

**Bachelor of Engineering (Mechanical Engineering)  
with Second Major in Innovation & Design**

**Cohort 2020/2021**

Modular Requirements	Modular Credits (MCs)
<b>University Level Requirements</b>	
<b>General education modules:</b>	
• Quantitative Reasoning (GER1000)	4
• Thinking & Expression (GET)	4
• Human Cultures (GEH)	4
• Singapore Studies (GES)	4
• Asking Questions (GEQ1000)	4
<b>Sub-total for University Level Requirements</b>	<b>20</b>
<b>Programme Requirements</b>	
<b>Faculty requirements:</b>	
• ES2531 Critical Thinking & Writing <sup>1</sup>	4
• EG2401A Engineering Professionalism	2
• ES1xxxx English <sup>2</sup>	-
<b>Foundation requirements (common core):</b>	
• ME1102 Engineering Principles & Practice I	4
• ME2104 Engineering Principles & Practice II	4
• MA1505 Mathematics I	4
• MA1512 Differential Equations for Engineering	2
• MA1513 Linear Algebra with Differential Equations	2
• CS1010E Programming Methodology	4
• EE2211 Introduction to Machine Learning	4
• EG1311 Design & Make	4
• IE2141 Systems Thinking & Dynamics	4
• MLE1010 Materials Engineering Principles & Practice	4
<b>ME core modules:</b>	
• ME2112 Strength of Materials	4
• ME2115 Mechanics of Machines	4
• ME2121 Engineering Thermodynamics & Heat Transfer	4
• ME2134 Fluid Mechanics I	4
• ME2142 Feedback Control Systems	4
• ME2162 Manufacturing Processes	4
<b>ME technical electives <sup>3</sup></b>	<b>20</b>
<b>ME design and project modules:</b>	
• ME2102 Engineering Innovation & Modelling	4
• EG3301R DCP Project <sup>3</sup> (over 2 consecutive semesters) <i>(Double-counted for Second Major in Innovation &amp; Design and replaces ME3103 Mechanical Systems Design)</i>	12
<b>EG3612 Vacation Internship Programme (VIP) <sup>3,4</sup></b>	<b>6</b>
<b>Sub-total for Programme Requirements</b>	<b>108</b>
<b>Unrestricted Elective Modules (UEM)</b>	
• Group A module for Second Major	4
• Group B module for Second Major	4
• Group C modules for Second Major – Innovation & Enterprise electives	8
• EG4301 DCP Dissertation <u>or</u> EG4301A Ideas to Start-up (over 2 consecutive semesters)	12
Other unrestricted electives	4
<b>Sub-total for Unrestricted Elective Modules</b>	<b>32</b>
<b>Total</b>	<b>160</b>

**Innovation & Design Programme  
Faculty of Engineering**

Notes:

- <sup>1</sup> Students in USP, UTCP, and RVRC may read an equivalent module (e.g. UWC2101%, UTW1001%, ES1601, ES1501%) in lieu of ES2531.
- <sup>2</sup> Students who have not passed or been exempted from the Qualifying English Test at the point of admission will have to read ES1000 and/or ES1103. ES1103 carries 4 MCs which may be counted as UEM.
- <sup>3</sup> Students in this Second Major are allowed to complete EG3612 (6 MCs) in lieu of EG3611A (10 MCs).

The 12 MCs for EG3301R are mapped by 8 MCs from ME3103/ME4101A and 4 MCs from the replacement of EG3611A (10 MCs) with EG3612 (6 MCs).

Students may also opt to do EG3611A (10 MCs) in lieu of EG3612 (6 MCs) and 4 MCs of technical electives.

**ME4102 Standards in Mechanical Engineering and ME4103 Mechanical Engineering and Society cannot be counted as ME technical electives. They may only be taken as UEM.**

- <sup>4</sup> EG3612 (VIP) is optional for poly-intake students and those in the following special programmes: double degree programmes (DDP), concurrent degree programmes (CDP), Chemical Sciences Programme (CSP), and E-Scholars. The 6 MCs for EG3612 may be replaced by other modules.

**Recommended semester schedule for Cohort 2020/2021 – JC-intake students or equivalent**  
(for students who opt for vacation internship)

Semester 1	MCs	Semester 2	MCs
ME1102 Engineering Principles & Practice I	4	ME2104 Engineering Principles & Practice II	4
MA1505 Mathematics I	4	MA1512 Differential Equations for Engineering	2
CS1010E Programming Methodology	4	MA1513 Linear Algebra with Differential Equations	2
GER1000 Quantitative Reasoning	4	EG1311 Design & Make	4
GET	4	GEQ1000 Asking Questions	4
		<b>Group A module for Second Major (UEM)</b>	<b>4</b>
<b>Sub-total</b>	<b>20</b>	<b>Sub-total</b>	<b>20</b>

Semester 3	MCs	Semester 4	MCs
MLE1010 Materials Engineering Principles & Practice	4	IE2141 Systems Thinking & Dynamics	4
EE2211 Introduction to Machine Learning	4	ME2102 Engineering Innovation & Modelling	4
ME2112 Strength of Materials	4	ME2115 Mechanics of Machines	4
ME2162 Manufacturing Processes	4	ME2121 Engineering Thermodynamics & Heat Transfer	4
ES2531 Critical Thinking & Writing	4	EG3301R DCP Project (replaces ME3103)	6
<b>Group B module for Second Major (UEM)</b>	<b>4</b>		
<b>Sub-total</b>	<b>24</b>	<b>Sub-total</b>	<b>22</b>

Summer vacation between Semesters 4 and 5	MCs
EG3612 Vacation Internship Programme	6
<b>Sub-total</b>	<b>6</b>

Semester 5	MCs	Semester 6	MCs
EG3301R DCP Project (replaces ME3103)	6	<b>Innovation &amp; Enterprise Elective 1 (UEM)</b>	<b>4</b>
ME2134 Fluid Mechanics I	4	ME2142 Feedback Control Systems	4
GEH	4	Technical Elective 1	4
GES	4	Technical Elective 2	4
		EG2401A Engineering Professionalism	2
<b>Sub-total</b>	<b>18</b>	<b>Sub-total</b>	<b>18</b>

Semester 7	MCs	Semester 8	MCs
<b>EG4301 DCP Dissertation (UEM)</b>	<b>6</b>	<b>EG4301 DCP Dissertation (UEM)</b>	<b>6</b>
<b>Innovation &amp; Enterprise Elective 2 (UEM)</b>	<b>4</b>	Technical Elective 5	4
Technical Elective 3	4	UEM	4
Technical Elective 4	4		
<b>Sub-total</b>	<b>18</b>	<b>Sub-total</b>	<b>14</b>

**Recommended semester schedule for Cohort 2020/2021 – JC-intake students or equivalent**  
(for students who opt for vacation internship **plus a specialisation**)

Semester 1	MCs	Semester 2	MCs
ME1102 Engineering Principles & Practice I	4	ME2104 Engineering Principles & Practice II	4
MA1505 Mathematics I	4	MA1512 Differential Equations for Engineering	2
CS1010E Programming Methodology	4	MA1513 Linear Algebra with Differential Equations	2
GER1000 Quantitative Reasoning	4	EG1311 Design & Make	4
GET	4	GEQ1000 Asking Questions	4
		<b>Group A module for Second Major (UEM)</b>	<b>4</b>
<b>Sub-total</b>	<b>20</b>	<b>Sub-total</b>	<b>20</b>

Semester 3	MCs	Semester 4	MCs
MLE1010 Materials Engineering Principles & Practice	4	IE2141 Systems Thinking & Dynamics	4
EE2211 Introduction to Machine Learning	4	ME2102 Engineering Innovation & Modelling	4
ME2112 Strength of Materials	4	ME2115 Mechanics of Machines	4
ME2162 Manufacturing Processes	4	ME2121 Engineering Thermodynamics & Heat Transfer	4
ES2531 Critical Thinking & Writing	4	<b>EG3301R DCP Project (replaces ME3103)</b>	<b>6</b>
<b>Group B module for Second Major (UEM)</b>	<b>4</b>		
<b>Sub-total</b>	<b>24</b>	<b>Sub-total</b>	<b>22</b>

Summer vacation between Semesters 4 and 5	MCs
EG3612 Vacation Internship Programme	6
<b>Sub-total</b>	<b>6</b>

Semester 5	MCs	Semester 6	MCs
<b>EG3301R DCP Project (replaces ME3103)</b>	<b>6</b>	<b>Innovation &amp; Enterprise Elective 1 (UEM)</b>	<b>4</b>
ME2134 Fluid Mechanics I	4	ME2142 Feedback Control Systems	4
GEH	4	Specialisation module 1	4
GES	4	Specialisation module 2	4
		EG2401A Engineering Professionalism	2
<b>Sub-total</b>	<b>18</b>	<b>Sub-total</b>	<b>18</b>

Semester 7	MCs	Semester 8	MCs
<b>EG4301 DCP Dissertation (UEM)</b>	<b>6</b>	<b>EG4301 DCP Dissertation (UEM)</b>	<b>6</b>
<b>Innovation &amp; Enterprise Elective 2 (UEM)</b>	<b>4</b>	Specialisation module 5	4
Specialisation module 3	4	UEM	4
Specialisation module 4	4		
<b>Sub-total</b>	<b>18</b>	<b>Sub-total</b>	<b>14</b>

**Recommended semester schedule for Cohort 2020/2021 – JC-intake students or equivalent**  
(for students who opt for industrial attachment in lieu of vacation internship)

Semester 1	MCs	Semester 2	MCs
ME1102 Engineering Principles & Practice I	4	ME2104 Engineering Principles & Practice II	4
MA1505 Mathematics I	4	MA1512 Differential Equations for Engineering	2
CS1010E Programming Methodology	4	MA1513 Linear Algebra with Differential Equations	2
GER1000 Quantitative Reasoning	4	EG1311 Design & Make	4
GET	4	GEQ1000 Asking Questions	4
		<b>Group A module for Second Major (UEM)</b>	<b>4</b>
<b>Sub-total</b>	<b>20</b>	<b>Sub-total</b>	<b>20</b>

Semester 3	MCs	Semester 4	MCs
MLE1010 Materials Engineering Principles & Practice	4	IE2141 Systems Thinking & Dynamics	4
EE2211 Introduction to Machine Learning	4	ME2102 Engineering Innovation & Modelling	4
ME2112 Strength of Materials	4	ME2115 Mechanics of Machines	4
ME2162 Manufacturing Processes	4	ME2121 Engineering Thermodynamics & Heat Transfer	4
ES2531 Critical Thinking & Writing	4	EG3301R DCP Project (replaces ME3103)	6
<b>Group B module for Second Major (UEM)</b>	<b>4</b>		
<b>Sub-total</b>	<b>24</b>	<b>Sub-total</b>	<b>22</b>

Semester 5	MCs	Semester 6	MCs
EG3301R DCP Project (replaces ME3103)	6	EG3611A Industrial Attachment	10
<b>Innovation &amp; Enterprise Elective 1 (UEM)</b>	<b>4</b>		
ME2134 Fluid Mechanics I	4		
GEH	4		
GES	4		
<b>Sub-total</b>	<b>22</b>	<b>Sub-total</b>	<b>10</b>

Semester 7	MCs	Semester 8	MCs
EG4301 DCP Dissertation (UEM)	6	EG4301 DCP Dissertation (UEM)	6
<b>Innovation &amp; Enterprise Elective 2 (UEM)</b>	<b>4</b>	Technical Elective 3	4
ME2142 Feedback Control Systems	4	Technical Elective 4	4
Technical Elective 1	4	EG2401A Engineering Professionalism	2
Technical Elective 2	4	UEM	4
<b>Sub-total</b>	<b>22</b>	<b>Sub-total</b>	<b>20</b>

**Recommended semester schedule for Cohort 2020/2021 – JC-intake students or equivalent**  
(for students who opt for industrial attachment **plus a specialisation**)

Semester 1	MCs	Semester 2	MCs
ME1102 Engineering Principles & Practice I	4	ME2104 Engineering Principles & Practice II	4
MA1505 Mathematics I	4	MA1512 Differential Equations for Engineering	2
CS1010E Programming Methodology	4	MA1513 Linear Algebra with Differential Equations	2
GER1000 Quantitative Reasoning	4	EG1311 Design & Make	4
GET	4	GEQ1000 Asking Questions	4
		<b>Group A module for Second Major (UEM)</b>	<b>4</b>
<b>Sub-total</b>	<b>20</b>	<b>Sub-total</b>	<b>20</b>

Semester 3	MCs	Semester 4	MCs
MLE1010 Materials Engineering Principles & Practice	4	IE2141 Systems Thinking & Dynamics	4
EE2211 Introduction to Machine Learning	4	ME2102 Engineering Innovation & Modelling	4
ME2112 Strength of Materials	4	ME2115 Mechanics of Machines	4
ME2162 Manufacturing Processes	4	ME2121 Engineering Thermodynamics & Heat Transfer	4
ES2531 Critical Thinking & Writing	4	EG3301R DCP Project (replaces ME3103)	6
<b>Group B module for Second Major (UEM)</b>	<b>4</b>		
<b>Sub-total</b>	<b>24</b>	<b>Sub-total</b>	<b>22</b>

Semester 5	MCs	Semester 6	MCs
EG3301R DCP Project (replaces ME3103)	6	EG3611A Industrial Attachment	10
<b>Innovation &amp; Enterprise Elective 1 (UEM)</b>	<b>4</b>		
ME2134 Fluid Mechanics I	4		
GEH	4		
GES	4		
<b>Sub-total</b>	<b>22</b>	<b>Sub-total</b>	<b>10</b>

Semester 7	MCs	Semester 8	MCs
EG4301 DCP Dissertation (UEM)	6	EG4301 DCP Dissertation (UEM)	6
<b>Innovation &amp; Enterprise Elective 2 (UEM)</b>	<b>4</b>	Specialisation module 3	4
ME2142 Feedback Control Systems	4	Specialisation module 4	4
Specialisation module 1	4	Specialisation module 5	4
Specialisation module 2	4	EG2401A Engineering Professionalism	2
<b>Sub-total</b>	<b>22</b>	<b>Sub-total</b>	<b>20</b>

**Recommended semester schedule for Cohort 2020/2021 – JC-intake students or equivalent**  
(for students in year-long NOC programmes)

Semester 1	MCs	Semester 2	MCs
ME1102 Engineering Principles & Practice I	4	ME2104 Engineering Principles & Practice II	4
MA1505 Mathematics I	4	MA1512 Differential Equations for Engineering	2
CS1010E Programming Methodology	4	MA1513 Linear Algebra with Differential Equations	2
GER1000 Quantitative Reasoning	4	EG1311 Design & Make	4
GET	4	GEQ1000 Asking Questions	4
		<b>Group A module for Second Major (UEM)</b>	<b>4</b>
<b>Sub-total</b>	<b>20</b>	<b>Sub-total</b>	<b>20</b>

Semester 3	MCs	Semester 4	MCs
MLE1010 Materials Engineering Principles & Practice	4	IE2141 Systems Thinking & Dynamics	4
EE2211 Introduction to Machine Learning	4	ME2102 Engineering Innovation & Modelling	4
ME2112 Strength of Materials	4	ME2115 Mechanics of Machines	4
ME2162 Manufacturing Processes	4	ME2121 Engineering Thermodynamics & Heat Transfer	4
ES2531 Critical Thinking & Writing	4	EG3301R DCP Project (replaces ME3103)	6
<b>Group B module for Second Major (UEM)</b>	<b>4</b>		
<b>Sub-total</b>	<b>24</b>	<b>Sub-total</b>	<b>22</b>

Semester 5	MCs	Semester 6	MCs
EG3301R DCP Project (replaces ME3103)	6	NOC	
ME2134 Fluid Mechanics I	4		
GEH	4		
GES	4		
Technical Elective 1	4		
<b>Sub-total</b>	<b>22</b>	<b>Sub-total</b>	

Semester 7	MCs	Semester 8	MCs
NOC		ME2142 Feedback Control Systems	4
		Technical Elective 2	4
		Technical Elective 3	4
		Technical Elective 4	4
<b>Sub-total</b>		<b>Sub-total</b>	<b>16</b>

Mapping of year-long NOC programmes:

NOC modules	iDP / Engineering modules
TR3201 Entrepreneurship Practicum (8 MCs)	EG2401A Engineering Professionalism (2 MCs) + ME366X (4 MCs – TE)
TR3202 Start-up Internship Programme (12 MCs)	EG3612 Vacation Internship Programme (6 MCs) + EG4301 DCP Dissertation (4 MCs out of 12 MCs)
TR3203N Start-up Case Study & Analysis (8 MCs)	EG4301 DCP Dissertation (8 MCs out of 12 MCs)
Entrepreneurship courses (up to 12 MCs)	Innovation & Enterprise electives (8 MCs – UEM)

**Recommended semester schedule for Cohort 2020/2021 – poly-intake students**

(for students who intend to complete in 6 semesters and are exempted from Group A module for Second Major)

Semester 1	MCs	Semester 2	MCs
MA1301 Introductory Mathematics (in lieu of EG3612)	4	EG3301R DCP Project (replaces ME3103)	6
MLE1010 Materials Engineering Principles & Practice	4	MA1505 Mathematics I	4
ME2112 Strength of Materials	4	ME2115 Mechanics of Machines	4
GER1000 Quantitative Reasoning	4	ME2121 Engineering Thermodynamics & Heat Transfer	4
Group B module for Second Major (UEM)	4	GEQ1000 Asking Questions	4
<b>Sub-total</b>	<b>20</b>	<b>Sub-total</b>	<b>22</b>

Semester 3	MCs	Semester 4	MCs
EG3301R DCP Project (replaces ME3103)	6	Innovation & Enterprise Elective 1 (UEM)	4
MA1512 Differential Equations for Engineering	2	IE2141 Systems Thinking & Dynamics	4
MA1513 Linear Algebra with Differential Equations	2	ME2142 Feedback Control Systems	4
EE2211 Introduction to Machine Learning	4	Technical Elective 1	4
ME2162 Manufacturing Processes	4	GET	4
ME2134 Fluid Mechanics I	4	EG2401A Engineering Professionalism	2
ES2531 Critical Thinking & Writing	4	UEM (in lieu of EG3612)	2
<b>Sub-total</b>	<b>26</b>	<b>Sub-total</b>	<b>24</b>

Semester 5	MCs	Semester 6	MCs
EG4301 DCP Dissertation (UEM)	6	EG4301 DCP Dissertation (UEM)	6
Innovation & Enterprise Elective 2 (UEM)	4	Technical Elective 3	4
Technical Elective 2	4	Technical Elective 4	4
GEH	4	Technical Elective 5	4
GES	4		
<b>Sub-total</b>	<b>22</b>	<b>Sub-total</b>	<b>18</b>

Notes:

- Poly-intake students may receive the following exemptions depending on their Diploma qualification:
  - ME1102 Engineering Principles & Practice I (4 MCs)
  - ME2104 Engineering Principles & Practice II (4 MCs)
  - CS1010E Programming Methodology (4 MCs)
  - ME2102 Engineering Innovation & Modelling (4 MCs)
  - EG1311 Design & Make (4 MCs)
  - Unrestricted elective modules (20 MCs)
- Poly-intake students may be exempted from Group A module for Second Major (4 MCs) and/or one Innovation & Enterprise elective (4 MCs) depending on their Diploma qualification. These would be included as part of the 20 MCs of exemptions for unrestricted elective modules.
- EG3612 (VIP) is not compulsory for poly-intake students. The 6 MCs for VIP may be fulfilled by MA1301 (4 MCs) and/or other modules.



**Recommended semester schedule for Cohort 2020/2021 – poly-intake students**

(for students who intend to complete in 7 semesters and are exempted from Group A module for Second Major)

Semester 1	MCs	Semester 2	MCs
MA1301 Introductory Mathematics (in lieu of EG3612)	4	EG3301R DCP Project (replaces ME3103)	6
MLE1010 Materials Engineering Principles & Practice	4	MA1505 Mathematics I	4
ME2112 Strength of Materials	4	ME2115 Mechanics of Machines	4
GER1000 Quantitative Reasoning	4	ME2121 Engineering Thermodynamics & Heat Transfer	4
Group B module for Second Major (UEM)	4	GEQ1000 Asking Questions	4
<b>Sub-total</b>	<b>20</b>	<b>Sub-total</b>	<b>22</b>

Semester 3	MCs	Semester 4	MCs
EG3301R DCP Project (replaces ME3103)	6	IE2141 Systems Thinking & Dynamics	4
MA1512 Differential Equations for Engineering	2	ME2142 Feedback Control Systems	4
MA1513 Linear Algebra with Differential Equations	2	Technical Elective 1	4
EE2211 Introduction to Machine Learning	4	GET	4
ME2162 Manufacturing Processes	4	EG2401A Engineering Professionalism	2
ES2531 Critical Thinking & Writing	4		
<b>Sub-total</b>	<b>22</b>	<b>Sub-total</b>	<b>18</b>

Semester 5	MCs	Semester 6	MCs
EG4301 DCP Dissertation (UEM)	6	EG4301 DCP Dissertation (UEM)	6
ME2134 Fluid Mechanics I	4	Innovation & Enterprise Elective 1 (UEM)	4
GES	4	Technical Elective 2	4
GEH	4	Technical Elective 3	4
<b>Sub-total</b>	<b>18</b>	<b>Sub-total</b>	<b>18</b>

Semester 7	MCs
Innovation & Enterprise Elective 2 (UEM)	4
Technical Elective 4	4
Technical Elective 5	4
UEM (in lieu of EG3612)	2
<b>Sub-total</b>	<b>14</b>

**Recommended semester schedule for Cohort 2020/2021 – JC-intake students or equivalent**  
(for students in E-Scholars programme)

Semester 1	MCs	Semester 2	MCs
ME1102 Engineering Principles & Practice I	4	ME2104 Engineering Principles & Practice II	4
ME2112 Strength of Materials	4	MA1512 Differential Equations for Engineering	2
ME2134 Fluid Mechanics I	4	MA1513 Linear Algebra with Differential Equations	2
GER1000 Quantitative Reasoning	4	ME2102 Engineering Innovation & Modelling	4
RC4 module 1 (replaces ES2531 Critical Thinking & Writing)	4	ME2115 Mechanics of Machines	4
Group B module for Second Major (UEM)	4	RC4 module 2	4
		EG3301R DCP Project (replaces ME3103)	6
		Group A module for Second Major (UEM)	4
<b>Sub-total</b>	<b>24</b>	<b>Sub-total</b>	<b>30</b>

Semester 3	MCs	Semester 4 – NOC	MCs
MLE1010 Materials Engineering Principles & Practice	4	TR3202 Start-up Internship Programme	12
EE2211 Introduction to Machine Learning	4	Entrepreneurship courses	8
ME2162 Manufacturing Processes	4		
RC4 module 3	4		
RC4 module 4	4		
EG2101 Pathways to Engineering Leadership (replaces EG2401A Engineering Professionalism)	2		
EG3301R DCP Project (replaces ME3103)	6		
<b>Sub-total</b>	<b>28</b>	<b>Sub-total</b>	<b>20</b>

Semester 5	MCs	Semester 6	MCs
EG4301 DCP Dissertation (UEM)	6	EG4301 DCP Dissertation (UEM)	6
UEM (in lieu of IE2141)	4	ME2121 Engineering Thermodynamics & Heat Transfer	4
ME2142 Feedback Control Systems	4	Technical Elective 3	4
Technical Elective 1	4	Technical Elective 4	4
Technical Elective 2	4	Technical Elective 5	4
RC4 module 5	4		
<b>Sub-total</b>	<b>26</b>	<b>Sub-total</b>	<b>22</b>

Notes:

- Students must complete the following modules before Semester 1 through advanced placement credits:
  - CS1010E Programming Methodology (4 MCs)
  - MA1505 Mathematics I (4 MCs)
  - EG1311 Design & Make (4 MCs)
- TR3202 and the NOC entrepreneurship courses are mapped to EG3612 Vacation Internship Programme (6 MCS), 8 MCs of Innovation & Enterprise electives (i.e. Group C modules), and 6 MCs of UEM.