

SCHOOL OF MATERIALS AND MINERAL RESOURCES ENGINEERING

# Postgraduate Handbook

MSc & PhD Research

Academic Session 2025/2026



# Table of Contents

## 01 Background 01

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- 1.1 SMMRE Background
- 1.2 Vision of SMMRE
- 1.2 Mission of SMMRE

## 02 Organizational Chart 05

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- 2.1 Administrative Organizational Chart

## 03 Academic Programme 07

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- 3.1 Programme Overview
- 3.2 PEO, PLO & CLO
- 3.3 Research Field & Specialization
- 3.4 Expertise
- 3.5 Graduation Requirements
- 3.6 Testing Facility

## 04 Academic Calender 21

---

- 4.1 Academic Calender (Academic Session 2024/2025)

## 05 Directory 23

---

- 5.1 Administrative
- 5.2 Academic Staff
- 5.3 Research Officier
- 5.4 Vocational Training Officier
- 5.5 Admin Staff
- 5.6 Technical Staff



# 01

# BACKGROUND

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## 1.1 SMMRE BACKGROUND

The School of Materials and Mineral Resources Engineering (SMMRE) started its program since 1984 in Universiti Sains Malaysia (USM), Penang under the School of Industrial Technology and Engineering Sciences. With the advancement of technology and market demand for skilled engineers in the country, USM took the initiative to fulfill the requirement by having its own engineering school separated from other disciplines of applied sciences.

In March 1986, the engineering disciplines under the School of Industrial Technology were separated to form their own schools, which include the formation of the School of Materials and Mineral Resources Engineering. USM had then housed the new campus at Ipoh before moving to Seri Iskandar, Perak. However, after a lapsed of 15 years, in May 2001, the campus was moved to the new site situated at Nibong Tebal, Seberang Perai Selatan, Penang.

Compared to other schools or faculty in other Institutes of Higher Learning in Malaysia, the School of Materials and Mineral Resources Engineering is unique because it offers three programs, these are Materials Engineering, Mineral Resources Engineering and Polymer Engineering at bachelor degree (honours) level for each programme.

Polymer Engineering program is the latest addition to the school that commenced in April 2002. The program is an upgrading of Polymer Technology program that was originally under the School of Industrial Technology in USM Penang.

In general, the three programs include specialization as follows:

- (i) The Material Engineering emphasizes on materials such as metal, ceramic, composite, polymer and semiconductor and electronic materials. These involve design and production of materials, quality control and the materials properties.
- (ii) Mineral Resources Engineering focuses on areas of mining, processing and management of mineral resources and the environment.
- (iii) Polymer Engineering focuses on polymeric materials such as plastics, rubber, latex and composites. These involve synthesis, processing, design and production of polymer products, quality control and the properties of polymers.

In principal, Universiti Sains Malaysia, upholds the mission among which to build a greater understanding and strive to provide quality education as well as efficient and professional services through vast knowledge, innovation and latest expertise while upholding common ethical values.

With that, SMMRE through its three programmes have one similar objective that is to produce materials, mineral resources and polymer engineers that are professionally qualified, knowledgeable and matured, highly skilled and capable to perform in relevant engineering activities including giving ideas and solution towards complex engineering problem through analytical, innovative and proactive thinking. With these philosophies, the curriculum has been design to fulfill the aspiration and goals of Industrial Revolution 4.0, sustainable development goals (SDGs), industrial needs and in line with the growth of world globalization technology. Therefore, the existing curriculum is moulded with the following quality:

- Recognized by professional bodies including Board of Engineers Malaysia (BEM) and Institution of Engineers Malaysia (IEM).
- Balanced integration of teaching based on theory with practical skills.
- Continuously up-dated with various specializations in tandem with the needs and development of local and international market.
- Develop and generate graduates with knowledge, ethics, quality, skill, innovative and strong commitment towards excellent performance.

## 1.2 VISION OF SMMRE

To be an established and respectable world class academic and research school of excellence based on current technology.

## 1.3 MISSION OF SMMRE

To be globally recognized as a dynamic engineering school that produces creative, innovative and resourceful intellectuals with an ethos towards life-long learning that will contribute towards the creation of knowledge based society.



# 02

## ORGANIZATIONAL CHART



# ADMINISTRATIVE ORGANIZATIONAL CHART



## DEAN

Prof. Ts. Dr. Zulkifli Mohamad Ariff



## DEPUTY DEAN

(Research, Innovation & Industrial-Community Engagement)  
Assoc. Prof. Dr. Khairul Anuar Shariff



## DEPUTY DEAN

(Academic, Career & International)  
Dr. Suhaina Ismail



**PROGRAMME CHAIRMAN**  
(Materials Engineering)  
Dr. Syazana Ahmad Zubir



**PROGRAMME CHAIRMAN**  
(Mineral Resources Engineering)  
Dr. Nurul'Ain Jabit



**PROGRAMME CHAIRMAN**  
(Polymer Engineering)  
Assoc. Prof. Ir. Ts. Dr. Zuratul Ain  
Abdul Hamid



**MANAGER**  
(Corporate Affairs & Community Engagement)  
Dr. Mohamad Danial Shafiq



**SENIOR ASSISTANT REGISTRAR**  
Mrs. Normala Omar



**SENIOR ASSISTANT Engineer**  
Mr. Khairul Nasrin Abas



**ASSISTANT REGISTRAR**  
Mrs. Nurintan Syuhada Halim

# 03

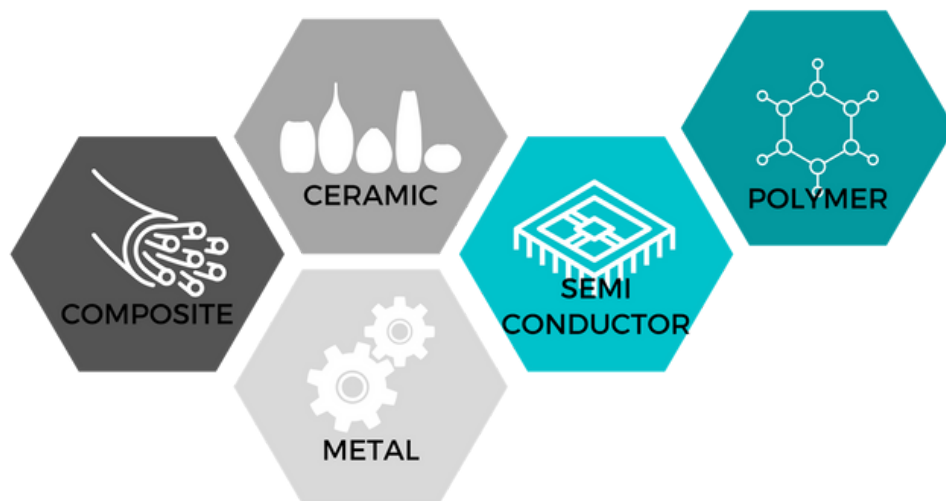
## ACADEMIC PROGRAMME



## 3.1 PROGRAMME OVERVIEW

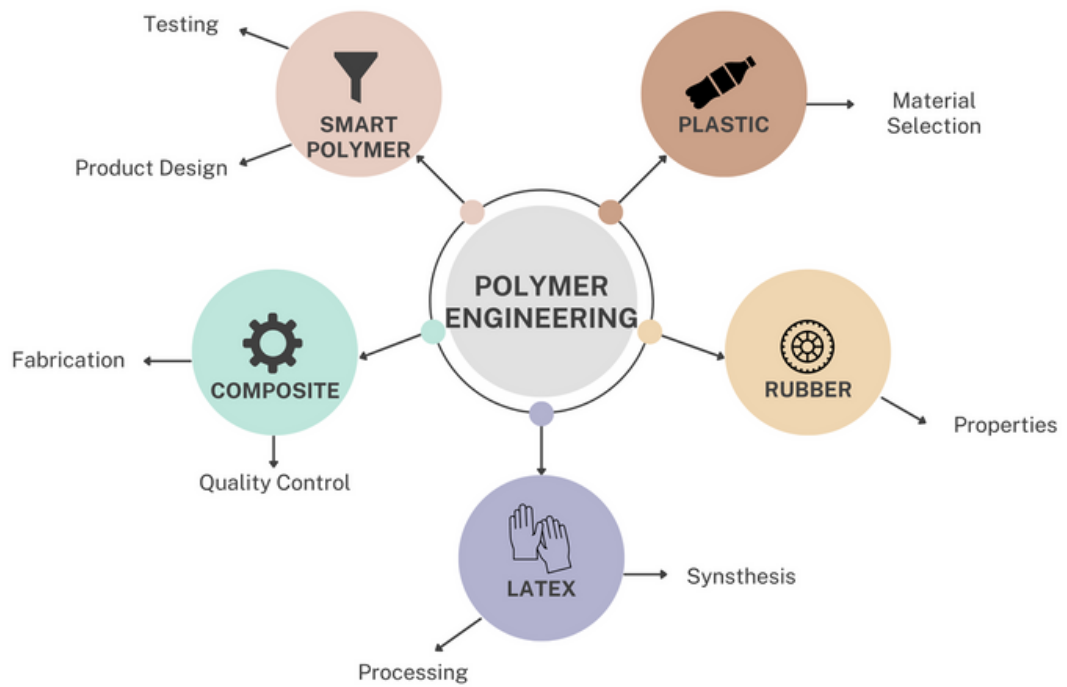
### Materials Engineering

The programme covers multidisciplinary materials synthesis, product development and fabrication for semiconductor, oil and gas, steel, advanced composite, polymer, ceramic and biomedical industries.



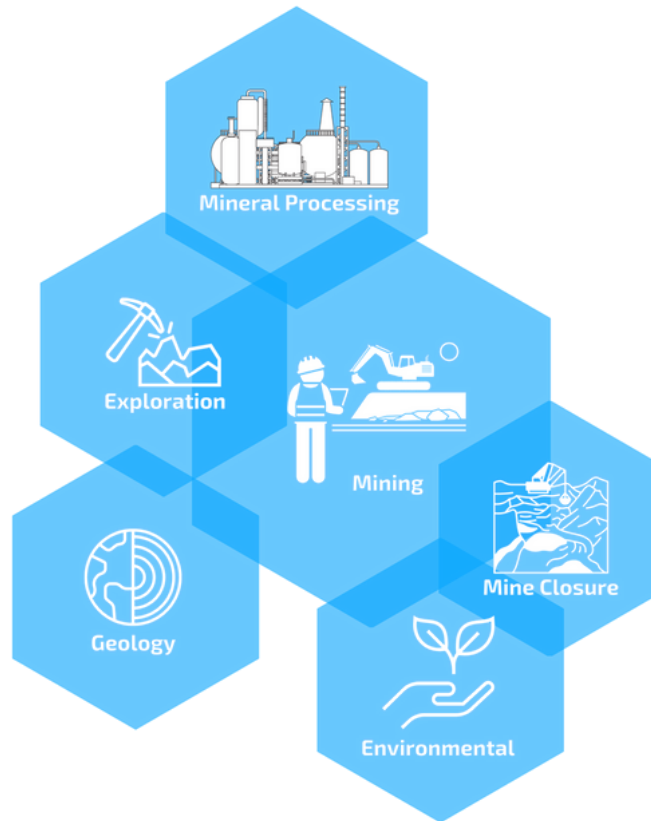
# Polymer Engineering

The programme focuses on synthesis of new polymers, processing of polymeric materials and development of polymer product in the fields of electronics, medical, aeronautics, automotive and oil & gas.



# Mineral Resources Engineering

The only programme in Malaysia that offers specialization in mining and/or quarrying and processing of metallic and non-metallic minerals through conventional and advanced technologies.



## 3.2 PEO & PLO

### 3.2.1 PEO

With the mission of the School of Materials and Mineral Resources Engineering, the Bachelor of Science in Materials Engineering (Mixed Mode) program offers a high-quality academic program with the aim of producing graduates with the following program educational objectives (CEO):

| PEO   | Description of the educational objectives of the program                                                                                                                                                                                                |
|-------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| PEO 1 | Capable of integrating concepts, theories, methods, and current knowledge to conduct quality research that benefits both the local and global community. (PLO1 - Knowledge and Understanding, PLO2 - Cognitive Skills)                                  |
| PEO 2 | Graduates who are skilled in analyzing problems critically and accurately and capable of exploring creative and innovative solutions through various modern digital platforms. (PLO3 - Practical Skills, PLO6 - Digital Skills, PLO7 - Numeracy Skills) |
| PEO 3 | Practicing professional, sustainable, and ethical values in fulfilling responsibilities to employers, society, and the nation. (PLO11 - Ethics & Professionalism, PLO8 - Leadership, Autonomy & Responsibility)                                         |
| PEO 4 | Possess effective and confident communication skills in conveying knowledge orally and in writing and be able to apply entrepreneurial mindsets and skills in research work. (PLO5 - Communication Skills, PLO10 - Entrepreneurial Skills)              |
| PEO 5 | Capable of exploring new knowledge and cross-disciplinary collaboration that impacts the socio-economic development and sustainability of society and the nation. (PLO4 - Interpersonal Skills, PLO9 - Personal Skills)                                 |

## 3.2.2 PLO

Students pursuing this master's degree program will have in-depth knowledge of subjects related to Materials Engineering. Students should be able to achieve the following program learning outcomes (PLO) at the end of their studies.

| PLO                                           | Description of Learning Outcomes                                                                                                                                                            |
|-----------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>PLO 1-<br/>Knowledge and Understanding</b> | Demonstrate in-depth and frontier knowledge in the related field.                                                                                                                           |
| <b>PLO 2-<br/>Cognitive skills</b>            | Apply knowledge critically and integratively to manage and solve complex problems using various techniques, tools or skills for the purpose of producing new ideas or innovative solutions. |
| <b>PLO 3-<br/>Practical skills</b>            | Demonstrate effective and innovative research skills by utilizing specialized research methods and the latest investigative techniques in the relevant field with minimal supervision       |
| <b>PLO 4-<br/>Interpersonal skills</b>        | Demonstrate the ability to collaborate with various parties in carrying out the research.                                                                                                   |
| <b>PLO 5-<br/>Communication skills</b>        | Present knowledge, skills, ideas, and research findings clearly using appropriate methods to various parties.                                                                               |
| <b>PLO 6-<br/>Digital skills</b>              | Utilize appropriate digital technology and software to analyze and enhance research findings.                                                                                               |
| <b>PLO7-<br/>Numeracy skills</b>              | Use appropriate methods to analyze and evaluate data for the purpose of solving problems.                                                                                                   |
| <b>PLO 8-<br/>Leadership skills</b>           | Demonstrate leadership qualities and be responsible when collaborating with others in managing research                                                                                     |
| <b>PLO 9-<br/>Personal skills</b>             | Demonstrate commitment to lifelong learning and personal development in the relevant field.                                                                                                 |
| <b>PLO 10-<br/>Entrepreneurial skills</b>     | Apply entrepreneurial skills to identify opportunities and implement projects related to the field of research.                                                                             |
| <b>PLO 11-<br/>Ethics and Professionalism</b> | Comply with safety rules and instructions, and demonstrate principles, professionalism, ethics, and sustainable practices in conducting research.                                           |

## 3.3 RESEARCH FIELD & SPECIALIZATION

### **MATERIALS ENGINEERING**



#### ***Metal & Corrosion***

Alloy, coating, light weight alloy, corrosion-protection, lead-free solder, metal-implant, metal joining and high temperature oxidation



#### ***Ceramic & Glass***

Advanced ceramic, bioceramics, ceramic coating, glass, bioglass, glass-ceramics, ceramic scaffold and ceramic-implant



#### ***Electronic & Semiconductor***

Semiconductor oxides, organic memory, photocatalytic, LED, sensors and Quantum dot



#### ***Polymer & Composite***

Polymer blend, conductive polymer composite, fiber reinforced composites, Polyurethane, advanced composites and Conductive ink



#### ***Nano & Advanced Materials***

Self-ordering nanostructure, sensor & biosensor, electronic applications, photocatalyst, photoactive materials, Energy Materials

# **POLYMER ENGINEERING**



## ***Rubber***

Dry – foam, tire technology, film, blending, self healing rubber  
Wet – glove technology, coating film, medical devices.



## ***Plastic***

Blending, reactive extrusion, injection moulding, rheology, biodegradable plastic.



## ***Smart Polymer***

Packaging, photolithography technology, conductive polymer, solar cell, shape memory polymer, colour changing polymer.



## ***Composite***

Natural fiber, recycled filler, hybrid filler, advanced and bio-composite.



## ***Biopolymer***

Medical application, agriculture, application, sensor technology, food packaging.



## ***Petrochemical***

Polymer reaction, molecular design, dispersion, colloid stability, pour point depressant materials development.



## ***Additive Manufacturing***

3D printing, design, modelling and simulation, materials development.

# **MINERAL RESOURCES ENGINEERING**



## ***GEOMINE***

Geological Exploration, Ore Minerals, Industrial Mineral, UAV/Drone Mapping, Rock slope stability Analysis, Rock Mass Underground/Tunneling, Geo-Mapping, Mine Plan Design, Blasting & Mining.



## ***REE***

Exploration, Mining, Extraction & Environment



## ***ENVIROMINE***

Mine Sustainability, AMD Treatment, Acid Potential Generation Study (Geochemical Test Work), Mine Water Characterization, Circular Economy, E-waste, Industrial waste, Metal extraction, Environmental Study, Rehabilitation/reclamation, Modelling & simulation



## ***MINERAL PROCESSING***

Mineral Characterization, Beneficiation, Mineral Processing Plant Design, Modelling and Simulation of Mineral Processing Systems, Hydrometallurgy, Pyrometallurgy & Resource Recycling

## 3.4 EXPERTISE



<https://experts.usm.my/>

## 3.5 GRADUATION REQUIREMENTS

A Research Mode student must comply with the following graduation requirements:

- Fulfill the minimum duration of candidature;
- Pass the pre-requisite courses (if any) as determined by the School/Centre/Institute;
- Must obtain minimum grade C for Malaysian Culture and Malay Language (LKM111).

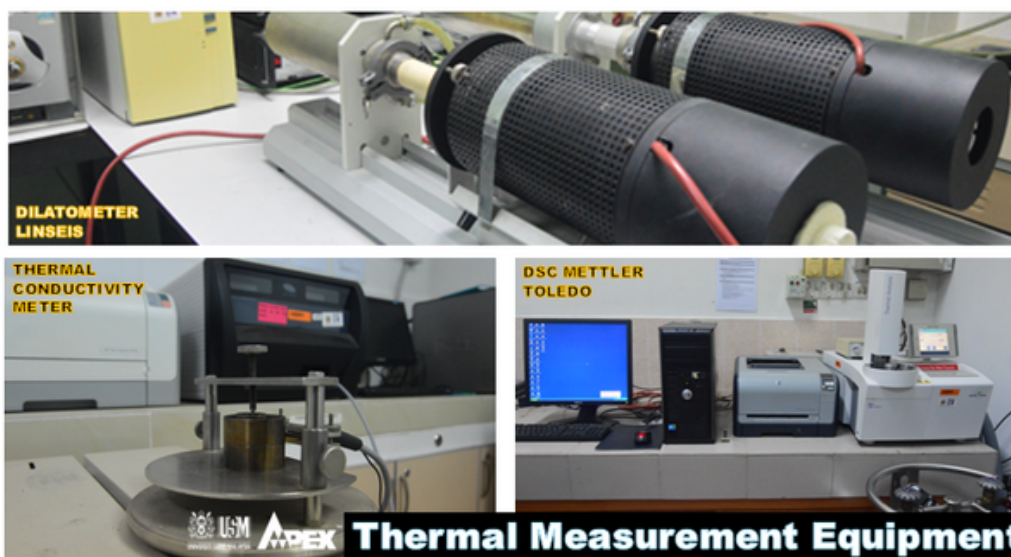
This course is compulsory for all international students;

- Pass the Research Methodology course;
- Fulfill the publication requirements as below:

| Program     | MSc                                                                                                     | PhD                                                                                                                                                                                         |
|-------------|---------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Engineering | At least one (1) article journal, accepted or published in journals/proceedings indexed by WoS / SCOPUS | One (1) article journal, accepted by or published in a journal indexed by WoS in Q1/Q2<br>OR<br>At least two (2) articles journal accepted or published in journals indexed by WoS / SCOPUS |



## 3.6 TESTING FACILITY





## Materials Testing Laboratory ISO/IEC 17025:2017



# 04

## ACADEMIC CALENDER



# ACADEMIC CALENDAR - ACADEMIC SESSION 2025/2026

## Note:

- New Coursework/Mixed/Online mode students' registration for Semester 1, 2022/2026 (October 2025) can be completed via online process from 1 September 2025 - 6 October 2025.
- New Coursework/Mixed/Online mode students' registration for Semester 2, 2025/2026 (March 2026) can be completed via online process from 2 February 2026 - 16 March 2026.
- New Research mode students' registration can be completed anytime within offer letter validity period.

| SEM                                           | WEEKS | ACTIVITIES                                                    | DATE                                    | REMARKS                                                                              |
|-----------------------------------------------|-------|---------------------------------------------------------------|-----------------------------------------|--------------------------------------------------------------------------------------|
| ONE                                           | 1     | Teaching & Learning<br>(T&L 7 Weeks)                          | Monday, 06.10.2025 - Sunday, 12.10.2025 |                                                                                      |
|                                               | 2     |                                                               | Monday, 13.10.2025 - Sunday, 19.10.2025 |                                                                                      |
|                                               | 3     |                                                               | Monday, 20.10.2025 - Sunday, 26.10.2025 | 20.10.2025, Monday - Deepavali**                                                     |
|                                               | 4     |                                                               | Monday, 27.10.2025 - Sunday, 02.11.2025 |                                                                                      |
|                                               | 5     |                                                               | Monday, 03.11.2025 - Sunday, 09.11.2025 |                                                                                      |
|                                               | 6     |                                                               | Monday, 10.11.2025 - Sunday, 16.11.2025 |                                                                                      |
|                                               | 7     |                                                               | Monday, 17.11.2025 - Sunday, 23.11.2025 |                                                                                      |
|                                               | 8     | Mid Semester Break<br>(1 Week)                                | Monday, 24.11.2025 - Sunday, 30.11.2025 |                                                                                      |
|                                               | 9     | Teaching & Learning<br>(T&L 7 Weeks)                          | Monday, 01.12.2025 - Sunday, 07.12.2025 |                                                                                      |
|                                               | 10    |                                                               | Monday, 08.12.2025 - Sunday, 14.12.2025 |                                                                                      |
|                                               | 11    |                                                               | Monday, 15.12.2025 - Sunday, 21.12.2025 |                                                                                      |
|                                               | 12    |                                                               | Monday, 22.12.2025 - Sunday, 28.12.2025 | 25.12.2025, Thursday - Christmas Day                                                 |
|                                               | 13    |                                                               | Monday, 29.12.2025 - Sunday, 04.01.2026 | 01.01.2026, Thursday - New Year of 2025                                              |
|                                               | 14    |                                                               | Monday, 05.01.2026 - Sunday, 11.01.2026 |                                                                                      |
|                                               | 15    |                                                               | Monday, 12.01.2026 - Sunday, 18.01.2026 |                                                                                      |
|                                               | 16    | Revision Week<br>(1 Week)                                     | Monday, 19.01.2026 - Sunday, 25.01.2026 |                                                                                      |
|                                               | 17    | Examination<br>(3 Weeks)                                      | Monday, 26.01.2026 - Sunday, 01.02.2026 | 01.02.2026, Sunday - Thaipusam                                                       |
|                                               | 18    |                                                               | Monday, 02.02.2026 - Sunday, 08.02.2026 | 02.02.2026, Sunday - Replacement leave for Thaipusam (Main & Engineering Campus)     |
|                                               | 19    |                                                               | Monday, 09.02.2026 - Sunday, 15.02.2026 |                                                                                      |
|                                               | 20    | Mid Semester Break /<br>Industrial Training<br>(4 Weeks)      | Monday, 16.02.2026 - Sunday, 22.02.2026 | 17 & 18.02.2026, Tuesday & Wednesday - Chinese New Year                              |
|                                               | 21    |                                                               | Monday, 23.02.2026 - Sunday, 01.03.2026 | 19.02.2026, Thursday - 1st day of Ramadhan                                           |
|                                               | 22    |                                                               | Monday, 02.03.2026 - Sunday, 08.03.2026 |                                                                                      |
|                                               | 23    |                                                               | Monday, 09.03.2026 - Sunday, 15.03.2026 | 07.03.2026, Saturday - Nuzul Al-Quran                                                |
| TWO                                           | 24/1  | Teaching & Learning<br>(T&L 7 Weeks)                          | Monday, 16.03.2026 - Sunday, 22.03.2026 | 21.03.2026 & 22.03.2026, Saturday & Sunday - Eid al-Fitr**                           |
|                                               | 25/2  |                                                               | Monday, 23.03.2026 - Sunday, 29.03.2026 | 23.03.2026, Monday - Replacement leave for Eid al-Fitr****                           |
|                                               | 26/3  |                                                               | Monday, 30.03.2026 - Sunday, 05.04.2026 |                                                                                      |
|                                               | 27/4  |                                                               | Monday, 06.04.2026 - Sunday, 12.04.2026 |                                                                                      |
|                                               | 28/5  |                                                               | Monday, 13.04.2026 - Sunday, 19.04.2026 |                                                                                      |
|                                               | 29/6  |                                                               | Monday, 20.04.2026 - Sunday, 26.04.2026 |                                                                                      |
|                                               | 30/7  |                                                               | Monday, 27.04.2026 - Sunday, 03.05.2026 | 01.05.2026, Friday - Labour Day                                                      |
|                                               | 31/8  | Mid Semester Break<br>(1 Week)                                | Monday, 04.05.2026 - Sunday, 10.05.2026 |                                                                                      |
|                                               | 32/9  | Teaching & Learning<br>(T&L 7 Weeks)                          | Monday, 11.05.2026 - Sunday, 17.05.2026 |                                                                                      |
|                                               | 33/10 |                                                               | Monday, 18.05.2026 - Sunday, 24.05.2026 |                                                                                      |
|                                               | 34/11 |                                                               | Monday, 25.05.2026 - Sunday, 31.05.2026 | 27 & 28.05.2026, Wednesday & Thursday - Eid al-Adha**                                |
|                                               | 35/12 |                                                               | Monday, 01.06.2026 - Sunday, 07.06.2026 | 31.05.2026, Sunday - Wesak Day                                                       |
|                                               | 36/13 |                                                               | Monday, 08.06.2026 - Sunday, 14.06.2026 | 01.06.2026, Monday - Replacement leave for Wesak Day (Main & Engineering Campus)     |
|                                               | 37/14 |                                                               | Monday, 15.06.2026 - Sunday, 21.06.2026 | 01.06.2026, Monday - Yang di-Pertuan Agong's Birthday                                |
|                                               | 38/15 |                                                               | Monday, 22.06.2026 - Sunday, 28.06.2026 | 17.06.2026, Wednesday - Awal Muharram                                                |
|                                               | 39/16 | Revision Week<br>(1 Week)                                     | Monday, 29.06.2026 - Sunday, 05.07.2026 |                                                                                      |
|                                               | 40/17 | **Examination<br>(2 Weeks)                                    | Monday, 06.07.2026 - Sunday, 12.07.2026 | 07.07.2026, Tuesday - Georgetown World Heritage City Day                             |
|                                               | 41/18 | Examination<br>(3 Weeks)                                      | Monday, 13.07.2026 - Sunday, 19.07.2026 | 11.07.2026, Saturday - Penang Governor's Birthday                                    |
|                                               | 42/19 |                                                               | Monday, 20.07.2026 - Sunday, 26.07.2026 |                                                                                      |
| COURSES DURING LONG BREAK /<br>SEMESTER BREAK | 43/20 | Long Semester Break /<br>Industrial Training<br>(10/11 Weeks) | Monday, 27.07.2026 - Sunday, 02.08.2026 |                                                                                      |
|                                               | 44/21 |                                                               | Monday, 03.08.2026 - Sunday, 09.08.2026 |                                                                                      |
|                                               | 45/22 |                                                               | Monday, 10.08.2026 - Sunday, 16.08.2026 |                                                                                      |
|                                               | 46/23 |                                                               | Monday, 17.08.2026 - Sunday, 23.08.2026 |                                                                                      |
|                                               | 47/24 |                                                               | Monday, 24.08.2026 - Sunday, 30.08.2026 | 25.08.2026, Tuesday - Maulidur Rasul                                                 |
|                                               | 48/25 | *T&L                                                          | Monday, 31.08.2026 - Sunday, 06.09.2026 | 31.08.2026, Monday - National Day                                                    |
|                                               | 49/26 | Examination                                                   | Monday, 07.09.2026 - Sunday, 13.09.2026 |                                                                                      |
|                                               | 50/27 |                                                               | Monday, 14.09.2026 - Sunday, 20.09.2026 | 16.09.2026, Wednesday - Malaysia Day                                                 |
|                                               | 51/28 |                                                               | Monday, 21.09.2026 - Sunday, 27.09.2026 | 29 & 30.09.2026, Tuesday & Wednesday - Sultan of Kelantan's Birthday (Health Campus) |
|                                               | 52/29 |                                                               | Monday, 28.09.2026 - Sunday, 04.10.2026 |                                                                                      |

# 05

## DIRECTORY



## 5.1 ADMINISTRATIVE

### **DEAN**

Prof. Ts. Dr. Zulkifli Bin Mohamad Ariff  
6100/5262 [zulariff@usm.my](mailto:zulariff@usm.my)

### **DEPUTY DEAN (Academic, Career & International)**

Dr. Suhaina Binti Ismail  
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Assoc. Prof. Dr. Khairul Anuar b. Shariff  
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### **PROGRAMME CHAIRMAN (Materials Engineering)**

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### **PROGRAMME CHAIRMAN (Mineral Resources Engineering)**

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### **PROGRAMME CHAIRMAN (Polymer Engineering)**

Assoc. Prof. Ir. Ts. Dr. Zuratul Ain Binti Abdul Hamid  
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### **MANAGER OF CORPORATE AFFAIRS & POSITIONING**

Dr. Mohamad Danial Shafiq  
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### **SENIOR ASSISTANT REGISTRAR**

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### **SENIOR ASSISTANT ENGINEER**

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## 5.2 ACADEMIC STAFF

| NAME                                                      | TEL. EXT | EMAIL               |
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| Assoc. Prof. Dr. Yeoh Fei Yee                             | 6175     | feiyee@usm.my       |
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## 5.2 ACADEMIC STAFF

| NAME                                                   | TEL. EXT | EMAIL                    |
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# Thank You

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