RUBBER RESEARCH INFORMATION FROM USM
UNIVERSITI SAINS MALAYSIA

- Second out of 20 public universities in Malaysia
- Established in 1969, the second oldest university in Malaysia
- The first and only APEX university in Malaysia
- One of the five research universities in Malaysia
- One of the leading universities in the country
- 27 Academic Schools (1 Graduate School of Business)
- 18 Centres of Excellence (CoE) and 3 Higher Institution Centres of Excellence (HiCoE)
- About 2000 academic staff
- Student population of about 30,000
- Offers undergraduate & postgraduate programme (by research, coursework & mixed mode)

Campuses:
- Main Campus – Penang (253.98 hectares)
- Engineering Campus (72.84 hectares)
- Health Campus (87.62 hectares)
- Advanced Medical and Dental Institute (141.7 hectares)
- Offshore program in Belgaum, Bangalore, India
- Kuala Lumpur City Venture
Established in March 2001. Area of campus **72.84 hectares** (320 acres)
50 km from the Main Campus
Chronology of Engineering Campus

1972
- The subject of electronic technology, polymer, material and mineral resources offered at the School of Applied Sciences at Main Campus

1984
- Engineering Science and Technology Program offered at School of Engineering & Technology Industry at Main Campus

1986
- Engineering program was first offered in Perak Campus, Ipoh, Perak

1990
- Ipoh Perak Branch Campus moved to the Campus of Sri Iskandar, Tronoh, Perak

2001
- Perak Branch Campus moved to Engineering Campus Transkrian, Nibong Tebal, Penang

2007
- MRU

2008
- APEX F1

2014
- APEX F2

2015
- 2025 World Class Research U
**Students & Staff Statistics (2017)**

### Engineering Campus

<table>
<thead>
<tr>
<th>Category</th>
<th>Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>Undergraduates</td>
<td>2,158</td>
</tr>
<tr>
<td>Graduates Students</td>
<td>932</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>3,090</td>
</tr>
<tr>
<td>Professors</td>
<td>42</td>
</tr>
<tr>
<td>Associates Professors</td>
<td>68</td>
</tr>
<tr>
<td>Senior Lecturers</td>
<td>115</td>
</tr>
<tr>
<td>Lecturers</td>
<td>19</td>
</tr>
<tr>
<td>Post Doctoral/Visitor Professor</td>
<td>11</td>
</tr>
<tr>
<td>Language Teachers</td>
<td>11</td>
</tr>
<tr>
<td>Non-Academics</td>
<td>590</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>856</td>
</tr>
</tbody>
</table>

No of Alumni: 16,638
B.Eng (Hons): 13,535 (from 1988-2016)
MSc: 2,341 (from 2005-2016)
PhD: 762 (from 2005-2016)
Engineering Campus

School of Civil Engineering
School of Electrical & Electronic Engineering
School of Aerospace Engineering
School of Mechanical Engineering
School of Materials & Mineral Resources Engineering
School of Chemical Engineering
Supportive Department
REDAC
SERC
CEDEC
Vision

- Transforming higher education for a sustainable tomorrow

Mission

- USM is a pioneering, trans-disciplinary research intensive university that empowers future talent and enables the bottom billions to transform their socio-economic well-being
Main Administrative Staff

**Professor Dr. Zuhailawati Hussain**
Dean

**Professor Ir. Dr. Mariatti Jaafar**
(Deputy Dean - Academic, Student Affairs & Alumni)

**Assoc. Prof. Dr. Khairunisak Abdul Razak**
(Deputy Dean - Research, Graduate Studies & Networking)

**Assoc. Prof. Dr. Nurulakmal Mohd Sharif**
(Programme Chairman - Materials Eng.)

**Dr. Mohd Hazizan Mohd Hashim**
(Programme Chairman - Mineral Resources Eng.)

**Prof. Dr. Zulkifli Ahmad**
(Programme Chairman - Polymer Eng.)

**Assoc. Prof. Dr. Azura A.Rashid**
(Programme Chairman - OBE & Business Unit)
Programme offered at undergraduate level

Materials Engineering

Mineral Resources Engineering

Polymer Engineering

Enrolment: 500 students/4 years program
POLYMER ENGINEERING STAFF

ACADEMIC STAFF

Professor : 5
Associate Professor : 5
Lecturer : 5
Vocational Training Officer : 1

Total Number of Academic Staff : 16

TECHNICAL STAFF

Number of Technical Staff : 5
## Curriculum of B. Eng (Hon) in Polymer Engineering, USM

<table>
<thead>
<tr>
<th>First Year</th>
<th>Unit</th>
<th>Total</th>
<th>Lecture</th>
<th>Lab</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Semester I</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>EUM</td>
<td>111/4</td>
<td>Engineering Mathematics</td>
<td>4</td>
<td>4</td>
</tr>
<tr>
<td>EMM</td>
<td>101/3</td>
<td>Engineering Mechanics</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>EBB</td>
<td>113/3</td>
<td>Engineering Materials</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>EBS</td>
<td>110/2</td>
<td>Engineering Drawing</td>
<td>2</td>
<td>0</td>
</tr>
<tr>
<td>EBP</td>
<td>103/3</td>
<td>Polymer Organic Chemistry</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td><strong>Total</strong></td>
<td><strong>15</strong></td>
<td><strong>13</strong></td>
<td><strong>2</strong></td>
</tr>
<tr>
<td></td>
<td>SEMESTER BREAK</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Semester II</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>EBB</td>
<td>160/3</td>
<td>Physical Chemistry of Engineering Materials</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>EAS</td>
<td>152/3</td>
<td>Strength of Materials</td>
<td>4</td>
<td>4</td>
</tr>
<tr>
<td>EUM</td>
<td>112/4</td>
<td>Numerical &amp; Statistical</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>EML</td>
<td>102/2</td>
<td>Engineering Methods</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>EEU</td>
<td>104/3</td>
<td>Engineering Practice</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Electrical Technology</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td><strong>Total</strong></td>
<td><strong>15</strong></td>
<td><strong>15</strong></td>
<td><strong>0</strong></td>
</tr>
<tr>
<td></td>
<td><strong>SESSION BREAK (11 weeks)</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Second Year</td>
<td>Unit</td>
<td>Total</td>
<td>Lecture</td>
<td>Lab</td>
</tr>
<tr>
<td>--------------------------</td>
<td>-------------------------------</td>
<td>-------</td>
<td>---------</td>
<td>-----</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Semester I</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>EUP</td>
<td>222/3 Engineers in Society</td>
<td>3</td>
<td>3</td>
<td>0</td>
</tr>
<tr>
<td>EBB</td>
<td>220/3 Polymeric Materials</td>
<td>3</td>
<td>3</td>
<td>0</td>
</tr>
<tr>
<td>EBP</td>
<td>201E/3 Polymer Synthesis</td>
<td>3</td>
<td>3</td>
<td>0</td>
</tr>
<tr>
<td>EBP</td>
<td>202/3 Polymer Structure</td>
<td>3</td>
<td>3</td>
<td>0</td>
</tr>
<tr>
<td>EBB</td>
<td>250/2 Computer Methods in Engineers</td>
<td>2</td>
<td>2</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td></td>
<td>14</td>
<td>14</td>
<td>0</td>
</tr>
<tr>
<td>SEMESTER BREAK</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Semester II</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>EBB</td>
<td>215/3 Semiconductor Materials</td>
<td>3</td>
<td>3</td>
<td>0</td>
</tr>
<tr>
<td>EBP</td>
<td>204/3 Elastomeric Materials</td>
<td>3</td>
<td>3</td>
<td>0</td>
</tr>
<tr>
<td>EBP</td>
<td>212/3 Latex Processing</td>
<td>3</td>
<td>3</td>
<td>0</td>
</tr>
<tr>
<td>EBP</td>
<td>216/2 Polymer Engineering Laboratory</td>
<td>2</td>
<td>0</td>
<td>2</td>
</tr>
<tr>
<td>EBP</td>
<td>207/2 Transport Phenomena in Polymers</td>
<td>2</td>
<td>2</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td></td>
<td>13</td>
<td>11</td>
<td>2</td>
</tr>
</tbody>
</table>

SESSION BREAK (11 weeks)
## Curriculum

<table>
<thead>
<tr>
<th>Third Year</th>
<th>Unit</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Total</td>
</tr>
<tr>
<td><strong>Semester I</strong></td>
<td></td>
</tr>
<tr>
<td>EBP</td>
<td>308/3</td>
</tr>
<tr>
<td>EBP</td>
<td>310/3</td>
</tr>
<tr>
<td>EBP</td>
<td>303/3</td>
</tr>
<tr>
<td>EBP</td>
<td>306E/3</td>
</tr>
<tr>
<td>EBP</td>
<td>316/2</td>
</tr>
<tr>
<td></td>
<td><strong>---------</strong></td>
</tr>
<tr>
<td></td>
<td>14</td>
</tr>
<tr>
<td><strong>Electives</strong></td>
<td></td>
</tr>
<tr>
<td><strong>SEMESTER BREAK</strong></td>
<td></td>
</tr>
<tr>
<td><strong>Semester II</strong></td>
<td></td>
</tr>
<tr>
<td>EBP</td>
<td>317/3</td>
</tr>
<tr>
<td>EBP</td>
<td>307E/2</td>
</tr>
<tr>
<td>EBP</td>
<td>341/3</td>
</tr>
<tr>
<td>EBP</td>
<td>324/3</td>
</tr>
<tr>
<td>EBP</td>
<td>320/2</td>
</tr>
<tr>
<td></td>
<td><strong>---------</strong></td>
</tr>
<tr>
<td></td>
<td>13</td>
</tr>
<tr>
<td><strong>Electives</strong></td>
<td></td>
</tr>
<tr>
<td>EBP</td>
<td>314/3</td>
</tr>
<tr>
<td><strong>SESSION BREAK (11 weeks) EBP350/5- Industrial Training</strong></td>
<td></td>
</tr>
<tr>
<td>Final Year</td>
<td>Unit</td>
</tr>
<tr>
<td>---------------------------------------------------------------------------</td>
<td>---------------------</td>
</tr>
<tr>
<td></td>
<td>Total</td>
</tr>
<tr>
<td>Semester I</td>
<td></td>
</tr>
<tr>
<td>EBP 400/3 Product Design &amp; Failure Analysis</td>
<td>3</td>
</tr>
<tr>
<td>EBP 420E/2 Rubber Engineering</td>
<td>2</td>
</tr>
<tr>
<td>EBP 415/3 Fiber Processing</td>
<td>3</td>
</tr>
<tr>
<td>EBP 418/2 Plastic Laboratory</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>------</td>
</tr>
<tr>
<td></td>
<td>10</td>
</tr>
<tr>
<td>Elective</td>
<td></td>
</tr>
<tr>
<td>EBB 323/3 Fabrication Technology of Semiconductor</td>
<td>3</td>
</tr>
<tr>
<td>SEMESTER BREAK</td>
<td></td>
</tr>
<tr>
<td>Semester II</td>
<td></td>
</tr>
<tr>
<td>EBP 401/6 Final Year Academic Project</td>
<td>6</td>
</tr>
<tr>
<td>EBP 402/3 Mould &amp; Die Design</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>------</td>
</tr>
<tr>
<td></td>
<td>9</td>
</tr>
<tr>
<td>Elect. EBP 412/3 Specialty Polymers</td>
<td>3</td>
</tr>
</tbody>
</table>
Professor Dr. Hanafi Ismail  
B.Sc (UKM), Ph.D. (Loughborough) U.K.  
e-mail: ihanafi@usm.my  
Tel no.: 04-599 6113

Research interests:  
1. Rubber reinforcement; rubber-rubber and rubber-Plastic blend; recycling of waste rubber and plastic products  
2. Short fiber, mineral fillers and nanofillers-reinforced rubber, plastic and TPE composites

Link for Google Scholar:  
Assoc. Prof. Dr. Zulkifli Mohamad Ariff  
B. Tech. (USM), M.Sc. (UMIST), U.K. Ph.D. (USM)  
e-mail: zulariff@eng.usm.my  
Tel no.: 04-599 6173 (Office)  

Research Interests:  
1. Rheological properties measurement of polymer melts  
2. Production and characterization of various polymeric foams  
3. Real-time monitoring of polymer processes

Link for Google Scholar & Blog:  
https://scholar.google.com/citations?user=JRp0s4oAAAAJ&hl=en  
http://www.foamnflow.com
Rubber Foams (Journals)

International


National

Rubber Foams (Conference)


Rubber Foams (Conference)


Rubber Curing & Flow (Journals & Conference)

Dr. Nadras Othman
Dipl. in Rubber and Plastic Technology, (UiTM)
Dipl. in Natural Rubber Processing, (RRIM)
B. Eng (Honest) in Polymer Engineering (London) U.K.
Ph.D. (USM)
e-mail: srnadras@eng.usm.my
Tel no.: +60135813137 (HP), +6045996177 (OFF)

Research Interests:
1. Elastomer clay composite
2. Elastomer with nano filler and natural fibre
3. Retreading technology: Tire tread liner and cushion gum

Link for Google Scholar:
https://scholar.google.com/citations?user=sAo28QIAAAAAJ&hl=en
SELECTED INTERNATIONAL ISI JOURNAL


SELECTED INTERNATIONAL SCOPUS JOURNAL


Assoc. Prof. Dr. Azura A. Rashid
B. Tech. (USM), Ph.D., (London) U.K.
(e-mail: azura@eng.usm.my)
Tel no.: 

Research Interests:
1. Conductive rubber composites
2. Palm ash/paper sludge filled thermoplastic elastomer composites
3. Effect of ageing on physical properties of natural rubber
4. Diffusion and reaction of oxygen during ageing of natural rubber

Link for Google Scholar:

https://scholar.google.com/citations?user=cqlxtpwAAAAJ&hl=en
Dr. Raa Khimi bin Shuib
B. Eng. Polymer Engineering (USM), Ph.D (UoW, New Zealand)
Email : raakhimi@usm.my
Tel no.: +60194647498 (hp), +604-5996122 (office)
Research Interests:
1. Vibration Damping Materials,
2. Rheology and Flow behaviour of Rubber
3. Smart Elastomeric Materials- Magnetorheological Elastomer

Link for Google Scholar:

https://scholar.google.com/citations?user=4bU6vZIAAAAJ&hl=en
Applied research

- Structure-properties relationship of polymeric materials such as rubber composites, rubber blends, rubber foams, biodegradable polymers, etc.

- Development and characterization new and existing polymeric materials and systems

- Optimization of polymer processing of compound formulation polymeric materials
Applied research (cont.)

- Development of new materials such as new thermoplastic elastomer materials based on natural rubber, bioactive composite materials, degradable plastics and production of new compatibilizer or coupling agent with the utilization of the nation’s diverse natural resources.

- Preparation and characterization of nano and natural filler-rubber composites such as development of cost effective modified via incorporation of multi-component filler and high performance lignocellulose/mineral fillers.

- New technologies for recycling of various rubber and plastic waste.
Basic research

- Rubber science and technology
- Latex technology
- Synthesis of new polymers
- Physical and chemical modification of natural rubber, interphases and interfaces
- Polymer Rheology
- Modelling and simulation of polymer processes, polymer structures, polymer reactions, etc.
FACILITIES
FACILITIES
FACILITIES

Thermal Analysis

TGA

DSC

DSC
FACILITIES

HARDNESS TESTER

PHYSICAL TESTING EQUIPMENT

UNIVERSAL TESTING MACHINE
FACILITIES

SCANNING PROBE MICROSCOPE

IMAGE ANALYSER

FESEM

OPTICAL MICROSCOPE
FACILITIES

PORTABLE XRD

X-RAY EQUIPMENTS

XRD

XRF