

### 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  $\geq$  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](http://me.nus.edu.sg) for latest updated information on BEng (ME) Curriculum.

MODULAR REQUIREMENTS	MCS
<b><u>University Requirements</u></b> General Education Modules (GE) (5 Modules, each of 4MCs) <ul style="list-style-type: none"> <li>• Human Cultures (GEH)</li> <li>• Quantitative Reasoning (GER)</li> <li>• Thinking and Expression (GET)</li> <li>• Singapore Studies (GES)</li> <li>• Asking Questions (GEQ)</li> </ul>	<b>20</b>
<b>Unrestricted Electives</b>	<b>32</b>
<b>Programme Requirements</b>	

<b>MODULAR REQUIREMENTS</b>		<b>MCS</b>
<b><i>Faculty Requirements</i></b>		<b>6</b>
(ES1531 or equivalent) Critical Thinking & Writing <sup>1</sup>		4
EG2401A	Engineering Professionalism	2
ES1xxx	English <sup>2</sup>	-
<b><i>Foundation Requirements</i></b>		<b>36</b>
MA1505	Mathematics I	4
MA1512	Differential Equations for Engineering	2
MA1513	Linear Algebra & Differential Equations	2
CS1010E	Programming Methodology	4
ME1102	Engineering Principles & Practice I	4
ME2104	Engineering Principles & Practice II	4
EG1311	Design and Make	4
MLE1010	Materials Engineering Principles & Practice	4
EE2211	Introduction to Machine Learning	4
IE2141	Systems Thinking and Dynamics	4
<b>Mechanical Engineering Major Requirements</b>		
<b><i>ME Core Subjects</i></b>		<b>28</b>
ME2102	Engineering Innovation and Modelling	4
ME2112	Strength of Materials	4
ME2115	Mechanics of Machines	4
ME2121	Engineering Thermodynamics	4
ME2134	Fluid Mechanics I	4
ME2142	Feedback Control Systems	4

<b>MODULAR REQUIREMENTS</b>		<b>MCS</b>
ME3162	Manufacturing Processes	4
<b>Professional Development Modules</b>		<b>8</b>
ME4102	Standards in Mechanical Engineering	4
ME4103	Mechanical Engineering and Society	4
(Students in iRP pathway will read TWO Level-5000 modules) (Students in iDP pathway will follow iDP requirements)		
<b>ME Design Project &amp; Internship Modules</b>		<b>18</b>
ME3103	Mechanical Systems Design or	8
ME4101A	B.Eng Dissertation (Both modules over 2 semesters)	
EG3611A	Industrial Attachment <sup>3</sup>	10
<b>ME Technical Electives (from Table 3.2.10b)</b>		<b>12</b>
<b>Total</b>		<b>160</b>

<sup>1</sup> 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.

<sup>2</sup> 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.

<sup>3</sup> 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<sup>◇</sup> Machine Vision

#### Fluid Mechanics

- ME2135 Intermediate Fluid Mechanics
- ME4231 Aerodynamics
- ME4233 Computational Methods in Fluid Mechanics
- ME5304<sup>◇</sup> Experimental Fluid Mechanics
- ME5309<sup>◇</sup> 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<sup>◇</sup> Corrosion of Materials
- ME5516<sup>◇</sup> 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<sup>◇</sup> Transport Phenomena in Energy Systems

ESP5403<sup>◇</sup> 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<sup>◇</sup> Aircraft Engines and Rocket Propulsion

### **Group B**

ME4212 Aircraft Structures

ME4233 Computational Methods in Fluids Mechanics

ME4291 Finite Element Analysis

ME5304<sup>◇</sup> 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 <sup>◇</sup>	Energy Engineering
ME5207 <sup>◇</sup>	Solar Energy Systems
ME5516 <sup>◇</sup>	Emerging Energy Conversion and Storage Technologies
ESP4401	Optimization of Energy Systems
ESP5402 <sup>◇</sup>	Transport Phenomena in Energy Systems
ESP5403 <sup>◇</sup>	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 <sup>◇</sup>	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.