

# **BEng (Hons) Mechanical Engineering - E440 (Under Review)**

## **1.0 Introduction**

Mechanical Engineering is the historical root of engineering practice. It gave its name to the realm of technology-based problem-solving, but today the field goes beyond mastering the design and use of engines. Mechanical engineers make a real difference in society as they are involved in the design and maintenance of a range of systems including mechanical/mechatronics, structural, thermodynamic and combustion, heat transfer, fluid and thermal energy, materials and materials handling, manufacturing equipment and process plants among others.

The overall goal of the programme is to provide students with the theoretical, analytical, design and practical problem-solving aptitudes towards the practice of mechanical engineering. Innovation, scientific rigour, ethical attitude and a sense of purpose for the benefit of society are the core values associated to the delivery of the programme.

The objective is to achieve academic excellence by providing education such that graduates can assume key roles in engineering practice and applied research in industry, in the private sector and in public service. The programme has been designed to meet the competency standards prescribed by engineering bodies forming part of the Washington Accord for recognition of qualifications and international mobility of engineers.

The first two years of the programme cover the fundamentals of mechanical engineering together with the basic principles of mathematics and sciences. The subsequent two years focus on consolidating fundamental Mechanical Engineering knowledge with specialisation on topics related to structural mechanics and dynamics, and thermal engineering within the context of sustainable development.

Graduates from this programme are eligible to practice as professional mechanical engineers in the public, parastatal and private sector organisations after satisfying the pre-registration requirements of the Council of Registered Professional Engineers of Mauritius (CRPE).

It should be noted that the programme has been formulated to meet the requirements of the Engineering Council of South Africa (ECSA), one of the signatories of Washington Accord for accredited BEng programmes. This implies that the programme includes at least the required number of credits as per ECSA knowledge area, and also develops and assesses all the ECSA's Exit Level Outcomes (ELOs). The 8 semesters of each programme have been structured to satisfy the accreditation requirements for ECSA regarding the number of notional hours credits and knowledge areas content. One credit is equal to 10 notional hours. A notional hour is made up of delivery time (teaching time) plus learning time (individual private time in the learning process). The academic year is broken into two semesters of 17 weeks each, made up of 14 teaching weeks, one week for test(s) and 2 weeks of examination. Modules are generally one-semester long.

## **2.0 Objectives**

The objectives are to allow students to:

- Develop a sound mastery of the fundamentals of Mechanical Engineering;

- Acquire skills in interpreting, simulating, modelling, designing, analysing and solving Mechanical Engineering problems;
- Develop an understanding of the responsibilities of engineers as professionals particularly in terms of ethics and as contributors to the sustainable development objective;
- Develop a critical mind, independent learning ability, communication, teamwork, management and leadership skills essential in Mechanical Engineering practice.

### 3.0 General Entry Requirements

As per General Entry Requirements for admission to the University of Mauritius for Undergraduate Degrees.

### 4.0 Programme Requirements

GCE 'A' Level Passes in Mathematics and Physics.  
Pass at O'Level Chemistry.

### 5.0 Minimum Requirements for Degree Award

The award of the degree is subject to the student satisfying the following requirements:

- Successful completion of 604 notional hours credits (151 UoM Credits) as per the programme structure;
- Satisfactory completion of industrial placements and workshop practice as specified in the programme
- Satisfactory performance in each of the Exit Level Outcomes (ELOs) specified against modules in the module specification sheets.

The General University Regulations pertaining to "Exit Points" will not be applicable to this Programme.

The programme has been formulated to meet the competency standards prescribed by the Washington Accord. This means that graduates from this programme would in addition to satisfying the prescribed credits per knowledge area (basic sciences, mathematics, engineering sciences, and complementary studies) would also have demonstrated satisfactory performance in the following 11 Exit Level Outcomes:

- ELO1: Problem Solving
- ELO2: Application of scientific and engineering knowledge
- ELO3: Engineering Design
- ELO4: Investigations, experiments and data analysis
- ELO5: Engineering methods, skills and tools, including Information Technology
- ELO6: Professional and technical communication
- ELO7: Impact of Engineering activity
- ELO8: Individual, team and multidisciplinary working
- ELO9: Independent learning ability
- ELO10: Engineering Professionalism
- ELO 11: Engineering Management

## 6.0 Programme Duration

|         | Normal  | Maximum |
|---------|---------|---------|
| Degree: | 4 years | 7 years |

## 7.0 Classification of Awards

The award classification will be based on the CPA (x) at the end of the Programme of Studies as follows:

| CPA              | CLASSIFICATION                                 |                |
|------------------|--|----------------|
| $\geq 70$        | 1 <sup>st</sup> Class                          | } with Honours |
| $60 \leq x < 70$ | 2 <sup>nd</sup> Class 1 <sup>st</sup> Division |                |
| $50 \leq x < 60$ | 2 <sup>nd</sup> Class 2 <sup>nd</sup> Division |                |
| $< 50$           | No Award                                       |                |

## 8.0 Pre-Requisite Modules (PR)

A student will be allowed to follow module y of which module x is a *pre-requisite* (PR) provided he/she has satisfactorily completed module x with at least a pass grade.

## 9.0 Assessment and Pass Requirements

The assessment mode for each module will be based on one or a combination of the following:

- Examination
- Continuous assessment
- Mini projects
- Practical and other reports
- Presentations
- Attendance to seminars

16 notional hours credits modules shall have 3-hour examination papers. 12 or 8 notional hours credits modules shall have 2-hour examination papers.

In order to pass a module a student must obtain an examination mark of at least 40% and a final mark of at least 50%.

**Calculation of the final mark:** The continuous assessment must account for no less than 30% and for no more than 50% of the final mark, with the exception of modules like design and research projects. Certain modules are assessed on the basis of 100% Continuous Assessment. The specific details and/or formula for the calculation of the final mark are given in the Module Specification Sheet (MSS) of each module.

Students have to retake both continuous assessment and exams in the failed module except in case of Resit Examinations; See provisions for Resit Examinations at Section 10. Students passing failed modules will score maximum marks of 50% in these modules but will have the failed marks not counted in the computation of the CPA.

If the student's CPA is between 40% and 50%, he/she fails the year. However, student will be eligible to repeat the year, will maintain credits and marks for individual modules where the mark scored is 50% or above. If the CPA is less than 40%, the registration will be terminated.

### **Rules in Cases of Unsatisfactory Performance of ELOs**

The ELOs and assessment criteria are specified against modules in the module specification sheets (MSS).

A student must comply with the subminimum requirements in subdivisions of certain modules. For such modules these specific requirements are given in the MSS of the module. These sub-minima include the achievement of ELOs that are assessed in the module. A sub minimum mark of 50% is required for all assessed elements (relevant questions in an assessment, project or assignment) in which the achievement of exit level outcomes are assessed (for the particular module).

The following rules will apply in cases of unsatisfactory performance of ELOs.

#### **(i) ELOs assessed in the written examination.**

A student failing the assessment of an ELO in a written examination will be deemed to have failed the module. The student will have to retake the module next time it is offered. However, a Resit examination may be granted for the module only if a pass mark of at least 50% has been obtained; See the rules for Resit examinations at Section 10(iii).

#### **(ii) ELOs assessed in coursework, e.g., mini-project work.**

A student not satisfying an ELO may be given an extension by the lecturer and moderator prior to the written examination to amend and resubmit the coursework for pass mark of 50 % only. In case the student still fails to satisfy the ELO in the re-submission, he/she will be awarded Grade N in the module and will have to do a new coursework in the next academic year, provided he/she has scored a minimum of 50 % in the overall module mark.

In case a student fails the module, that is, scored less than 50 % in the overall module mark, he/she will be awarded Grade F and has to retake the whole module the next time it is offered.

#### **(iii) ELOs (other than ELO 6) assessed in the Final Year Project.**

If a candidate fails to obtain a pass mark of 50 % for any ELO (other than ELO 6) in the Final Year Project, the Board of Examiners may consider one of the following:

- For a project/dissertation with possibility of amendments, award the student Grade N in the module and grant the student an extension period of up to 3 months to amend the work related to the ELO, and resubmit for pass mark of 50 % in the ELO;
- For a project/dissertation with recommendations for a new submission, award the student Grade F in the module and student will have to undertake a new project in the following academic year.

#### **(iv) ELO 6 assessed in the Design Project and/or Final Year Project.**

For a student failing to obtain the pass mark of 50 % for ELO 6 in the Design Project and/or Final Year Project, the Board of Examiners may consider awarding the student Grade N and granting the student an extension period of up to 3 months to amend the components of the work related to this ELO, and resubmit the Design Project and/or Final Year Project for a pass mark of 50 % in the ELO, provided that the student has scored a minimum of 50 % in the overall module mark.

In case a student fails the module, that is, scored less than 50 % in the overall module mark, he/she will be awarded Grade F and has to retake the whole Design Project and/or Final Year Project the next time it is offered.

**(v) ELO 3 assessed in the Design Project.**

A student failing ELO 3 will be awarded Grade F in the design project and will have to retake the module the next time it is offered.

The detailed assessment mode for each module is given in the MSS.

## **10.0 Resit Examinations**

If a student obtains a CPA of at least 50% but has not passed all the modules, a Resit examination may be granted for failed modules by the Board of Examiners provided that:

- (i) A minimum of 40% has been obtained in continuous assessment.
- (ii) A Final mark of at least 40% has been achieved in the failed modules which exclude assessment of ELOs;
- (iii) A pass mark has been achieved but the required sub minimum for passing an Exit Level Outcome (ELO) has not been obtained.

Resit examinations do not apply to final year Project/Dissertation/Mini-Project Portfolio/Industrial Training and to modules assessed solely by continuous assessment.

## **11.0 Duration of examinations**

16 NH credits modules shall have 3-hour examination papers. 12 NH credits and 8 NH credits modules shall have 2-hour examination papers.

## **12.0 Termination of Registration**

Termination of registration will occur in the following circumstances:

- If the CPA is less than 25% at the end of Semester 1, Level 1.
- If the CPA is less than 40% at the end of an academic year.
- If the student fails to obtain credit in a module which he/she is repeating. This excludes Resit examinations.
- If the student does not pass all the modules for 1<sup>st</sup>, 2<sup>nd</sup> and 3<sup>rd</sup> years in a total of five years.

## **13.0 Unless otherwise decided by Faculty Board, the following will apply for:**

### **Progression from lower level to higher level**

#### **First Year to Second Year**

A student should not have failed more than two modules to be able to register for Second Year modules. If any of the failed modules is a Pre-requisite(s) for a Second Year module, then the candidate cannot register for the PR-linked Second Year module until the Pre-requisite(s) is passed.

#### **Second Year to Third Year**

A student **must** have passed all prescribed First Year modules. In addition, the student should not have failed more than two modules of the prescribed second year modules to be able to register for Third Year

modules. If any of the failed modules is a Pre-requisite(s) for a Third Year module, then the candidate cannot register for the PR-linked Third Year module until the pre-requisite is passed.

### Third Year to Fourth Year

A student **must** have passed all prescribed second year modules. In addition, the student should not have failed more than two modules of the prescribed **Third Year** modules to be able to register for Fourth Year modules. If any of the failed modules is a pre-requisite for a Fourth Year module, then the candidate cannot register for the PR-linked Fourth Year module until the pre-requisite is passed.

### 14.0 Registration for Modules in a Higher Year of Study for Repeating Students

If a student is repeating a year and the CPA is above 45, the student may be allowed to register for a maximum of two modules per semester from the higher year of study. The student will need to make a request to the Dean of Faculty. The student cannot register for a module of a higher year of study if a timetable clash occurs with a module of a previous year which has not yet been passed and which is prescribed for his or her field of study. Moreover, registration for modules is subject to pre-requisites being met.

### 15.0 Self-Development (SD)

This refers to directly supervised work in terms of hours/week. It includes practicals, tutorials, seminars, visits, mini-projects, oriented-discussion, coached group-work, presentations and other structured activities associated to enhancing the engineering application abilities and professional and personal attributes of the students. Such supervised work is included in the time-table.

### 16.0 BEng (Hons) Mechanical Engineering Programme Structure

#### Year 1 – Semester 1

| Module Code  | Module Name   | Hours/<br>Week<br>L+SD | UoM<br>Credits | Notional<br>Hours<br>Credits | Pre-<br>Requisite |
|--------------|---|------------------------|----------------|------------------------------|-------------------|
| MECH 1102(1) | Engineering Graphics                                | 3+2                    | 4              | 16                           |                   |
| MATH 1101(1) | Mathematics 1                                       | 3+2                    | 4              | 16                           |                   |
| ELEC 1107(1) | Physics for Engineers 1                             | 3+2                    | 4              | 16                           |                   |
| CHE 1103(1)  | Chemistry for Engineers                             | 3+2                    | 4              | 16                           |                   |
| MECH 1103(1) | Professional Communication for Mechanical Engineers | 2+2                    | 3              | 12                           |                   |
| MECH 1104    | Industry Seminar                                    |                        |                |                              |                   |
|              |   |                        | <b>19</b>      | <b>76</b>                    |                   |

#### Year 1 – Semester 2

| Module Code  | Module Name                          | Hours/<br>Week<br>L+SD | UoM<br>Credits | Notional<br>Hours<br>Credits | Pre-<br>Requisite |
|--------------|--------------------------------------|------------------------|----------------|------------------------------|-------------------|
| MECH 1201(1) | Material Science                     | 3+2                    | 4              | 16                           |                   |
| MATH 1201(1) | Mathematics 2                        | 3+2                    | 4              | 16                           |                   |
| ELEC 1201(1) | Physics for Engineers 2              | 3+2                    | 4              | 16                           |                   |
| MECH 1204(1) | Mechanics                            | 3+2                    | 4              | 16                           |                   |
| SOCI 1207(1) | Contemporary Society and Development | 1.5+1                  | 2              | 8                            |                   |
| MECH 1205    | Workshop Practice 1                  |                        |                |                              |                   |
|              |                                      |                        | <b>18</b>      | <b>72</b>                    |                   |

**Year 2 – Semester 1**

| Module Code  | Module Name                          | Hours/<br>Week<br>L+SD | UoM<br>Credits | Notional<br>Hours<br>Credits | Pre-Requisite                        |
|--------------|--------------------------------------|------------------------|----------------|------------------------------|--------------------------------------|
| ENGG 2101(3) | Engineering Mathematics 1            | 3+2                    | 4              | 16                           | <b>MATH 1101(1)<br/>MATH 1201(1)</b> |
| MECH 2103(3) | Dynamics                             | 3+2                    | 4              | 16                           |                                      |
| MECH 2106(3) | Strength of Materials                | 3+2                    | 4              | 16                           |                                      |
| MECH 2107(3) | IT and Programming Techniques        | 3+2                    | 4              | 16                           |                                      |
| MECH 2110(3) | Principles of Electrical Engineering | 3+2                    | 4              | 16                           | <b>ELEC 1201(1)</b>                  |
|              | Industry Seminar                     |                        |                |                              |                                      |
|              |                                      |                        | <b>20</b>      | <b>80</b>                    |                                      |

**Year 2 – Semester 2**

| Module Code  | Module Name                                   | Hours/<br>Week<br>L+SD | UoM<br>Credits | Notional<br>Hours<br>Credits | Pre-Requisite |
|--------------|---|------------------------|----------------|------------------------------|---------------|
| ENGG 2201(3) | Engineering Mathematics 2                     | 3+2                    | 4              | 16                           |               |
| MECH 2201(3) | Numerical Methods and Quantitative Techniques | 3+2                    | 4              | 16                           |               |
| MECH 2212(3) | Mechanical Design 1                           | 3+2                    | 4              | 16                           |               |
| MECH 2203(3) | Thermodynamics 1                              | 3+2                    | 4              | 16                           |               |
| MECH 2205(3) | Occupational Health and Safety                | 1.5+1                  | 2              | 8                            |               |
| MECH 2210    | Workshop Practice 2                           |                        |                |                              |               |
|              |   |                        | <b>18</b>      | <b>72</b>                    |               |

**Year 3 – Semester 1**

| Module Code  | Module Name          | Hours/<br>Week<br>L+SD | UoM<br>Credits | Notional<br>Hours<br>Credits | Pre-Requisite       |
|--------------|----------------------|------------------------|----------------|------------------------------|---------------------|
| MECH 3103(5) | Mechanical Design 2  | 3+2                    | 4              | 16                           |                     |
| MECH 3104(5) | Structural Mechanics | 3+2                    | 4              | 16                           |                     |
| MECH 3105(5) | Thermofluids 1       | 3+2                    | 4              | 16                           |                     |
| MECH 3106(5) | Thermodynamics 2     | 3+2                    | 4              | 16                           | <b>MECH 2203(3)</b> |
| MECH 3107(5) | Project Management   | 1.5+1                  | 2              | 8                            |                     |
|              | Industry Seminar     |                        |                |                              |                     |
|              |                      |                        | <b>18</b>      | <b>72</b>                    |                     |

**Year 3 – Semester 2**

| Module Code  | Module Name                        | Hours/<br>Week<br>L+SD | UoM<br>Credits | Notional<br>Hours<br>Credits | Pre-Requisite                        |
|--------------|------------------------------------|------------------------|----------------|------------------------------|--------------------------------------|
| MECH 3206(5) | Mechanical Design 3                | 3+2                    | 4              | 16                           |                                      |
| MECH 3203(5) | Vibration and Noise                | 3+2                    | 4              | 16                           |                                      |
| MECH 3204(5) | Experimentation and Investigations | 3+2                    | 4              | 16                           |                                      |
| MECH 3205(5) | Continuum Mechanics                | 3+2                    | 4              | 16                           | <b>MECH 3104(5)<br/>ENGG 2201(3)</b> |
| CHE 3211(5)  | Environmental Management           | 1.5+1                  | 2              | 8                            |                                      |
| MECH 3201    | Industrial Placement               |                        |                |                              |                                      |
|              |                                    |                        | <b>18</b>      | <b>72</b>                    |                                      |

**Year 4 – Yearly Module**

| Module Code   | Module Name | Hours/<br>Week<br>L+SD | UoM<br>Credits | Notional<br>Hours<br>Credits | Pre-Requisite |
|---------------|-------------|------------------------|----------------|------------------------------|---------------|
| MECH 4000Y(5) | Project     |                        | 12             | 48                           |               |

**Year 4 – Semester 1**

| Module Code  | Module Name             | Hours/<br>Week<br>L+SD | UoM<br>Credits | Notional<br>Hours<br>Credits | Pre-Requisite |
|--------------|-------------------------|------------------------|----------------|------------------------------|---------------|
| MECH 4101(5) | Computational Mechanics | 3+2                    | 4              | 16                           | MECH 3205(5)  |
| MECH 4102(5) | Thermofluids 2          | 3+2                    | 4              | 16                           | MECH 3105(5)  |
| MECH 4103(5) | Design Project          | 0+4                    | 4              | 16                           | MECH 3206(5)  |
| ENGG 4102(5) | Sociology for Engineers | 1.5+1                  | 2              | 8                            |               |
|              | Industry Seminar        |                        |                |                              |               |
|              |                         |                        | <b>14</b>      | <b>56</b>                    |               |

**Year 4 – Semester 2**

| Module Code  | Module Name                 | Hours/<br>Week<br>L+SD | UoM<br>Credits | Notional<br>Hours<br>Credits | Pre-Requisite                |
|--------------|-----------------------------|------------------------|----------------|------------------------------|------------------------------|
| MECH 4208(5) | Control Systems             | 3+2                    | 4              | 16                           |                              |
| MECH 4202(5) | Thermal and Fluid Machinery | 3+2                    | 4              | 16                           | MECH 4102(5)<br>MECH 3106(5) |
| MECH 4203(5) | Thermal Engineering         | 3+2                    | 4              | 16                           |                              |
| MECH 4201(5) | Engineering Professionalism | 1.5+1                  | 2              | 8                            |                              |
|              |                             |                        | <b>14</b>      | <b>56</b>                    |                              |

**Total Notional Hours Credits = 604****Total UoM Credits = 151**