# Faculty of Electrical and Electronics Engineering

# FACULTY OF ELECTRICAL & ELECTRONICS ENGINEERING

## INTRODUCTION

Faculty of Electrical & Electronics Engineering was established on 16th February, 2002. The main aim of the Faculty is to produce and train highly skilled engineers and technical assistants with diploma and/or degree level. The program offered is a combination of technology and engineering aspect with integration of applied and skilled based knowledge. This faculty is offering courses that focusing on industries in Peninsular Malaysia East Coast Industrial Corridor, mainly in chemical, petrochemical and manufacturing.

The faculty objective is to produce professional and semi-professional in electrical and electronics engineering. It is also aim to develop support specialist in electrical and electronics related to chemical, petrochemicals, manufacturing and process industry requirements.

This faculty will also embark on research and development activities in electrical and electronics engineering to produce expert groups relevant to the industries need especially in East Coast region. It is hoped that it will become the centre of reference for industry. It also hoped that the faculty will functions as a centre that channels innovative research products and expert services in electrical and electronics engineering to the local industries.

### Vision

To be a world class faculty for competency-based technical education in Electrical & Electronics Engineering.

### Mission

- To provide the highest quality competency-based technical education in electrical & electronics engineering to meet & exceed the needs of stakeholders.
- To continually improve our business through innovation & technology development by providing industrial-based facilities in line with the university focus areas.
- To develop our associates potential through participative & team involvement by providing a conducive environment that encourages creativity & innovativeness towards becoming a learning organisation.

**Curriculum Design**

For programmes in the faculty, the academic curriculum is designed based upon five top-down criteria:

- faculty vision and mission
- programme educational objectives
- programme outcomes
- course outcomes
- lesson outcomes

Basically, the creation of academic curriculum is initiated with the understanding of faculty vision and mission. From the faculty vision and mission, programme educational objectives are established.

Next, the programme outcomes were streamlined with the programme educational objectives. Once the relationship between the outcomes and objectives were determined, course outcomes and lesson outcomes were created.

As the world is rapidly gearing towards globalization, the creation of borderless countries has resulted greater competition for existing jobs and thus leading to competitive job market. Industries also become more and more technology-intensive and with the introduction of new engineering disciplines. Mastering technical principles is essential for an engineer to be in the forefront of industry because no matter how technology progress, the principles will be essentially to be the same. Therefore, a solid foundation in science and mathematics, and technical competencies are necessary in application, development and innovation of technology.

Future Malaysia engineers shall be trained with the stronger emphasis in the engineering sciences to enable greater flexibility in mastering the various engineering disciplines, particularly emerging ones and to develop their interest in R&D and innovation. In addition, they must be strong in the various skills related to industry such as in communications, team working, management, economics, finance, law, politics and the environment. Engineers must also trained in the humanities including ethics and professionalism and the exposed to future global scenarios and trends.

**PROGRAMMES OFFERED**

There are a total of four undergraduate programmes offered by the faculty for the 2013/2014 intake session as follows:

Degree in Electrical Engineering (Electronics) - BEE
Degree in Electrical Engineering (Power System) - BEP
Degree in Electrical Engineering (Control & Instrumentation) - BEC
Diploma in Electrical Engineering (Industrial Electronics) - DEE

Every programme is developed based on market survey of various stakeholders particularly the industry that the programme is eyeing to market the graduates. We can group the stakeholders into three categories as follows:

- Student, alumni and parents
- Employer & industry
- University & faculty advisory board/ panel

**Degree in Electrical Engineering (Electronics) - BEE**

A bachelor graduate program contains knowledge of electrical and electronic system. It consists of design, construction, production, maintenance, experimentation and control over components and equipments of electrical systems.

**Degree in Electrical Engineering (Power System) - BEP**

A bachelor graduate program contains strong knowledge of electrical and electronic system. It consists of design, construction, production, maintenance, experimentation and control over components and equipments of electrical systems. To realize this industrialization objective, electrical and electronic engineers must strive for excellence in invention and innovation, managing and administrating electrical and electronic equipments.

**Degree in Electrical Engineering (Control & Instrumentation) - BEC**

A bachelor graduate program contains strong knowledge of electrical and electronic systems and control engineering. It consists of innovative design solution, construction, production and maintenances, major in control, automation and instrumentation engineering problems throughout experimental via industrial scale laboratories. The focus sub-areas: instrumentations, control and optimization, robotics and automation.

**Diploma in Electrical Engineering (Industrial Electronics) - DEE**

This is a 3-year programme, specializing in industrial electronics engineering technology. At the end of the study, graduates will be awarded with a diploma, a technical skills certificate, and a soft skills certificate.

**Programme Educational Objectives (PEO)**

PEO1: Graduates achieve advance standing professionally based on their technical expertise & accomplishment related to engineering practice and research, or in other fields they choose to pursue.

PEO2: Graduates continue to acquire knowledge in technical and non-technical areas in pursuit of life-long learning.

PEO3: Graduates demonstrate commitment to the community and the professions, holding responsible positions that contribute to the benefits of the society.

**Programme Outcomes (PO)**

PO1: **Knowledge** – Ability to acquire and apply knowledge of sciences and electrical and electronics engineering fundamentals

PO2: **Technical Skills** – Ability to acquire in-depth technical competency in specific engineering discipline

PO3: **Problem Solving Skills** – Ability to identify, formulate and provide effective solution to engineering problems

PO4: **Design** – Ability to utilize system approach to design and evaluate system performance

PO5: **Sustainability** – Ability to describe the design principles for sustainable development

PO6: **Integrity** –Ability to demonstrate the professional and ethical responsibilities

PO7: **Communication Skills** – Ability to communicate effectively with multidisciplinary professions and community at large

PO8: **Leadership** – Ability to function effectively as individual and in group with the capacity to be a leader

PO9: **Comprehensive World View** – Ability to understand the social, cultural, global and environmental responsibilities of a professional engineer

PO10: **Life-Long Learning** – Ability to recognise the need for, and possess the capability in life-long learning

PO11: **Versatile** – Ability to utilize modern engineering tools necessary for engineering practice and adaptable to industrial needs

PO12: **Technopreneurship** – Ability to explain the entrepreneurship concept in engineering practice

**Career Opportunities**

The demand for professionals in the fields of electrical and electronics is increasing by the year. This is due to the increase in the investments made by foreign investors in Malaysia. Graduates will have the opportunity to work in the fields of industrial power systems, consumer and industrial electronics, manufacturing, and education.

**Laboratories and Facilities**

The engineering laboratories provided by Faculty of Electrical & Electronics Engineering are as follows:

Basic Engineering Lab
Computer-based Lab
Physics Lab
Printed Circuit Board (PCB) Fabrication Lab
Instrumentation & Process Control Lab
Programmable Logic Control (PLC)
Mini Plant
Calibration Lab
Robotics Lab
Pneumatic Lab
Electrical Installation & Workshop
Motor Control Lab
Basic Machine Lab
Machine & Drive Lab
Power System Lab

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**DIPLOMA IN ELECTRICAL ENGINEERNG (INDUSTRIAL ELECTRONICS) DEE**

| YEAR | | FIRST | | SECOND | | THIRD | |
|---|---|---|---|---|---|---|---|
| SEM | | FIRST | SECOND | FIRST | SECOND | FIRST | SECOND |
| ELECTRICAL ENGINEERING CORE COURSES | *SHORT SEMESTER | DEE1123 Circuit Analysis | DEE2123 Circuits Analysis II | DEE1233 Analog Electronic I | DEE2612 Basic Maintenance Technology | DEE3413 Principles of Communication Systems | DEE3719 Industrial Training |
| | | DEE1212 Computer Programming | DEE2313 Instrumentation & Measurements | DEE3313 Principles of Control Systems | DEE3143 Basic Electrical Machines & Power Systems | DEE3323 Industrial Automations | |
| | | DEE1931 Basic Electronics Instruments | DEE1951 Domestic Wiring | DEE1223 Digital Electronics | DEE3213 Microprocessor | DEE3223 Industrial Electronics | |
| | | DEE1941 Technical Drawing | DEE1961 Metrology | DEE2931 Basic Programmable Logic Control | DEE3233 Analog Electronics II | DEE3263 Embedded Controller Technology | DEE3723 Industrial Training Report |
| | | | | DEE2941 Motor Control | DEE2951 Programmable Logic Controller Application | DEE3712 Mini Project | |
| | | | | | DEE2961 Industrial Installation | DEE3931 Electro Pneumatic | |
| | | | | | | DEE3941 Microcontroller Application | |
| 67 | | 7 | 8 | 11 | 13 | 16 | 12 |
| 30 | **University Required Courses** :*English For Academic Skills, English For Technical Communication , Physic, General Chemistry I, Basic Mathematics, Foundation English, *Islamic and Asian Civilisation I, Calculus, Applied Calculus, *Briged Siswa (Co-Curriculum I), Ethnic Relations, Soft Skills 1&2, Physics, Asas Pembudayaan Keusahawanan. | | | | | | |
| 97 | **Total Units For Graduation** | | | | | | |

## Foreign Language Electives

| CODE | COURSE | CREDIT |
|---|---|---|
| UHF1111 | Mandarin for Beginners | 1 |
| UHF1121 | German for Beginners | 1 |
| UHF1131 | Japanese for Beginners | 1 |
| UHF1141 | Arabic for Beginners | 1 |

## BACHELOR OF ELECTRICAL ENGINEERING (POWER SYSTEMS) (BEP)

| YEAR | FIRST | SECOND | THIRD | | FOURTH |
|---|---|---|---|---|---|
| SEM | FIRST & SECOND | FIRST & SECOND | FIRST & SECOND | | FIRST & SECOND |
| ELECTRICAL ENGINEERING CORE COURSES | BEE1133<br>Circuit Analysis I | BEE2213<br>Analog Electronics I | BEE1611<br>Occupational Safety & Health | BEE3735 INDUSTRIAL TRAINING (LI) 12 WEEKS<br>BEE3741 INDUSTRIAL TRAIINING REPORT | BEE3143<br>Power System Analysis |
| | BEE1931<br>Basic Electronic Applications | BEE1213<br>Digital Electonics | BEE2123<br>Electrical Machines | | BEE4223<br>Power Electronic & Drive Systems |
| | BEE1941<br>Electrical Wiring | BEE2931<br>Basic Programmable Logic Controller | BEE2143<br>Signals & Networks | | BEE4**3<br>Engineering Elective 2 |
| | BEE1143<br>Circuit Analysis II | BEE2941<br>Basic Electropneumatic | BEE2223<br>Microprocessor | | BEE4**3<br>Engineering Elective 3 |
| | BEE1313<br>Instrumentation & Measurements | BEE2233<br>Analog Electronics II | BEE3931<br>PC Interfacing | | BEE4712<br>Engineering Project I |
| | BEE1951<br>Technical Drawing | BEE3113<br>Electromagnetic Fields Theory | BEE3941<br>Microcontroller Applications | | BEE3123<br>Power Generation & Operation |
| | BEE1961<br>Motor Control | BEE1222<br>Computer Programming | BEE3133<br>Electical Power Systems | | BEE4143<br>Power System Protection & High Voltage |
| | | BEE2951<br>PLC Applications | BEE4641<br>Engineers & Society | | BEE4**3<br>Engineering Elective 4 |
| | | BEE2961<br>Industrial Electropneumatic | BEE3313<br>Principles of Control Systems | | BEE4**3<br>Engineering Elective 5 |
| | | | BEE3413<br>Principles of Communication Systems | | BEE4724<br>Engineering Project II |
| | | | BEE***3<br>Engineering Elective 1 | | |
| 94 | 13 | 18 | 27 | 6 | 30 |
| 36 | **University Required Courses** : Applied Calculus,Applied Statistics, Technical English, Technical Writing, Islamic And Asian Civilizations 1,Co-Curriculum I&II, Ordinary Differential Equations, Academic Report Writing, Ethnic Relations, Soft Skills 1&2,Foreign Languages Level 1&2,Technopreneurship, Numerical Methods, Project Management, Basic Physics | | | | |
| 130 | **Total Unit For Graduation** | | | | |

**Engineering Electives**

| CODE | COURSE | CREDIT |
|---|---|---|
| BEE4163 | Alternative Energy | 3 |
| BEE3163 | Electromechanical Systems | 3 |
| BEE4113 | Electrical Installation Design | 3 |
| BEE4153 | Power Quality | 3 |
| BEE4513 | Industrial Automation | 3 |
| BEE4413 | Digitial Signal Processing | 3 |
| BEE4323 | Embedded Controller Technology | 3 |
| BEE4343 | Process Control | 3 |
| BEE4373 | Robotics | 3 |

**Foreign Language Level 1 & 2**

| CODE | COURSE | CREDIT |
|---|---|---|
| UHF1111 | Mandarin for Beginners | 1 |
| UHF1121 | German for Beginners | 1 |
| UHF1131 | Japanese for Beginners | 1 |
| UHF1141 | Arabic for Beginners | 1 |
| UHF1151 | Spanish for Beginners | 1 |
| UHF1161 | Malay Language for Beginners** | 1 |
| UHF2111 | Mandarin for Intermediate | 1 |
| UHF2121 | German for Intermediate | 1 |
| UHF2131 | Japanese for Intermediate | 1 |
| UHF2141 | Arabic for Intermediate | 1 |
| UHF2151 | Spanish for Intermediate | 1 |
| UHF2161 | Malay Language for Intermediate** | 1 |

**For Foreigner Student**:

i. UHE3062 Malaysia: The Impact of Globalisation
ii. UHE3012 Contemporary Leadership in Community

## BACHELOR OF ELECTRICAL ENGINEERING (ELECTRONICS) (BEE)

| YEAR | FIRST | SECOND | THIRD | | FOURTH |
|---|---|---|---|---|---|
| SEM | FIRST & SECOND | FIRST & SECOND | FIRST & SECOND | | FIRST & SECOND |
| ELECTRICAL ENGINEERING CORE COURSES | BEE1133<br>Circuit Analysis I | BEE2213<br>Analog Electronics I | BEE1611<br>Occupational Safety & Health | BEE3735 INDUSTRIAL TRAINING (LI) 12 WEEKS<br>BEE3741 INDUSTRIAL TRAINING REPORT | BEE3133<br>Electrical Power Systems |
| | BEE1931<br>Basic Electronic Applications | BEE1213<br>Digital Electronics | BEE2123<br>Electrical Machines | | BEE4323<br>Embedded Controller Technology |
| | BEE1941<br>Electrical Wiring | BEE2931<br>Basic Programmable Logic Controller | BEE2143<br>Signals & Networks | | BEE4**3<br>Engineering Elective 2 |
| | BEE1143<br>Circuit Analysis II | BEE2941<br>Basic Electropneumatic | BEE2223<br>Microprocessor | | BEE4**3<br>Engineering Elective 3 |
| | BEE1313<br>Instrumentation & Measurements | BEE2233<br>Analog Electronics II | BEE3931<br>PC Interfacing | | BEE4712<br>Engineering Project I |
| | BEE1951<br>Technical Drawing | BEE3113<br>Electromagnetic Fields Theory | BEE3941<br>Microcontroller Applications | | BEE4413<br>Digital Signal Processing |
| | BEE1961<br>Motor Control | BEE1222<br>Computer Programming | BEE3233<br>Electronic System Design | | BEE4213<br>Multimedia Technology & Applications |
| | | BEE2951<br>PLC Applications | BEE4632<br>Maintenance Technology | | BEE4**3<br>Engineering Elective 4 |
| | | BEE2961<br>Industrial Electropneumatic | BEE3313<br>Principles of Control Systems | | BEE4**3<br>Engineering Elective 5 |
| | | | BEE3413<br>Principles of Communication Systems | | BEE4724<br>Engineering Project II |
| | | | BEE***3<br>Engineering Elective 1 | | |
| 94 | 13 | 18 | 27 | 6 | 30 |
| 36 | **University Required Courses** : Applied Calculus,Applied Statistics, Technical English, Technical Writing, Islamic And Asian Civilizations 1,Co-Curriculum I&II, Ordinary Differential Equations, Academic Report Writing, Ethnic Relations, Soft Skills 1&2,Foreign Languages Level 1&2,Technopreneurship, Numerical Methods, Project Management, Basic Physics | | | | |
| 130 | **Total Unit For Graduation** | | | | |

**Engineering Electives**

| CODE | COURSE | CREDIT |
|---|---|---|
| BEE4343 | Process Control | 3 |
| BEE4373 | Robotics | 3 |
| BEE4383 | Computer Controlled Systems | 3 |
| BEE4313 | Industrial Control Technology | 3 |
| BEE4233 | Data Communications | 3 |
| BEE4253 | Computer Vision Systems | 3 |
| BEE4363 | Distributed Control System | 3 |
| BEE4333 | Intelligent Control | 3 |
| BEE4223 | Power Electronics & Drives Systems | 3 |

**Foreign Language Level 1 & 2**

| CODE | COURSE | CREDIT |
|---|---|---|
| UHF1111 | Mandarin for Beginners | 1 |
| UHF1121 | German for Beginners | 1 |
| UHF1131 | Japanese for Beginners | 1 |
| UHF1141 | Arabic for Beginners | 1 |
| UHF1151 | Spanish for Beginners | 1 |
| UHF1161 | Malay Language for Beginners** | 1 |
| UHF2111 | Mandarin for Intermediate | 1 |
| UHF2121 | German for Intermediate | 1 |
| UHF2131 | Japanese for Intermediate | 1 |
| UHF2141 | Arabic for Intermediate | 1 |
| UHF2151 | Spanish for Intermediate | 1 |
| UHF2161 | Malay Language for Intermediate** | 1 |

**For Foreigner Student**:

i. UHE3062 Malaysia: The Impact of Globalisation
ii. UHE3012 Contemporary Leadership in Community

## BACHELOR OF ELECTRICAL ENGINEERING (CONTROL & INSTRUMENTATION) (BEC)

| YEAR | FIRST | SECOND | THIRD | | FOURTH |
|---|---|---|---|---|---|
| SEM | FIRST & SECOND | FIRST & SECOND | FIRST & SECOND | | FIRST & SECOND |
| ELECTRICAL ENGINEERING CORE COURSES | BEE1133<br>Circuit Analysis I | BEE2213<br>Analog Electronics I | BEE1611<br>Occupational Safety & Health | BEE3735 INDUSTRIAL TRAINING (LI) 12 WEEKS<br>BEE3741 INDUSTRIAL TRAIINING REPORT | BEE3133<br>Electrical Power Systems |
| | BEE1931<br>Basic Electronic Applications | BEE1213<br>Digital Electronics | BEE4641<br>Engineer & Society | | BEE4323<br>Embedded Controller Technology |
| | BEE1941<br>Electrical Wiring | BEE2931<br>Basic Programmable Logic Controller | BEE2143<br>Signals & Networks | | BEE4373<br>Robotics |
| | BEE1143<br>Circuit Analysis II | BEE2941<br>Basic Electropneumatic | BEE2223<br>Microprocessor | | BEE4**1<br>Engineering Elective 1 |
| | BEE1313<br>Instrumentation & Measurements | BEE2233<br>Analog Electronics II | BEE3931<br>PC Interfacing | | BEE4712<br>Engineering Project I |
| | BEE1951<br>Technical Drawing | BEE3113<br>Electromagnetic Fields Theory | BEE3941<br>Microcontroller Applications | | BEE4523<br>Industrial Instrumentation |
| | BEE1961<br>Motor Control | BEE1222<br>Computer Programming | BEE3233<br>Electronic System Design | | BEE4343<br>Process Control |
| | | BEE2951<br>PLC Applications | BEE4632<br>Maintenance Technology | | BEE4363<br>Distributed Control Systems |
| | | BEE2961<br>Industrial Electropneumatic | BEE3133<br>Principles of Control Systems | | BEE4**3<br>Engineering Elective 2 |
| | | | BEE3413<br>Principles of Communication Systems | | BEE4724<br>Engineering Project II |
| | | | BEE4213<br>Multimedia Technology &Applications | | |
| | | | BEE3323<br>Modern Control Systems | | |
| 94 | 13 | 18 | 27 | 6 | 30 |
| 36 | **University Required Courses** : Applied Calculus,Applied Statistics, Technical English, Technical Writing, Islamic And Asian Civilizations 1,Co-Curriculum I&II, Ordinary Differential Equations, Academic Report Writing, Ethnic Relations, Soft Skills 1&2,Foreign Languages Level 1&2,Technopreneurship, Numerical Methods, Project Management, Basic Physics | | | | |
| 130 | **Total Unit For Graduation** | | | | |

**Engineering Electives**

| CODE | COURSE | CREDIT |
|---|---|---|
| BEE4383 | Computer Controlled Systems | 3 |
| BEE4313 | Industrial Control Technology | 3 |
| BEE4233 | Data Communications | 3 |
| BEE4253 | Computer Vision Systems | 3 |
| BEE4413 | Digital Signal Processing | 3 |
| BEE4333 | Intelligent Control | 3 |
| BEE4223 | Power Electronics & Drives Systems | 3 |

**Foreign Language Level 1 & 2**

| CODE | COURSE | CREDIT |
|---|---|---|
| UHF1111 | Mandarin for Beginners | 1 |
| UHF1121 | German for Beginners | 1 |
| UHF1131 | Japanese for Beginners | 1 |
| UHF1141 | Arabic for Beginners | 1 |
| UHF1151 | Spanish for Beginners | 1 |
| UHF1161 | Malay Language for Beginners** | 1 |
| UHF2111 | Mandarin for Intermediate | 1 |
| UHF2121 | German for Intermediate | 1 |
| UHF2131 | Japanese for Intermediate | 1 |
| UHF2141 | Arabic for Intermediate | 1 |
| UHF2151 | Spanish for Intermediate | 1 |
| UHF2161 | Malay Language for Intermediate** | 1 |

**For Foreigner Student:**

iii. UHE3062 Malaysia: The Impact of Globalisation
iv. UHE3012 Contemporary Leadership in Community

**SYNOPSIS OF FACULTY & PROGRAMME COURSES**
**DIPLOMA COURSE SYNOPSIS**

**DEE1123**
**Circuit Analysis I**
**Credit Hours: 3**
**Pre-Requisite : None**

**Synopsis**

This course provides the basic concepts and engineering methods of DC circuit's analysis and serves as an essential entry point for the wider scope of electrical engineering. The contents include voltage, Ohm's Law, Kirchhoff's Law, series and parallel circuits, mesh and node analysis, Superposition and Source Transformation Theorems, and Response of First- Order circuits

**References**


1. Alexander, C. & Sadiku, M., "Fundamentals of Electric Circuits", 2nd ed., McGraw- Hill, 2004.
2. Nilsson, J. & Riedel, S., "Electric Circuits", 6th ed., Prentice Hall, 2001.
3. Floyd, Thomas L., "Principles of Electric Circuits", 7th ed., Prentice Hall, 2003.


**DEE1212**
**Computer Programming**
**Credit Hours : 2**
**Pre-Requisite : None**

**Synopsis**

This course presents the C programming language for electrical and electronic engineer. The contents emphasis not only on the theoretical knowledge of programming but also the practical implementation in real-life situation. Students will learn basic structure of computer programming in C language. Students will also exposed to method for basic hardware/software interfacing and real-life problem solving environment.

**References**


1. Greg Perry "C by example." Que College (ISBN: 1-56529-453-X)C:
2. HM Deitel & PJ Deitel, "How to Program."Prential Hall
3. Jean Paul Corriveau, "Step-by-Step Guide to C Programming," Prentice Hall Publications 1998 BOOK (0-13-339946-X)
4. William Buchanan, "C for electronic engineering with applied software engineering." Prentice Hall (ISBN: 0-13-342668-8)
5. Jeri R. Hanly & Elliot B.Koffman, "C program design for engineers," Addison Wesley, (ISBN:9-780201-708714)

6. Byron Gottfried, “Programming with C.” McGraw-Hill Schaum's outline series (ISBN:0-07-114259-2)

**DEE1941**
**Technical Drawing**
**Credit Hour: 1**
**Pre-Requisite: None**

**Synopsis**
This course introduces student to two engineering skill; Electrical Installation I and AutoCAD. The student will learn about domestic wiring and installation, safety measures and also perform the practical of single phase wiring. The student will also learn about 2D design using AutoCAD which will also covers AutoCAD fundamentals, hatching, printing and plotting technique.

**References**

1. Abd Samad Hanif, “Pemasangan dan Penyelenggaraan Elektrik”, Dewan Bahasa & Pustaka, KL, 2000.
2. Mohd Isa Idris & Ramli Harun, “Asas Pendawaian”, IBS Buku Sdn. Bhd, 2002.
3. Abd Samad Hanif, “Pemasangan Elektrik”, Dewan Bahasa & Pustaka, KL, 2000.
4. Thomas A. Stellman & G.V. Krishnan, “Harnessing AutoCAD 2002”,Autodesk Press, Canada, 2002.
5. James A. LEACH, “AutoCAD 2004 Companion”, McGraw Hill, 2004

**DEE2123**
**Circuit Analysis II**
**Credit Hours : 3**
**Pre-Requisite: DEE1123**

**Synopsis**
This course introduces the basic knowledge in AC electrical circuit fundamentals which include knowledge of electromagnetism, alternating current and voltage, phasors and complex numbers, sinusoidal and steady state analysis, AC power, rms value, transformer, RLC circuits and also introduction to three- phase systems.

**References**

1. Alexander, C. & Sadiku, M., Fundamentals of Electric Circuits, 2nd ed., McGraw- Hill, 2004.
2. Nilsson, J. & Riedel, S., Electric Circuits, 6th ed., Prentice Hall, 2001.
3. Floyd, Thomas L., Principles of Electric Circuits, 7th ed., Prentice Hall, 2003.

**DEE2313**
**Instrumentation & Measurements**
**Credit Hours: 3**
**Pre-Requisite: None**

**Synopsis**
This Course introduces students to the principles of instrumentation and measurements, determination of error that caused by the meters. The students will be exposed to the architecture and the operation of DC and AC meters, oscilloscope, signal generator, sensors and transducers, analysis of DC and AC meters and introduction to signal conditioning.

**References**


1. Larry D. Jones , A. Foster Chin, Electronic Instruments and Measurements, 2nd Edition,Prentice-Hall,1995
2. J. P. Holman, Experimental Methods for Engineers, 7th Edition, McGraw-Hill,2001
3. Curtis D. Johnson, Process Control Instrumentation Technology, 7th Edition, Prentice-Hall, 2003


**DEE3931**
**Electro Pneumatic**
**Credit Hour: 1**
**Pre-Requisite: None**

**Synopsis**
In this course, the students will be exposed to basic of programmable logic control (PLC), specifically Omron PLC, and also learn the basic of pneumatic. In PLC, the student will learn how to practically perform PLC programming by using ladder diagram, identifying input and output devices and also lean how to wire up the PLC hardware. In Pneumatic, the student will learn about cylinders, valves, compressed air system and at the same time will practically use the pneumatic tools and equipment.

**References**


1. Omron, “OMRON User Manual”, OMRON Corporation, Japan, 2000.
2. Omron, Programming Manual”, OMRON Corporation, Japan, 2000.
3. Omron, Console Manual”, OMRON Corporation, Japan, 2000.
4. F. Ebel, G.Prede & D.Scholz, “Fundamentals of Pneumatics TP101, Textbook”, FESTO Didactic, Germany, 2004
5. F. Ebel, G.Prede & D.Scholz, “Pneumatic, Basic Level TP101, Textbook”, FESTO Didactic, Germany, 2004
6. F. Ebel, G.Prede & D.Scholz, “Pneumatics, Advanced Level TP102, Textbook”, FESTO Didactic, Germany, 2004

**DEE1233**
**Analog Electronics I**
**Credit Hours : 3**
**Pre-Requisite : DEE1123**

**Synopsis**

Nowadays, industrial demands especially in semiconductor devices are increasing rapidly. This requires a strong basic knowledge in semiconductors. In this course, an introduction of basic knowledge in analog electronics, that includes knowledge of semiconductors and modern electronic components such as diodes, rectifiers, capacitor as filters, and also BJT are covered. Their basic applications and circuit troubleshooting technique are also discussed in this course to meet the industrial demands.

**References**


1. Robert Boylestad, Electronic Devices and Circuit Theory, ISBN 0-13-394552-9, McGraw Hill, 2000
2. Thomas L. Floyd, Electronic Devices, ISBN 0-13-028484-X, Prentice Hall
3. Donald A. Neaman, Electronics Circuits Analysis and Design 2nd Edition, ISBN 0-07-118176-8, McGraw Hill, 2001
4. Theodore F. Bogart Jr., Electronic Devices and Circuits, 6th Edition, ISBN 0-13-121990-1, Prentice Hall, 2004


**DEE3313**
**Principles of Control Systems**
**Credit Hours: 3**
**Pre-Requisite: None**

**Synopsis**
This Course approaches the students to introduction to control system technology, its applications, system response, stability analysis and compensation. Give exposure to basic design of control system.

**References**


1. Katsuhiko Ogata, Modern Control Engineering, 4th Edition, Prentice-Hall,2002
2. Benjamin C. Kuo, Farid Golnaraghi, Automatic Control Systems, 8th Edtion, John Wiley, 2003


**DEE1223**
**Digital Electronics**
**Credit Hours: 3**
**Pre-Requisite: None**

**Synopsis**
This subject is emphasis on the fundamental of digital electronics. The student is first thought about the number system and logic gates before introducing them to digital IC technology. Then they are exposed to both combinational logic network and combinational MSI logic. In concurrence with this, the fundamental

of sequential logic, flip-flop, counter and shift register will be thought. Finally, the memory devices are introduced.

**References**


1. Tocci, R. J., "Digital Systems: Principles and Applications", 9th Ed. (2004), Prentice-Hall.
2. Kleitz, W., "Digital Electronics: A Practical Approach", 6th Ed. (2004), Prentice-Hall.
3. Thomas Floyd, "Digital Fundamental", 9th Ed. (2006), Prentice-Hall
4. Begnell & Donovan, "Digital Electronics", 4th Ed. (2000), Delmar Thomson Learning.


**DEE2931**
**Basic Programmable Logic Controller**
**Credit Hour: 1**
**Pre-Requisite: None**

**Synopsis**
This course is an advance level of PLC and pneumatic where student will be exposed to the industrial application of PLC and learn about tools and devices in electro pneumatic. The student will practically perform the PLC programming and practically execute it by using several applications. In electro pneumatic, students will learn to design and use electro pneumatic tools and application.

**References**


1. F. Ebel, G.Prede & D.Scholz, "Fundamentals of Electropneumatics TP101, Textbook", FESTO Didactic, Germany, 2004
2. F. Ebel, G.Prede & D.Scholz, "Electropneumatics, Basic Level TP201, Textbook", FESTO Didactic, Germany, 2004
3. F. Ebel, G.Prede & D.Scholz, "Electropneumatics, Advanced Level TP202, Textbook", FESTO Didactic, Germany, 2004
4. Omron, "OMRON User Manual", OMRON Corporation, Japan, 2000.
5. Omron, Programming Manual", OMRON Corporation, Japan, 2000.
6. Omron, Console Manual", OMRON Corporation, Japan, 2000.


**DEE2612**
**Basic Maintenance Technology**
**Credit Hours: 2**
**Pre-Requisite: None**

**Synopsis**
This course exposes the students to the required technical / engineering discipline knowledge and skills to diagnosis and correct faults across a wide range of equipment. The course will provides knowledge of different strategic approaches best suited to maintenance and the manufacturing environment and context.

**References**


1. Terry Wireman; "Benchmarking: Best Practises in Maintenance Management"; Industrial Press Inc., 2004, ISBN: 0831131683
2. Joel Levitt; "Complete Guide to Preventive and Predictive Maintenance"; Industrial Press Publication, December 20, 2002, ISBN: 0831131543
3. Anthony Kelly; "A (2002) Maintenance Strategy: A Business Centred Approach", Butterworth Henemann Burke, 2002


**DEE3313**
**Principles of Control Systems**
**Credit Hours: 3**
**Pre-Requisite: None**

**Synopsis**

This course introduces students the basic electrical power systems. Students will be exposed to the basic concept of power system management, the types and functions of protective devices and switchgears. Student will also be introduced to the principles of electrical machines. Student will learn the fundamental aspects of rotating electrical machines such as operational characteristics of electrical apparatus.

**References**


1. Wildi , Theodore, "Electrical Machines , Drives ,and Power System", 5th Edition, Prentice-Hall, 2002
2. Fehr.Ralph E., "Industrial Power Distribution", Prentice-Hall, 2002
3. Stephen J. Chapman; "Electric Machinery and Power System Fundamentals", 1st Ed., McGraw-Hill, New York, 2002.
4. Ryff, Peter F.; Electric Machinery 3rd Ed., Prentice Hall, New Jersey, 1998.
5. Nagrath I. J., Kothari D. P.; "Electric Machines", 2nd Ed., McGraw-Hill, New Delhi, 1997.


**DEE3213**
**Microprocessor Fundamentals**
**Credit Hours: 3**
**Pre-Requisite: None**

**Synopsis**

This course in an introduction to a microprocessor. Students are exposed to the internal architecture of the microprocessor, various instruction sets, and basic hardware design of microprocessor base. Students are also learned in team to complete a course projects to enhance knowledge in developing hardware and software in related to design of microprocessor base.

**References**


1. Wray, Using Microprocessors & Microcomputers: Motorola family, Prentice Hall

2. Tocci, Microprocessors & Microcomputers: Software & Hardware, Prentice Hall
3. Cahill, Digital & Microprocessor Engineering, Prentice Hall

**DEE3233**
**Analog Electronics II**
**Credit Hours: 3**
**Pre-Requisite: DEE1233**

**Synopsis**
Demands from industry on knowledgeable manpower especially who have in-depth knowledge in semiconductors area are increasing rapidly. To fulfill the demand, this course offer wide coverage of knowledge in analog devices. The topics covers CAD using PSpice, basic FET and amplifiers, power amplifiers, frequency response analysis as well as operational amplifiers. Their basic applications and circuit troubleshooting techniques are also discussed in this course in order to meet the industrial demands.

**References**
1. Robert Boylestad, "Electronic Devices and Circuit Theory", ISBN 0-13-394552-9, McGraw Hill, 2000.
2. Thomas L. Floyd, "Electronic Devices", ISBN 0-13-028484-X, Prentice Hall,2004.
3. Donald A. Neaman, "Electronics Circuits Analysis and Design", 2nd Edition, ISBN 0-07-118176-8, McGraw Hill, 2001.

**DEE2941**
**Motor Control**
**Credit Hour: 1**
**Pre-Requisite: None**

**Synopsis**
This course introduces student to three phase wiring and also motor control circuitry. The student will learn how to practically perform electrical wiring involving three phase supply and also the safety measures required. The student will also learn to design motor control circuitry such as forward reverse and star/delta connection, then practically test the connection by using real control and protection devices.

**References**
1. Rex Miller & Mark Richard Miller, "Electric Motors", Wiley Publishing Inc, Canada, 2004
2. Walter N. Alerich & Stephen L. Herman, "Electric Motor Control", Delmar Publishers, Canada, 1998.
3. Abd Samad Hanif, "Pemasangan dan Penyelenggaraan Elektrik", Dewan Bahasa & Pustaka, KL, 2000.
4. Mohd Isa Idris & Ramli Harun, "Asas Pendawaian", IBS Buku Sdn. Bhd, 2002.
5. Abd Samad Hanif, "Pemasangan Elektrik", Dewan Bahasa & Pustaka, KL, 2000.
6. William H. Clark, Electrical Design Guide for Commercial Buildings, McGraw-Hill, 1998

**DEE3413**
**Principles of Communication System**
**Credit Hours: 3**
**Pre-Requisite: None**

**Synopsis**
An introduction to communication technology where students are exposed to various fundamental techniques of communication. This includes the introduction to modulation techniques such as amplitude modulation (AM) and frequency modulation (FM). Digital modulation techniques such as pulse modulation, shift keying and line coding are also be discussed.

**References**

1. Couch II, Modern Communication Systems: Principles & Applications, Prentice Hall
2. Tomasi, Fundamental of Electronic Communications Systems, Prentice Hall
3. Tomasi, Advanced Electronic Communications Systems, Prentice Hall
4. Pearson, Basic Communication Theory, Prentice Hall
5. Roddy, Electronic Communications, Prentice Hall.


**DEE3323**
**Industrial Automations**
**Credit Hours: 3**
**Pre-Requisite: None**

**Synopsis**
This course mainly consists of three major modules which are related to industrial control application. Students will gain knowledge in theoretical part of modern control technology as well as application of control system in manufacturing and process control.

**References**

1. Warnock, I G., 1988, “Programmable Controllers, operation and application”, Prentice Hall .
2. Gupton, J A., 1986, “Computer controlled industrial machines processes and robots”, Prentice Hall.
3. Lansky, Z J. et al., 1986, “Industrial pneumatic control”, Marcel Dekker.


**DEE3223**
**Industrial Electronics**
**Credit Hours: 3**
**Pre-Requisite: None**

**Synopsis**
This course presents the characteristics of active filters using operational amplifiers, characteristics of the active filter using operational amplifiers, characteristics of thyristors, power supply design, power amplifier design and analysis of Analog to Digital Converter (ADC) and Digital to Analog Digital Converter (DAC).

**References**

1. Robert Boylestad, "Electronic Devices and Circuit Theory", ISBN 0-13-394552-9, McGraw Hill, 2000.
2. Thomas L. Floyd, "Electronic Devices", ISBN 0-13-028484-X, Prentice Hall,2004.
3. Donald A. Neaman, "Electronics Circuits Analysis and Design", 2nd Edition, ISBN 0-07-118176-8, McGraw Hill, 2001.

**DEE3263**
**Embedded Controller Technology**
**Credit Hours: 3**
**Pre-Requisite: None**

**Synopsis**
This course is an introduction to a microcontroller. Students are exposed to the internal architecture of the microcontroller, various instruction sets and basic hardware design of microcontroller-based. For this reason this course introduces the hardware, software, design and interface with various devices.

**References**

1. Wray, Using Microprocessors & Microcomputers: Motorola family, Prentice Hall.
2. Tocci, Microprocessors & Microcomputers: Software & Hardware, Prentice Hall.
3. Cahill, Digital & Microprocessor Engineering, Prentice Hall.

**DEE3941**
**Microcontroller Application**
**Credit Hours: 1**
**Pre-Requisite: None**

**Synopsis**
This course introduces student to basic autotronics knowledge and PC Interfacing. The student will learn on how to design an automatic controller using the combination of electronic circuit, switches, relay, timer, sensors, ac/dc motor, inverter and PLC. The student will also learn about communication technique between pc based controller to the hardware via RS232, USB or parallel port. It is intended for student to be familiar with the system design and programming of PC Based Data Acquisition & Control (DA&C) using commercially available DA&C cards. It provides a solid foundation to the students so that they can identify the proper applications of PC Based Data Acquisition & Control in industrial environment.

**References**

1. Sergio Franco, "Design with Operational Amplifier & Analogue Integrated Circuit, McGraw Hill, Singapore, 2002.
2. Nigel P. Cook, "Practical Electronics Second Edition", Prentice Hall, USA, 2002.
3. Barry Hollembeak, "Automotive Electricity & Electronics", Thomson, USA, 2003.

4. Stephens, Rod, "Visual Basic graphics programming: Hand-on applications and advance color development." Wiley, 2000.
5. Brey, Barry B, "The Intel Microprocessors: 8086/8088, 80186/80188, 80286, 80386, 80486, Pentium, Pentium Pro Processor, Pentium II, Pentium III and Pentium 4: architecture, programming and interfacing." Prentice Halls, 2003.

**DEE3719**
**Industrial Training (HW)**
**Credit Hours: 9**
**Pre-Requisite: None**

**Synopsis**
In industrial training the students should gain insight into the industrial practice, in order to visualize the tasks and possibilities of their later occupation work. All students are required to undergo an industrial training for a certain period that has been agreed by the faculty during the last semester of the academic year. The performance of each student during the periods of his/her Industrial Training is evaluated jointly by the faculty staff, and the representatives from employer organizations.

**References**
1. "Industrial Training Guidelines", KUKTEM.

**DEE3723**
**Industrial Training Report (HW)**
**Credit Hours: 3**
**Pre-Requisite: None**

**Synopsis**
All students are required to undergo an industrial training for a certain period that has been agreed by the faculty during the last semester of the academic year. The performance of each student during the periods of his/her Industrial Training is evaluated jointly by the faculty staff, and the representatives from employer organizations. The student is required to maintain proper records in his/her log book and submit the reports along with an Industrial Training Report on the training received by him/her.

**References**
1. "Industrial Training Guidelines", KUKTEM.

## BACHELOR PROGRAMME COURSE SYNOPSIS

**BEE4333**
**Intelligent Control**
**Credit Hours: 3**
**Pre-Requisite: None**

**Synopsis**
This course introduces students to the principles of Artificial Intelligence which includes Expert System, Fuzzy Logic, Artificial Neural Networks and Genetic Algorithms. Project based exercise will also included in order to have a better understanding on the course.

**Course Outcomes**
CO1: Explain the concept of intelligent control and their applications.
CO2: Analyze the Fuzzy Logic and Artificial Neural Networks through case study or project based exercise.
CO3: Analyze Genetic Algorithms system through case study.

**References**
1. Michael Negnevitsky, "Artificial Intelligence: A Guide to Intelligent Systems", Addison Wesley, 2005.
2. Marzuki Khalid, "Artificial Intelligence: Fuzzy Logic Module", Universiti Teknologi Malaysia.
Marzuki Khalid, "Artificial Intelligence: Artificial Neural Networks Module", Universiti Teknologi Malaysia

**BEE4373**
**Robotics**
**Credit Hours: 3**
**Pre-Requisite: None**

**Synopsis**
This course provides an understanding of the principles of operation of automated equipment with particular reference to the industrial robot. This course covers classification and various types of robots and its application, robot kinematics, differential kinematics, robot dynamics, robot path planning and robot sensing.

**Course Outcomes**
CO1: Understand robotics and sensing system, its basic components and applications.
CO2: Determine the velocity of a robot manipulator using Jacobian matrix.
CO3: Demonstrate the trajectory command that satisfies a set of constrained via points.
CO4: Apply techniques and skills of robot manipulation through laboratory work.
CO5: Analyze robot kinematics and dynamic.

**References**
1. Saeed B. Niku, "Introduction To Robotics: Analysis, Systems, Applications", Prentice Hall, 2001
2. Craig,J.J., "Introduction to Robotics: Mechanics and Control", 2nd ed, Addison-Wesley, 1989

3. Fu,K.S.,Gonzalez,R.C., Lee,C.S.G., "Robotics: Control, Sensing, Vision, and Intelligence", Mc-Graw-Hill, Singapore, 1987.

**BEE4523**
**Industrial Instrumentation**
**Credit Hours: 3**
**Pre-Requisite: None**

**Synopsis**
This course presents the process parameters that are applied in most processing industries of pressure, level, temperature and flow for both measurement and control applications. The principles applications of primary sensing elements, final control elements, transducers and transmitters which are used in process industries are discussed. Industrial application for instrumentation and process control is also covered.

**Course Outcomes**
CO1: Describe the concept and suitable instrument for process measurement.
CO2: Implement the equations involving pressure, temperature, level, flow, and final control element for numerical problems.
CO3: Analyze the information of measurement device and industrial application.
CO4: Evaluate the operation and installation procedure for selected measurement instruments in a particular industrial situation.
CO5: Communicate effectively through written communication.

**References**
1. Tony R.Kuphaldt, “Lesson in Industrial Instrumentation”, 2009.
2. William C.Dunn, “Introduction to Instrumentation, Sensors, and Process Control”, Arctech House, 2005.
3. Curtis D. Johnson, “Process Control Instrumentation Technology”, Prentice Hall 2006.
4. Alan S Morris, “Measurement & Instrumentation Principles”,Buterworth-Heinemann, 2001.

**BEE3233**
**Electronic System Design**
**Credit Hours: 3**
**Pre-Requisite: BEE1213**

**Synopsis**
In this course, the principles of advanced digital design will be introduced. It builds on logic design principles learned in BEE 1213 and demonstrates how digital design and rapid prototyping can be facilitated by FPGAs and hardware description languages (HDL). Digital design is taught at a higher level of abstraction than BEE1213. It has a lab component involving VHDL and FPGAs.

**Course Outcomes**
CO1: Describe the principles of designing finite state machines (FSM).
CO2: Implement logic circuit using HDL.

CO3: Design a digital system using combinational & sequential (medium scale Integrated logic) MSI component.
CO4: Design finite state machines based on electrical & electronics engineering problem.
CO5: Work in team and communicate effectively.

**References**

1. Katz, "Contemporary Logic Design", 2nd Ed., USA: Prentice Hall.
2. Givone, "Digital Principles and Design", USA: McGraw-Hill.
3. Tocci,R.J., "Digital Systems: Principles and Applications", 9th Ed., USA: Prentice-Hal

**BEE4253**
**Computer Vision System**
**Credit Hours: 3**
**Pre-Requisite: None**

**Synopsis**

This course introduces students to the principles of Computer Vision which includes image formation and low level image processing, theory and techniques for extracting features from images, measuring shape and location, and recognizing and classifying objects. Student will be exposed to design project using image processing software.

**Course Outcomes**

CO1: Apply the concept of computer vision and their Applications
CO2: Evaluate various image processing techniques.
CO3: Develop a simple vision system application using image processing software.

**References**

1. Rafael C. González, Richard Eugene Woods S.G. Kochan, "Digital image processing, 3rd Ed., USA: Person Prentice Hall, 2008
2. E.R. Davies, "Machine Vision: Theory, Algorithms, Practicalities", 2nd Ed. USA: Academic Press, 1997.

**BEE4323**
**Embedded Controller Technology**
Credit Hours: 3
Pre-Requisite: BEE1213

**Synopsis**

This course is an introduction to a microcontroller and is designed to give the students a fundamental understanding of the microcontroller-based system. It provides an introduction to the architecture and the design of hardware and software for the Motorola M68HC11. Various instruction sets and internal features are explained. Its applications as a single chip controller are discussed and its interfacing with various I/O devices is demonstrated.

**Course Outcomes**

CO1: Explain the architecture of the microcontroller.

CO2: Develop a firmware using assembly language.
CO3: Design a simple hardware based on 68HC11 microcontroller.
CO4: Work in a team and communicate effectively.

**References**


1. Wray, "Using Microprocessors & Microcomputers: Motorola family", Prentice Hall, 4th ed, 1998
2. Tocci, "Microprocessors & Microcomputers: Software & Hardware", Prentice Hall, 6th ed, 2002
3. Cahill, "Digital & Microprocessor Engineering", Prentice Hall, 1982
4. Motorola, "M6811 User's Manual", Motorola Inc.
5. Driscoll, "Data Acquisition and Process Control with the M68HC11 Microcontroller", Prentice Hall,
6. Miller, "Microcomputer Engineering", Prentice Hall, 3rd ed, 2003
7. Cady, "Software and Hardware Engineering", Oxford University Press, 1997
8. Spasov, "Microcontroller Technology: The 68HC11", Prentice Hall, 5th ed, 2004
9. Skroder, "Using 68HC11 Microcontroller", Prentice Hall, 1996


**BEE4233**
**Data Communications**
**Credit Hours: 3**
**Pre-Requisite: None**

**Synopsis**

This course emphasizes the importance and the applications of the Data Communications in the Electrical & Electronics Engineering courses. The syllabus covers data communications, communication networks and TCP/IP protocol suite.

**Course Outcomes**

CO1: Define data communications generally and describe various types of computer network protocols.
CO2: Identify data transmission using ISO standard and explain the protocol of data transmission.
CO3: Determine standard interface for certain data network protocols.

**References**


1. Stallings, "Data and Computer Communications". Prentice Hall.
2. Forouzan,B.A., "Data Communications Networking". McGraw Hill.

**BEE4313**
**Multimedia Technology & Applications**
**Credit Hours: 3**
**Pre-Requisite: None**

**Synopsis**
This subject emphasizes on integration of multiple media (text, images, audio, video and animation) using various practices of software application and to develop multimedia system. It introduces how multimedia can be used in various application areas. Issues in multimedia will also be discussed.

**Course Outcomes**
CO1:Demonstrate the knowledge of principles in multimedia (text, images, audio, video and animation), compression techniques and multimedia technologies
CO2: Practice various type of software application in multimedia system.
CO3: Develop a multimedia system
CO4: Work effectively as an individual, and as a member/leader in a team.

**References**
T. Vaughan, "Multimedia: Making it Work", McGraw Hill, 2008.
2. N. Chapman and J. Chapman, "Digital Multimedia", Wiley, 2004.

**BEE4413**
**Digital Signal Processing**
**Credit Hours: 3**
**Pre-Requisite: None**

**Synopsis**
This course introduces students to the fundamental principles of digital signal processing including sampling theorems, z-transform, Linear Time-invariant systems analysis, Discrete-Time Systems structures, Filter design and Discrete Fourier Transform. This course also exposes students to computational tools (MATLAB) in solving engineering problems related to DSP.

**Course Outcomes**
CO1: Describe the DSP fundamental theory and components
CO2: Apply z-transform for analysis of discrete time system
CO3: Define various structure of discrete-time system
CO4: Design various types of FIR and IIR filter based on a set of specification.
CO5: Apply DFT technique to analyze signal

**References**
1. Proakis,J.G., Monolakis,D.G., "Digital Signal Processing: Principles, Algorithms and Applications", 4th Ed., Prentice Hall, 2007.
2. Mitra,S.K., "Digital Signal Processing: A Computer-Based Approach", 3rd Ed., McGraw-Hill, 2005.
3. Hayes, M.H., "Schaum's Outline of Theory and Problems of Digital Signal Processing", McGraw-Hill, 1999.I

4. Oppenheim,A.V., Schafer,R.W., "Discrete-Time Signal Processing", 2nd Ed., Prentice Hall, 1999.
5. Ingle,V.K., Proakis,J.G., "Digital Signal Processing using MATLAB", Thompson, 1907.

**BEE3132**
**Power Generation & Operation**
**Credit hours: 3**
**Pre-Requisite: None**

**Synopsis**
This course introduces students to the concept of power system operation and control. Students will be exposed to the concept of power system management to meet load demand at optimal operating cost and various ways in controlling electrical power

**Course Outcomes**
CO1: Perform calculation and analyze related to planning of electrical power.
CO2: Differentiate and analyze control method in power.
CO3: Model and analyze power system network under steady state conditions using power system software.
CO4: Work in team and communicate effectively.

**References**
1. Wood, A.J. & Wollenberg,B.F., "Power Generation, Operation & Control", 2nd Edition, Wiley-interscience, 1996.
2. P.Kundur, "Power System Stability and Control", Mc-Graw Hill, Inc, 1997.
3. Weedy, B.M. & Cory,B.J., "Electric Power Systems", 4th Edition, Wiley, 2001

**BEE3143**
**Power System Analysis**
**Credit Hours: 3**
**Pre-Requisite: BEE3133**

**Synopsis**
This course introduces students to the fundamental concepts of power system analysis which covered the power flow problem analysis, balanced and unbalanced fault analysis and stability evaluation. Students will be exposed to the problems commonly encountered in power system engineering practice, analysis and techniques applied to solve some practical problems in power systems.

**Course Outcomes**
CO1: Analyze the power flow equations for an n- bus power system.
CO2: Analyze balance and unbalance fault analysis.
CO3: Evaluate the performance of power system stability.
CO4: Analyze model of power system network under steady state and faults conditions using power system software.
CO5: Work in team effectively.

**References**
1. Saadat, H., "Power System Analysis", 2nd Edition, McGraw-Hill, 2004

2. Grainger, J.J. and Stevenson Jr, W.D., "Power System Analysis", International Edition, McGraw-Hill,1994

**BEE4143**
**Power System Protection & High Voltage**
**Credit Hours: 3**
**Pre-Requisite: None**

**Synopsis**
This course introduces students to the concept of power system protection and high voltage engineering. It covers in detail the components of power system protections and relay coordination. The theory of high voltage engineering will also be covered in this course.

**Course Outcomes**
CO1: Describe the components of power system protection.
CO2: Recognize the various type of circuit breaker
CO3: Design the relay setting of IDMT and distance protection
CO4: Explain the concepts of high voltage engineering
CO5: Work in team and communicate effectively.

**References**
1. Short, T.A., "Electric Power Distribution", 1st Edition, CRC Press, 2004
2. Pansini,A.J., "Guide to Electrical Power Distribution Systems", 6nd Edition, CRC Press, 2005
3. Naidu, M.S. and Kamaraju, V., "High Voltage Engineering", 3rd Edition, McGraw Hill, 2004
4. Kock, J. D. and Strauss, C., "Practical Power Distribution for Industry", 1st Edition, Newness, Elsevier, 2004

**BEE4163**
**Alternative Energy**
**Credit Hours: 3**
**Pre-Requisite: None**

**Synopsis**
This course introduces students to the alternative energy theories and concepts of some components and energy utilization in electric power system industries. It covers energy conversion, utilization and storage system for renewable technologies such as solar, wind, biomass, fuel cell, wave and etc. This course emphasis on fundamental of photovoltaic (PV) systems such as solar energy potential and solar energy resources, solar cells and its electrical characteristics, PV modules and array, PV modules interconnection, conversion into electrical energy, energy storage, power conditioning and maximum power point tracking (MPPT), inverter control topologies, design and sizing for stand-alone and grid-connected system. It also touches upon the environmental consequences of energy conversion and how alternative energy can reduce pollution and global climate change

**Course Outcomes**
CO1 : present alternative energy scenario
CO2 : Understanding solar resources and PV system components.
CO3 : Explain effects of power system to environment.
CO4 : Design PV System for power generation

**References**


1. Fundamentals of Renewable Energy Processes, Aldo Da Rosa, Elsevier Academic Press, ISBN 0120885107
2. A. Goetzberger, V. U. Hoffmann, *Photovoltaic Solar Energy Generation*, Springer-Verlag, 2005.
3. Botkin, D.B. & Keller, E.A., "Environmental Science: Earth as a Living Planet", 5th Edition, John Wiley & Sons Inc., 1996.


**BEE3133**
**Electrical Power Systems**
**Credit Hours: 3**
**Pre-Requisite: BEE1133**

**Synopsis**

This course introduces the fundamental of electrical power system which are the overview of power system, generation, transmission lines, distribution, representation of components, basic power system analysis.

**Course Outcomes**

CO1: Discuss the roles of each component in Malaysian power system operation and explain the basic concept of electricity tariff and energy efficiency.
CO2: Analyse the basic design concepts and perform component representation using per-unit system.
CO3: Derive and apply suitable equations related to parameters, models and performances of power transmission lines.
CO4 : Work in team effectively

**References**


1. Hadi Saadat, "Power System Analysis", 2nd Edition, Mc-Graw Hill, 2004.
2. W. Theodore, "Electrical Machines, Drives and Power System", 5th Edition, Prentice-Hall, 2002.
3. William D. Stevenson, Jr., "Element of Power System


**BEE4113**
**Electrical Installation Design**
**Credit Hours: 3**
**Pre-Requisite: None**

**Synopsis**

This course provides knowledge in electrical installation design especially for commercial buildings. It explores the basic estimation and design procedure based on various codes of practice and standards. Student will be introduced to design a few basic systems in electrical installation such as lighting, protection system, grounding and lightning protection. Students also involve in problem solving and troubleshooting technique when they study on system inspection and testing.

**Course Outcomes**

CO1: Design lighting layout and power layout using CADD software.
CO2: Estimate electrical load for an installation and design single-line diagram for the installation.
CO3: Explain the protection system used in electrical installation.

CO4: Design grounding system and lightning protection system.
CO5: Explain basic inspection and testing for building electrical installations.

**References**


1. The Institute of Electrical and Electronics Engineers, Inc, "An American National Standard IEEE Guide for Safety in AC Substation Grounding", ISBN 471-85393-3, IEEE, 1986.
2. Abd. Samad Hanif, "Pemasangan dan Penyelengaraan Elektrik", Dewan Bahasa dan Pustaka, 1994.
3. Institution of Electrical Engineers, "Regulations For Electrical Installations", 16th Edition, ISBN 0-852965-10-9, The Institution of Electrical Engineers.
4. National Fire Protection Association, "NFPA 780: Standard for the Installation of Lightning Production Systems",2008 Edition.


**BEE4153**
**Power Quality**
**Credit Hours: 3**
**Pre-Requisite: None**

**Synopsis**

This course is an introduction to power quality disturbances. It first introduces the concept of power quality and then quantifies the particular power quality disturbances that fall within the wider umbrella of electromagnetic phenomena. It provides a strong foundation for better understanding of the underlying principles of each power quality problem. Students are exposed to power quality solutions, standards, monitoring tools, grounding practices and distributed generation.

**Course Outcomes**

CO1: Identify types of power quality disturbances.
CO2: Classify problems and effects of power quality.
CO3: Evaluate methods to eliminate power quality interference
CO4: Assess severity of power quality disturbances.
CO5: Work in group environment.

**References**


1. Dugan,R.C., McGranaghan,M.F., Santoso,S. and Beaty, H.W., "Electrical Power Systems Quality", 2nd Edition, McGraw-Hill, 2003.
2. Kennedy, B.W., "Power Quality Primer", McGraw-Hill,2000.


**BEE4223**
**Power Electronics and Drive Systems**
**Credit Hours: 3**
**Pre-Requisite: None**

**Synopsis**

The primary objective of the course is to give students a foundation of knowledge, understanding, analysis and design of power electronics circuits for conversion and control of electrical energy. The course presents concepts, fundamentals analysis tools, practical consideration for design, and a range of power

electronics applications. Practical experiments in the laboratory will also be conducted. Students will be exposed to the power converter, PWM switching techniques, DC and induction motor drives.

**Course Outcomes**

CO 01: Demonstrate switching characteristics of basic solid state power devices, operating principles, advantages and disadvantages of basic power electronic converter topologies
CO 02: Analyze power electronic converters using commercially available simulation tools.
CO 03: Design power electronic converters to meet functional objectives
CO 04: Work effectively in team

**References**


1. Mohan, Undeland and Robbins, "Power Electronics - Converters, Applications and Design", John Wiley & Son.
2. M. H. Rashid, "Power Electronics - Circuits, Devices and Applications", ISBN 0-131228, Prentice Hall.
3. D. W. Hart, "Introduction to Power Electronics", ISBN 0-02351182-6, Prentice Hall.
4. P.C. Sen, "Principles of Electrical Machines and Power Electronics", ISBN 0-471-02295-0, John Wiley & Sons.
5. T. Wildi, "Electrical Machines, Drives and Power Systems", ISBN 00-13-098637-2, Prentice Hall.


**BEE4343**
**Process Control**
**Credit Hours: 3**
**Pre-Requisite: None**

**Synopsis**

The course introduces students to establishing the process performance through methods of specifying and measuring process performance. With basic overview of the control loop and its components, this leads students for designing process control loops, process control improvement and techniques to assist in the process of identifying the potential for improved process control performance in team.

**Course Outcomes**

CO1 : Describe the basic principles and objectives of control in process industries
CO2 : Apply knowledge of mathematics and sciences to process dynamics and control
CO3 : Analyze and utilize process input output data to form empirical models of a process plant
CO4: Use and apply modern computational techniques and tools for solving process control problems.
CO5: Evaluate PID controller performance with different tuning strategies
CO6: Work effectively in team

**References**
1. Marlin,T.E., "Process Control",2nd Edition, Mc-Graw-Hill, USA, 2000.
2. Stefani et. al, "Design of Feedback Control Systems",4th Edition, Oxford, NY, 2002.
3. Smith,C.A., "Automated Continuous Process Control ", John Wiley, USA, 2002

**BEE4313**
**Industrial Control Technology**
**Credit Hours: 3**
**Pre-Requisite: None**

**Synopsis**
This course mainly consists of three major modules which are related to industrial control application. Students will gain knowledge in theoretical part of modern control technology as well as application of control system in manufacturing and process control

**Course Outcomes**
CO1: Describe types of controller to be used in industrial applications.
CO2: Derive mathematical modeling of fluid system.
CO3: Analyze suitable controller for manufacturing and process application.
CO4: Evaluate the application of analogue and digital Controllers

**References**
1. Johnson,C.D., "Process Control Instrumentation Technology", Prentice Hall Internation, 2003.
2. Bartelt, "Industrial Control Electronic", Delmar Thomson Learning, 2002.
3. Ogata,K., "Modern Control Engineering", Prentice Hall, 2002

**BEE4383**
**Computer Controlled Systems**
**Credit Hours: 3**
**Pre-Requisite: None**

**Synopsis**
This course introduces students to the basic design and analysis tools used in practical discrete-time and sampled data control systems as well as to give an exposure of the student to the general area of linear systems theory which appears so very often in all branches of engineering.

**Course Outcomes**
CO1: Identify the principles of signal conversion in digital control systems
CO2: Apply the sampling process, associated theorem and various form of sampling operations
CO3: Apply the mathematical modeling of the discrete-time system in z-domain
CO4: Apply various method of discretization of analog transfer function into discrete-time

CO5: Apply realization of Digital Filters and Controllers
CO6: Analyze the quantization effect due to truncation and rounding propagating through system's transfer function

**References**


1. Ogata, K., Discrete Time Control Systems, Prentice-Hall Int.
2. Kuo, B.C., Digital Control System, 2nd Edition, Holt, Rinehart and Winston.
3. Paraskevopoulos, P.N., Digital Control Systems, Prentice-Hall Int.


**BEE1931**
**Basic Electronic Applications**
**Credit Hours: 2**
**Pre-Requisite: None**

**Synopsis**

Students will learn how to use power supply, function generator, digital multimeter, oscilloscope, analog digital trainer and IC tester. The students will learn on how to design a switching circuit and how to interface between electronics and electrical circuit.

**Course Outcomes**

CO1: Apply right safety precaution in laboratory and workplace.
CO2: Utilize DC power supply, oscilloscope, function generator, digital multi-meter and Analog Digital Trainer.
CO3: Recognize the function of switches, relays and sensor.
CO4: Construct electrical and electronic circuit to meet design requirement.

**References**


1. Paul B Zbar, Basic electronics : a text-lab manual, New York: Glencoe, 1994
2. Thomas L. Floyd, Electronics fundamentals : circuits, devices and applications, Prentice Hall, 2004
3. Martin Feldman, Electronics laboratory manual, Prentice Hall, 2002


**BEE1951**
**Technical Drawing**
**Credit Hours: 2**
**Pre-Requisite: None**

**Synopsis**

This course covers theoretical knowledge and practical-based on doing technical drawing by using mainly AUTOCAD software. The software is focusing on the fundamental level of AUTOCAD skill until the plotting technique. The students will be guided and exposed to draw basic technical drawing, electrical and electronic circuit diagrams as well as the geometrical drawing.

**Course Outcomes**

CO1: Identify the basic commands and functions in AUTOCAD.

CO2: Use AUTOCAD software as the main tool to draw technical drawing especially in electrical and electronics engineering field.

**References**

1. Lockhart, Shawna , *A Tutorial Guide to AutoCAD 2008*, Pearson Education, 2007.
2. Grabowski, Ralph , *Using Autocad 2008*, Thomson Learning, 2007.

**BEE2931**
**Basic Programmable Logic Controller**
**Credit Hours: 2**
**Pre-Requisite: None**

**Synopsis**

This course covers the fundamental of Programmable Logic Controller (PLC) included input and output component, memory address, wiring diagram, troubleshooting and design of a ladder diagram.

**Course Outcomes**

CO1: Describe the basic principle of PLC and it's function
CO2: Implement PLC Hardware configuration.
CO3: Execute and practice PLC Programming for specific tasks.
CO4: Practice right attitude and safety procedure.

**References**

1. Jon Stenerson "Industrial Automation and Process Control",Upper Saddle River, NJ: Prentice Hall,2003
2. John R Hackworth & Frederick D Hackworth,Jr "Programmable Logic Controller:Programming Method and Application",Upper Saddle River,NJ:Prentice Hall,2004
3. OMRON "Sysmac CQM1H Series Operation Manual",Revised August 2005
4. Frank D. Petruzella, "Programmable Logic Controllers", 3rd Edition, Mc-Graw Hill, 2005.
5. Omron, "Programming Manual", Revised December 2003, Omron Corporation, 2003.

**BEE2951**
**PLC Applications**
**Credit Hours: 2**
**Pre-Requisite: None**

**Synopsis**

The student will learn on how to design the PLC Programming to control simple manufacturing applications. Students are also exposed to the analog input and output of PLC card.

**Course Outcomes**

CO1: Configure the Analog Input and Output of PLC Card
CO2: Demonstrate and discuss the function of discrete and analog card.
CO3: Identify input and output component of simple manufacturing applications

CO4: Develop a program to operate the manufacturing applications
CO5 : Practices right attitude and safety procedures

**References**


1. Frank D. Petruzella, “Programmable Logic Controllers”, 3rd Edition, Mc-Graw Hill, 2005.
2. Omron, “Programming Manual”, Revised December 2003, Omron Corporation, 2003.
3. Omron, “Operation Manual”, Revised June 2001, Omron Corporation, 2001.
4. F. Ebel, G. Prede, D. Scholz,”Electropnuematics Basic Level”, 07/2004, Festo DidacticGmbH & Co, 2004
5. John R Hackworth & Frederick D Hackworth,Jr


**BEE3931**
**PC Interfacing**
**Credit Hours: 2**
**Pre-Requisite: None**

**Synopsis**

This subject covers the development of Graphical User Interface (GUI) using programming software and the communication technique between pc based controller to the hardware via DAQ CARD .It is intended for student to be familiar with the system design and programming of PC Based Data Acquisition & Control (DA&C) using commercially available DA&C cards. It provides a solid foundation to the students so that they can identify the proper applications of PC Based Data Acquisition & Control in industrial environment

**Course Outcomes**

CO1: Develop Graphical User Interface (GUI) using programming software
CO2: Design a simple program to control specific applications
CO3: Identify hardware specifications to integrate with software
CO4: Develop a program to interface between software and Hardware
CO5: Apply right safety precaution in laboratory and workplace.

**References**


1. Davidson, Jack W. C++ (Computer program language), New York: McGraw-Hill, 1999.
2. Ramteke, Timothy, “Borland C++ Builder to accompany Introduction to C and C++ for technical students, a skill building approach”, Upper Saddle River, NJ: Prentice Hall, 1998


**BEE1941**
**Electrical Wiring**
**Credit Hours: 2**
**Pre-Requisite: None**

**Synopsis**

This course introduces students to the single phase and three phase wiring and installation. The students will learn about supply system, rules and regulation, wiring system and electrical

protection system. They are also will practice in applying trunking and conduits for electrical wiring as well as doing fitting and installation of electrical system devices. Then, they will conduct inspection and testing on their wiring and installation as safety conformation and fulfill the regulations.

**Course Outcomes**

CO1: Interpret rules and regulation for electrical wiring comprising of cable selection, load calculation, inspection and testing.
CO2: Construct the single phase and three phase electrical wiring correctly.
CO3: Use suitable wiring tools and accessories.
CO4: Demonstrate right attitude and safety implementation.

**References**


1. Paul Cook,"Commentary on IEE wiring regulations" 16th edition BS 7671:2001
2. "Selection and Erection Guidance Note 1", IEE Wiring Regulations BS 7671:2001
3. "Isolation And Switching Guidance Note 2", IEE Wiring Regulations BS 7671:2001
4. "Inspection And Testing Guidance Note 3", IEE Wiring Regulations BS 7671:2001
5. "Guidelines for Electrical Wiring In Residential Buildings", Suruhanjaya Tenaga, 2008.


**BEE1961**
**Motor Control**
**Credit Hours: 2**
**Pre-Requisite: None**

**Synopsis**

This course exposes students to various types of three phase induction motor starting circuit. The students also will learn about the principle of electrical motor and its protection system.

**Course Outcomes**

CO1: Explain the function, types and components of electrical motor.
CO2: Implement motor starter circuit.
CO3: Construct motor control circuit using suitable tools and accessories.
CO4: Practice right attitude and safety implementation.

**References**


1. Rex Miller & Mark Richard Miller, "Electric Motors",Wiley Publishing Inc, Canada, 2004.
2. Walter N. Alerich & Stephen L. Herman, "Electric Motor Control", Delmar Publishers, Canada, 1998.


**BEE2941**
**Basic Electropneumatics**
**Credit Hours: 2**
**Pre-Requisite: None**

**Synopsis**
This subject covers about pneumatic and electropneumatics system starting from energy supply, input elements, processing elements, control elements and working elements. The student also will learn how to used electropneumatic tools and design electropneumatic control system using relay, timer, counter and sensors.

**Course Outcomes**
CO1: Describe pneumatic & electropneumatic system and its components.
CO2: Identify operation of various type of sensors related to pneumatic system.
CO3: Design pneumatic & electropneumatic control system.
CO4: Practice right attitude and safety procedure.

**References**

1. F. Ebel, G.Prede & D.Scholz, “Fundamentals of Pneumatics TP101, Textbook”, FESTO Didactic, Germany, 2004
2. F. Ebel, G.Prede & D.Scholz, “Pneumatic, Basic Level TP101, Textbook”, FESTO Didactic, Germany, 2004
3. F. Ebel, G.Prede & D.Scholz, “Pneumatics, Advanced Level TP102, Textbook”, FESTO Didactic, Germany, 2004
4. F. Ebel, G.Prede & D.Scholz, “Fundamentals of Electropneumatics TP101, Textbook”, FESTO Didactic, Germany, 2004
5. F. Ebel, G.Prede & D.Scholz, “Electropneumatics, Basic Level TP201, Textbook”, FESTO Didactic, Germany, 2004
6. F. Ebel, G.Prede & D.Scholz, “Electropneumatics, Advanced Level TP202, Textbook”, FESTO Didactic, Germany, 2004


**BEE2961**
**Industrial Electropneumatic**
**Credit Hours: 2**
**Pre-Requisite: None**

**Synopsis**
The students will learn on how to control and integrate the electro pneumatics system using programmable logic controller (PLC). This subject focuses on applying programming for various types of electropneumatics applications.

**Course Outcomes**
CO1: Understanding of programmable logic controller structure and configurations.
CO2: Understand and apply ladder programming instruction
CO3: Design and apply programmable logic controller in electropneumatics applications.
CO4: Practice right attitude and safety procedure.

**References**

1. F. Ebel, G.Prede & D.Scholz, “Electropneumatics, Advanced Level TP202, Textbook”, FESTO Didactic, Germany, 2004

2. Siemens AG, “Simatic S7-300 Automation System, Tecnological Functions Manual Ed. 05/2003”, Siemens AG, 2003
3. Siemens AG, “Simatic Programming with STEP 7 manual”, Siemens AG, 2004
4. Siemens AG, “Simatic S7-300, Technical data Manual Ed. 08/2004”, Siemens AG, 2004

**BEE3941**
**Microcontroller Applications**
**Credit Hours: 2**
**Pre-Requisite: None**

**Synopsis**
This course exposes students to the Peripheral Interface Circuit programming and hardware configurations. Beginning with understanding on PIC architecture, applying programming software is used to operate hardware function. Several applications such as ADC, PWM, UART for USB and LCD functions are used to get more functioning development for PIC control system.

**Course Outcomes**
CO1: Explain the function, types and components of PIC control system.
CO2: Implement PIC hardware and software.
CO3: Demonstrate right attitude and safety implementation.
CO4: Construct PIC circuit using suitable tools and components.

**References**
1. Huang, Han-Way, “PIC microcontroller : an introduction to software and hardware interfacing ”, Clifton Park, NY: Thomson/Delmar Learning, 2005.
2. Iovine, John, **“**PIC microcontroller project book : for PICBasic and PICBasic pro compilers “,New York: McGraw-Hill, 2004
3. Mazidi, Muhammad Ali, **“**PIC mictocontroller and embedded systems : using Assembly and C forPIC 18 “,Upper Saddle River, NJ : Prentice Hall, 2008

**BEE1133**
**Circuit Analysis I**
**Credit Hours: 3**
**Pre-Requisite: None**

**Synopsis**
This course introduces the basic concepts and engineering methods of DC and AC circuit analysis. The contents include Ohm's Law, Kirchhoff's Law, series and parallel circuits, Mesh and Nodal analysis, Source Transformation Theorems, and responses of basic First Order circuits.

**Course Outcomes**
CO1: Describe basic principle of laws, rules and circuit analysis (Direct Current and Alternating Current).
CO2: Analyze linear circuits.
CO3: Apply the circuit analysis techniques to solve any given linear electric circuit.

CO4: Work in a team and communicate effectively

**References**

1. C. Alexander and M. Sadiku, "Fundamentals of Electric Circuits", 4th ed., McGraw-Hill, 2008.
2. J. Nilsson and S. Riedel, "Electric Circuits", 8th ed., Prentice Hall, 2008.

**BEE1143**
**Electric Circuits II**
**Credit Hours: 3**
**Pre-Requisite: BEE1133**

**Synopsis**

This course provides the basic concepts and engineering methods of DC and AC circuits. The contents include applications of Mesh and Nodal analysis, Superposition and Source Transformation Theorems, Thevenin and Norton Theorem. Resonant circuit, second order circuit and Balanced 3-phase circuits are also covered.

**Course Outcomes**

CO1: Describe the basic principles of circuit theorems (DC and AC)
CO2: Perform AC steady-state power calculations, power triangle and power factor correction.
CO3: Analyze variation RLC circuits using frequency domain and resonant parameter.
CO4: Analyze second order circuits.
CO5: Apply the theorems and concepts in order to analyze any given linear electric circuit.
CO6: Work in a team and communicate effectively.

**References**

1. C. Alexander and M. Sadiku, "Fundamentals of Electric Circuits", 2nd ed., McGraw-Hill, 2004.
2. J. Nilsson and S. Riedel, "Electric Circuits", 6th ed., Prentice Hall, 2001

**BEE1213**
**Digital Electronics**
**Credit Hours: 3**
**Pre-Requisite: None**

**Synopsis**

This course emphasizes on the fundamental of digital electronics. The student is first taught about the number system and logic gates before introducing them to digital IC technology. Then they are exposed to both combinational logic network and combinational MSI logic. In concurrence with this, the fundamental of sequential logic, flip-flop, counter and shift register will be taught. Finally, the memory devices are introduced.

**Course Outcomes**
CO1: Apply various techniques for digital logic simplification
CO2: Apply basic gates, flip flops and MSI in digital circuit
CO3: Analyze simple logic system
CO4: Work in a team and communicate effectively

**References**
1. R.J. Tocci, "Digital Systems: Principles and Applications", 10th Ed., USA: Prentice-Hall, 2006
2. W. Kleitz, "Digital Electronics: A Practical Approach", 8th Ed., USA: Prentice-Hall, 2007
3. T. Floyd, "Digital Fundamental", 10th Ed., USA: Prentice-Hall, 2008
4. Begnell and Donovan, "Digital Electronics", 5th Ed., USA: Delmar Thomson Learning, 2006

**BEE1222**
**Computer Programming**
**Credit Hours: 2**
**Pre-Requisite: None**

**Synopsis**
This course presents the C programming language for electrical & electronic engineer. The contents emphasis not only on the theoretical knowledge of programming but also the practical implementation in real-life situation. Students will learn basic structure of computer programming in C language. Students will also be exposed to method for basic hardware/software interfacing.

**Course Outcomes**
CO1: Explain basic hardware/software interfacing.
CO2: Demonstrate structure programming technique using high level language.
CO3: Use computer programming techniques in solving electrical & electronics engineering problem.
CO4: Work in team and communicate effectively.

**BEE1313**
**Instrumentation & Measurement**
**Credit Hours: 3**
**Pre-Requisite: None**

**Synopsis**
This course introduces students to the principles of instrumentation and measurements, determination of error that caused by the meters. The students will be exposed to the architecture and the operation of DC and AC meters, oscilloscope, signal generator, sensors and transducers, analysis of DC and AC meters and introduction to signal conditioning.

**Course Outcomes**
CO1: Describe the elements of Instrumentation & Measurement System.
CO2: Solve numerical problems for AC and DC meters.

CO3: Demonstrate the operation of oscilloscope, signal generator, measuring devices and their applications.
CO4: Communicate and express idea effectively.

**References**


1. Larry D. Jones , A. Foster Chin, "Electronic Instruments and Measurements", 2nd Edition,Prentice-Hall, 1995.
2. J. P. Holman, "Experimental Methods for Engineers", 7th Edition, McGraw-Hill, 2001.
3. Curtis D. Johnson, "Process Control Instrumentation Technology", 7th Edition, Prentice-Hall, 2003.


**BEE2123**
**Electrical Machines**
**Credit Hours: 3**
**Pre-Requisite: None**

**Synopsis**

This course introduces the fundamental concepts and principles of transformer and various types of electrical machines. It is intended for students to understand fundamental aspects of rotating electrical machines. The first part of the course is a quick review of some electromagnetism fundamental while the following will deal with the transformers and different types of electrical machines.

**Course Outcomes**

CO1: Describe the basic principles of selected electrical machines.
CO2: Analyze the transformer and machines equivalent circuits.
CO3: Analyze the operating conditions for electrical machines under steady state conditions.
CO4: Determine and interpret the parameters of transformer and torque-speed characteristics of rotating machines.
CO5: Communicate effectively

**References**


1. Stephen J. Chapman, "Electric Machinery and Power System Fundamentals", 1st ed., McGraw-Hill, New York, 2002.
2. Theodore Wildi, "Electrical Machines, Drives, and Power Systems", 5th ed., Prentice Hall, New Jersey, 2002.
3. A.E. Firtzgerald, Charles Kingsley, Jr., Stephen D. Umans, "Electric Machinery", 6th ed., McGraw-Hill, New York, 2003.
4. Charles I. Hubert, "Electric Machines", 2nd ed., Prentice Hall, New Jersey, 2002.


**BEE2143**
**Signals & Networks**
**Credit Hours: 3**
**Pre-Requisite: BUM2133**

**Synopsis**

This course introduces the students to various signals transformation techniques and its application to electrical circuits. This includes Fourier Series, Fourier Transforms and Laplace

Transform. The concept of transfer function is introduced in filter analysis and design with additional two port network techniques.

**Course Outcomes**

CO1: Identify various types of signals and systems.
CO2: Apply Fourier and Laplace transform in solving electrical circuit problems.
CO3: Analyze filters characteristic and obtain its transfer function.
CO4: Apply two-port parameters in solving electrical circuit problems

**References**


1. Alexander, Sadiku, "Fundamentals of Electric Circuits", 3rd Edition. McGraw-Hill, 2007.
2. M.J. Roberts, "Signals and Systems : Analysis Using Transform Methods and MATLAB", McGraw-Hill, 2003.
3. Simon Haykin, Barry Van Veen, "Signals and Systems", 2nd Ed., Wiley, 2003.
4. A.V. Oppenheim, A.L. Willsky, "Signals & Systems", 2nd Edition., Prentice Hall, 1997.


**BEE2213**
**Analog Electronics I**
**Credit Hours: 3**
**Pre-Requisite: BEE1133**

**Synopsis**

This course introduces the fundamental of semiconductor devices which are diodes and transistors. It also describes BJT transistors operational characteristic that covers the DC and AC analysis. In addition, the various type of BJT configuration will be examined and analyzed. Furthermore, the analysis of the amplifier circuit will be extended to its frequency response.

**Course Outcomes**

CO1: Describe the characteristic and operation of semiconductor diodes and BJT transistor properties in AC and DC condition
CO2: Analyze the operating condition of various BJT configuration in AC and DC condition
CO3: Determine the frequency response of various BJT configuration

**References**


1. Boylestad R. L. and Nashelsky L., "Electronic Devices and Circuit Theory", 9th edition, ISBN0-13-197408-4, Prentice Hall , 2006.
2. Floyd T. L., "Electronic Devices", 8th edition, ISBN 978-0-13-615581-2, Prentice Hall,2008.
3. Paynter R. T., "Introductory Electronic Devices and Circuits", ISBN-0-13-120675-3, Prentice Hall, 2003

**BEE2223**
**Microprocessor**
**Credit Hours: 3**
**Pre-Requisite: BEE1213**

**Synopsis**
This course in an introduction to a microprocessor. Students are exposed to the internal architecture of the microprocessor, various instruction sets, and basic hardware design of microprocessor-based

**Course Outcomes**
CO1: Explain the architecture of the microprocessor system.
CO2: Use assembly language to program a microprocessor system.
CO3: Develop a simple hardware based on 68000 microprocessor
CO4: Work in a team and communicate effectively

**References**

1. Wray, "Using Microprocessors & Microcomputers: Motorola Family", 5th Ed., Prentice Hall
2. Tocci, "Microprocessors & Microcomputers: Software & Hardware", 5th Ed., Prentice Hall
3. Cahill, "Digital & Microprocessor Engineering", 2nd Ed., Prentice Hall
4. M. Munim and A. Zabidi, "Mikropemproses Famili 6800", Malaysia: UTM Motorola, "M6811 User's Manual", Motorola Inc.


**BEE2233**
**Analog Electronics II**
**Credit Hours: 3**
**Pre-Requisite: BEE2213**

**Synopsis**
This course introduces the fundamental of semiconductor devices which are transistors. It also describes Field-Effect Transistor (FET) operational characteristic that covers the DC and AC analysis. Some important devices such as op-amp and active filters are also introduced. Towards the end of this course, students are exposed to the applications of these semiconductor devices. During the laboratory sessions, students are expected to demonstrate and troubleshoot basic semiconductor device circuits.

**Course Outcomes**
CO1: Describe the characteristic and operation of FET properties and op-amp in AC and DC condition
CO2: Identify various FET and op-amp configuration in AC and DC condition
CO3: Design for various type of FET amplifier configuration and active filters
CO4: Demonstrate and troubleshoot FET and op-amp circuits

**References**

1. Robert Boylestad, "Electronic Devices and Circuit Theory", 9th Edition, ISBN0-13-197408-4, Prentice Hall , 2006
2. Thomas L. Floyd, "Electronic Devices", ISBN 0-13-028484-X,Prentice Hall,2004.

3. Robert T.Paynter, "Introductory Electronic Devices and Circuits", ISBN-0-13-120675-3, Prentice Hall, 2003
4. Theodore F. Bogart Jr., "Electronic Devices and Circuits", 6th Edition, ISBN 0-13-121990-1, Prentice Hall, 2004.

**BEE3113**
**Electromagnetic Fields Theory**
**Credit Hours: 3**
**Pre-Requisite: None**

**Synopsis**
This course introduces students on the importance and the applications of the Electromagnetic Fields Theory in the Electrical Engineering courses. The syllabus covered includes the concepts of electrostatic field, magnetostatic field and electromagnetic field (time varying field).

**Course Outcomes**
CO1: Apply the basic concept of vector algebra in coordinate system to solve electric and magnetic fields problems.
CO2: Solve electric and magnetic fields including stored energies due to specified charge and current distributions.
CO3: Solve problem involving one dimensional Poisson's and Laplace's equations
CO4: Differentiate the physical basis of Maxwell's equations in integral and differential forms.
CO5: Apply the properties of electromagnetic (EM) wave in relation to its propagation.

**References**

1. M.N.O.Sadiku,"Elements of Electromagnetics",Oxford University Press
2. W.H.Hayt and J.A Buck, "Engineering Electro magnetic", Mc Graw Hill
3. F.T.Ulaby,"Fundamentals of Applied Electromagnetics", Prentice Hall
4. N.N.Rao,"Elements of Engineering Electromagnetics;, Prentice Hall
5. A.Serwey and J.W.Jewett,"Physics for Scientists and Engineers with Modern Physics", Thomson.

**BEE3313**
**Principles of Control Systems**
**Credit Hours: 3**
**Pre-Requisite: None**

**Synopsis**
This course introduces students to the control system technology, mathematical models of feedback systems. The students will be exposed to transient and steady-state analysis, root locus, frequency response and analysis design of compensator.

**Course Outcomes**
CO1: Acquire fundamental concept of control systems.
CO2: Derive and manipulate mathematical model and transfer function of physical systems.

CO3: Analyze control system performance in terms of transient, steady-state, and frequency response of a linear time-invariant systems.
CO4: Design a compensator to meet specifications in frequency domain.

**References**


1. Norman S. Nise, Control System Engineering, John Wiley.
2. Katsuhiko Ogata, Modern Control Engineering, Prentice Hall.
3. Benjamin C. Kuo, Farid Golnaraghi, Automatic Control System, John Wiley.
4. Richard C. Dorf, Robert H. Bishop, Modern Control Systems, Prentice Hall.
5. M Gopal, Control Systems: Principle & Designs, Mc Graw Hill.


**BEE3413**
**Principles of Communication Systems**
**Credit Hours: 3**
**Pre-Requisite: BEE3413**

**Synopsis**

This course introduces theories in the area of communication systems. Topics covered include the basic elements of communications, signal analysis, amplitude modulation, angle modulations and digital modulations, as well as transmission channels and noise impact on the modulation system. Finally, some emergence of digital communication technologies are presented and compared.

**Course Outcomes**

CO1: Describe the basic principle of communication system
CO2: Analyze and differentiate various type of modulation and demodulation techniques
CO3: Apply the concepts to practical applications in Telecommunication
CO4: Work in a team and communicate effectively

**References**


1. Tomasi, “Electronic Communication System: Fundamental through Advance”, Prentice Hall.
2. B.P.Lathi, “Modern Digital and Analog Communication System”, 3rd Ed., Prentice Hall.
3. Proakis, “Communication Systems Engineering”, Prentice Hall
4. Couch II, “Digital and Analog Communication Systems”, Prentice Hall.
5. Miller, “Modern Electronic Systems”, Prentice Hall
6. Hwei Hsu,"Schaum's Outline: Analog and Digital Communication", 2nd Ed., McGraw Hill

**BEE4632**
**Maintenance Technology**
**Credit hours: 2**
**Pre-Requisite: None**
**Synopsis**
This course exposed the students to various maintenance strategies and technologies available for maintenance practices adoption. The course will introduce the students to the many skills required for the implementation of an effective maintenance program, including workplace environment simulation, i.e. interpersonal skills, desired work-culture, costs appreciation, workplace safety, workplace productivity, etc.

**Course Outcomes**
CO1: Describe the importance of maintenance organization in an industry.
CO2: Classify the types of maintenance strategies available.
CO3: Distinguish differences of predictive maintenance tools
CO4: Implement an effective maintenance program for a specific set- up.
CO5 : Execute an effective failure analysis Techniques
CO6 : Assess maintenance performance using Computerized Maintenance Management System (CMMS) software.
CO7: Demonstrate appropriate and effective action for plant shutdown programme

**References**
1. Joel Levitt; Complete Guide to Preventive and Predictive Maintenance; Industrial Press Publication, December 20, 2002, ISBN: 0831131543
2. Terry Wireman; Benchmarking Best Practices in Maintenance Management; Industrial Press Publication, 2004, ISBN: 0831131683