOMATION II

LEARNING OUTCOMES

1. Analyse Boolean function and logic circuit in digital applications.
2. Construct simple logical operations using combinational and sequential logic circuits.
3. Report findings orally or in writing by performing assignments/experiments effectively.

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.

BERL 1222
NETWORK, SWITCHING AND ROUTING

LEARNING OUTCOMES

1. Describe the fundamental concept of networking.
2. Setup the local area network and identify the network IP.
3. Work individually or in groups effectively to perform assignments/tasks given.

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.

BERL 1234
TECHNOLOGY SYSTEM PROGRAMMING II

LEARNING OUTCOMES

1. Analyse problems and solve using high level programming language.
2. Apply programming concept and produce the appropriate program solution.
3. Report findings orally to a group of people in a formal manner.

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 GUI model and respond according to the problems.

BERL 1243
PROFESSIONAL PRACTICES

LEARNING OUTCOMES

1. Apply the aspects and procedures in the area of professional practices.
2. Perform hazard identification, risk assessment, and risk control in the working environment (HIRARC).
3. Propose strategies for addressing societal issues and fulfilling responsibilities in technology practices.
4. Justify the issues and challenges of professional ethics within the working environment.

SYNOPSIS

This course provides an overview of the fundamental distinctions between technology and engineering concepts, the organizational structure of professional bodies, and the

pathway to becoming a professional technologist. It also explores technology ethics in the technologist profession, covering personal and professional ethics, codes of conduct, rights and responsibilities, and ethical dilemmas in past engineering practices through case studies. Additionally, students will learn to propose strategies for addressing societal issues and fulfilling responsibilities in technology practices. The course also introduces key aspects of Occupational Safety and Health (OSH), including relevant regulations, OSH management within organizations, the Plan-Do-Check-Act (PDCA) cycle, and the Hazard Identification, Risk Assessment, and Risk Control (HIRARC) framework.

BERL 2112
TECHNOLOGY DATA ACQUISITION AND ANALYSIS I

LEARNING OUTCOMES

1. Apply the principle of transducer and sensor, signal conditioning and data acquisition system.
2. Demonstrate electronic apparatus interfacing to device consists of sensors and others.
3. Report findings orally or in writing by performing assignments/experiments effectively.

SYNOPSIS

This course covers the basics of operation and analysis of electronic instruments, including the working principles and nature of transducers and sensors, signal conditioning and data acquisition system. Software tools interface with a microprocessor also introduced. The importance of application and signal condition techniques is emphasized. Elements and principle of data exchange, acquisition and application are discussed.

BERL 2125
FLEXIBLE MANUFACTURING SYSTEM II

LEARNING OUTCOMES

1. Design industrial automation control system using appropriate industrial based approach.
2. Construct hardware system and programming language for specific application in modular production system.
3. Work individually or in groups effectively to perform assignments/tasks given.

SYNOPSIS

This course is practical in nature. It introduces current industrial automation technology, from device level to system architecture through PLC programming. This course also provides a broad overview of manufacturing operations and applications of automation technologies in industrial manufacturing. The course also introduces the Modular Production System (MPS), covering its concept and core elements, and navigates towards smart manufacturing for the development of Industry 4.0.

BERL 2135
EMBEDDED SYSTEM PROGRAMMING TOOL

LEARNING OUTCOMES

1. Analyse the theory and architecture of microcontroller systems.
2. Construct program into microcontroller.
3. Report findings orally or in writing by performing assignments/experiments effectively.

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 or Python. Meanwhile, the Raspberry Pi will be used as a controller.

BERL 2143
NETWORK SECURITY IMPLEMENTATION

LEARNING OUTCOMES

1. Apply network security principles as well as the tools and configurations available.
2. Construct experimental investigations using network security techniques through experimental work.
3. Report findings orally or in writing by performing assignments/experiments effectively.

SYNOPSIS

This course covers a 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 organisations from cybersecurity risks, threats, and vulnerabilities. The rationale for offering this subject is to provide students with basic concepts, knowledge, and skills in network security implementation. This course develops students to become competent network security technologists upon graduation.

BERL 2214
TECHNOLOGY DATA ACQUISITION AND ANALYSIS II

LEARNING OUTCOMES

1. Analyse data transfer, monitoring, and control techniques.
2. Demonstrate wired and wireless communication techniques.
3. Report findings orally or in writing by performing assignments/experiments effectively.

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.

BERL 2222
TECHNOLOGY SYSTEM OPTIMIZATION I

LEARNING OUTCOMES

1. Explain the theory and basic principle of electronic measurement.
2. Apply working principles of measurement to further understand the theoretical concepts.
3. Report findings orally or in writing by performing assignments/experiments effectively.

SYNOPSIS

This course covers the fundamentals of measurement and instrumentation. This includes the measurement techniques and network technology. System application, electronic measurement and network are emphasised.

BERL 2232
APPLICATION SYSTEM DEVELOPMENT I

LEARNING OUTCOMES

1. Apply logical database design concept to represent a functioning database.
2. Build a working database using relevant technology according to database standards and procedures.
3. Independently seek solutions to technical issues arise during database development.

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.

BERL 2244
TECHNOLOGY OPERATION MANAGEMENT

LEARNING OUTCOMES

1. Apply concepts, processes and layout techniques in manufacturing operations to achieve organization standard and quality, cost and delivery goals.
2. Display competence in manipulating manufacturing data to construct process charts and process layouts.
3. Demonstrate awareness of manufacturing issues by proposing and justifying process outcomes that consider quality, cost and delivery.

SYNOPSIS

This course provides a broad overview of concepts and principles in production and operation management in industry. Topics include productivity, forecasting techniques, efficiency theory, layout techniques, capacity planning and work measurement.

BERL 3114
TECHNOLOGY SYSTEM OPTIMIZATION II

LEARNING OUTCOMES

1. Demonstrate strong analytical and critical thinking skills to solve signal and system related problems using MATLAB programming language.
2. Construct embedded system and integration.
3. Communicate and articulate effectively in both verbal and written during mini projects presentation and technical reports.

SYNOPSIS

This course integrates concepts and mathematical models to equip students with the fundamental skills of signal analysis and its applications in real engineering and technology. The course is structured into three sections. The first section covers signals and systems, where various types of signals are measured and analysed to facilitate control and automation. The second section focuses on embedded systems and integration. The third section covers mobile application development.

BERL 3124
APPLICATION SYSTEM DEVELOPMENT II

LEARNING OUTCOMES

1. Relates different components of a system to develop a working software application.
2. Build an efficient database based on a well-designed data model using cloud data storage technology.
3. Organize a plan to solve technical issues faced during application system development.

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.

BERL 3134
TECHNOLOGY QUALITY MANAGEMENT

LEARNING OUTCOMES

1. Analyse quality problems effectively using the principles and tools of total quality management in industry.
2. Demonstrate skill and performance in industrial situations through independent pursuit of quality control measures.
3. Participate actively in quality management project to solve problems in quality management.

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.

BERL 3215
SYSTEM INTEGRATION DESIGN

LEARNING OUTCOMES

1. Devise plan based on specific tasks using SCADA.
2. Construct and manage structure of an automation system, configuration and parameterization of its hardware and software.
3. Work individually or in groups effectively to perform assignments/tasks given.

SYNOPSIS

This course introduces students to Supervisory Control and Data Acquisition (SCADA) as well as providing them with the technical knowledge and practical experience in industrial automation. It covers generic SCADA hardware, which includes controllers, instrumentation, and communication, and SCADA software, which includes HMI, alarms, and trends.

BERL 3225
MAINTENANCE MANAGEMENT SYSTEM

LEARNING OUTCOMES

1. Demonstrate knowledge on maintenance strategies used in industrial practices.
2. Perform maintenance activities in a cost effective manner using appropriate software.
3. Communicate technical analysis ideas presented in technical report.

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.

Course Code – BERP

BERP 3164
FINAL YEAR PROJECT 1

LEARNING OUTCOMES

1. Explain the problem, objectives and scope of project associated to the industrial or community needs.
2. Choose a proper methodology.
3. Justify the preliminary findings in the oral and written forms effectively
4. Use relevant theory to produce solution.

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.

BERP 3176
FINAL YEAR PROJECT 2

LEARNING OUTCOMES

1. Differentiate all necessary knowledge of IOT applications.
2. Construct data efficiently in a meaningful form using relevant tools.
3. Justify the results in the oral and written forms effectively.
4. Work independently and ethically.
5. Practice teamwork effectively and leadership skills.

SYNOPSIS

This is the second part of the Bachelor Degree Project. Students are expected to continue the project performed in Bachelor Degree Project until completion. At the end of the semester, students are required to submit the Bachelor Degree Project report and present their projects for assessment.

BERP 3234
FINAL YEAR PROJECT I

LEARNING OUTCOMES

1. Evaluate issues or problems in industrial technology and propose solutions.
2. Organizes work activity and proposal for the implementation of Final Year Project.
3. Presents ideas related to project to evaluators in more systematic.

SYNOPSIS

This course aims to equip students with knowledge and skills in conducting project research, particularly in the field of technical and vocational education in Malaysia. Students will learn to evaluate issues in industrial technology and propose effective solutions. Each student is required to propose a project and submit a written project proposal, demonstrating their ability to organise work activities and plan for project implementation. Throughout the course, students will systematically develop their projects and document their progress. By the end of the course, students must submit the Final Year Project 1 report Additionally, students are expected to present their project ideas to evaluators in a structured and systematic manner.

BERP32112
INDUSTRIAL TRAINING

LEARNING OUTCOMES

1. Solve technology related problems using methods, tools and techniques learnt throughout the training
2. Explain effectively with the technical community and produce technical reports and presentations.
3. Demonstrate social etiquette and professionalism in technology practice.

SYNOPSIS

Industrial training is a compulsory component for degree program students at Universiti Teknikal Malaysia Melaka (UTeM). The experience and skills acquired from a period of placement can be invaluable and provide the advantage to the students when applying for employment after graduation. During the training period with the relevant industry, students are expected to involve in the following areas of training in order to achieve the underlying objectives: Manufacturing, production process and / or its optimization process, mechanical design and product, maintenance and repair of equipment, product testing and quality control.

BERP 3316
FINAL YEAR PROJECT II

LEARNING OUTCOMES

1. Analyse data to produce meaningful form using relevant tools.
2. Perform project implementation systematically.
3. Present the results in the oral and written forms effectively.

SYNOPSIS

This course is a continuation of Final Year Project 1. In Final Year Project 2, students continue and complete their project initiated in Final Year Project 1, applying methods to implement, test, and evaluate their solutions. The course emphasises critical thinking, problem-solving, and project management. At the end of the course, students are required to submit a full report and present their final outcomes for evaluation.

BERP 41112
INDUSTRIAL TRAINING

LEARNING OUTCOMES

1. Develop practical knowledge and experience in engineering processes and work organization.
2. Adapt to the practical skills and equipment handling as required by actual engineering practice.
3. Incorporate work ethics and professionalism in actual workplace.

SYNOPSIS

This course provides students with first-hand experience in engineering practices in real working environment in which students will be exposed to engineering and technological practice as well as work culture, ethics and professionalism. It also provides students the opportunities to develop technical and interpersonal skills as a preparation for entering the working environment.

Course Code – BERV

BERV 1115
DIGITAL SYSTEM /
SISTEM DIGITAL

LEARNING OUTCOMES

1. Apply Boolean functions and logic circuit in digital system applications.
2. construct simple logical operations using combinational and sequential logic circuits

3. Report findings orally or in writing by performing assignments/experiments effectively.

SYNOPSIS

Topics covered: Flip-Flops, Counters, Shift Registers, Sequential Logic Design applying Finite State Machine, Hardware Description Language (HDL) for combinational and sequential logic circuit.

BERV 1125
SINGLE-CHIP MICROCOMPUTER AND SENSOR

LEARNING OUTCOMES

1. Demonstrate a working knowledge of basic interface development and interface application development of the single-chip microcomputer.
2. Develop the hardware-software functionalities and technologies to solve given task using appropriate techniques and tools.
3. Present and report findings orally or in writing by performing assignment effectively.

SYNOPSIS

The course is mainly aimed at the technics of the interface application and development of single-chip microcomputer and the interface development of sensor combined with operation and maintenance characteristics of Internet of Things engineering which are required by hardware development engineer, system development engineer of Internet of Things and other relevant posts. Students can learn to analyze the organization and structure of the single-chip microcomputer and to solve the programming problems of the single-chip microcomputer and sensor with the improved project-designing ability of sensor.

BERV 1145
IDENTIFICATION TECHNOLOGY OF INTERNET OF THINGS

LEARNING OUTCOMES

1. Apply the principle of communication theory for RFID radio frequency identification.
2. Build the practical identification application using one-dimensional code, QR code, RFID, NFC and CPU.
3. Demonstrate the ability to perform the task given independently by optimizing available resources.

SYNOPSIS

The course is mainly aimed at the technics of RFID radio frequency identification, NFC development, bar code application and development combined with operation and maintenance characteristics of Internet of Things engineering which are required by RFID radio frequency engineer, application and development engineer of Internet of Things and other relevant posts. Students can learn to analyze RFID problems with different frequency and to solve the standard problems of identification technology with the application and development of identification.

BERV 1313
COMPUTER PROGRAMMING

LEARNING OUTCOMES

1. Explain the fundamental principles of problem solving, programming techniques and structures in program development.
2. Construct computer program codes by applying suitable programming structures and techniques.
3. Present and report finding orally or in writing by performing project effectively.

SYNOPSIS

This course covers the introductory topics in programming using C++ language. It includes the introduction to computers and programming, the fundamentals of programming, problem solving and software development. Data types and operators, selection, repetition, function, array, file, structured data and pointer are among the topics covered in the course.

BERV 2135
EMBEDDED INTERFACE TECHNOLOGY

LEARNING OUTCOMES

1. Apply the embedded basic interface development and sensor interface development.
2. Utilize the principles of embedded systems with programmable or reconfigurable devices to solve given problems.
3. Report the findings orally or in writing by performing assignments/experiments.

SYNOPSIS

The course aims at the embedded interface development and sensor interface development skills that embedded hardware engineers and embedded software engineers need to master, combined with the characteristics of operation and maintenance of the Internet of Things project. Students learn to analyze and solve the problem of composition, structure, development tools and basic interface of embedded system in the completion of project tasks.

BERV 2215
IOT SHORT-RANGE WIRELESS COMMUNICATION TECHNOLOGY

LEARNING OUTCOMES

1. Apply the knowledge of ZigBee, BLE and WiFi technology to solve short-range communication issues given a particular scenario and constraint.
2. Construct the short-range wireless systems using ZigBee, Bluetooth BLE and WiFi technology.
3. Demonstrate the ability to propose suitable solution by optimizing available resources.

SYNOPSIS

The course aims to provide students with the current skills on the IoT short range wireless communication technology and devices. This course covers various in deep topic on ZigBee and Bluetooth Low Energy (BLE) technology including its architecture, configuration and programming, design, and analysis. At the end of the course, students should be able to analyze the problem of wireless sensor network fault handling and maintenance, and solve the problem of wireless communication in application development and at the same time improve student ability on relevant wireless protocols in engineering application development.

BERV 2225
IOT LONG-DISTANCE WIRELESS COMMUNICATION TECHNOLOGY

LEARNING OUTCOMES

1. Explain principles and characteristics of long-range IoT wireless technologies
2. Demonstrate the development environment installation, protocol stack installation, engineering configuration and compilation, program operation and debugging

3. Select appropriate long range wireless communication technologies of IOT, cognize NB-IoT, LoRa, LTE and other hardware suites to solve related issues.

SYNOPSIS

The course aims to provide students the skills of protocol stack analysis, equipment control and integrated application project design required by the development engineers of Internet of Things projects, the engineers of system integration of Internet of Things, pre-sale and after-sale personnel, technical marketing and other relevant posts, so that the students can master the development technology of wireless sensor network in the process of completing the Internet of Things projects, and improve the capability of engineering application development based on related wireless protocols.

BERV 2325
SENSOR MICRO OPERATING SYSTEM

LEARNING OUTCOMES

1. Apply the working principles and the method of using an open-source operating system designed for low-power wireless Internet of Things devices.
2. Build the sensor driver under the operating system using MCU development suite.
3. Evaluate the suitability of the operating system and MCU hardware suite to perform a given task.
4. Report the findings orally or in writing by performing assignments/experiments.

SYNOPSIS

This course prepares students with the basic concepts of working principles, functional characteristics, network characteristics and usage methods of an open-source operating system (OS) designed for low-power wireless Internet of Things devices. It covers topics of the selected open-source OS, development suite, communication protocol, project development, debugging, and testing. Throughout the course, students will develop the essential skills in producing an integrated engineering practice project.

BERV 3415
IOT PROJECT PLANNING

LEARNING OUTCOMES

1. Comprehend knowledge points such as single-chip microcomputer and embedded development, sensor application technology, IOT identification technology and wireless communication technology
2. Organize efficiently the practical skills of IOT project function analysis, sensor driver design, hardware node configuration of subsystems into the network and design logic
3. Implementation method of IOT project software, and obtain the design and implementation ability of IOT project
4. Arrange the business model canvas incorporating human and financial elements

SYNOPSIS

The course aims to provide students the skills of software and hardware design, scheme design, function test, project implementation and maintenance of IoT project required by project development, project implementation, operation and maintenance and other relevant posts of IoT industry, so that the students can master the design and development ideas of IOT projects such as intelligent medical, intelligent community and intelligent pension according to the professional characteristics of IoT, and improve their capability of designing and implementing actual IoT projects.

BERV 3435
IOT SYSTEM INTEGRATION

LEARNING OUTCOMES

1. Analyze the basic knowledge of IoT system integration and management as well as the application mode of sensor network, transmission network and Internet.
2. Adapt the knowledge points of IoT projects such as demand analysis, network design, equipment selection and installation, sensor network deployment, gateway installation and testing, system integrated wiring and project operation and maintenance.
3. Evaluate technical analysis on IoT application system, formulate and plan solutions for IoT application system.
4. Verify the results in the oral and written forms effectively.

SYNOPSIS

The course mainly aims at the skills of system integration software and hardware design, scheme design, system deployment and operation and maintenance required by engineers of system integration of Internet of Things, project implementation engineer, integrated wiring post and other positions, so that the students can learn to analyze and solve the problems encountered in equipment selection, installation and debugging, database deployment and network design, and improve their integrated ability of IoT system from design practice to maintenance.

Course Code – BERW

BERW 1033
CIRCUIT DEVELOPMENT AND TESTING

LEARNING OUTCOMES

1. Analyze electrical and electronic circuits containing basic components and semiconductor devices using the basic principles of electrical and electronics, law and rules.
2. Construct appropriate circuit using various analysis methods.
3. Report findings orally or in writing by performing the assignment effectively.

SYNOPSIS

This course is intended to equip students with the basic principles of electrical and electronics for DC circuits. It begins by discussing the concept of electric circuit and its elements together with fundamental laws such as Ohm's Law, Kirchoff's Law. The methods used to analyze a circuit is taught, beginning with voltage and current divider, and wye-delta transformations before continuing to more complex methods such as Kirchoff's Current Loop (KCL), Kirchoff's Voltage Loop (KVL), nodal and mesh analysis. After this, the course shifts to learning about the basics of semiconductor materials. Three elements will be studied, the diode, Bipolar Junction Transistor (BJT) and Operational Amplifiers (Op-Amp). The study will involve understanding each element's structure, basic operation, and circuit application.

BERW 1045
SIGNALS ANALYSIS AND SYSTEMS TESTING

LEARNING OUTCOMES

1. Apply variety of inputs and responses in time domain and frequency domain through Fourier Series, Fourier Transform and Laplace Transform techniques.
2. Perform signals and systems analysis through appropriate tools and techniques.
3. Engage in independent search and synthesis of technical information from reliable sources.

SYNOPSIS

This course focuses on analyzing signals and testing system performance. Students will develop proficiency in signal analysis techniques, including time and frequency domain analysis, using tools like Fourier and Laplace transforms.

Practical applications and system evaluation methods will be emphasized.

BERW 1055
SYSTEM DEVELOPMENT AND PLANNING

LEARNING OUTCOMES

1. Apply system development and planning to compute equivalent amount for cash flows and project risk.
2. Measure project risk using suitable methods such as present worth, future worth, annual worth analysis, break-even and payback analysis, and replacement and retention analysis.
3. Integrates project planning and risk management for system development.

SYNOPSIS

This course covers engineering economics and managing risk in system development and planning. Engineering economics discusses about the time value of money and interest relationships, which are useful to define certain project planning that are utilised by engineers and project managers to select the best economic choice among several alternatives. Projects examined will include both product and service-producing investments. The effects of escalation, inflation, and taxes on the economic analysis of alternatives are also discussed. Management of risk incorporates the concepts of probability and statistics in the evaluation of alternatives. This allows management to determine the probability of success or failure of the project.

BERW 1065
ANALOG AND DIGITAL COMMUNICATION SYSTEM

LEARNING OUTCOMES

1. Apply the knowledge of analog and digital communication system to solve related problems.
2. Implement basic configurations for analog and digital communication systems.
3. Demonstrate effective communication skill through assignment.

SYNOPSIS

This course provides a comprehensive overview of both analog and digital communication systems. Students will explore fundamental telecommunication principles, in-depth analysis of analog modulation techniques (amplitude, frequency, and phase modulation), and the effects of noise on signal transmission. The course further delves into the fundamentals of digital communication, including digital modulation schemes, enabling students to understand the transition from analog to digital signals.

BERW 1075
INTRODUCTION TO COMMUNICATION TECHNOLOGY

LEARNING OUTCOMES

1. Apply the role of communication technology in various societal contexts.
2. Assemble appropriate communication tools for specific applications in communication technology.
3. Present and report findings orally or in writing by performing assignments or experiments effectively.

SYNOPSIS

Introduction to Communications Technology explores the evolution, concepts, and applications of communication technologies. Students analyze the impact of digital media, understand communication networks, and develop critical thinking skills to evaluate technologies effectively, establish correct professional ideas and learning views, and lay a good foundation for the study of professional courses.

BERW 1085
OPTICAL COMMUNICATION TECHNOLOGY

LEARNING OUTCOMES

1. Exploit optical component specification, characteristic and deduce its performance.
2. Assemble optical components for communication system project.
3. Demonstrate lifelong learning on optical fibre communication technology.

SYNOPSIS

This course provides a foundation in optical communication technology, covering fundamental principles, system components, and network architectures. Through this course, students will develop the ability to analyse optical communication systems, evaluate fibre performance, handle faults and perform maintenance tasks — skills required by installation engineers, maintenance engineers and project engineers. Students will gain proficiency in using optical instrumentation and fibre fusion and identify other issues in enhancing their comprehensive understanding of optical communication and optical access as they complete the various project tasks.

BERW 1095
DATA COMMUNICATION TECHNOLOGY

LEARNING OUTCOMES

1. Analyze the TCP/IP protocol stack, the construction method of data network architecture and the characteristics of the node equipment at all levels in the data communication network.
2. Perform detection of network failure through debugging and necessary maintenance method.
3. Demonstrate a data network and data communication technology through project or assignment.

SYNOPSIS

This course prepares the students with the overall design requirements of the communication. Through this course, the student will learn the basic technology of data network, data network protocols and applications such as TCP/IP, exchange routing, DHCP, ACL, NAT/VPN, firewall. The students will be exposed to the features of all exchange configuration, router configuration, network security configuration, data network maintenance skills and data communication which are required for data communication debugging engineers, data communication maintenance engineers, data communication design engineers and other relevant posts. The students will learn to analyze the data communication level, data exchange performance, fault handling and maintenance problems in the related project. Also, the student will learn to solve the problem of the network construction and maintenance by fully master the technical capabilities required by the data network construction engineers, design and maintenance engineers, and equipment commissioning engineers, with data network configuration, service provisioning, maintenance and troubleshooting capabilities to improve the comprehensive ability in LAN, communication network, wide area network, Internet, network management to complete the project tasks

BERW 1305
COMPUTER NETWORK

LEARNING OUTCOMES

1. Demonstrate the general knowledge of computer network.
2. Construct Computer Network using the basic concepts and principles of computer network.
3. Work in groups to report and present the basic practical skills of computer network technology.

SYNOPSIS

This course provides a general introduction to hardware, devices and software for developing and managing computer networks. It is designed to give students the ability to plan for a new network and managing existing network infrastructure.

BERW 2105
MODERN MOBILE COMMUNICATION TECHNOLOGY

LEARNING OUTCOMES

1. Evaluate the concepts and theories of modern mobile communication technology.
2. Construct experimental investigation on the equalization and multiplexing techniques.
3. Demonstrate understanding of the impact of the modern mobile communication technology towards society/environment.

SYNOPSIS

The Modern Mobile Communication Technology is a core basic course in the communications profession. The course's leading courses are courses such as The Principles of Communication and Principles of Optical Communication. The subsequent learning courses may include courses such as Indoor Coverage Engineering of Mobile Communication and Packet Transport Technology. According to the overall design requirements of the communication professional training program and through this course, the students learn all the wireless communication protocols, base stations, antennas, equipment opening and maintenance skills required by mobile communication debugging engineers, mobile communication maintenance engineers, indoor coverage engineers and other relevant posts in combination with modern mobile communication, so that students are able to master the characteristics of mobile communication network structure, network management equipment maintenance, system integration and comprehensive ability in mobile communication network maintenance in the process of completing the project tasks.

BERW 2115
CAPSTONE PROJECT 1

LEARNING OUTCOMES

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

1. Apply various financial indicators & tools to prepare financial information for a new business venture.
2. Acquire skills to analyze financial matters.
3. Demonstrate negotiation strategies in an investor simulation to reach a target term-sheet outcome (valuation, dilution, controls).

SYNOPSIS

Entrepreneurial ventures live or die by cash. This course builds the financial fluency founders need to launch and scale how revenue is generated, how to choose and access funding, how to manage cash flow and runway, how to read the numbers that signal performance, and how to value a company at different stages. Students learn basic accounting, essential financial indicators, funding types and investor categories, the role of intellectual property in financing, the financials required in an investment-ready business plan, and the art of negotiating with investors. New ventures require smart capital and disciplined financial management. This course equips students to design sustainable revenue models, prepare and interpret core financial statements, and control cash flow to extend runway. We compare funding pathways — bootstrapping, grants, debt, equity, and crowdfunding — while profiling angels, VCs, and strategic investors and what they expect. Students examine how intellectual property strengthens fundraising, build the financial sections of an investor-ready business plan, estimate venture value using common methods, and practice negotiating term sheets. By

the end, students can justify financing decisions with credible numbers and clear assumptions.

BERW 2125
CAPSTONE PROJECT

LEARNING OUTCOMES

1. Apply the business model canvas incorporating human and financial elements.
2. Write a convincing business plan.
3. Acquire skills to resolve organizational conflicts.
4. Evaluate vital organizational behaviors necessary to grow a new venture.

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.

BERW 2815
PACKET TRANSFER TECHNOLOGY

LEARNING OUTCOMES

1. Solve the problem related to network failure based on the basic principle knowledge of various packet transport network technology.
2. Evaluate the physical and logical structure of the packet network.
3. Communicate technical concepts and operational guidelines clearly and effectively in various network technology contexts.

SYNOPSIS

This course prepares students to become application-oriented professionals in packet transfer technology, equipping them with fundamental theoretical knowledge and practical skills. Key topics include MPLS, MPLS VPN, QoS, OAM, time synchronization, and network protection, which are essential for modern packet-based communication networks. Students will develop hands-on abilities in equipment debugging, port and VPN configuration, network protection setup, QoS tuning, and clock synchronization. The course also emphasizes skills needed for roles such as packet transfer network support engineer, maintenance engineer, and equipment test engineer, especially within mobile communication networks. Additionally, students will learn to analyze both the physical and logical structures of packet networks, troubleshoot network performance issues, data transmission failures, and equipment faults. Through project-based tasks, they will enhance their fault diagnosis and problem-solving skills, preparing them for real-world challenges in packet transfer networks.

BERW 2835
WIRELESS NETWORK PLANNING AND OPTIMIZATION

LEARNING OUTCOMES

1. Coordinate and integrate proficiency in LTE/5G network architecture, planning, optimization, and testing using related software and tools to achieve consistent and harmonious performance.
2. Evaluate the performance of LTE/5G wireless network with different parameters or scenarios.
3. Demonstrate leadership quality and work effectively with team members to complete project or assignment.

SYNOPSIS

This course prepares students with data testing and data analysis skills, planning, optimization process and tools of LTE/5G wireless network. Through this course, students will analyze LTE/5G network, solve network issues such as coverage, capacity, handover and interference which are required by wireless network management engineers, network optimization engineers and other relevant posts. Students will learn theoretical knowledge on LTE architecture, coverage, capacity, network evaluation and other components such as test data analysis, handover and interference. Students will be exposed to technical skills of network planning, LTE/5G wireless network optimization and fault handling. Furthermore, students will learn application of software in network optimization, perform LTE network testing and data analysis to study network coverage, handover and interference problem.

BERW 2855
DATA NETWORK DEVELOPMENT AND PLANNING

LEARNING OUTCOMES

1. Demonstrate and apply the general knowledge in data network development and planning for effortlessly integrate and utilize modern tools to plan, design, and optimize data networks based on acquired knowledge.
2. Construct experimental investigations and develop strategies for designing, planning, and optimizing for the small and medium data network.
3. Report findings orally or in writing by performing assignments/experiments the organize of data network design and planning in communication and society.

SYNOPSIS

This course prepares students with the overall design requirements of the talent training scheme for the major of communication. Through this course, students will learn the role of a data network designer, the modes and methods of selecting node equipment to form a data network, as well as modes of expanding and optimising the data network. Students will be exposed to basic knowledge and skills of data network design and planning, mastering the application and operation as a data network design engineer, adapting to technology updates, analysing demands and factors restricting network construction, and producing a complete, safe and reliable scheme for data comprehensive quality and ethics.

BERW 2865
COMMUNICATION TECHNOLOGY DESIGN, ESTIMATE AND BUDGET

LEARNING OUTCOMES

1. Manipulate communication technology design, calculation, estimation and budget by means of modern tools and techniques

2. Design, estimate and budget communication line and mobile base station.
3. Organise basic design and estimate and budget of communication line and equipment technology in the form of teamwork.

SYNOPSIS

This course covers the theory and practice of communication technology design, estimation and budgeting, communication project planning and project approval processes, and calculation methods of engineering estimation and budgeting. Students will also learn to analyse the workflow of communication network technology, address and solve various network design problems, and develop their comprehensive ability to judge, analyse and handle problems encountered throughout the course.

BERW 3135
COMMUNICATION PROJECT MANAGEMENT AND SUPERVISION

LEARNING OUTCOMES

1. Organize communication engineering projects by means of common management tools.
2. Evaluate communication project management technique and skill and supervisory methods.
3. Propose communication project management technique and skill and supervisory methods through principle of teamwork and leadership.

SYNOPSIS

This course embraces characteristics and composition of all project management elements which includes supervision specifications, bidding and contract management, and communication engineering project required by all engineers, project management and supervision team. The course also develops comprehensively the students' proficiency in communication project specification, communication supervision specification, project contract and maintenance in the process of completing the project tasks while not neglecting topics of construction process, site design and budget, design and implementation of lightning protection grounding engineering, basic norms and skills of equipment installation, and the acceptance criteria of engineering projects, contract management, bidding management, supervision regulations and specifications. Finally, the course is also anticipating in helping students to gain enterprising spirit and problem-solving ability.

BERW 3145
MOBILE COMMUNICATIONS INDOOR COVERAGE PROJECT

LEARNING OUTCOMES

1. Organize the working principles and the method of indoor coverage project cases through CAD software.
2. Design the indoor distribution communication system project.
3. Demonstrate the problem-solving indoor project through principle of teamwork and leadership.

SYNOPSIS

This course prepares the students with overall design requirements of the talent training scheme for the major of communication. Through this course, the students learn the engineering survey, planning and design, building construction and optimization and acceptance skills of the indoor coverage system required by the mobile communication indoor distribution engineer, base station survey engineer and network optimization engineer and other relevant posts of mobile communications.

BERW 3155
5G MOBILE COMMUNICATION TECHNOLOGY

LEARNING OUTCOMES

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

1. Adapt 5G wireless communication technologies and applications.
2. Compare different types of 5G components, technologies, and equipment to solve related problem.
3. Display commitment towards professional development and lifelong learning through project or assignment.

SYNOPSIS

This course prepares the students with basic knowledge on 5G mobile communication such as development history, communication standard, networking, equipment, antenna, network support, fault location processing and operation of 5G wireless devices which are required by wireless engineers and relevant post. Students will be exposed with theoretical knowledge of 5G wireless network and basic operational skills of 5G network equipment. They will master the application and operation skills required by posts, such as 5G wireless network engineer, as well as the ability of adapting to the technology updating.


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