

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

Cohort 2019/2020

Modular Requirements	Modular Credits (MCs)
University Level Requirements	
General education modules:	
• Quantitative Reasoning (GER1000)	4
• Thinking & Expression (GET)	4
• Human Cultures (GEH)	4
• Singapore Studies (GES)	4
• Asking Questions (GEQ1000)	4
Sub-total for University Level Requirements	20
Programme Requirements	
Faculty requirements:	
• ES2531 Critical Thinking & Writing ¹	4
• EG2401A Engineering Professionalism	2
• ES1xxxx English ²	-
Foundation requirements (common core):	
• 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
ME core modules:	
• 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
ME technical electives ³	20
ME design and project modules:	
• ME2102 Engineering Innovation & Modelling	4
• EG3301R DCP Project ³ (over 2 consecutive semesters) <i>(Double-counted for Second Major in Innovation & Design and replaces ME3103 Mechanical Systems Design)</i>	12
EG3612 Vacation Internship Programme (VIP) ^{3,4}	6
Sub-total for Programme Requirements	108
Unrestricted Elective Modules (UEM)	
• 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
Sub-total for Unrestricted Elective Modules	32
Total	160

**Innovation & Design Programme
Faculty of Engineering**

Notes:

- ¹ Students in USP, UTCP, and RVRC may read an equivalent module (e.g. UWC2101%, UTW1001%, ES1601, ES1501%) in lieu of ES2531.
- ² 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.
- ³ 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.

- ⁴ 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 2019/2020 – 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
		Group A module for Second Major (UEM)	4
Sub-total	20	Sub-total	20

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
Group B module for Second Major (UEM)	4		
Sub-total	24	Sub-total	22

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

Semester 5	MCs	Semester 6	MCs
EG3301R DCP Project (replaces ME3103)	6	Innovation & Enterprise Elective 1 (UEM)	4
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
Sub-total	18	Sub-total	18

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

Recommended semester schedule for Cohort 2019/2020 – 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
		Group A module for Second Major (UEM)	4
Sub-total	20	Sub-total	20

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
Group B module for Second Major (UEM)	4		
Sub-total	24	Sub-total	22

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

Semester 5	MCs	Semester 6	MCs
EG3301R DCP Project (replaces ME3103)	6	Innovation & Enterprise Elective 1 (UEM)	4
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
Sub-total	18	Sub-total	18

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

Recommended semester schedule for Cohort 2019/2020 – 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
		Group A module for Second Major (UEM)	4
Sub-total	20	Sub-total	20

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
Group B module for Second Major (UEM)	4		
Sub-total	24	Sub-total	22

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

Semester 7	MCs	Semester 8	MCs
EG4301 DCP Dissertation (UEM)	6	EG4301 DCP Dissertation (UEM)	6
Innovation & Enterprise Elective 2 (UEM)	4	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
Sub-total	22	Sub-total	20

Recommended semester schedule for Cohort 2019/2020 – 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
		Group A module for Second Major (UEM)	4
Sub-total	20	Sub-total	20

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
Group B module for Second Major (UEM)	4		
Sub-total	24	Sub-total	22

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

Semester 7	MCs	Semester 8	MCs
EG4301 DCP Dissertation (UEM)	6	EG4301 DCP Dissertation (UEM)	6
Innovation & Enterprise Elective 2 (UEM)	4	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
Sub-total	22	Sub-total	20

Recommended semester schedule for Cohort 2019/2020 – 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
		Group A module for Second Major (UEM)	4
Sub-total	20	Sub-total	20

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
Group B module for Second Major (UEM)	4		
Sub-total	24	Sub-total	22

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		
Sub-total	22	Sub-total	

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

Mapping of year-long NOC programmes:

NOC modules	/DP / 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 2019/2020 – JC-intake students or equivalent
(for students from Common Engineering)

Semester 1	MCs	Semester 2	MCs
Engineering Principles & Practice I	4	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
EG1311 Design & Make	4	MLE1010 Materials Engineering Principles & Practice	4
GET	4	GER1000 Quantitative Reasoning	4
		Group A module for Second Major (UEM)	4
Sub-total	20	Sub-total	20

Semester 3	MCs	Semester 4	MCs
EE2211 Introduction to Machine Learning	4	IE2141 Systems Thinking & Dynamics	4
ME2112 Strength of Materials	4	ME2102 Engineering Innovation & Modelling	4
ME2162 Manufacturing Processes	4	ME2115 Mechanics of Machines	4
GEQ1000 Asking Questions	4	ME2121 Engineering Thermodynamics & Heat Transfer	4
ES2531 Critical Thinking & Writing	4	EG3301R DCP Project (replaces ME3103)	6
Group B module for Second Major (UEM)	4		
Sub-total	24	Sub-total	22

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

Semester 5	MCs	Semester 6	MCs
EG3301R DCP Project (replaces ME3103)	6	Innovation & Enterprise Elective 1 (UEM)	4
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
Sub-total	18	Sub-total	18

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

Recommended semester schedule for Cohort 2019/2020 – poly-intake students

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

Semester 3	MCs	Semester 4	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
Sub-total	20	Sub-total	22

Semester 5	MCs	Semester 6	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
Sub-total	26	Sub-total	24

Semester 7	MCs	Semester 8	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		
Sub-total	22	Sub-total	18

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 2019/2020 – poly-intake students

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

Semester 3	MCs	Semester 4	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
Sub-total	20	Sub-total	22

Semester 5	MCs	Semester 6	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
ES2531 Critical Thinking & Writing	4	EG2401A Engineering Professionalism	2
Sub-total	22	Sub-total	22

Semester 7	MCs	Semester 8	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
Sub-total	18	Sub-total	18

Semester 9	MCs
Innovation & Enterprise Elective 2 (UEM)	4
Technical Elective 4	4
Technical Elective 5	4
UEM (in lieu of EG3612)	2
Sub-total	14

Recommended semester schedule for Cohort 2019/2020 – 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
Sub-total	24	Sub-total	30

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		
Sub-total	28	Sub-total	20

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		
Sub-total	26	Sub-total	22

Notes:

- Students must complete the following modules before Semester 1 through advanced placement credits:
 - CS1010E Programming Methodology (4 MCs)
 - MA1505 Mathematics (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.