



**School of Mechanical Engineering (SCE)**

**Faculty of Engineering**

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# Bachelor Of Engineering (Mechanical-Industrial)

## ADMINISTRATION TEAM



| Position   | Name   |
|--|--|
| Chair  | Professor Dr. Mohd Hasbullah Idris<br><a href="mailto:hasbullah@utm.my">hasbullah@utm.my</a><br>07-5534567   |
| Associate Chair (Academic and Student Development)     | Professor Dr. Izman Sudin<br><a href="mailto:izman@utm.my">izman@utm.my</a><br>07-5557051                    |
| Associate Chair (Research and Academic Staff)          | Assoc. Prof. Dr. Zaini Ahmad<br><a href="mailto:azaini@utm.my">azaini@utm.my</a><br>07-5557048               |
| Associate Chair (Quality and Strategy)                 | Assoc. Prof. Dr. Haslinda Mohamed Kamar<br><a href="mailto:haslinda@utm.my">haslinda@utm.my</a>              |
| Associate Chair (Continuous Education and TNE)         | Dr. Engku Mohammad Nazim Engku Abu Bakar<br><a href="mailto:nazim@utm.my">nazim@utm.my</a>                   |
| Associate Chair (Facility)                             | Assoc. Prof. Dr. Mohamed Ruslan Abdullah<br><a href="mailto:ruslanabdullah@utm.my">ruslanabdullah@utm.my</a> |
| Director (Applied Mechanics & Design)                  | Assoc. Prof. Dr. Mohd Yazid Yahya<br><a href="mailto:yazidyahya@utm.my">yazidyahya@utm.my</a><br>07-5557044  |
| Director (Aeronautics, Automotive & Ocean Engineering) | Assoc. Prof. Dr. Pakharuddin Mohd Samin<br><a href="mailto:pakhar@utm.my">pakhar@utm.my</a><br>07-5557043    |
| Director (Materials,                                   | Assoc. Prof. Dr. Muhamad Azizi Mat Yajid   |

|   |  |
|---|--|
| Manufacturing & Industrial Engineering) | <a href="mailto:azizi@utm.my">azizi@utm.my</a><br>07-5557038                               |
| Director (Thermal Fluids)               | Dr. Aminuddin Saat<br><a href="mailto:aminuddin@utm.my">aminuddin@utm.my</a><br>07-5557036 |

**BACHELOR OF ENGINEERING (MECHANICAL – INDUSTRIAL)  
PROGRAMME SPECIFICATIONS**

|            |   |   |
|------------|---|---|
| <b>1.</b>  | <b>Programme Name</b>                                       | Bachelor of Engineering (Mechanical – Industrial) |
| <b>2.</b>  | <b>Final Award</b>  | Bachelor of Engineering (Mechanical – Industrial) |
| <b>3.</b>  | <b>Awarding Institution</b>                                 | Universiti Teknologi Malaysia                     |
| <b>4.</b>  | <b>Teaching Institution</b>                                 | Universiti Teknologi Malaysia                     |
| <b>5.</b>  | <b>Professional or Statutory Body of Accreditation</b>      | Engineering Accreditation Council (EAC)           |
| <b>6.</b>  | <b>Language(s) of Instruction</b>                           | Bahasa Melayu and English                         |
| <b>7.</b>  | <b>Mode of Study (Conventional, distance learning etc.)</b> | Conventional                                      |
| <b>8.</b>  | <b>Mode of Operation (Franchise, self-govern, etc.)</b>     | Self-govern                                       |
| <b>9.</b>  | <b>Study Scheme (Full Time / Part Time)</b>                 | Full Time   |
| <b>10.</b> | <b>Study Duration</b>                                       | Minimum : 4 years<br>Maximum : 6 years            |
|            | Type of Semester  | No of Semesters                                   |
|            | Normal  | 8   |
|            | Short   | 1   |
|            |   | No of Weeks/Semester                              |
|            |   | 14  |
|            |   | 8   |
| <b>11.</b> | <b>Entry Requirements</b>                                   | Matriculation/STPM/Diploma or equivalent          |
| <b>12.</b> | <b>Programme Objectives (PEO)</b>                           |   |

- (i) Demonstrate academic and technological excellence professionally and globally, particularly in areas related to mechanical engineering practices and contribute innovatively to the nation's wealth creation.
- (ii) Career advancement by achieving higher levels of responsibility, leadership and acquiring professional and advanced academic qualifications.
- (iii) Recognize and practice professional, ethical, environmental and societal responsibilities and value different global and cultural aspects of the work and society.
- (iv) Adapt and communicate effectively and be successful working with multidisciplinary teams.

### 13. Programme Learning Outcomes (PO)

#### (a) Technical Knowledge and Competencies

| Intended Learning Outcomes   | Teaching and Learning Method   | Assessment  |
|--|--|---|
| <b>PO1</b>   |  |   |
| Acquire and apply fundamental knowledge of mathematics, science and engineering principles to solve complex mechanical and industrial engineering problems<br><br>Keywords: <b>Engineering Knowledge</b>   | Lectures, tutorials, laboratory works, seminars, studio works, directed reading, final year projects and problem-based learning. | Examinations, laboratory reports, seminar presentations, problem-based exercises, individual and group project reports. |
| <b>PO2</b>   |  |   |
| Identify, formulate and analyse complex mechanical and industrial engineering problems<br><br>Keywords: <b>Problem Analysis</b>  | Lectures, tutorials, laboratory works, seminars, studio works, directed reading, final year projects and problem-based learning. | Examinations, laboratory reports, seminar presentations, problem-based exercises, individual and group project reports. |
| <b>PO3</b>   |  |   |
| Design solutions for complex mechanical and industrial engineering problems that fulfil health, safety, societal, cultural and environmental needs<br><br>Keywords: <b>Design/Development of Solutions</b> | Lectures, tutorials, laboratory works, seminars, studio works, directed reading, final year projects and problem-based learning. | Examinations, laboratory reports, seminar presentations, problem-based exercises, individual and group project reports. |

| PO4   |  |   |
|---|--|---|
| Investigate complex mechanical and industrial engineering problems using research-based knowledge and methods to produce conclusive results<br><br>Keywords: <b>Investigation</b> | Lectures, tutorials, laboratory works, seminars, studio works, directed reading, final year projects and problem-based learning. | Examinations, laboratory reports, seminar presentations, problem-based exercises, individual and group project reports. |

| Intended Learning Outcomes   | Teaching and Learning Method   | Assessment  |
|--|--|---|
| PO5  |  |   |
| Use modern engineering and information technology (IT) tools in complex mechanical and industrial engineering activities, with an understanding of limitations<br><br>Keywords: <b>Modern Tools Usage</b>  | Lectures, tutorials, laboratory works, seminars, studio works, directed reading, final year projects and problem-based learning. | Examinations, laboratory reports, seminar presentations, problem-based exercises, individual and group project reports. |
| (b) Generic Skills   |  |   |
| PO6  |  |   |
| Apply professional engineering practice and solutions to complex mechanical and industrial engineering problems related to societal, health, safety, legal and cultural issues with full responsibility and integrity<br><br>Keywords: <b>The Engineer and Society</b> | Lectures, tutorials, seminars, group projects and industrial training.   | Industrial training and group project reports.  |
| PO7  |  |   |

|  |   |   |
|--|---|---|
| Evaluate the sustainability and impact of professional engineering work in the solutions of complex mechanical and industrial engineering problems in societal and environmental contexts<br><br>Keywords: <b>Environment and Sustainability</b> | Tutorials, laboratory works, group assignments and projects, final year project presentations and problem-based learning. | Group reports, learning logs/diaries and oral presentations.    |
| <b>PO8</b>   |   |   |
| Apply ethical principles and commit to professional ethics and responsibilities and norms of engineering practice;<br><br>Keywords: <b>Ethics</b>  | Lectures, tutorials, seminars, group projects and industrial training.  | Industrial training and group project reports.                  |
| <b>PO9</b>   |   |   |
| Communicate effectively on complex mechanical and industrial engineering activities both orally and in writing;<br><br>Keywords: <b>Communication</b>  | Seminars, assignments and final year projects.  | Report and theses.  |
| <b>PO10</b>  |   |   |
| Work productively as an individual, and as a member or leader in a team that may involve multi-disciplinary settings;<br><br>Keywords: <b>Team Working</b>   | Lectures and project assignments.   | Demonstrations, reports, tests, examinations and presentations. |
| <b>PO11</b>  |   |   |

|  |                                   |   |
|--|-----------------------------------|---|
| Undertake lifelong learning and manage information including conducting literature study;<br><br>Keywords: <b>Life Long Learning</b>   | Lectures and project assignments. | Demonstrations, reports, tests, examinations and presentations. |
| <b>PO12</b>  |                                   |   |
| Demonstrate and apply knowledge on finance and management principles and acquire entrepreneurship skill;<br><br>Keywords: <b>Project Management Finance &amp; Entrepreneurship</b> | Lectures and project assignments. | Demonstrations, reports, tests, examinations and presentations. |

| <b>14. Classification of Courses</b>                       |                                      |                     |                   |
|--|--------------------------------------|---------------------|-------------------|
| <b>No.</b>   | <b>Classification</b>                | <b>Credit Hours</b> | <b>Percentage</b> |
| i.   | Programme Core                       | 90                  | 64.3              |
| ii.  | Programme Electives                  | 27                  | 19.3              |
| iii.   | Compulsory University Courses        | 23                  | 16.4              |
| <b>Total</b>   |                                      | <b>140</b>          | <b>100</b>        |
| <b>Classification of courses for engineering programme</b> |                                      |                     |                   |
| A  | Engineering Courses                  | 117                 | 83.6              |
|  | <b>Total credit hours for Part A</b> | <b>117</b>          |                   |
| B  | Non-Engineering                      | 23                  | 16.4              |
|  | <b>Total credit hours for Part B</b> | <b>23</b>           |                   |
| <b>Total credit hours for Part A and B</b>                 |                                      | <b>140</b>          | <b>100</b>        |



|   |            |
|---|------------|
| <b>15. Total Credit Hours to Graduate</b> | <b>140</b> |
|---|------------|

## Award Requirements

To graduate, students must:

- Attain a total of not less than 140 credit hours with a minimum CGPA of 2.00.
- Has passed all specified courses.
- Has applied for graduation and has been approved by the University.
- Has completed all four (4) short courses and one (1) test in UTM Professional Skills Certificate Programme.
- Other condition as specified.

## Entry Requirements

The minimum qualifications for candidates who intend to do a Bachelor of Engineering (Mechanical - Industrial) are as follows:

1. Minimum results based on **the Malaysian High School Certificate (STPM)** (results would be based on the general requirements as well as other conditions as the pre-requisites for the programme set by the university).

### University General Requirements:

- i. Passed Malaysian Certificate Examination (SPM) or its equivalent with a credit in Bahasa Melayu/Bahasa Malaysia or a credit in Bahasa Melayu/Bahasa Malaysia, July Paper.
- ii. Passed the Malaysian High School Certificate (STPM) or its equivalent and obtained the following:
  - a) **Grade C (NGMP 2.00)** General Studies/General Paper, and
  - b) **Grade C (NGMP 2.00)** in two (2) other subjects

- iii. Passed the Malaysian University English Test (MUET) with minimum result of **Band 1**.

#### Programme Specific Requirements

- i. Obtained a **CGPA of 2.80**; and Passed with a minimum **Grade B- (NGMP 2.67)** in two (2) of the following subjects:
  - a) Mathematics T / Further Mathematics
  - b) Physics or Chemistry
- ii. Passed with at least a **Grade C** in Mathematics and Physics in the SPM level or equivalent.
- iii. Passed the Malaysian University English Test (MUET) with minimum result of **Band 2**.
- iv. Do not have any health problems that may affect their studies.

2. Minimum requirements for **Matriculation Certificates (KPM) / UM Science Foundation / UiTM Foundation** (fulfil the general requirements set by the university as well as other conditions of the programme).

#### General University Requirements

- i. Passed Malaysian Certificate Examination (SPM) or its equivalent with a credit in Bahasa Melayu/Bahasa Malaysia or a credit in Bahasa Melayu/Bahasa Malaysia, July Paper.
- ii. Passed the Matriculation Certificates (KPM) / UM Science Foundation / UiTM Foundation with a minimum **CGPA of 2.00** and passed all the core subjects.
- iii. Passed the Malaysian University English Test (MUET) with minimum result of **Band 1**.

#### Programme Specific Requirements

- i. Obtained a **CGPA of 2.80**; and Passed with a **Grade B- (2.67)** in two (2) of the following subjects:

- a) Mathematics / Engineering Mathematics
  - b) Physics / Engineering Physics or Chemistry / Engineering Chemistry
- ii. Passed with at least a **Grade C** in Mathematics and Physics in the SPM level or equivalent.
  - iii. Passed the Malaysian University English Test (MUET) with minimum result of **Band 2**.
  - iv. Do not have any health problems that may affect their studies.
3. Minimum qualifications for students with **Certificates/Diplomas** (fulfil the general requirements set by the university as well as specific requirements of the programme).

General University Requirements

- i. Obtained a Diploma or equivalent qualification recognised by the Malaysian Government and approved by the Senate.

or

- ii. Passed STPM examination in 2016 or before and obtained at least:

- a) **Grade C (NGMP 2.00)** General Studies/General Paper, and
- b) **Grade C (NGMP 2.00)** in two (2) other subjects

or

- iii. Passed the Matriculation Certificates (KPM) / UM Science Foundation / UiTM Foundation in 2017 or before and obtained minimum **CGPA of 2.00**.
- iv. Passed the Malaysian University English Test (MUET) with minimum result of **Band 1**.
- v. Passed Malaysian Certificate Examination (SPM) or its equivalent with a credit in Bahasa Melayu/Bahasa Malaysia or a credit in Bahasa Melayu/Bahasa Malaysia, July Paper.

Programme Specific Requirements

- i. Obtained a Diploma in Mechanical Engineering from UTM or equivalent with minimum **CGPA of 2.75**.

or

- ii. For those who obtained a **CGPA of less than 2.75** but have at least **two (2)** years working experience in related field are eligible to apply.

or

- iii. Meet the minimum entry requirements as required for STPM holders.

or

- iv. Meet the minimum entry requirements as required for those who have completed the Matriculation Certificates (KPM) / UM Science Foundation / UiTM Foundation.
- v. Passed with at least a **Grade C** in Mathematics and Physics in the SPM level or equivalent.

or

- vi. Obtained at least a **C Grade (2.00)** in any one of the Mathematic courses at Diploma level.
- v. Passed the Malaysian University English Test (MUET) with minimum result of **Band 2**.
- vii. Do not have any health problems that may affect their studies.

**Note:**

Candidates are required to submit the results transcript of all their examinations taken during their Diploma study (semester one until the final semester) to UTM. A copy of the diploma or a letter of completion of study will also have to be submitted together with their applications.

**Year of entry and duration of study will be based on the credit exemptions approved by the UTM.**

## Programme Educational Objectives (PEO)

After having exposed to 3 to 5 years working experience, our graduates should become professionals who demonstrate the following competencies:

| Code | Intended Educational Objectives   |
|------|---|
| PEO1 | Demonstrate academic and technological excellence professionally and globally, particularly in areas related to mechanical engineering practices and contribute innovatively to the nation's wealth creation. |
| PEO2 | Career advancement by achieving higher levels of responsibility, leadership and acquiring professional and advanced academic qualifications.  |
| PEO3 | Recognize and practice professional, ethical, environmental and societal responsibilities and value different global and cultural aspects of the work and society.  |
| PEO4 | Adapt and communicate effectively and be successful working with multidisciplinary teams.   |

## Programme Learning Outcomes (PLO)

After having completed the programme, graduates should be able to demonstrate the following competencies:

| Code | Intended Learning Outcomes   |
|------|--|
| PLO1 | Acquire and apply fundamental knowledge of mathematics, science and engineering principles to solve complex mechanical and <b>industrial</b> engineering problems. |
| PLO2 | Identify, formulate and analyse complex mechanical and <b>industrial</b> engineering problems.   |
| PLO3 | Design solutions for complex mechanical and <b>industrial</b> engineering problems that fulfil health, safety, societal, cultural                                  |

|       |   |
|-------|---|
|       | and environmental needs.  |
| PLO4  | Investigate complex mechanical and <b>industrial</b> engineering problems using research-based knowledge and methods to produce conclusive results.   |
| PLO5  | Use modern engineering and information technology (IT) tools in complex mechanical and <b>industrial</b> engineering activities, with an understanding of the limitations.  |
| PLO6  | Apply professional engineering practice and solutions to complex mechanical and <b>industrial</b> engineering problems related to societal, health, safety, legal and cultural issues with full responsibility and integrity. |
| PLO7  | Evaluate the sustainability and impact of professional engineering work in the solutions of complex mechanical and <b>industrial</b> engineering problems in societal and environmental contexts.                             |
| PLO8  | Apply ethical principles and commit to professional ethics and responsibilities and norms of engineering practice.  |
| PLO9  | Communicate effectively on complex mechanical and <b>industrial</b> engineering activities both orally and in writing.  |
| PLO10 | Work productively as an individual, and as a member or leader in a team that may involve multi-disciplinary settings.   |
| PLO11 | Undertake lifelong learning and manage information including conducting literature study.   |
| PLO12 | Demonstrate and apply knowledge on finance and management principles and acquire entrepreneurship skill.  |

## **PROFESSIONAL SKILLS CERTIFICATE (PSC)**

Students are required to enrol in certificate programmes offered by the Centres of Excellence in the University and the School of Professional and Continuing Education (SPACE) during the duration of their studies in UTM. The four (4) short courses and one test are as follows:

1. How to Get Yourself Employed (HTGYE)
2. ISO 9001: 2008 Quality Management System Requirement (ISO)
3. Occupational Safety and Health Awareness (OSHA)
4. How to Manage Your Personal Finance (HTMYPF)
5. Test of English Communication Skills for Graduating Students (TECS):
  - (i) TECS 1001 (Paper I – Oral Interaction)
  - (ii) TECS 1002 (Paper II - Writing)

## **MOBILITY PROGRAMME (OUTBOUND)**

Universiti Teknologi Malaysia (UTM) is offering five (5) types of mobility programs which allow UTM Student to go abroad and join academic programs in universities, institutions or organizations in all over the world. The opportunities offered are as below:

### **1. Study Abroad / Student Exchange**

Study Abroad/Student Exchange programme is a programme which allow student to spend one or two semesters at universities abroad and take courses in regular semester with credit transfer opportunity.

### **2. Research Internship Abroad**

Research Internship is a program which allow student to join research study or internship under the supervision of an academic staff at universities or industries abroad from all over the world.

### **3. Global Outreach Programme (GOP)**

GOP is a 7 to 14 days academic based program to experience various cultures in other countries. It includes immersion elements such as research & academic activities, social responsibility and cross cultural activities.

#### 4. International Invitation Programme

Students participate in program organised by international institutions/ organisations with the following themes:

- (i) Seminar, Conference or Paper Presentation
- (ii) Cultural Exhibition and Conference
- (iii) Student Development Activity

#### 5. Summer School Abroad

Summer School program is a program which is designed to provide educational opportunities in 4 to 8 weeks during summer holiday abroad. It is related to environment, local community, heritage and tradition.

Details and appropriate forms and procedures can be reached at **UTM International link:** <http://www.utm.my/international/outbound-mobility-programs/>

## COURSE MENU

| YEAR 1: SEMESTER 1 |  |   |   |     |        |               |
|--------------------|--|---|---|-----|--------|---------------|
| CODE               | COURSE   | L | T | P/S | CREDIT | PRE-REQUISITE |
| SEMM 1013          | Programming for Engineers                      | 3 | 0 | 3   | 3      |               |
| SEMM 1203          | Static*  | 3 | 1 | 0   | 3      |               |
| SEMM 1503          | Engineering Drawing                            | 1 | 0 | 6   | 3      |               |
| SEMM 1911          | Experimental Methods                           | 1 | 0 | 0   | 1      |               |
| SEMM 1921          | Introduction to Mechanical Engineering         | 1 | 0 | 0   | 1      |               |
| SSCE 1693          | Engineering Mathematics I                      | 3 | 1 | 0   | 3      |               |
| UHLB 1112          | English Communication Skills                   | 3 | 0 | 0   | 2      |               |
| UHS 1012           | Islamic and Asian Civilization (Local student) | 2 | 0 | 0   | 2      |               |



|              |  |   |   |   |           |  |
|--------------|--|---|---|---|-----------|--|
| UHMS 1022    | Malaysian Studies 3<br>(International Student) | 2 | 0 | 0 | 2         |  |
| <b>Total</b> |  |   |   |   | <b>18</b> |  |

| <b>YEAR 1: SEMESTER 2</b> |  |          |          |            |               |                      |
|---------------------------|--|----------|----------|------------|---------------|----------------------|
| <b>CODE</b>               | <b>COURSE</b>  | <b>L</b> | <b>T</b> | <b>P/S</b> | <b>CREDIT</b> | <b>PRE-REQUISITE</b> |
| SEMM 1113                 | Mechanics of Solids I*   | 3        | 1        | 0          | 3             | SEMM 1203            |
| SEMM 1213                 | Dynamics*  | 3        | 1        | 0          | 3             | SEMM 1203            |
| SEMM 1513                 | Introduction to Design   | 1        | 0        | 3          | 3             | SEMM 1503            |
| SKEU 1002                 | Electrical Technology  | 2        | 1        | 0          | 2             |                      |
| SSCE 1793                 | Differential Equations   | 3        | 1        | 0          | 3             | SSCE1693             |
| UHMT 1012                 | Graduate Success Attributes                                      | 2        | 0        | 0          | 2             |                      |
| UHMS 1172                 | Malaysian Dynamics<br>(Local student)                            | 2        | 0        | 0          | 2             |                      |
| UHLM 1012                 | Malay Language for Communication<br>2<br>(International student) | 2        | 0        | 0          | 2             |                      |
| <b>Total</b>              |  |          |          |            | <b>18</b>     |                      |

| <b>YEAR 2: SEMESTER 1</b> |   |          |          |            |               |                       |
|---------------------------|---|----------|----------|------------|---------------|-----------------------|
| <b>CODE</b>               | <b>COURSE</b>                           | <b>L</b> | <b>T</b> | <b>P/S</b> | <b>CREDIT</b> | <b>PRE-REQUISITE</b>  |
| SEMM 2123                 | Mechanics of Solids II*                 | 3        | 1        | 0          | 3             | SEMM 1113             |
| SEMM 2223                 | Mechanics of Machines and<br>Vibration* | 3        | 1        | 0          | 3             | SEMM 1213             |
| SEMM 2313                 | Mechanics of Fluids I*                  | 3        | 1        | 0          | 3             | SEMM 1203, SEMM 1013* |

|              |                                    |   |   |   |           |           |
|--------------|------------------------------------|---|---|---|-----------|-----------|
| SEMM 2413    | Thermodynamics*                    | 3 | 1 | 0 | 3         |           |
| SEMM 2921    | Laboratory I                       | 0 | 0 | 2 | 1         | SEMM 1911 |
| UHLB 2122    | Advanced Communications Skills     | 3 | 0 | 0 | 2         | UHLB 1112 |
| UHIT 2302    | Thinking of Science and Technology | 2 | 0 | 0 | 2         |           |
| <b>Total</b> |                                    |   |   |   | <b>17</b> |           |

| <b>YEAR 2: SEMESTER 2</b> |   |          |          |            |               |                      |
|---------------------------|---|----------|----------|------------|---------------|----------------------|
| <b>CODE</b>               | <b>COURSE</b>                             | <b>L</b> | <b>T</b> | <b>P/S</b> | <b>CREDIT</b> | <b>PRE-REQUISITE</b> |
| SEMM 2323                 | Mechanics of Fluids II*                   | 3        | 1        | 0          | 3             | SEMM 2313            |
| SEMM 2433                 | Applied Thermodynamics and Heat Transfer* | 3        | 1        | 0          | 3             | SEMM 2413            |
| SEMM 2613                 | Materials Science                         | 3        | 1        | 0          | 3             |                      |
| SEEU 2012                 | Electronics                               | 2        | 0        | 0          | 2             | SEEU 1002            |
| SSCE 1993                 | Engineering Mathematics II                | 3        | 1        | 0          | 3             | SSCE 1693            |
| SSCE 2193                 | Engineering Statistics                    | 3        | 1        | 0          | 3             |                      |
| <b>Total</b>              |   |          |          |            | <b>17</b>     |                      |

Subject to changes

\* Core Courses – minimum passing grade is C (50%)

# University general course for international student only, international students are not required to take UICI 1012 and UHAS 1172.

Notes: L – Lecture, T – Tutorial, P/S – Practical/Studio

| <b>YEAR 3: SEMESTER 1</b> |               |          |          |            |               |                      |
|---------------------------|---------------|----------|----------|------------|---------------|----------------------|
| <b>CODE</b>               | <b>COURSE</b> | <b>L</b> | <b>T</b> | <b>P/S</b> | <b>CREDIT</b> | <b>PRE-REQUISITE</b> |

|           |   |   |   |   |    |                          |
|-----------|---|---|---|---|----|--------------------------|
| SEMM 2713 | Manufacturing Processes                     | 3 | 1 | 0 | 3  |                          |
| SEMM 3233 | Control Engineering                         | 3 | 0 | 0 | 3  | SEMM 1213**, SSCE 1793** |
| SEMM 3931 | Laboratory II                               | 0 | 0 | 3 | 1  | SEMM 2921                |
| SEMI 3813 | Work Design and Productivity                | 3 | 0 | 0 | 3  |                          |
| SEMI 3823 | Quality System                              | 3 | 0 | 0 | 3  |                          |
| UBSS 1032 | Introduction to Entrepreneurship            | 2 | 0 | 0 | 2  |                          |
| UKQF 2xx2 | Co-curriculum and Service Learning Elective | 0 | 0 | 3 | 2  |                          |
| Total     |   |   |   |   | 17 |                          |

| YEAR 3: SEMESTER 2 |                                    |   |   |     |        |                        |
|--------------------|------------------------------------|---|---|-----|--------|------------------------|
| CODE               | COURSE                             | L | T | P/S | CREDIT | PRE-REQUISITE          |
| SEMM 3023          | Applied Numerical Methods          | 3 | 0 | 0   | 3      | SEMM 1013, SSCE 1793   |
| SEMM 3242          | Instrumentation                    | 1 | 0 | 3   | 2      | SKEU 2012**            |
| SEMM 3523          | Component Design                   | 2 | 0 | 3   | 3      | SEMM 2123**, SEMM 1513 |
| SEMM 3941          | Laboratory III                     | 0 | 0 | 3   | 1      | SEMM 3931              |
| SEMI 3833          | Production Planning and Control    | 3 | 0 | 0   | 3      |                        |
| SEMI 3843          | Engineering Economy and Accounting | 3 | 0 | 0   | 3      |                        |
| UHLB 3132          | Professional Communication Skills  | 3 | 0 | 2   | 2      | UHLB 1112, UHLB 2122   |
| Total              |                                    |   |   |     | 17     |                        |

| YEAR 3: SHORT SEMESTER |                     |   |   |     |        |  |
|------------------------|---------------------|---|---|-----|--------|--|
| CODE                   | COURSE              | L | T | P/S | CREDIT | PRE-REQUISITE  |
| SEMM 3915              | Industrial Training |   |   |     | 5      | ##, SEMM 2123**, SEMM 2223**, SEMM 2323**, SEMM 2433** |
| Total                  |                     |   |   |     | 5      |  |

| YEAR 4: SEMESTER 1 |  |   |   |     |        |  |
|--------------------|--|---|---|-----|--------|--|
| CODE               | COURSE   | L | T | P/S | CREDIT | PRE-REQUISITE                                      |
| SEMM 4533          | System Design (capstone)                               | 2 | 0 | 3   | 3      | SEMM 3523  |
| SEMM 4912          | Undergraduate Project I                                | 0 | 0 | 6   | 2      | SEMM 2123**, SEMM 2223**, SEMM 2323**, SEMM 2433** |
| SEMI 4813          | Industrial System Simulation                           | 3 | 0 | 0   | 3      |  |
| SEMI 4823          | Operations Research                                    | 3 | 0 | 0   | 3      |  |
| SEMI 48x3          | Industrial Engineering Elective                        | 3 | 0 | 0   | 3      |  |
| UXXX 2xx2          | Generic Skills or Knowledge Expansion Cluster Elective | 2 | 0 | 0   | 2      |  |
| Total              |  |   |   |     | 16     |  |

| YEAR 4: SEMESTER 2 |   |   |   |     |        |                              |
|--------------------|---|---|---|-----|--------|------------------------------|
| CODE               | COURSE  | L | T | P/S | CREDIT | PRE-REQUISITE                |
| SEMM 4902          | Engineering Professional Practice (Academic Service Learning) | 1 | 0 | 3   | 2      | Must be 3 <sup>rd</sup> year |

|           |   |   |   |    |    |           |
|-----------|---|---|---|----|----|-----------|
| SEMM 4924 | Undergraduate Project II                    | 0 | 0 | 12 | 4  | SEMM 4912 |
| SEMI 4833 | Safety and Engineering Management           | 3 | 0 | 0  | 3  |           |
| SEMI 4843 | Facility Design                             | 3 | 0 | 0  | 3  |           |
| ULAX 1112 | Language Skills Elective (Foreign Language) | 2 | 0 | 0  | 2  |           |
| UKQT 3001 | Extra Curricula Experiential Learning       | 1 | 0 | 0  | 1  |           |
| Total     |   |   |   |    | 15 |           |

\*\* Minimum grade D- (30%) in the pre-requisite courses  
 ## Obtained minimum of 80 credits

Notes: L – Lecture, T – Tutorial, P/S – Practical/Studio

## Elective Courses

**List of Industrial Engineering Elective Courses (Students may take ONE of the following courses)**

|    |           |  |
|----|-----------|--|
| 1. | SEMI 4853 | Quality Engineering                        |
| 2. | SEMI 4863 | Ergonomics and Occupational Safety         |
| 3. | SEMI 4873 | Reliability and Maintenance                |
| 4. | SEMI 4883 | Supply Chain Management and Sustainability |

## GRADUATION CHECKLIST

To graduate, students must pass all the stated courses in this checklist. It is the responsibility of the students to ensure that all courses are taken and

passed. Students who do not complete any of the course are not allowed to graduate.

| NO                                    | COURSE CODE | COURSE NAME                            | CREDIT EARNED (JKD) | CREDIT COUNTED (JKK) | TICK (/) IF PASSED |
|---------------------------------------|-------------|--|---------------------|----------------------|--------------------|
| <b>MECHANICAL ENGINEERING COURSES</b> |             |  |                     |                      |                    |
| 1                                     | SEMM 1013   | Programming for Engineers              | 3                   | 3                    |                    |
| 2                                     | SEMM 1113   | Mechanics of Solids I                  | 3                   | 3                    |                    |
| 3                                     | SEMM 1203   | Statics                                | 3                   | 3                    |                    |
| 4                                     | SEMM 1213   | Dynamics                               | 3                   | 3                    |                    |
| 5                                     | SEMM 1503   | Engineering Drawing                    | 3                   | 3                    |                    |
| 6                                     | SEMM 1513   | Introduction to Design                 | 3                   | 3                    |                    |
| 7                                     | SEMM 1911   | Experimental Methods                   | 1                   | 1                    |                    |
| 8                                     | SEMM 1921   | Introduction to Mechanical Engineering | 1                   | 1                    |                    |
| 9                                     | SEMM 2123   | Mechanics of Solids II                 | 3                   | 3                    |                    |
| 10                                    | SEMM 2223   | Mechanics of Machines & Vibration      | 3                   | 3                    |                    |
| 11                                    | SEMM 2313   | Mechanics of Fluids I                  | 3                   | 3                    |                    |
| 12                                    | SEMM 2323   | Mechanics of Fluids II                 | 3                   | 3                    |                    |
| 13                                    | SEMM 2413   | Thermodynamics                         | 3                   | 3                    |                    |
| 14                                    | SEMM 2433   | Applied Thermodynamics & Heat Transfer | 3                   | 3                    |                    |
| 15                                    | SEMM 2613   | Materials Science                      | 3                   | 3                    |                    |
| 16                                    | SEMM 2713   | Manufacturing Processes                | 3                   | 3                    |                    |
| 17                                    | SEMM 2921   | Laboratory I                           | 1                   | 1                    |                    |
| 18                                    | SEMM 3023   | Applied Numerical Methods              | 3                   | 3                    |                    |
| 19                                    | SEMM 3233   | Control Engineering                    | 3                   | 3                    |                    |
| 20                                    | SEMM 3242   | Instrumentation                        | 2                   | 2                    |                    |
| 21                                    | SEMM 3523   | Component Design                       | 3                   | 3                    |                    |
| 22                                    | SEMM 3915   | Industrial Training                    | 5                   | HL                   |                    |
| 23                                    | SEMM 3931   | Laboratory II                          | 1                   | 1                    |                    |
| 24                                    | SEMM 3941   | Laboratory III                         | 1                   | 1                    |                    |

|  |           |                                   |            |           |  |
|--|-----------|-----------------------------------|------------|-----------|--|
| 25   | SEMM 4533 | System Design                     | 3          | 3         |  |
| 26   | SEMM 4902 | Engineering Professional Practice | 2          | 2         |  |
| 27   | SEMM 4912 | Undergraduate Project I           | 2          | 2         |  |
| 28   | SEMM 4924 | Undergraduate Project II          | 4          | 4         |  |
| 29   | SEMI 3813 | Work Design & Productivity        | 3          | 3         |  |
| 30   | SEMI 3823 | Quality System                    | 3          | 3         |  |
| 31   | SEMI 3833 | Production Planning & Control     | 3          | 3         |  |
| 32   | SEMI 3843 | Engineering Economy & Accounting  | 3          | 3         |  |
| 33   | SEMI 4813 | Industrial System Simulation      | 3          | 3         |  |
| 34   | SEMI 4823 | Operations Research               | 3          | 3         |  |
| 35   | SEMI 4833 | Safety & Engineering Management   | 3          | 3         |  |
| 36   | SEMI 4843 | Facility Design                   | 3          | 3         |  |
| 37   | SEMI 4xx3 | Industrial Engineering Elective   | 3          | 3         |  |
| <b>TOTAL CREDIT FOR MECHANICAL ENGINEERING COURSES (A)</b>       |           |                                   | <b>101</b> | <b>96</b> |  |
| <b>ELECTRICAL COURSES<br/>(School of Electrical Engineering)</b> |           |                                   |            |           |  |
| 1  | SEEU 1002 | Electrical Technology             | 2          | 2         |  |
| 2  | SEEU 2012 | Electronics                       | 2          | 2         |  |
| <b>TOTAL CREDIT FOR ELECTRICAL COURSES (B)</b>                   |           |                                   | <b>4</b>   | <b>4</b>  |  |
| <b>MATHEMATICS COURSES<br/>(Faculty of Science)</b>              |           |                                   |            |           |  |
| 1  | SSCE 1693 | Engineering Mathematics I         | 3          | 3         |  |
| 2  | SSCE 1793 | Differential Equations            | 3          | 3         |  |
| 3  | SSCE 1993 | Engineering Mathematics II        | 3          | 3         |  |

|   |           |   |           |           |  |
|---|-----------|---|-----------|-----------|--|
| 4   | SSCE 2193 | Engineering Statistics  | 3         | 3         |  |
| <b>TOTAL CREDIT FOR MATHEMATICS COURSES (C)</b>                   |           |   | <b>12</b> | <b>12</b> |  |
| <b>UNIVERSITY GENERAL COURSES</b>                                 |           |   |           |           |  |
| <b>CLUSTER 1: APPRECIATION OF PHILOSOPHY, VALUE &amp; HISTORY</b> |           |   |           |           |  |
| 1   | UICI 1012 | Islamic & Asian Civilization<br>(for local students only)               | 2         | 2         |  |
|   | UHAK 1022 | Malaysian Studies 3<br>(for international students only)                |           |           |  |
| 2   | UHAS 1172 | Malaysian Dynamics<br>(for local students only)                         | 2         | 2         |  |
|   | ULAM 1012 | Malay Language for Communication 2<br>(for international students only) |           |           |  |
| <b>CLUSTER 2: GENERIC SKILLS</b>                                  |           |   |           |           |  |
| 1   | UHMT 1012 | Graduate Success Attributes   | 2         | 2         |  |
| 2   | UHMT 2012 | Leadership  | 2         | 2         |  |
| 3.  | UHMS 2022 | Critical and Creative Thinking  | 2         | 2         |  |
| 4.  | UHMS 2032 | The Human side of Knowledge Management                                  | 2         | 2         |  |
| 5.  | UHMS 2042 | Development and Global Issues   | 2         | 2         |  |
| 6.  | UHMT 2042 | Guidance & Counselling  | 2         | 2         |  |
| 7.  | UHMT 2062 | Psychology of Adjustment  | 2         | 2         |  |



|                                       |           |  |   |   |  |
|---------------------------------------|-----------|--|---|---|--|
| 8.                                    | UBSS 2072 | Fundamentals of Intellectual Property Law                | 2 | 2 |  |
| 9.                                    | UBSS 2082 | Law for Entrepreneurs                                    | 2 | 2 |  |
| 10.                                   | UBSS 2092 | Entrepreneurship and Enterprise Development              | 2 | 2 |  |
| 11.                                   | UBSS 2102 | Social Entrepreneurship                                  | 2 | 2 |  |
| 12.                                   | UHMS 2112 | Engineering Communication                                | 2 | 2 |  |
| 13.                                   | UHMS 2122 | Human Communication                                      | 2 | 2 |  |
| 14.                                   | UHMT 2132 | Professional Ethics                                      | 2 | 2 |  |
| 15.                                   | UMJT 2142 | Professional Ethics, Safety and Health<br>(Ningen Ryoku) | 2 | 2 |  |
| <b>CLUSTER 3: KNOWLEDGE EXPANSION</b> |           |  |   |   |  |
| 1.                                    | UHIT 2302 | Science and Technology Thinking                          | 2 | 2 |  |
| 2.                                    | UHIT 1022 | Science, Technology and Mankind                          | 2 | 2 |  |
| 3.                                    | UHII 2012 | Al-Qur'an and Human Civilization                         | 2 | 2 |  |
| 4.                                    | UHIT 2032 | Life Institutions and Sustainable Development            | 2 | 2 |  |
| 5.                                    | UHIZ 2042 | Future Studies   | 2 | 2 |  |
| 6.                                    | UHIT 2052 | Family Law   | 2 | 2 |  |
| 7.                                    | UHIZ 2062 | World Science  | 2 | 2 |  |
| 8.                                    | UHS 2072  | Sustainable Economy                                      | 2 | 2 |  |
| 9.                                    | UHS 2082  | Practice and Concept of Halal Management                 | 2 | 2 |  |
| 10.                                   | UHII 2092 | Philosophy of Islamic Art                                | 2 | 2 |  |
| 11.                                   | UHII 2102 | Islam and Health   | 2 | 2 |  |

|  |           |   |   |   |  |
|--|-----------|---|---|---|--|
| 12.  | UHII 2132 | Islamic Entrepreneurship                  | 2 | 2 |  |
| 13.  | UETS 2142 | Sustainable Energy                        | 2 | 2 |  |
| <b>CLUSTER 4: CO-CURRICULUM &amp; SERVICE LEARNING</b> |           |   |   |   |  |
| 1  | UKQX xxx2 | Co-curriculum & Service Learning Elective | 2 | 2 |  |
| 2  | UKQE 3001 | Extra Curricular Experiential Learning    | 1 | 1 |  |
| <b>CLUSTER 5: LANGUAGE SKILLS</b>                      |           |   |   |   |  |
| 1  | UHLB 1112 | English Communication Skills              | 2 | 2 |  |
| 2  | UHLB 2122 | Academic Communication Skills             | 2 | 2 |  |
| 3  | UHLB 3132 | Professional Communication Skills         | 2 | 2 |  |
| 4  | UHLB 1032 | Introductory Academic English             | 2 | 2 |  |
| 5  | UHLB 1042 | Intermediate Academic English             | 2 | 2 |  |
| 6  | UHLA 1112 | Arabic Language                           | 2 | 2 |  |
| 7  | UHLJ 1112 | Japanese Language 1                       | 2 | 2 |  |
| 8  | UHLC 1112 | Mandarin Language I                       | 2 | 2 |  |
| 9  | UHLE 1112 | French Language                           | 2 | 2 |  |
| 10   | UHLN 1112 | Persian Language                          | 2 | 2 |  |
| 11   | UHLJ 1122 | Japanese Language for Communication I     | 2 | 2 |  |

|   |   |   |            |            |  |
|---|---|---|------------|------------|--|
| 12  | UHLM 1112                                   | Malay Language for Communication                    | 2          | 2          |  |
| <b>CLUSTER 6: ENTREPRENEURSHIP</b>  |   |   |            |            |  |
| 1   | UBSS 1032                                   | Introduction to Entrepreneurship                    | 2          | 2          |  |
| <b>TOTAL CREDIT FOR UNIVERSITY GENERAL COURSES (D)</b>  |   |   | <b>23</b>  | <b>23</b>  |  |
| <b>TOTAL CREDIT TO GRADUATE (A + B + C + D)</b>   |   |   | <b>140</b> | <b>135</b> |  |
| Note: # Choose one elective either from Cluster 2 (Generic Skills) or Cluster 3 (Knowledge Expansion) for UxxX 2xx2 |   |   |            |            |  |
| <b>OTHER COMPULSORY COURSES</b>   |   |   |            |            |  |
| <b>PROFESSIONAL SKILLS CERTIFICATE (PSC)</b>  |   |   |            |            |  |
| 1   | GLL 1001                                    | How To Get Yourself Employed                        |            |            |  |
| 2   | GLL 1029                                    | ISO 9001:2008 Quality Management System Requirement |            |            |  |
| 3   | GLL 1040                                    | Occupational Safety, Health and Environment         |            |            |  |
| 4   | GLL 1041                                    | How to Manage Your Personal Finance                 |            |            |  |
| 5   | Test of English Communication Skills (TECS) |   |            |            |  |
|   | TECS 1001                                   | Oral Interaction                                    |            |            |  |
|   | TECS 1002                                   | Writing   |            |            |  |

# COURSE SYNOPSIS

## COURSE SYNOPSIS FOR B. ENG (MECHANICAL - INDUSTRIAL)

### **SEMI 3823 Quality System**

This course emphasizes on the importance of quality and productivity in industrial and operation systems. The principles of quality Improvement strategies and quality management systems such as Total Quality Management, Six Sigma, Lean Sigma, ISO 9000, ISO 14000 are highlighted. Statistical process control (SPC) techniques such as seven basic tools, variable and attribute control charts, process capability studies, acceptance sampling and reliability are covered. Students are required to work in groups to integrate the quality and statistical engineering tools in solving case studies problems.

### **SEMI 4823 Operation Research**

This course provides students with the concepts and tools to model manufacturing or service systems efficiently using mainly Operations Research techniques. It focuses on formulating models based on deterministic and stochastic Operations Research techniques, applying these techniques for decision making and developing solutions from the models.

### **SEMI 3833 Production Planning and Control**

This course is designed to expose students to the several theories and principles in Production Planning and Control (PPC) either in manufacturing or service sectors. It discusses issues on forecasting, capacity and aggregate planning, scheduling, inventory control and also computerized manufacturing system such as Manufacturing Requirement Planning (MRP), Demand Requirement Planning (DRP) and Enterprise Resources Planning (ERP). Besides that, it also introduces basic lean concept as part of the latest issues in manufacturing system. At the end of the course, students should be able to apply knowledge in production planning and control for managing all the resources such as man, machines, materials and time in an organization. This is to ensure the system becomes more productive, effective and efficient.

### **SEMI 3813 Work Design and Productivity**

This subject is designed to introduce students to techniques in designing work in manufacturing and service industries. It will emphasize on method study and work measurement. Other concepts and approach will also be introduced such as Productivity, Sustainability, Principles of Motion Economy, Design for Manufacture and Assembly (DFMA), Single Minute Exchange of Die (SMED) and Mistake Proofing (Poka Yoke). At the end of the course, students should be able to select the appropriate techniques, approaches and concepts in designing work that optimizes the use of resources such as man, machine, materials and time to improve productivity.

### **SEMI 3843 Engineering Economy and Accounting**

This course is designed to equip students to acquired engineering economy and accounting concepts, principles and methods. The focus of this course is to provide understanding on engineering economic principles and methods and to apply it in engineering field. The course has two parts. Part 1 is designed to teach students to formulate cash-flow, perform analysis on engineering economic problems and evaluate between alternative of engineering investment/projects to make decision. Part 2 is designed to teach students to perform cost estimates using traditional and current costing techniques in production process, prepare simple financial statement and interpret financial performance of business firms for decision and control.

### **SEMI 4833 Safety and Engineering Management**

This course aims to prepare students with basic management knowledge and safety. The management part touches key issues in management and organization, management yesterday and today, strategic management, organizational structure and design, human resource management, motivating employees and leadership. In addition to these, project management aspects are included such as developing a project plan, managing risk, scheduling resources and costs, reducing project duration, and Progress and Performance Measurement. Major topic covers for safety are OSHA 1994, Factories and Machinery Act 1967, hazard identification, risk assessment and control, basic principles of accident

prevention and occupational health. For Project Management, students will be exposed with some methods of doing network for project such as CPM and PERT, lagging activities and how to calculate cost for crash project. At the end of the course, students should be able to describe fundamental aspects of management; integrate knowledge in engineering and management in making business decisions, managing a project using project management principles and techniques in planning, scheduling and controlling projects, and apply the principles of hazard identification, risk assessment/control; plan, design and implement an effective safety program.

## ELECTIVE COURSES

### **SEMI 4863 Ergonomics and Occupational Safety**

The course provides an introduction to ergonomics and occupational safety. In ergonomics, it concerns the study of human at work with the purpose of enhancing efficiency, productivity and comfort. It places human at the centre of reference with the components of machine, workspace and environment. In occupational safety, it introduces boiler, Unfired pressure vessel (UPV), hoisting machine and local exhaust ventilator (LEV) design. At the end of the course, students should be able to apply ergonomics and occupational safety principles and techniques in the design and analysis of workplace, processes and products.

### **SEMI 4873 Reliability and Maintenance**

This course introduces the reliability and maintenance concepts and tools. It gives an understanding about how to apply these concepts and tools at different phases of systems' and component life cycle. It covers maintenance and reliability models and to assist the decision maker in making cost effective decisions based on life cycle costing. At the system/equipment utilisation phase, it focuses on understanding how maintenance can improve the availability of processes, and how to reduce downtime through maintenance optimisation and total productive maintenance.

### **SEMI 4813 Industrial System Simulation**

This course is aimed to equip students with the knowledge on discrete-event simulation. A software will be utilized to model, build and run simulation models. The course cover topics on discrete-event approaches, representing uncertainty, trace driven simulation, input data analytics, modelling and building simulation models, verifying and validating simulation models, experimentation and running of simulation models, analysis of output results, etc

### **SEMI 4883 Supply Chain Management and Sustainability**

The course is designed for early exposure and understanding of the practical and theory in supply chain management and sustainability to the students. It guides students to develop an effective SCM strategy and its activities also the relationships that exist among a chain of firms that work together to provide a product or service. It shall cover the followings: Supply chain strategy, Sourcing strategy, logistic management, distribution management, measuring supply chain performance, information technology in supply chain, coordination in supply chain, and sustainability. The learning process for this course will be conducted through lectures, case studies practices, discussion, audio-video presentation, group project and presentation.

### **SEMI 4853 Quality Engineering**

This course covers process and product variation, Six Sigma, Quality Function Deployment, Failure Mode Effect Analysis, Gage Repeatability and Reproducibility, Short Run SPC and experimental methods such Taguchi Methods and Classical Experimental Designs. Students are required to work in groups to integrate these tools in solving case studies problems.

### **SEMI 4843 Facility Design**

This course is designed to equip students with the basic knowledge of designing manufacturing layout facilities. Topics covered in this course include selection of the facility location, design layout procedures and algorithms, personnel requirements, line balancing, material handling and warehouse operations. At the end of the course, students should be able to design manufacturing plant layout by considering all engineering/manufacturing and supporting activities requirements, evaluate the best layout from the generated alternatives, select the best facility location, determine line balancing loss and select the best material handling equipment for the manufacturing plant.