3.2.10.2 Degree Requirements

Students in the BEng. (Mechanical Engineering) programme are required to satisfy the following requirements to graduate from the course:

- Complete a minimum of 160 MCs with a CAP ≥ 2.0.
- Pass the modules in accordance with Table 3.2.10a.
- Pass at least 12 MCs equivalent of technical elective modules as listed in Table 3.2.10b. Students may, subject to approval of the Head of Department, take up to two ME5-Level technical modules in lieu of two of the technical electives.
- Subject to approval of the Head of Department, students may enrol in one of the following specialisations when they are in Stage 2 standing:
  - Aeronautical Engineering
  - Energy and Sustainability
  - Offshore Oil & Gas Technology
  - Robotics
- To qualify for a specialisation, a student must pass at least four modules from the chosen area of specialisation and any other requirements as given in Table 3.2.10c. Students in a specialisation programme are required to do their final-year dissertation (8MCs) in an area related to the specialisation. For updated information on Specialisation programmes, please refer to Specialisations.

Students should not read more than 60 MCs of Level-1000 modules towards their degree requirements.

Table 3.2.10a: Summary of ME Modular Requirements and Credits (For student intakes from AY2019/2020 onwards)

Students are advised to refer to Department of Mechanical Engineering website at me.nus.edu.sg for latest updated information on BEng (ME) Curriculum.

<table>
<thead>
<tr>
<th>MODULAR REQUIREMENTS</th>
<th>MCS</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>University Requirements</strong></td>
<td></td>
</tr>
<tr>
<td>General Education Modules (GE) (5 Modules, each of 4MCs)</td>
<td></td>
</tr>
<tr>
<td>• Human Cultures (GEH)</td>
<td></td>
</tr>
<tr>
<td>• Quantitative Reasoning (GER)</td>
<td></td>
</tr>
<tr>
<td>• Thinking and Expression (GET)</td>
<td></td>
</tr>
<tr>
<td>• Singapore Studies (GES)</td>
<td></td>
</tr>
<tr>
<td>• Asking Questions (GEQ)</td>
<td>20</td>
</tr>
<tr>
<td><strong>Unrestricted Electives</strong></td>
<td>32</td>
</tr>
<tr>
<td><strong>Programme Requirements</strong></td>
<td></td>
</tr>
<tr>
<td>MODULAR REQUIREMENTS</td>
<td>MCS</td>
</tr>
<tr>
<td>----------------------</td>
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</tr>
<tr>
<td><strong>Faculty Requirements</strong></td>
<td>6</td>
</tr>
<tr>
<td>(ES1531 or equivalent) Critical Thinking &amp; Writing¹</td>
<td>4</td>
</tr>
<tr>
<td>EG2401A Engineering Professionalism</td>
<td>2</td>
</tr>
<tr>
<td>ES1xxx English³</td>
<td>-</td>
</tr>
<tr>
<td><strong>Foundation Requirements</strong></td>
<td>36</td>
</tr>
<tr>
<td>MA1505 Mathematics I</td>
<td>4</td>
</tr>
<tr>
<td>MA1512 Differential Equations for Engineering</td>
<td>2</td>
</tr>
<tr>
<td>MA1513 Linear Algebra &amp; Differential Equations</td>
<td>2</td>
</tr>
<tr>
<td>CS1010E Programming Methodology</td>
<td>4</td>
</tr>
<tr>
<td>ME1102 Engineering Principles &amp; Practice I</td>
<td>4</td>
</tr>
<tr>
<td>ME2104 Engineering Principles &amp; Practice II</td>
<td>4</td>
</tr>
<tr>
<td>EG1311 Design and Make</td>
<td>4</td>
</tr>
<tr>
<td>MLE1010 Materials Engineering Principles &amp; Practice</td>
<td>4</td>
</tr>
<tr>
<td>EE2211 Introduction to Machine Learning</td>
<td>4</td>
</tr>
<tr>
<td>IE2141 Systems Thinking and Dynamics</td>
<td>4</td>
</tr>
<tr>
<td><strong>Mechanical Engineering Major Requirements</strong></td>
<td><strong>28</strong></td>
</tr>
<tr>
<td>ME2102 Engineering Innovation and Modelling</td>
<td>4</td>
</tr>
<tr>
<td>ME2112 Strength of Materials</td>
<td>4</td>
</tr>
<tr>
<td>ME2115 Mechanics of Machines</td>
<td>4</td>
</tr>
<tr>
<td>ME2121 Engineering Thermodynamics</td>
<td>4</td>
</tr>
<tr>
<td>ME2134 Fluid Mechanics I</td>
<td>4</td>
</tr>
<tr>
<td>ME2142 Feedback Control Systems</td>
<td>4</td>
</tr>
<tr>
<td>MODULAR REQUIREMENTS</td>
<td>MCS</td>
</tr>
<tr>
<td>----------------------------------------------</td>
<td>-----</td>
</tr>
<tr>
<td>ME3162 Manufacturing Processes</td>
<td>4</td>
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<tr>
<td><strong>Professional Development Modules</strong></td>
<td>8</td>
</tr>
<tr>
<td>ME4102 Standards in Mechanical Engineering</td>
<td>4</td>
</tr>
<tr>
<td>ME4103 Mechanical Engineering and Society</td>
<td>4</td>
</tr>
<tr>
<td>(Students in iRP pathway will read TWO Level-5000 modules)</td>
<td></td>
</tr>
<tr>
<td>(Students in iDP pathway will follow iDP requirements)</td>
<td></td>
</tr>
<tr>
<td><strong>ME Design Project &amp; Internship Modules</strong></td>
<td>18</td>
</tr>
<tr>
<td>ME3103 Mechanical Systems Design or</td>
<td></td>
</tr>
<tr>
<td>ME4101A B.Eng Dissertation (Both modules over 2 semesters)</td>
<td>8</td>
</tr>
<tr>
<td>EG3611A Industrial Attachment^1</td>
<td>10</td>
</tr>
<tr>
<td><strong>ME Technical Electives (from Table 3.2.10b)</strong></td>
<td>12</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>160</td>
</tr>
</tbody>
</table>

1 BEng students are required to read ES1531 Critical Thinking & Writing. Alternatively, students can read ES1501X Academic Expository Writing. USP/UTRP/RVRC students should refer to their respective programmes for USP/UTRP/RVRC modules to be read in place of ES1531.

2 Students who have not passed or been exempted from the Qualifying English Test at the time of admission to the Faculty will have to read ES1000 and/or ES1103. This will be decided by CELC.

3 Industrial attachment is optional for BEng students who are from direct poly intake and in the following special programmes: DDPs, CDPs, GEP & CSP. The modular credits for the industrial attachment will become ‘Free Electives’ i.e., Unrestricted Electives (UE).

**Table 3.2.10b: ME Technical Electives Modules**

**Applied Mechanics**
- ME2114 Mechanics of Materials
- ME3211 Mechanics of Solids
- ME4212 Aircraft Structures
- ME4213 Vibration Theory and Applications

**Control and Mechatronics**
- ME2143 Sensors and Actuators
- ME3241 Microprocessor Applications
ME3242  Automation
ME4241  Aircraft Performance, Stability and Control
ME4245  Robot Mechanics and Control
ME4246  Modern Control System
ME5405◊  Machine Vision

Fluid Mechanics
ME2135  Intermediate Fluid Mechanics
ME4231  Aerodynamics
ME4233  Computational Methods in Fluid Mechanics
ME5304◊  Experimental Fluid Mechanics
ME5309◊  Aircraft Engines and Rocket Propulsion

Manufacturing
ME3261  Computer aided Design and Manufacturing
ME3263  Design for Manufacturing and Assembly
ME4261  Tool Engineering
ME4262  Automation in Manufacturing
ME4263  Fundamentals of Product Development

Materials Science
ME3251  Materials for Engineers
ME4253  Biomaterials Engineering
ME4255  Materials Failure
ME4256  Functional Materials and Devices
ME5506◊  Corrosion of Materials
ME5516◊  Emerging Energy Conversion and Storage Technologies

Micro Systems Technology
ME3281  Microsystems Design and Applications

Thermodynamics
ME3122  Heat Transfer
ME3221  Sustainable Energy Conversion
ME4223  Thermal Environmental Engineering
ME4225  Applied Heat Transfer
ME4226  Energy and Thermal Systems
ME4227  Internal Combustion Engine
ESP4401  Optimization of Energy Systems
ESP5402◊ Transport Phenomena in Energy Systems
ESP5403◊ Nanomaterials for Energy Systems

Multidisciplinary
ME3291 Numerical Methods in Engineering
ME4291 Finite Elements Analysis

Table 3.2.10c: Technical Electives Modules for ME Specialisations

Students are advised to refer to Department of Mechanical Engineering website at Specialisation for latest updated information related to specialisations.

Aeronautical Engineering
Students taking the Aeronautical Engineering Specialisation must read ME2135 Intermediate Fluid Mechanics, select TWO(2) modules from Group A and TWO(2) modules from Group B and present their FYP in a poster session.

Compulsory
ME2135 Intermediate Fluid Mechanics

Group A
ME4231 Aerodynamics
ME4241 Aircraft Performance, Stability and Control
ME5309◊ Aircraft Engines and Rocket Propulsion

Group B
ME4212 Aircraft Structures
ME4233 Computational Methods in Fluids Mechanics
ME4291 Finite Element Analysis
ME5304◊ Experimental Fluid Mechanics

Energy and Sustainability
Students taking the Energy and Sustainability Specialisation must complete at least FOUR(4) modules from the list below and present their FYP in a poster session.

ME3221 Sustainable Energy Conversion
ME4223 Thermal Environmental Engineering
ME4225 Applied Heat Transfer
ME4226 Energy and Thermal Systems
ME4227 Internal Combustion Engines
ME5205◊ Energy Engineering
ME5207◊ Solar Energy Systems
ME5516◊ Emerging Energy Conversion and Storage Technologies
ESP4401 Optimization of Energy Systems
ESP5402◊ Transport Phenomena in Energy Systems
ESP5403◊ Nanomaterials for Energy Systems

**Offshore Oil and Gas Technology**
Students taking the Offshore Oil and Gas Technology Specialisation must read Group A modules and THREE(3) modules from Group B.

**Group A**
ME2135 Intermediate Fluid Mechanics
ME4105 Specialisation Study Module (Offshore Oil and Gas Technology)

**Group B**
ME3211 Mechanics of Solids
ME4213 Vibration Theory and Applications
ME4245 Robot Mechanics and Control
ME4261 Tool Engineering
ME5506◊ Corrosion of Materials

**Robotics**
Students taking the Robotics Specialisation must complete 24MC of the following requirements:

- Compulsory module ME3243/EE3305 Robotic System Design (4MC).
- THREE(3) elective (12MC) from the basket of modules listed below.
- Complete a final year project (8MC) in the area of Robotics.

ME4245 Robot Mechanics and Control
EE4308 Autonomous Robot Systems
EE4305 Fuzzy/Neural Systems for intelligent robotics
EE4309 Robot Perception
BN4203 Robotics in Rehabilitation
BN4601 Intelligent Medical Robotics
EE4705 Human-Robot Interaction
ME4242 Soft Robotics
Stage 4 status and a CAP of more than 3.5 are needed in order to read Level-5000 modules.