

**Bachelor of Engineering (Materials Science & 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):	
• MLE1001A Materials Science & Engineering Principles & Practice I	4
• MLE2001 Materials Science & Engineering Principles & Practice II	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
MLE core modules:	
• CM1501 Organic Chemistry for Engineers	4
• PC1432 Physics IIE	4
• MLE2101 Introduction to Structure of Materials	4
• MLE2102 Thermodynamics & Phase Diagrams	4
• MLE2103 Phase Transformation & Kinetics	3
• MLE2104 Mechanical Properties of Materials	4
• MLE2105 Electronic Properties of Materials	4
• MLE3101 Materials Characterization Laboratory	3
• MLE3111 Materials Processing Laboratory	4
MLE technical electives ³ (minimum of 8 MCs at Level 4000 or above)	18
MLE design and project modules:	
• EG3301R DCP Project ³ (over 2 consecutive semesters) <i>(Double-counted for Second Major in Innovation & Design and replaces MLE4102A Design Project)</i>	12
EG3612 Vacation Internship Programme (VIP) ^{3,5}	6
Sub-total for Programme Requirements	108

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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 ⁴ (over 2 consecutive semesters)	12
Other unrestricted electives	4
Sub-total for Unrestricted Elective Modules	32
Total	160

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 MLE4102A 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.
- ⁴ Students in this Second Major are allowed to complete additional technical electives (6 MCs) in lieu of MLE4101A B.Eng. Dissertation (6 MCs) if they complete EG4301/EG4301A.
- ⁵ 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
MLE1010 Materials Engineering Principles & Practice	4	MLE1001A Materials Science & Engineering Principles & Practice I	4
CM1501 Organic Chemistry for Engineers	4	MA1512 Differential Equations for Engineering	2
EG1311 Design & Make	4	MA1513 Linear Algebra with Differential Equations	2
GET	4	CS1010E Programming Methodology	4
GEH	4	PC1432 Physics IIE	4
		GER1000 Quantitative Reasoning	4
		Group A module for Second Major (UEM)	4
Sub-total	20	Sub-total	24

Semester 3	MCs	Semester 4	MCs
MLE2001 Materials Science & Engineering Principles & Practice II	4	IE2141 Systems Thinking & Dynamics	4
EE2211 Introduction to Machine Learning	4	MLE2104 Mechanical Properties of Materials	4
MLE2101 Structure of Materials	4	MLE2105 Electronic Properties of Materials	4
MLE2102 Thermodynamics & Phase Diagrams	4	GEQ1000 Asking Questions	4
MLE2103 Phase Transformation & Kinetics	3	EG3301R DCP Project (replaces MLE4102A)	6
Group B module for Second Major (UEM)	4	EG2401A Engineering Professionalism	2
Sub-total	23	Sub-total	24

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 MLE4102A)	6	Innovation & Enterprise Elective 1 (UEM)	4
MLE3111 Materials Processing Laboratory	4	MLE3101 Materials Characterization Laboratory	3
Technical Elective 1	4	Technical Elective 2	4
ES2531 Critical Thinking & Writing	4	Technical Elective 3	4
		GES	4
Sub-total	18	Sub-total	19

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	2
Technical Elective 4	4	UEM	4
Sub-total	14	Sub-total	12

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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
MLE1010 Materials Engineering Principles & Practice	4	MLE1001A Materials Science & Engineering Principles & Practice I	4
CM1501 Organic Chemistry for Engineers	4	MA1512 Differential Equations for Engineering	2
EG1311 Design & Make	4	MA1513 Linear Algebra with Differential Equations	2
GET	4	CS1010E Programming Methodology	4
GEH	4	PC1432 Physics IIE	4
		GER1000 Quantitative Reasoning	4
		Group A module for Second Major (UEM)	4
Sub-total	20	Sub-total	24

Semester 3	MCs	Semester 4	MCs
MLE2001 Materials Science & Engineering Principles & Practice II	4	IE2141 Systems Thinking & Dynamics	4
EE2211 Introduction to Machine Learning	4	MLE2104 Mechanical Properties of Materials	4
MLE2101 Structure of Materials	4	MLE2105 Electronic Properties of Materials	4
MLE2102 Thermodynamics & Phase Diagrams	4	GEQ1000 Asking Questions	4
MLE2103 Phase Transformation & Kinetics	3	EG3301R DCP Project (replaces MLE4102A)	6
Group B module for Second Major (UEM)	4	EG2401A Engineering Professionalism	2
Sub-total	23	Sub-total	24

Semester 5	MCs	Semester 6	MCs
EG3301R DCP Project (replaces MLE4102A)	6	EG3611A Industrial Attachment	10
Innovation & Enterprise Elective 1 (UEM)	4		
MLE3111 Materials Processing Laboratory	4		
GES	4		
ES2531 Critical Thinking & Writing	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	MLE3101 Materials Characterization Laboratory	3
Technical Elective 1	4	Technical Elective 3	4
Technical Elective 2	4	Technical Elective 4	2
		UEM	4
Sub-total	18	Sub-total	19

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
MLE1010 Materials Engineering Principles & Practice	4	MLE1001A Materials Science & Engineering Principles & Practice I	4
CM1501 Organic Chemistry for Engineers	4	MA1512 Differential Equations for Engineering	2
EG1311 Design & Make	4	MA1513 Linear Algebra with Differential Equations	2
GET	4	CS1010E Programming Methodology	4
GEH	4	PC1432 Physics IIE	4
		GER1000 Quantitative Reasoning	4
		Group A module for Second Major (UEM)	4
Sub-total	20	Sub-total	24

Semester 3	MCs	Semester 4	MCs
MLE2001 Materials Science & Engineering Principles & Practice II	4	IE2141 Systems Thinking & Dynamics	4
EE2211 Introduction to Machine Learning	4	MLE2104 Mechanical Properties of Materials	4
MLE2101 Structure of Materials	4	MLE2105 Electronic Properties of Materials	4
MLE2102 Thermodynamics & Phase Diagrams	4	MLE3101 Materials Characterization Laboratory	3
MLE2103 Phase Transformation & Kinetics	3	GEQ1000 Asking Questions	4
Group B module for Second Major (UEM)	4	EG3301R DCP Project (replaces MLE4102A)	6
Sub-total	23	Sub-total	25

Semester 5	MCs	Semester 6	MCs
EG3301R DCP Project (replaces MLE4102A)	6	NOC	
MLE3111 Materials Processing Laboratory	4		
GES	4		
ES2531 Critical Thinking & Writing	4		
Sub-total	18	Sub-total	

Semester 7	MCs	Semester 8	MCs
NOC		Technical Elective 1	4
		Technical Elective 2	4
		Technical Elective 3	4
		Technical Elective 4	2
Sub-total		Sub-total	14

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Mapping of year-long NOC programmes:

NOC modules	iDP / Engineering modules
TR3201 Entrepreneurship Practicum (8 MCs)	EG2401A Engineering Professionalism (2 MCs) + TE (4 MCs)
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 – poly-intake students
(for students who are exempted from CS1010E)

Semester 3	MCs	Semester 4	MCs
MA1301 Introductory Mathematics (in lieu of EG3612)	4	EG3301R DCP Project (replaces MLE4102A)	6
PC1221 Fundamentals of Physics I (in lieu of EG3612)	4	PC1222 Fundamentals of Physics II	4
MLE1010 Materials Engineering Principles & Practice	4	MA1512 Differential Equations for Engineering	2
GET	4	MA1513 Linear Algebra with Differential Equations	2
Group B module for Second Major (UEM)	4	MLE1001A Materials Science & Engineering Principles & Practice I	4
		GER1000 Quantitative Reasoning	4
Sub-total	20	Sub-total	22

Semester 5	MCs	Semester 6	MCs
EG3301R DCP Project (replaces MLE4102A)	6	EE2211 Introduction to Machine Learning	4
MLE2001 Materials Science & Engineering Principles & Practice II	4	MLE2104 Mechanical Properties of Materials	4
MLE2101 Structure of Materials	4	MLE2105 Electronic Properties of Materials	4
MLE2102 Thermodynamics & Phase Diagrams	4	EG2401A Engineering Professionalism	2
MLE2103 Phase Transformation & Kinetics	3	GEQ1000 Asking Questions	4
PC1432 Physics IIE	4	Group A module for Second Major (UEM)	4
Sub-total	25	Sub-total	22

Semester 7	MCs	Semester 8	MCs
EG4301 DCP Dissertation (UEM)	6	EG4301 DCP Dissertation (UEM)	6
MLE3111 Materials Processing Laboratory	4	Innovation & Enterprise Elective 1 (UEM)	4
Technical Elective 1	4	IE2141 Systems Thinking & Dynamics	4
GEH	4	MLE3101 Materials Characterization Laboratory	3
GES	4	Technical Elective 2	4
Sub-total	22	Sub-total	21

Semester 9	MCs
Innovation & Enterprise Elective 2 (UEM)	4
Technical Elective 3	4
Technical Elective 4	4
Technical Elective 5	2
Sub-total	14

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Notes:

1. Poly-intake students may receive the following exemptions depending on their Diploma qualification:
 - CS1010E Programming Methodology (4 MCs)
 - CM1501 Organic Chemistry for Engineers (4 MCs)
 - EG1311 Design & Make (4 MCs)
 - ES2531 Critical Thinking & Writing (4 MCs)
 - Unrestricted elective modules (20 MCs)

2. 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.

3. EG3612 (VIP) is not compulsory for poly-intake students. The 6 MCs for VIP may be fulfilled by MA1301 (4 MCs), PC1221 (4 MCs), PC1222 (4 MCs) and/or other modules.