



USM UNIVERSITI
SAINS
MALAYSIA



Master of Science (Electronic Systems Design Engineering) (MSc. ESDE)

**School of Electrical and Electronic Engineering
(SEEE, USM)**

Academic Session 2023/2024

USM Vision

Transforming Higher Education for a Sustainable Tomorrow

USM Mission

USM is a pioneering, transdisciplinary research-intensive university that empowers future talents and enables the bottom billions to transform their socio-economic well-being

School of Electrical and Electronic Engineering Mission

To provide quality education and sustainable research that produce professionals with the necessary knowledge, skills and character that is required for the advancement of engineering and technology

STUDENT'S PERSONAL INFORMATION

| | |
|--|--|
| Full Name | |
| Identity Card (IC) / Passport No. | |
| Current Address | |
| Permanent Address | |
| Email Address | |
| Telephone No. (Residence) | |
| Mobile Phone No. (if applicable) | |
| School | |
| Programme of Study | |

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1.0 SCHOOL OF ELECTRICAL AND ELECTRONIC ENGINEERING

<http://ee.eng.usm.my>

1.1 Introduction

Since the academic session of 2000/2001, the School of Electrical and Electronic Engineering has been offering degree programmes at the undergraduate and postgraduate levels. In the academic session of 2003/2004, a mixed-mode master degree programme known as Master of Science (Electronic Systems Design Engineering) (MSc. ESDE) was introduced. This programme exposes candidates to up-to-date theoretical and practical aspects of Electronic Systems Design and advanced computing technologies and their applications. Candidates are also trained to equip them with the capability of addressing engineering related problems of the industry.

1.2 Objectives and Philosophy

The vision of Universiti Sains Malaysia is: -
"Transforming Higher Education for a Sustainable Tomorrow"

The mission of Universiti Sains Malaysia is: -
"USM is a pioneering, transdisciplinary research intensive university that empowers future talents and enables the bottom billions to transform their socio-economic well-being"

The mission of the School of Electrical and Electronic Engineering is: -
"To provide quality education and sustainable research that produce professionals with the necessary knowledge, skills and character that is required for the advancement of engineering and technology".

In line with these vision and missions, the offering of the MSc. ESDE was designed to produce electronic engineers with professional qualifications who are skilled and knowledgeable, credible and able to find solutions to various engineering problems through innovative thinking.

Based on this philosophy, the goals of the curriculum of this study programme have been designed to fulfil the national agenda, as well as industrial and current technological advancement needs. Hence, the curriculum has been organized to possess the following characteristics:

- Recognized by relevant qualification and accreditation bodies as well as acclaimed internationally;
- Proper and balanced integration of practical and theoretical aspects;
- Offering comprehensive choice of many well-planned and advanced specialisations; and
- Developing persons of sound character who are knowledgeable, competent and innovative

With the above characteristics, USM graduates of this program will become postgraduate engineers of excellence, calibre and able to achieve high level of professionalism as engineers or researchers in their respective fields.

1.3 Programme Educational Objectives (PEOs) and Programme Learning Outcomes (PLOs)

Starting from the 2006/2007 academic session, the new intake of students experienced a set of curriculum known as Outcome Based Education (OBE). Briefly, OBE is a method of curriculum design and teaching that focuses on what students can actually do after they are taught.

Under OBE, there are three Programme Educational Objectives (PEOs) as follows: -

PEO 1: Graduates who are employed in Electronic Engineering related fields.

PEO 2: Graduates who are innovative, pursue continuous career development, and participate in society related activities.

PEO 3: Graduates who have leadership qualities, ethical values and awareness of sustainability issues.

Also under the OBE, each degree programme has Programme Learning Outcomes (PLOs) that describe what students are expected to know and be able to perform or attain by the time of graduation. SEEE is adopting the PLOs as stated by Malaysian Qualifications Framework (MQF) 2nd Edition as follows:-

PLO 1: Knowledge and Understanding

Apply theoretical knowledge in Electronic Systems Design Engineering

PLO 2: Practical Skills

Perform practical work, procedure and research related to Electronic Systems Design Engineering while adhering to standard requirements and quality control.

PLO 3: Cognitive Skills

Utilise skills to identify, interpret, evaluate, apply, adapt and solve problems critically and scientifically in Electronic Systems Design Engineering practice.

PLO 4: Communication Skills

Communicate effectively in verbal and written forms to deliver information, findings and results within Electronic Systems Design Engineering context.

PLO 5: Interpersonal Skills

Demonstrate interpersonal skills, social responsibilities, and teamwork in coordinating activities of Electronic Systems Design Engineering practice

PLO 6: Ethics and Professionalism

Demonstrate high level of moral and values as well as ethical and professionalism in adhering to ethical principles, code of conduct, law and regulations in Electronic Systems Design Engineering practices based on good standards and quality assurance.

PLO 7: Personal Skills

Use lifelong learning skills in academic and career development.

PLO 8: Entrepreneurial Skills

Apply managerial and entrepreneurial skills in everyday activities and planning by considering the actual scenario and from different perspectives.

PLO 9: Leadership, Autonomy and Responsibility

Utilise knowledge and understanding in leadership for effective leadership in the effort to contribute to the advancement of Electronic Systems Design Engineering.

PLO 10: Digital Skills

Demonstrate skills in ICT in various digital application involving technology and data to obtain, process and support information for Electronic Systems Design Engineering practice.

PLO 11: Numeracy Skills

Demonstrate skills in using and interpreting numerical, visual and graphic data for presentation of information, findings and results in Electronic Systems Design Engineering

1.4 Main Administrative Staff

Professor Ir. Ts. Dr. Shahrel Azmin Sundi @ Suandi
Dean

Assoc. Prof. Ir. Dr. Rosmiwati Mohd Mokhtar
Deputy Dean (Academic, Career and International)

Assoc. Prof. Dr. Muhammad Nasiruddin Mahyuddin
Deputy Dean (Research, Innovation and Industry-Community Engagement)

Dr. Mohd Nazri Mahmud
Programme Chairman
(Mixed Mode Master Programme)

Assoc. Prof. Dr. Haidi Ibrahim
Programme Chairman
(Electronic Engineering)

Assoc. Prof. Ir. Dr. Mohamad Kamarol Mohd Jamil
Programme Chairman
(Electrical Engineering)

Assoc. Prof. Dr. Khoo Bee Ee
Programme Chairman
(Mechatronic Engineering)

Assoc. Prof. Dr. Dzati Athiar binti Ramli
Programme Chairman
(Quality & Commercialisation)

Mr. Samsuri Musa
Senior Assistant Registrar

Mdm. Nur Husna Mansor
Senior Assistant Registrar

1.5 List of Academic Staff

| Name | Tel. Ext | E-mail |
|---|----------|--------------------|
| PROFESSORS | | |
| Faisal Rafiq bin Mahamd Adikan, Dato' Dr. | 6085 | rafiq@usm.my |
| Mohd Fadzil bin Ain, Ir. Dr. | 5815 | eemfadzil@usm.my |
| Mohd Rizal bin Arshad, Ir. Ts. Dr. | 6015 | eerizal@usm.my |
| Nor Ashidi bin Mat Isa, Ir. Dr. | 6051 | ashidi@usm.my |
| Shahrel Azmin bin Sundi @ Suandi, Ir. Ts. Dr. | 6000 | shahrel@usm.my |
| Widad binti Ismail, Dr. | 6050 | eewidad@usm.my |
| ASSOCIATE PROFESSORS | | |
| Bakhtiar Affendi bin Rosdi, Dr. | 6083 | eebakhtiar@usm.my |
| Dahaman bin Ishak, Ir. Dr. | 5810 | dahaman@usm.my |
| Dzati Athiar binti Ramli, Dr. | 6028 | dzati@usm.my |
| Haidi bin Ibrahim, Dr. | 5822 | haidi@usm.my |
| Junita binti Mohamad Saleh, Dr. | 6027 | jms@usm.my |
| Khoo Bee Ee, Dr. | 6032 | beekhoo@usm.my |
| Mohamad Kamarol bin Mohd Jamil, Ir. Dr. | 6064 | eekamarol@usm.my |
| Mohamad Khairi bin Ishak, Dr. | 5737 | khairiishak@usm.my |

| | | |
|---|------|---------------------|
| Mohd Fadzli bin Mohd Salleh, Dr. | 6058 | fadzlisalleh@usm.my |
| Muhammad Nasiruddin bin Mahyuddin, Dr. | 5843 | nasiruddin@usm.my |
| Nor Asiah binti Muhamad, Ir. Dr. (on secondment to other agency) | 5726 | norasiah.m@usm.my |
| Nor Muzlifah binti Mahyuddin, Dr. | 5789 | eemnmuzlifah@usm.my |
| Nur Syazreen binti Ahmad, Dr. | 6014 | syazreen@usm.my |
| Patrick Goh Kuan Lye, Dr. | 6033 | eepatrick@usm.my |
| Rosmiwati binti Mohd Mokhtar, Ir. Dr. | 6003 | eerosmiwati@usm.my |
| Syed Sahal Nazli Alhady bin Syed Hassan, Dr. | 6019 | sahal@usm.my |
| Teh Jiashen, Ir. Ts. Dr. | 6016 | jjashenteh@usm.my |
| Wan Mohd Yusof Rahiman bin Wan Abdul Aziz, Dr. | 6024 | wanrahiman@usm.my |
| Zaini binti Abdul Halim, Dr. | 6061 | zaini@usm.my |
| Zuraini binti Dahari, Dr. | 6048 | eezuraini@usm.my |

SENIOR LECTURERS

| | | |
|--|------|-----------------------|
| Abdul Sattar bin Din, Dr. | 5796 | sattar@usm.my |
| Aeizaal Azman bin Abdul Wahab, Dr. | 5762 | aeizaal@usm.my |
| Ahmad Nazri bin Ali, Dr. | 6020 | nazriali@usm.my |
| Intan Sorfina binti Zainal Abidin, Dr. | 5795 | intan.sorfina@usm.my |
| Mohamad Adzhar bin Md Zawawi, Dr. | 6052 | adzhar@usm.my |
| Mohamad Tarmizi bin Abu Seman, Ir. Dr. | 6063 | mohdtarmizi@usm.my |
| Mohamed Fauzi bin Packeer Mohamed, Dr. | 6097 | fauzi.packkeer@usm.my |
| Mohamed Salem Mohamed Othman, Dr. | 5842 | salemm@usm.my |
| Mohd Khairunaz bin Mat Desa, Dr. | 5873 | khairunaz@usm.my |
| Mohd Nazri bin Mahmud, Dr. | 6059 | nazriee@usm.my |
| Mohd Shahrimie bin Mohd Asaari, Dr. | 6086 | mohdshahrimie@usm.my |
| Mohd Tafir bin Mustafa, Dr. | 6029 | tafir@usm.my |
| Muhammad Firdaus bin Akbar Jalaludin Khan, Dr. | 6087 | firdaus.akbar@usm.my |
| Muhammad Hafeez bin Mohamed Hariri, Ir. Dr. | 6054 | muhammadhafeez@usm.my |
| Muhammad Najwan bin Hamidi, Dr. | 6018 | najwan@usm.my |
| Noramalina binti Abdullah, Dr. | 6022 | eenora@usm.my |
| Nor Azlin binti Ghazali, Dr. | 5786 | azlin.ghazali@usm.my |

| | | |
|-------------------------------------|------|---------------------|
| Nor Rizuan Bin Mat Noor, Dr. | 6077 | nrmn@usm.my |
| Nur Zatil 'Ismah binti Hashim, Dr. | 6034 | zatil.hashim@usm.my |
| Ooi Chia Ai, Dr. | 6076 | chia.ai@usm.my |
| Tay Lea Tien, Dr. | 6082 | tay@usm.my |
| Teoh Soo Siang, Ir. Dr. | 6081 | eeteoh@usm.my |
| Wan Amir Fuad Wajdi bin Othman, Dr. | 6062 | wafw_othman@usm.my |

ACADEMIC FELLOWS

| | | |
|--------------------------------------|------|----------------------|
| Gomesh Nair A/L Shasidharan, Ir. Dr. | 5813 | gomesh@usm.my |
| Siti Fatimah Binti Abd Rahman, Dr. | 6079 | fatimahrahman@usm.my |

RESEARCH OFFICERS

| | | |
|---------------------------------|------|------------------|
| Mohamad Nazir bin Abdullah, Mr. | 5802 | eemnazir@usm.my |
| Mohd Nadzri bin Mamat, Mr. | 5801 | eenadzri@usm.my |
| Roslina binti Hussin, Mdm. | 6025 | eeroslina@usm.my |
| Suardi bin Kaharuddin, Mr. | 6057 | suardi@usm.my |

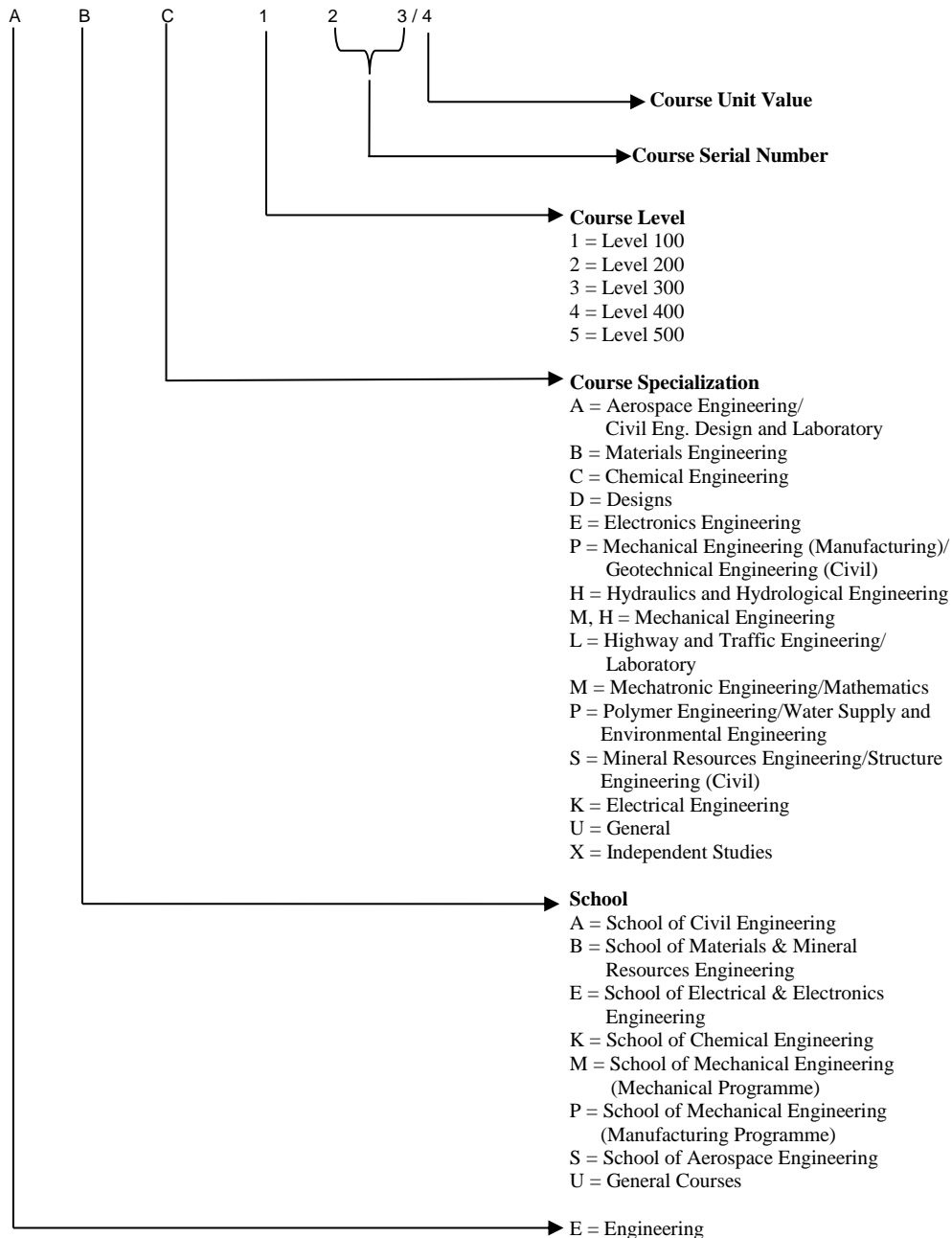
2.0 CURRICULUM STRUCTURE

2.1 Categories of Students

- i. **IN-HOUSE:** In this category, students are required to attend the programme in person at SEEE premises during the normal working hours.
- ii. **INDUSTRY:** Students who are industry practitioners attend the program outside the normal working hours and during the weekends.
- iii. **OFFSHORE:** Students who attend the programme at one or more remote locations during the normal working hours.

2.2 Course Code

Each course offered by the respective school in USM is denoted by the following code of ABC 123/4. The alphabets and numbers represent:



2.3 Course Offering

Students are required to register for this MSc. ESDE programme in three semesters for each academic session. These are Semester 1, Semester 2 and Semester 3 (Short KSCP Semester). Courses are offered and examined in the same semester.

- **Core Courses**

Core courses are compulsory course package which aims at giving a deeper understanding of an area of specialization major. Students need to accumulate 34 units of the core courses for the 70:30 Option, or 26 units for the 50:50 Option. The Dissertation is part of the core courses.

- **Elective Courses**

Elective courses are selected course package that aims at giving a specialised expertise on specified area of knowledge. Students need to accumulate no less than 6 units of the elective courses for the 70:30 Option, or 14 units for the 50:50 Option from the list of courses suggested and acknowledged by the school.

- **Audit Courses**

In principle, the university allows students to register for any courses on an audit basis for the purpose of enhancing the students' knowledge in specific fields during the duration of their study. However, the units of any such audit courses will not be taken into consideration for graduation purposes.

The registration procedures for courses on an audit basis are as follows:

- (a) Students can register for courses on an audit basis for the purpose of augmenting his/her knowledge in specific fields. Registration for the said course must be within the course registration week.
 - (b) Only students of active status are allowed to register for courses on an audit basis.
 - (c) Courses registered on an audit basis are designated as code 'Y' courses. This designation will be indicated on the relevant academic transcript. A space at the bottom of the academic transcript will be reserved for listing the courses registered on an audit basis.
 - (d) Courses registered on an audit basis will not be taken into consideration in determining the minimum and maximum units of courses registered.
 - (e) Students must fulfil all course requirements. Students who register for courses on an audit basis, are not obligated to sit for any examinations pertaining to that course. A grade 'R' will be awarded irrespective of whether the student had or had not sat for the examination.
- **Laboratory Work/Practical and Dissertation**
Programmes in the School of Electrical and Electronic Engineering place a great emphasis on laboratory work/practical. Laboratory work/practical is an important and essential aspect in most courses. It aims to provide students with a better understanding of the subject matter delivered through lectures.

Students are required to submit laboratory/practical reports which are part of the coursework assessment for courses delivered through lectures and the laboratory/practical component only. Attendance is compulsory for all levels of study and students may be barred from taking the written examination if their attendance is unsatisfactory.

Apart from attending classes (lectures and laboratory/practical), students must also engage in a dissertation project that culminates in the submission of a dissertation. Dissertation project shall last for six months and is usually completed in two consecutive semesters.

2.4 Programme Structure

The structure of the MSc. ESDE consist of two options of studies which are 70:30 and 50:50. The ratio refers to the percentage of research and coursework component. Taught courses are offered in the first two semesters only. The dissertation is offered in both Semester 2 and Semester 3.

| COURSE | UNITS | | REMARKS |
|--|--------------|--------------|--|
| | 70:30 Option | 50:50 Option | |
| i. Core | 34 | 26 | Courses are determined by SEEE |
| ii. Elective | 6 | 14 | Students may select the courses from the list determined by SEEE |
| iii. University Requirement (a) Bahasa Malaysia | - | | For International Students only |

Note: For graduation, students are required to complete at least 40 units, with minimum 'PASS' grade of C+ for all the courses, in addition to other conditions for graduation stated in Section 4.5.

2.4.1 Structure for 70:30 Option (In-house Students)

| Courses Offered | SEMESTER 1 | | SEMESTER 2 | |
|--|-------------|--|-------------|----------------------------------|
| | Code / Unit | Course Names | Code / Unit | Course Names |
| Core Courses | EEE506/3 | Embedded System Architecture and Design | EEE533/28 | Dissertation |
| Total= 34 Units | EKC500/3 | Science and Engineering Research Methodology | | |
| Elective Courses (Choose 2 courses only) | EEE507/3 | Advanced Analog Integrated Circuit Design | EEE516/3 | Advanced Antenna and Propagation |
| Total= 6 Units | EEE508/3 | Advanced Digital Signal and Image Processing | EEE518/3 | Intelligent Systems |
| | EEE513/3 | Microwave Circuit Design | | |
| | EEE514/3 | Industrial Power Electronics | | |
| | EEE517/3 | Advanced Control Systems | | |
| | EEE526/3 | Advanced Robotics | | |
| | EEE527/3 | Data Communications and Computer Networks | | |

2.4.2 Structure for 70:30 Option (Industry Students)

| Courses Offered | SEMESTER 1 | | SEMESTER 2 | |
|--|-------------|--|-------------|--------------|
| | Code / Unit | Course Names | Code / Unit | Course Names |
| Core Courses | EEE506/3 | Embedded System Architecture and Design | EEE533/28 | Dissertation |
| Total= 34 Units | EKC500/3 | Science and Engineering Research Methodology | | |
| Elective Courses (Choose 2 courses only) | EEE507/3 | Advanced Analog Integrated Circuit Design | | |
| Total= 6 Units | EEE508/3 | Advanced Digital Signal and Image Processing | | |
| | EEE511/3 | Internet of Things (IoT) Technology | | |

| | | | |
|--|----------|--|--|
| | EEE515/3 | Signal Integrity for High-Speed Digital Design | |
| | EEE518/3 | Intelligent Systems | |

2.4.3 Structure for 50:50 Option (Offshore Students)

| Courses Offered | SEMESTER 1 | | SEMESTER 2 | |
|--|-------------------------|--|--|---|
| | Code / Unit | Course Names | Code / Unit | Course Names |
| Core Courses | EEE506/3 | Embedded System Architecture and Design | EEE519/20 | Dissertation |
| Total = 26 Units | EEE538/3 | Engineering Research Methodology | | |
| Compulsory Courses (For Analogue and Digital IC Design Track) | EEE528/3 | Analog Integrated Circuit Design Part 1 | EEE507/3 | Advanced Analog Integrated Circuit Design |
| | EEE529/2 | Digital Integrated Circuit Design Part 1 | EEE536/3 | Digital Integrated Circuit Design Part 2 |
| | Total = 14 Units | EEE537/3 | Semiconductor Devices and Solid State Technology | |

2.5 Programme Mode of Delivery

The programme is delivered through either the conventional mode or open and distance learning (ODL) mode. Both modes of delivery follow the guidelines provided by the Malaysian Qualification Agency (MQA).

2.6 Structure of the Academic Year

The academic year is structured into three semesters as shown below:

| SEMESTERS | DURATION |
|---|----------|
| Semester 1 | 19 weeks |
| Semester 2 | 19 weeks |
| Semester 3 (KSCP) | 10 weeks |
| Notes: Students need to refer the USM Academic Calendar for this academic session | |

Semester 1 usually starts in September / October whereas Semester 2 in February / March. In addition, Semester 3 is known as *Kursus Semasa Cuti Panjang* (KSCP) and will start immediately after Semester 2 ends. For this 2023/24 Academic Session, Semester 1 will start on 16th October 2023, Semester 2 on 25th March 2024, and Semester 3 on 5th August 2024.

2.7 Examination System

Examinations are held at the end of every semester. Students have to sit for the examination of the courses they have registered for except for courses with 100% coursework. Students are required to settle all due fees and fulfil the standing requirements for lectures/tutorials/practical and other requirements before being allowed to sit for the examination. Course evaluation will be based on the two components of coursework and final examinations. Coursework evaluation includes tests, essays, projects, assignments and participation in tutorials. For dissertation, candidates are required to attend the viva voce examination.

2.7.1 Duration of Examination

| Evaluated Courses | Examination Duration |
|-------------------|---|
| 2 units | 1 hour for coursework of more than 40% |
| 2 units | 2 hours for coursework of 40% and below |
| 3 units or more | 2 hours for coursework of more than 40% |
| 3 units or more | 3 hours for coursework of 40% and below |

2.7.2 Barring from Examination

Students will be barred from sitting for the final examination if they do not fulfil at least 70% of the course requirements, such as due to absence from lectures and tutorials, and/or have not completed/fulfilled the required components of coursework. A grade 'X' would be awarded for a course for which a student is barred. Students will not be allowed to repeat the course during the *Courses During the Long Vacation* (KSCP) period.

2.7.3 Grade Point Average System

Students' academic achievement for **registered core, elective and university requirement courses** will be graded as follows:

| | | | | | | | | | | | | |
|------------------|------|------|------|------|------|------|------|------|------|------|------|---|
| Alphabetic Grade | A | A- | B+ | B | B- | C+ | C | C- | D+ | D | D- | F |
| Grade Points | 4.00 | 3.67 | 3.33 | 3.00 | 2.67 | 2.33 | 2.00 | 1.67 | 1.33 | 1.00 | 0.67 | 0 |
| Master Degree | Pass | | | | | | Fail | | | | | |

The minimum alphabetic grade for a PASS grade for Master degree programme is 'C+'.

Students who obtained a grade 'C' and below for a particular course would be given a chance to improve their grades by repeating the same course in the subsequent semester in which the course is offered.

The achievement of students in any semester is based on Grade Point Average (GPA) achieved from all the registered courses in a particular semester. GPA is the indicator to determine the academic performance of students in any semester.

CGPA is the Cumulative Grade Point Average accumulated by a student from one semester to another during the years of study.

The formula to compute GPA and CGPA is as follows:

$$\text{Grade Point Average} = \frac{\sum_{i=1}^n U_i M_i}{\sum_{i=1}^n U_i}$$

where:

- n = Number of courses taken
- U_i = Course units for course i
- M_i = Grade point for course i

Example of calculation for GPA and CGPA:

| | Course | Unit | Grade Point (GP) | Grade (G) | Total GP |
|------------|---------|------|------------------|------------|----------|
| Semester I | ABC XX1 | 4 | 3.00 | B | 12.00 |
| | ABC XX2 | 4 | 2.33 | C+ | 9.32 |
| | BCD XX3 | 3 | 1.67 | C- | 5.01 |
| | CDE XX4 | 4 | 2.00 | C | 8.00 |
| | EFG XX5 | 3 | 1.33 | D+ | 3.99 |
| | EFG XX6 | 2 | 2.67 | B- | 5.34 |
| | | 20 | | | 43.66 |

$$\text{GPA} = \frac{43.66}{20} = 2.18$$

| | Course | Unit | Grade Point (GP) | Grade (G) | Total GP |
|-------------|---------|------|------------------|------------|----------|
| Semester II | ABC XX7 | 3 | 1.00 | D | 3.00 |
| | ABB XX8 | 4 | 2.33 | C+ | 9.32 |
| | BBC XX9 | 4 | 2.00 | C | 8.00 |
| | BCB X10 | 4 | 2.67 | B- | 10.68 |
| | XYZ XX1 | 3 | 3.33 | B+ | 9.99 |
| | | 18 | | | 40.99 |

$$\text{GPA} = \frac{40.99}{18} = 2.28$$

$$\text{CGPA} = \frac{\text{Total Accumulated GP}}{\text{Total Accumulated Unit}} = \frac{43.66 + 40.99}{20 + 18} = \frac{84.65}{38} = 2.23$$

From the above examples, the CGPA is calculated as the total grade point accumulated for all the registered courses and divided by the total number of the registered units.

2.7.4 Repeating Course

Students are allowed to repeat course(s) to improve their CGPA to be minimum of 3.00 as long as the duration of student candidature is still active.

If a student obtains grade B- or below for any course, the student can repeat the course in the subsequent semester in which the course is offered.

Project/dissertation must be completed during the stipulated period according to the programme. Students who repeat their project/dissertation are required to select a new topic.

2.7.5 Examination Results

Full results (with grade) will be announced by the University through the Campus Online portal (campusonline.usm.my) after the School Examination Council meeting which is approximately one month after the final examination.

Students can print their official semester results document namely 'SEMGRED' through the Campus Online portal (campusonline.usm.my) on the same day/date of the results announcement.

3.0 COURSE DESCRIPTION

| Codes | Courses | Synopses |
|------------------------|--|--|
| EEE506/3 (Core) | Embedded System Architecture and Design | This course discusses design and architecture of embedded system. It gives exposure in detail about platform architecture and embedded processor architecture. Devices that are used in embedded system design, such as interrupt and memory and also interfacing device in embedded system, are also discussed in this course. Besides, operation system overview and embedded Linux are also exposed to students. The up-to-date issues such as multiprocessor, FPGA and System on Chip are also highlighted in this course. The exposure in term of practical towards embedded system design is provided through assignment and mini-project. |
| EEE519/20 (Core) | Dissertation | The aim of this course is to provide students with the opportunity to apply electrical and electronic engineering principles and techniques to the solution of a practical problem. Students will be exposed to research methodology before they can conduct their research. Students are expected to have research background related to practical problem, experience in design and implementation of the solution, and to write a dissertation about their investigation. The students are also expected to give oral presentation, answer questions about their project and give a demonstration of their project implementation. The project is carried out under the supervision of an academic staff and leads to a substantial dissertation. |
| EEE533/20 (Core) | Dissertation | The aim of this course is to provide students with the opportunity to apply electrical and electronic engineering principles and techniques to the solution of a practical problem. Students will be exposed to research methodology before they can conduct their research. Students are expected to have research background related to practical problem, experience in design and implementation of the solution, and to write a dissertation about their investigation. The students are also expected to give oral presentation, answer questions about their project and give a demonstration of their project implementation. The project is carried out under the supervision of an academic staff and leads to a substantial dissertation. |
| EEE507/3 (Elective) | Advanced Analog Integrated Circuit Design | This course is designed to provide knowledge in analysis of analog circuit design such as current source circuits, amplifier circuits, operational amplifier circuits, applications of amplifier and operational amplifier circuits. A design case such hybrid DAC will be used as example of the analog ic design. CAD/EDA tool such as LTSpice will be used in this course. |
| EEE508/3 (Elective) | Advanced Digital Signal and Image Processing | This course is designed to provide the knowledge of advanced digital signal and image processing to the students, such as designing FIR and IIR filters, effect of finite word length, transformations, enhancement and restoration of digital images. Case studies in communication, radar, sonar and medical imaging system will be presented to the students. |
| EEE511/3 (Elective) | Internet of Things Technology | This course focuses on the existing and potential applications of the Internet of Things (IoT). Standards, protocols, and application stacks for IoT will be introduced. Access to the IoT devices via Internet Gateways and related security issues will be studied. Data Analytics, Data Management and Privacy Issues of IoT will be covered. Students will also be briefly exposed to energy management issues for IoT. Practical exposure to IoT devices and software will be provided via assignments and projects. |
| EEE513/3 (Elective) | Microwave Circuit Design | This course provides the introduction, comprehension, application and analysis of RF and Microwave Concept and uses S-parameter Network and other networks. It also includes the introduction on understanding and design of transistor circuit and passive components, filters, amplifiers and microwave source and mixers. |
| EEE514/3 (Elective) | Industrial Power Electronics | This course is designed to provide the knowledge in analysis and design of power electronics systems such as rectifier, converter, inverter, switched-mode power supply and resonant converter. A design case using CAD/EDA tool such as MATLAB or PSIM will be conducted in this course. |
| EEE515/3 (Elective) | Signal Integrity for High Speed Digital Design | This course covers advanced signal integrity principles for high-speed digital designs. Topics include transmission line theory, crosstalk, differential signaling, package modeling, equalization, jitter, IBIS modeling, S-parameters and power integrity. |
| EEE516/3 (Elective) | Advanced Antenna and Propagation | This course reviews the topics on electromagnetic waves, waveguide, antenna design and analysis. It covers the sub-topics of electromagnetic inhomogeneous and nonhomogeneous media, rectangular, propagation mode, basic sources and types of antenna in reasonable propagation. Important concepts are introduced in the form of simulation and necessary analytical techniques are used to make a relative comparison. |
| EEE517/3 (Elective) | Advanced Control Systems | The first part of this course revisits the characteristics of feedback control systems and introduces advanced PID control design methods, and anti-windup control schemes. The second part revisits the modern control system techniques in the |

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| | | state-space domain, and introduces advanced optimal control methods that include LQR and LQG. |
| EEE518/3 (Elective) | Intelligent Systems | This course is devised to provide the knowledge on four intelligent systems which are Knowledge-Based Systems, Fuzzy Systems, Artificial Neural Network and Evolutionary Computation. |
| EEE526/3 (Elective) | Advanced Robotics | Evolution of robotic systems and their classification based on industry, application and technology. Basic robotic system and selection of its appropriate components including the mechanical, electronic, sensors and control modules. Relevant kinematic and dynamic analysis. Fundamentals of robotic system integration including hardware and software for control and simulation |
| EEE527/3 (Elective) | Data Communications and Computer Networks | This course offers students to learn the concepts of data communications, data-link layer, MAC layer, transport layer and application layer protocols. |
| EEE538/3 (Core) | Engineering Research Methodology | This course provides a hands-on course designed to impart to postgraduates the foundational methods and techniques of research in engineering context. The students will be practically exposed to the main components of a research framework which are problem definition, research design, data collection, ethical issues in research, report writing and presentation. |
| EEE528/3 (Elective/ Compulsory) | Analog Integrated Circuit Design Part 1 | This course is designed to provide the knowledge in analysis of analog circuit design such as current source circuits, amplifier circuits, operational amplifier circuits, applications of amplifier and operational amplifier circuits. A design case such hybrid DAC will be used as example of the analog ic design. CAD/EDA tool such as LTSpice will be used in this course. |
| EEE529/2 (Elective/ Compulsory) | Digital Integrated Circuit Design Part 1 | This course is designed to describe the basic IC design, in terms of levels, strategies, methods, challenges, economics and trends. Subsequently incorporating this knowledge along with the ability to encapsulate the use of EDA design tools and Verilog in the basic digital electronic design applications. |
| EEE536/3 (Elective/ Compulsory) | Digital Integrated Circuit Design Part 2 | This course is designed to describe the advanced IC design specifically in the physical design of digital IC, in terms of low power strategies, methods, challenges, and trends. Subsequently incorporating this knowledge along with the ability to encapsulate the use of EDA design tools such as Synopsys ICC2 and Primitime in the advanced digital IC design applications. |
| EEE537/3 (Elective/ Compulsory) | Semiconductor Devices and Solid State Technology | This course is designed to provide the concept of advanced semiconductor devices and solid state technology which applied in designing the nano scaling integrated circuitry. Concept of advance semiconductor in fabrication process mechanism will be exposed to the student. Simulation and modelling technique of devices will be implemented during the class. |

3.1 Course – Program Learning Outcome Matrix

| Code | Course | PLO 1 | PLO 2 | PLO 3 | PLO 4 | PLO 5 | PLO 6 | PLO 7 | PLO 8 | PLO 9 | PLO 10 | PLO 11 |
|-----------------------|--|-----------------------------|------------------|------------------|----------------------|----------------------|----------------------------|-----------------|------------------------|---|----------------|-----------------|
| | | Knowledge and Understanding | Practical Skills | Cognitive Skills | Communication Skills | Interpersonal Skills | Ethics and Professionalism | Personal Skills | Entrepreneurial Skills | Leadership, Autonomy and Responsibility | Digital Skills | Numeracy Skills |
| EEE506/3 | Embedded System Architecture and Design | √ | √ | √ | | | | √ | | | | |
| EEE507/3 | Advanced Analog Integrated Circuit Design | √ | | √ | | | | | | | | |
| EEE508/3 | Advanced Digital Signal and Image Processing | √ | | √ | | | | | | | | |
| EEE511/3 | Internet of Things Technology | √ | √ | | | | | √ | | | | |
| EEE513/3 | Microwave Circuit Design | | | √ | | | √ | | | | | |
| EEE514/3 | Industrial Power Electronics | √ | √ | √ | | | | | | | | |
| EEE515/3 | Signal Integrity For High Speed Digital Design | √ | √ | √ | | | | | | | | |
| EEE516/3 | Advanced Antenna and Propagation | | √ | √ | | | | | | | | |
| EEE517/3 | Advanced Control System | | √ | √ | | | | | | | | |
| EEE518/3 | Intelligent Systems | √ | | √ | | | | | | | √ | |
| EEE526/3 | Advanced Robotics | √ | | √ | √ | | | | | | | |
| EEE527/3 | Data Communications and Computer Networks | | √ | √ | | | | | | | | |
| EEE528/3 | Analog Integrated Circuit Design Part 1 | √ | √ | | | | | | | | | |
| EEE529/2 | Digital Integrated Circuit Design Part 1 | √ | √ | | | | | | | | | |
| EEE536/3 | Digital Integrated Circuit Design Part 2 | √ | | √ | | | | | | | | |
| EEE537/3 | Semiconductor Devices and Solid State Technology | √ | | √ | | | | | | | | |
| EEE519/20 & EEE533/28 | Dissertation | | | √ | √ | √ | √ | √ | √ | √ | √ | √ |

4.0 ADDITIONAL INFORMATION

4.1 Renewal Registration

It is compulsory for students to renew their registration before the beginning of each semester via the Campus Online Portal by clicking the 'Online Reg' menu. You will be directed to course registration page. Complete the course selection process until the invoice of the fees is generated. Fees payment need to be made before the new semester commences.

4.2 Courses During the Long Vacation (*Kursus Semasa Cuti Panjang*) (KSCP)

Courses during KSCP involve the Dissertation only. Students who have chosen to start their Dissertation in the KSCP semester and those who are continuing their Dissertation from Semester 2 need to register in the KSCP semester.

4.3 Academic Status

Any student who achieves a GPA of 2.00 and above for any examination in a semester will be recognised as ACTIVE and will be allowed to pursue his/her studies for the following semester.

Fail and Out (F&O) status will be awarded for failure to obtain any credits.

Student will be terminated if the CGPA is between 0.00-0.99 accumulated after 2 semesters.

4.4 Termination of Candidature

Without any prejudice to the above regulations, **the University Examination Council has the absolute right to terminate any student's studies if he/she does not fulfil the accumulated minimum credits.**

The University Examination Council has the right to terminate any student's studies due to certain reasons (a student who has not registered for the courses, has not attended the examination without valid reasons), as well as medical reasons can be disqualified from pursuing his/her studies.

4.5 Graduation Requirements

Students must fulfil the following requirements to graduate:

- a. Pass all courses and examination determined by the respective School with minimum C+ grade;
- b. Pass the Dissertation;
- c. Obtain at least a CGPA of 3.00;
- d. Fulfill the minimum duration of candidature;
- e. Accumulate at least 40 units;
- f. Must obtain minimum grade C for Malaysian Culture and Malay Language (LKM111). This course is compulsory for all international students

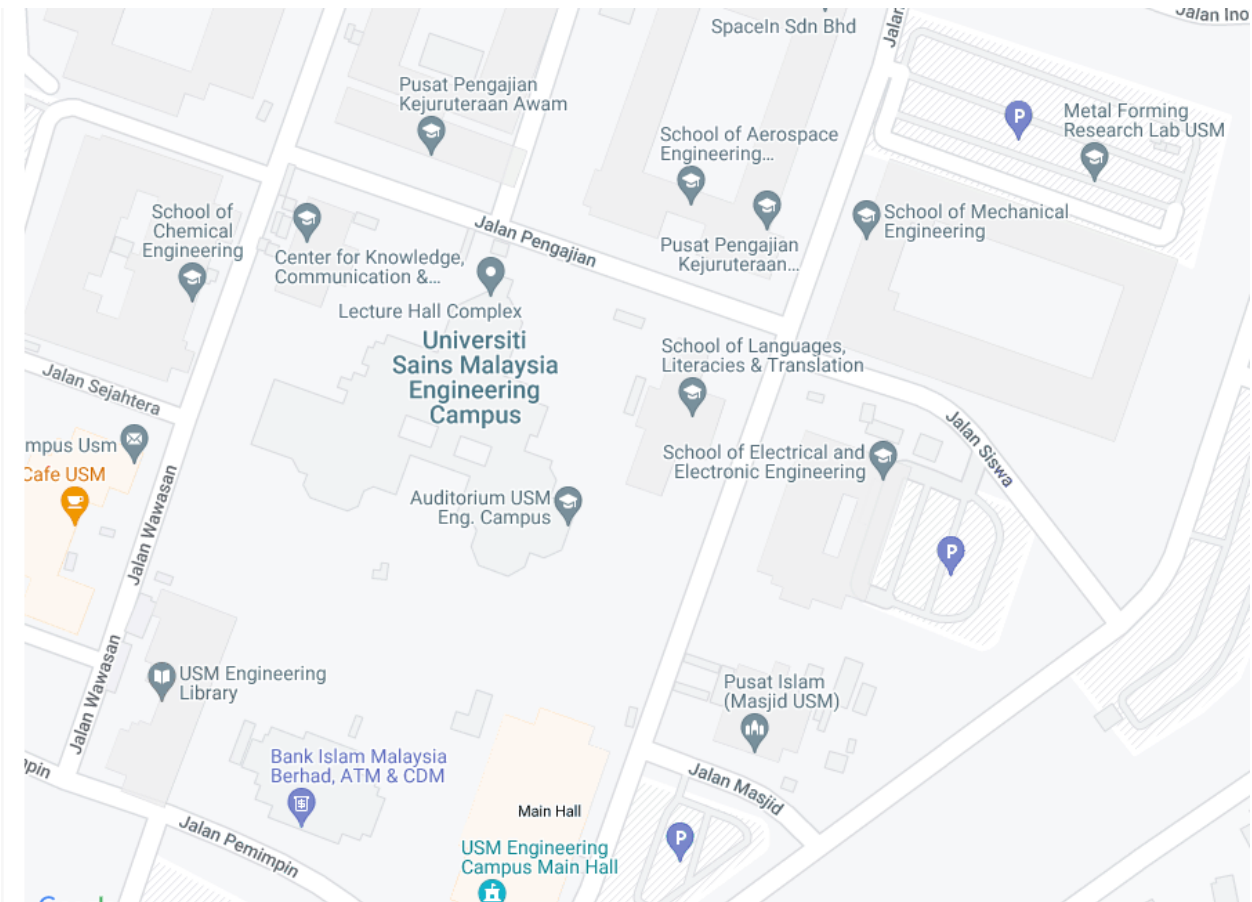
4.6 Academic calendar (accessible from: <https://bpa.usm.my/index.php/kalendar-akademik>)

Notes: All students are advised and required to refer IPS Students Postgraduate Handbook for further clarification pertaining postgraduate matters.

The handbook is accessible from:

https://ips.usm.my/images/download/IPS/candidature/Postgraduate_Student_Handbook_Aug2022_version.pdf

ENGINEERING CAMPUS MAP



NOTES

