Bachelor of Engineering (Materials Science & Engineering) with Second Major in Innovation & Design

Cohort AY2023/2024

Course Requirements	Units
Common Curriculum	
GEA1000 Quantitative Reasoning with Data	4
CS1010E Programming Methodology	4
ES2631 Critique and Communication of Thinking and Design ¹	4
GE: Cultures and Connections ¹	4
GE: Singapore Studies ¹	4
GE: Communities and Engagement ¹	4
CDE2000 Creating Narratives	4
CDE2501 Liveable Cities	4
DTK1234 Design Thinking	4
EE2211 Introduction to Machine Learning	4
EG1311 Design and Make	4
IE2141 Systems Thinking and Dynamics	4
PF1101 Fundamentals of Project Management	4
CDE4301 Innovation & Design Capstone or CDE4301A Ideas to Start-up	8
(over 2 consecutive semesters) ²	, i i i i i i i i i i i i i i i i i i i
Sub-total for Common Curriculum	60
Engineering Core	
MA1511 Engineering Calculus	2
MA1512 Differential Equations for Engineering	2
MA1513 Linear Algebra with Differential Equations	2
CE2407A Uncertainty Analysis for Engineers	2
EG2401A Engineering Professionalism	2
EG3611A Industrial Attachment <u>or</u>	10
CFG2101 NUS Vacation Internship Programme ³ and EG3612 Vacation Industrial	
Attachment	
Attachment Sub-total for Engineering Core	20
	20
Sub-total for Engineering Core	20 4
Sub-total for Engineering Core Engineering Programme Requirements	
Sub-total for Engineering Core Engineering Programme Requirements MLE1001B Materials Science & Engineering Principles & Practice I	4
Sub-total for Engineering Core Engineering Programme Requirements MLE1001B Materials Science & Engineering Principles & Practice I MLE2001A Materials Science & Engineering Principles & Practice II	4 4
Sub-total for Engineering Core Engineering Programme Requirements MLE1001B Materials Science & Engineering Principles & Practice I MLE2001A Materials Science & Engineering Principles & Practice II MLE2102 Thermodynamics and Renewable Energy Technologies	4 4 4
Sub-total for Engineering Core Engineering Programme Requirements MLE1001B Materials Science & Engineering Principles & Practice I MLE2001A Materials Science & Engineering Principles & Practice II MLE2102 Thermodynamics and Renewable Energy Technologies MLE2103A Materials Kinetics and Processing	4 4 4 2
Sub-total for Engineering CoreEngineering Programme RequirementsMLE1001B Materials Science & Engineering Principles & Practice IMLE2001A Materials Science & Engineering Principles & Practice IIMLE2102 Thermodynamics and Renewable Energy TechnologiesMLE2103A Materials Kinetics and ProcessingMLE2105 Electronic Materials of Materials	4 4 4 2 4
Sub-total for Engineering CoreEngineering Programme RequirementsMLE1001B Materials Science & Engineering Principles & Practice IMLE2001A Materials Science & Engineering Principles & Practice IIMLE2102 Thermodynamics and Renewable Energy TechnologiesMLE2103A Materials Kinetics and ProcessingMLE2105 Electronic Materials of MaterialsMLE3101A Materials Characterization	4 4 4 2 4 3
Sub-total for Engineering CoreEngineering Programme RequirementsMLE1001B Materials Science & Engineering Principles & Practice IMLE2001A Materials Science & Engineering Principles & Practice IIMLE2102 Thermodynamics and Renewable Energy TechnologiesMLE2103A Materials Kinetics and ProcessingMLE2105 Electronic Materials of MaterialsMLE3101A Materials CharacterizationMLE3101 Materials Characterization Laboratory	4 4 4 2 4 3 3 3
Sub-total for Engineering CoreEngineering Programme RequirementsMLE1001B Materials Science & Engineering Principles & Practice IMLE2001A Materials Science & Engineering Principles & Practice IIMLE2102 Thermodynamics and Renewable Energy TechnologiesMLE2103A Materials Kinetics and ProcessingMLE2105 Electronic Materials of MaterialsMLE3101A Materials CharacterizationMLE3101 Materials Characterization LaboratoryMLE3103 Materials Design: Aerospace to Biomedical Applications	4 4 4 2 4 3 3 3 4
Sub-total for Engineering CoreEngineering Programme RequirementsMLE1001B Materials Science & Engineering Principles & Practice IMLE2001A Materials Science & Engineering Principles & Practice IIMLE2102 Thermodynamics and Renewable Energy TechnologiesMLE2103A Materials Kinetics and ProcessingMLE2105 Electronic Materials of MaterialsMLE3101A Materials CharacterizationMLE3101 Materials Characterization LaboratoryMLE3103 Materials Design: Aerospace to Biomedical ApplicationsMLE3111A Materials Properties and Processing Laboratory	4 4 4 2 4 3 3 3 4 2
Sub-total for Engineering CoreEngineering Programme RequirementsMLE1001B Materials Science & Engineering Principles & Practice IMLE2001A Materials Science & Engineering Principles & Practice IIMLE2102 Thermodynamics and Renewable Energy TechnologiesMLE2103A Materials Kinetics and ProcessingMLE2105 Electronic Materials of MaterialsMLE3101A Materials CharacterizationMLE3101 Materials Characterization LaboratoryMLE3103 Materials Properties and Processing LaboratoryMLE3111A Materials Properties and Processing LaboratoryMLE3112 Machine Learning Approaches in Materials Laboratory	4 4 2 4 3 3 3 4 2 2 2
Sub-total for Engineering CoreEngineering Programme RequirementsMLE1001B Materials Science & Engineering Principles & Practice IMLE2001A Materials Science & Engineering Principles & Practice IIMLE2102 Thermodynamics and Renewable Energy TechnologiesMLE2103A Materials Kinetics and ProcessingMLE2105 Electronic Materials of MaterialsMLE3101A Materials CharacterizationMLE3101 Materials Characterization LaboratoryMLE3103 Materials Design: Aerospace to Biomedical ApplicationsMLE3111A Materials Properties and Processing LaboratoryMLE3112 Machine Learning Approaches in Materials LaboratoryTechnical electives	4 4 4 2 4 3 3 3 4 2 2 2 8
Sub-total for Engineering CoreEngineering Programme RequirementsMLE1001B Materials Science & Engineering Principles & Practice IMLE2001A Materials Science & Engineering Principles & Practice IIMLE2102 Thermodynamics and Renewable Energy TechnologiesMLE2103A Materials Kinetics and ProcessingMLE2105 Electronic Materials of MaterialsMLE3101A Materials CharacterizationMLE3101 Materials Characterization LaboratoryMLE3103 Materials Properties and Processing LaboratoryMLE3111A Materials Properties and Processing LaboratoryMLE3112 Machine Learning Approaches in Materials LaboratoryTechnical electivesSub-total for Engineering Programme Requirements	4 4 4 2 4 3 3 3 4 2 2 2 8
Sub-total for Engineering CoreEngineering Programme RequirementsMLE1001B Materials Science & Engineering Principles & Practice IMLE2001A Materials Science & Engineering Principles & Practice IIMLE2102 Thermodynamics and Renewable Energy TechnologiesMLE2103A Materials Kinetics and ProcessingMLE2105 Electronic Materials of MaterialsMLE3101A Materials CharacterizationMLE3101 Materials Characterization LaboratoryMLE3103 Materials Design: Aerospace to Biomedical ApplicationsMLE3111A Materials Properties and Processing LaboratoryMLE3112 Machine Learning Approaches in Materials LaboratoryTechnical electivesSub-total for Engineering Programme RequirementsUnrestricted Electives	4 4 2 4 3 3 3 4 2 2 2 8 8 40
Sub-total for Engineering CoreEngineering Programme RequirementsMLE1001B Materials Science & Engineering Principles & Practice IMLE2001A Materials Science & Engineering Principles & Practice IIMLE2102 Thermodynamics and Renewable Energy TechnologiesMLE2103A Materials Kinetics and ProcessingMLE2105 Electronic Materials of MaterialsMLE3101A Materials CharacterizationMLE3101 Materials Characterization LaboratoryMLE3103 Materials Design: Aerospace to Biomedical ApplicationsMLE3111A Materials Properties and Processing LaboratoryMLE3112 Machine Learning Approaches in Materials LaboratoryTechnical electivesSub-total for Engineering Programme RequirementsUnrestricted ElectivesGroup A course for Second Major	4 4 2 4 3 3 3 4 2 2 2 8 8 40 4 4
Sub-total for Engineering CoreEngineering Programme RequirementsMLE1001B Materials Science & Engineering Principles & Practice IMLE2001A Materials Science & Engineering Principles & Practice IIMLE2102 Thermodynamics and Renewable Energy TechnologiesMLE2103A Materials Kinetics and ProcessingMLE2105 Electronic Materials of MaterialsMLE3101A Materials CharacterizationMLE3101 Materials Characterization LaboratoryMLE3103 Materials Design: Aerospace to Biomedical ApplicationsMLE3111A Materials Properties and Processing LaboratoryMLE3112 Machine Learning Approaches in Materials LaboratoryTechnical electivesSub-total for Engineering Programme RequirementsUnrestricted ElectivesGroup A course for Second MajorGroup B course for Second Major	4 4 4 2 4 3 3 3 4 2 2 2 8 40 40 4 4
Sub-total for Engineering CoreEngineering Programme RequirementsMLE1001B Materials Science & Engineering Principles & Practice IMLE2001A Materials Science & Engineering Principles & Practice IIMLE2102 Thermodynamics and Renewable Energy TechnologiesMLE2103A Materials Kinetics and ProcessingMLE2105 Electronic Materials of MaterialsMLE3101A Materials CharacterizationMLE3101 Materials Characterization LaboratoryMLE3103 Materials Design: Aerospace to Biomedical ApplicationsMLE3112 Machine Learning Approaches in Materials LaboratoryTechnical electivesSub-total for Engineering Programme RequirementsUnrestricted ElectivesGroup A course for Second MajorGroup C courses for Second Major (Innovation & Enterprise electives)	4 4 4 2 4 3 3 3 4 2 2 2 8 4 2 2 8 40 40 4 4 4 8

Other unrestricted electives	8
Sub-total for Unrestricted Electives	40
Total	160

Notes:

- ¹ Students may read equivalent courses in NUS College (NUSC), University Town College Programme (UTCP), and Ridge View Residential Programme (RVRC).
- ² The 12 units for CDE4301/CDE4301A are counted towards 8 units for the Integrated Project requirement in the Common Curriculum while 4 units are counted as unrestricted elective.

The 12 units for CDE4301/CDE4301A will be fully counted as UE for students who are pursuing a specialisation with MLE4101B B.Eng. Dissertation (8 units) as a compulsory requirement to fulfil Integrated Project.

³ May be replaced by CDE2605 Undergraduate Research Opportunities Programme or CDE2605R Undergraduate Research Experience (UREx).

(for students who opt for vacation internships)

Semester 1	Units	Semester 2	Units
MLE1001B Materials Science &	4	MLE2001A Materials Science &	4
Engineering Principles & Practice I	4	Engineering Principles & Practice I	4
GEA1000 Quantitative Reasoning with Data	4	CS1010E Programming Methodology	4
DTK1234 Design Thinking	4	EG1311 Design & Make	4
MA1513 Linear Algebra with Differential	2	MA1511 Engineering Calculus	2
Equations	2		2
CE2407A Uncertainty Analysis for	2	MA1512 Differential Equations for	2
Engineers	Z	Engineering	2
PF1101 Fundamentals of Project	4	Group A/B course for Second Major	4
Management	4	Group A/B course for Second Major	4
Sub-total	20	Sub-total	20

Summer vacation between Semesters 2 and 3	Units
CFG2101 NUS Vacation Internship Programme	4
Sub-total	4

Semester 3	Units	Semester 4	Units	
MLE2102 Thermodynamics and	4	MLE2105 Electronic Properties of	4	
Renewable Energy Technologies	4	Materials	4	
CDE2501 Liveable Cities	4	ES2631 Critique and Communication of	4	
CDE2301 Liveable Cities	4	Thinking and Design	4	
EE2211 Introduction to Machine	4	IE2141 Systems Thinking & Dynamics	4	
Learning	4	122141 Systems minking & Dynamics	4	
EG2401A Engineering Professionalism	2	GE	4	
GE	4	CDE3301/EG3301R Ideas to Proof-of-	6	
GE	4	Concept	0	
Group A/B course for Second Major	4			
Sub-total	22	Sub-total	22	

Summer vacation between Semesters 4 and 5	Units
EG3612 Vacation Internship Attachment	6
Sub-total	6

Semester 5	Units	Semester 6 – can be used for SEP	Units
CDE3301/EG3301R Ideas to Proof-of- Concept	6	Innovation & Enterprise Elective 1	4
MLE2103A Materials Kinetics and Processing	2	Innovation & Enterprise Elective 2	4
MLE3101A Materials Characterization	3	Technical Elective 1	4
MLE3101 Materials Characterization Laboratory	3	Technical Elective 2	4
GE	4	UE	4
Sub-total	18	Sub-total	20

Innovation & Design Programme NUS College of Design and Engineering

Semester 7	Units	Semester 8	Units
CDE4301 Innovation & Design Capstone	6	CDE4301 Innovation & Design Capstone	6
MLE3103 Materials Design: Aerospace to	4	MLE3112 Machine Learning Approaches	2
Biomedical Applications	4	in Materials Laboratory	2
MLE3111A Materials Properties and	2	UE	4
Processing Laboratory	2		4
CDE2000 Creating Narratives	4		
Sub-total	16	Sub-total	12

(for students who opt for vacation internships plus a specialisation)

Semester 1	Units	Semester 2	Units
MLE1001B Materials Science &	4	MLE2001A Materials Science &	4
Engineering Principles & Practice I	4	Engineering Principles & Practice I	4
GEA1000 Quantitative Reasoning with Data	4	CS1010E Programming Methodology	4
DTK1234 Design Thinking	4	EG1311 Design & Make	4
MA1513 Linear Algebra with Differential	2		2
Equations	2	MA1511 Engineering Calculus	2
CE2407A Uncertainty Analysis for	2	MA1512 Differential Equations for	2
Engineers	Z	Engineering	Z
PF1101 Fundamentals of Project	4	Group A/B course for Second Major	4
Management	4	Group Arb course for second Major	4
Sub-total	20	Sub-total	20

Summer vacation between Semesters 2 and 3	Units
CFG2101 NUS Vacation Internship Programme	4
Sub-total	4

Semester 3	Units	Semester 4	Units	
MLE2102 Thermodynamics and	4	MLE2105 Electronic Properties of	4	
Renewable Energy Technologies	4	Materials	4	
CDE2501 Liveable Cities	4	ES2631 Critique and Communication of	4	
CDE2301 Liveable Cities	4	Thinking and Design	4	
EE2211 Introduction to Machine	4	IE2141 Systems Thinking & Dynamics	4	
Learning	4	122141 Systems minking & Dynamics	4	
EG2401A Engineering Professionalism	2	GE	4	
GE	4	CDE3301/EG3301R Ideas to Proof-of-	6	
GE	4	Concept	0	
Group A/B course for Second Major	4			
Sub-total	22	Sub-total	22	

Summer vacation between Semesters 4 and 5	Units
EG3612 Vacation Internship Attachment	6
Sub-total	6

Semester 5	Units	Semester 6 – can be used for SEP	Units
CDE3301/EG3301R Ideas to Proof-of- Concept	6	Innovation & Enterprise Elective 1	4
MLE2103A Materials Kinetics and Processing	2	Innovation & Enterprise Elective 2	4
MLE3101A Materials Characterization	3	Specialisation course 1	4
MLE3101 Materials Characterization Laboratory	3	Specialisation course 2	4
GE	4	Specialisation course 3	4
Sub-total	18	Sub-total	20

Innovation & Design Programme NUS College of Design and Engineering

Semester 7	Units	Semester 8	Units
CDE4301 Innovation & Design Capstone	6	CDE4301 Innovation & Design Capstone	6
MLE4101B B.Eng. Dissertation #	4	MLE4101B B.Eng. Dissertation #	4
MLE3103 Materials Design: Aerospace to	Δ	MLE3112 Machine Learning Approaches	2
Biomedical Applications	4	in Materials Laboratory	
MLE3111A Materials Properties and	2		
Processing Laboratory	2		
CDE2000 Creating Narratives	4		
Sub-total	20	Sub-total	12

[#] May be replaced by Specialisation Elective 4 and Specialisation Elective 5 if MLE4101B is not compulsory.

(for students who opt for industrial attachment)

Semester 1	Units	Semester 2	Units
MLE1001B Materials Science &	4	MLE2001A Materials Science &	4
Engineering Principles & Practice I	4	Engineering Principles & Practice I	4
GEA1000 Quantitative Reasoning with Data	4	CS1010E Programming Methodology	4
DTK1234 Design Thinking	4	EG1311 Design & Make	4
MA1513 Linear Algebra with Differential	2	MA1511 Engineering Calculus	2
Equations	2		<u> </u>
CE2407A Uncertainty Analysis for	2	MA1512 Differential Equations for	2
Engineers	2	Engineering	2
PF1101 Fundamentals of Project	4	Group A/B course for Second Major	4
Management	4	Group A/B course for Second Major	4
Sub-total	20	Sub-total	20

Semester 3	Units	Semester 4	Units
MLE2102 Thermodynamics and	4	MLE2105 Electronic Properties of	4
Renewable Energy Technologies	4	Materials	4
CDE2501 Liveable Cities	4	ES2631 Critique and Communication of	Λ
CDE2501 Liveable Cities	4	Thinking and Design	4
EE2211 Introduction to Machine	4	IE2141 Systems Thinking & Dynamics	4
Learning	4	122141 Systems minking & Dynamics	4
EG2401A Engineering Professionalism	2	GE	4
CT.	Δ	CDE3301/EG3301R Ideas to Proof-of-	6
GE	4	Concept	D
Group A/B course for Second Major	4		
Sub-total	22	Sub-total	22

Semester 5	Units	Semester 6	Units
CDE3301/EG3301R Ideas to Proof-of-	6	EG3611A Industrial Attachment	10
Concept	U		10
MLE2103A Materials Kinetics and	2		
Processing	2		
MLE3101A Materials Characterization	3		
MLE3101 Materials Characterization	3	2	
Laboratory	5		
GE	4		
UE	4		
Sub-total	22	Sub-total	10

Semester 7	Units	Semester 8	Units
CDE4301 Innovation & Design Capstone	6	CDE4301 Innovation & Design Capstone	6
Innovation & Enterprise Elective 1	4	Innovation & Enterprise Elective 2	4
MLE3103 Materials Design: Aerospace to	4	MLE3112 Machine Learning Approaches	2
Biomedical Applications	4	in Materials Laboratory	
MLE3111A Materials Properties and	2	2 Technical Elective 1	4
Processing Laboratory	2		4
CDE2000 Creating Narratives	4	Technical Elective 2	4
UE	4		
Sub-total	24	Sub-total	20

(for students who opt for industrial attachment plus a specialisation)

Semester 1	Units	Semester 2	Units	
MLE1001B Materials Science &	4	MLE2001A Materials Science &	Δ	
Engineering Principles & Practice I	4	Engineering Principles & Practice I	4	
GEA1000 Quantitative Reasoning with	4	CS1010E Programming Methodology	4	
Data		5 5 5,		
DTK1234 Design Thinking	4	EG1311 Design & Make	4	
MA1513 Linear Algebra with Differential	2	2	MA1511 Engineering Calculus	2
Equations			2	
CE2407A Uncertainty Analysis for	2	MA1512 Differential Equations for	2	
Engineers	2	Engineering	2	
PF1101 Fundamentals of Project	4	Crown A/D source for Second Major	4	
Management	4	Group A/B course for Second Major	4	
Sub-total	20	Sub-total	20	

Semester 3	Units	Semester 4	Units
MLE2102 Thermodynamics and	4	MLE2105 Electronic Properties of	4
Renewable Energy Technologies	4	Materials	4
CDE2501 Liveable Cities	4	ES2631 Critique and Communication of	4
CDE2501 Elveable Cities	4	Thinking and Design	4
EE2211 Introduction to Machine	4	IE2141 Systems Thinking & Dynamics	4
Learning	4	122141 Systems minking & Dynamics	4
EG2401A Engineering Professionalism	2	GE	4
GE	4	CDE3301/EG3301R Ideas to Proof-of-	6
GE	4	Concept	0
Group A/B course for Second Major	4		
Sub-total	22	Sub-total	22

Semester 5	Units	Semester 6	Units
CDE3301/EG3301R Ideas to Proof-of-	6	EG3611A Industrial Attachment	10
Concept	Ŭ		10
MLE2103A Materials Kinetics and	2	Creation course 2	
Processing	2	Specialisation course 2	4
MLE3101A Materials Characterization	3		
MLE3101 Materials Characterization	3		
Laboratory	5		
GE	4		
Specialisation course 1	4		
Sub-total	22	Sub-total	14

Semester 7	Units	Semester 8	Units
CDE4301 Innovation & Design Capstone	6	CDE4301 Innovation & Design Capstone	6
Innovation & Enterprise Elective 1	4	Innovation & Enterprise Elective 2	4
MLE4101B B.Eng. Dissertation #	4	MLE4101B B.Eng. Dissertation #	4
MLE3103 Materials Design: Aerospace to Biomedical Applications	4	Specialisation course 3	4
MLE3111A Materials Properties and Processing Laboratory	2	MLE3112 Machine Learning Approaches in Materials Laboratory	2
CDE2000 Creating Narratives	4		
Sub-total	24	Sub-total	20

[#] May be replaced by Specialisation Elective 4 and Specialisation Elective 5 if MLE4101B is not compulsory.

(for students in year-long NOC programmes)

Semester 1	Units	Semester 2	Units
MLE1001B Materials Science &	4	MLE2001A Materials Science &	4
Engineering Principles & Practice I	4	Engineering Principles & Practice I	4
GEA1000 Quantitative Reasoning with	4	CC1010E Programming Mathedology	4
Data	4	CS1010E Programming Methodology	4
DTK1234 Design Thinking	4	EG1311 Design & Make	4
MA1513 Linear Algebra with Differential	2	NAA1511 Engineering Calculus	2
Equations	2	MA1511 Engineering Calculus	2
CE2407A Uncertainty Analysis for	2	MA1512 Differential Equations for	2
Engineers	Z	Engineering	2
PF1101 Fundamentals of Project	4	Crown A/R course for Second Major	4
Management	4	Group A/B course for Second Major	4
Sub-total	20	Sub-total	20

Semester 3	Units	Semester 4	Units
MLE2102 Thermodynamics and	4	MLE2105 Electronic Properties of	4
Renewable Energy Technologies	4	Materials	4
CDE2501 Liveable Cities	4	ES2631 Critique and Communication of	4
	4	Thinking and Design	
EE2211 Introduction to Machine	4	IE2141 Systems Thinking & Dynamics	4
Learning	4	122141 Systems minking & Dynamics	4
GE	4	GE	4
Crown A/P course for Second Major	4	CDE3301/EG3301R Ideas to Proof-of-	6
Group A/B course for Second Major 4	4	Concept	0
Sub-total	20	Sub-total	22

Semester 5	Units	Semester 6 – NOC	Units
CDE3301/EG3301R Ideas to Proof-of-	6		
Concept			
MLE2103A Materials Kinetics and	2		
Processing	2		
MLE3101A Materials Characterization	3		
MLE3101 Materials Characterization	3	NOC	
Laboratory	5		
MLE3103 Materials Design: Aerospace to	4		
Biomedical Applications	4		
MLE3111A Materials Properties and	2		
Processing Laboratory	2		
Sub-total	20	Sub-total	22

Semester 7 – NOC	Units	Semester 8	Units
		MLE3112 Machine Learning Approaches in Materials Laboratory	2
		Technical Elective 1	4
NOC		Technical Elective 2	4
		CDE2000 Creating Narratives	4
		GE	4
		UE	2
Sub-total	20	Sub-total	20

A year-long NOC programme comprises the following courses:

- ETP3206L Innovation & Enterprise Internship (16 units) replaces EG3611A (10 units), EG2401A (2 units), and UE (4 units)
- ETP3202L Innovation & Enterprise Case Study & Analysis (8 units) replaces CDE4301A (8 units out of 12 units)
- ETP3203L Innovation & Enterprise Internship Practicum (8 units) replaces CDE4301A (4 units out of 12 units) and UE (4 units)
- ETP2271 Discovering Resilience and Purpose (2 units) counted as UE (2 units)
- Entrepreneurship courses (4 or 8 units) replaces Innovation & Enterprise electives (up to 8 units students will need to complete additional Innovation & Enterprise Electives in NUS if they are unable to complete 8 units of entrepreneurship courses during NOC)

(for students in one-semester NOC programmes)

Semester 1	Units	Semester 2	Units
MLE1001B Materials Science &	Δ	MLE2001A Materials Science &	4
Engineering Principles & Practice I	4	Engineering Principles & Practice I	4
GEA1000 Quantitative Reasoning with	Δ	CC1010E Programming Mathedalagy	4
Data	4	CS1010E Programming Methodology	4
DTK1234 Design Thinking	4	EG1311 Design & Make	4
MA1513 Linear Algebra with Differential			2
Equations	2	MA1511 Engineering Calculus	2
CE2407A Uncertainty Analysis for	2	MA1512 Differential Equations for	2
Engineers	2	Engineering	2
PF1101 Fundamentals of Project	4	Crown A/D source for Second Major	4
Management	4	Group A/B course for Second Major	4
Sub-total	20	Sub-total	20

Semester 3	Units	Semester 4	Units
MLE2102 Thermodynamics and	4	MLE2105 Electronic Properties of	4
Renewable Energy Technologies	4	Materials	4
CDE2501 Liveable Cities	1	ES2631 Critique and Communication of	4
	4	Thinking and Design	
EE2211 Introduction to Machine	4	IE2141 Systems Thinking & Dynamics	4
Learning	4 162	122141 Systems minking & Dynamics	4
GE	4	GE	4
Group A/B course for Second Major	4	CDE3301/EG3301R Ideas to Proof-of-	6
Group Are course for second Major	4	Concept	0
Sub-total	20	Sub-total	22

Semester 5	Units	Semester 6 – NOC	Units
CDE3301/EG3301R Ideas to Proof-of-	6		
Concept	U		
MLE2103A Materials Kinetics and	2		
Processing	2		
MLE3101A Materials Characterization	3	NOC	
MLE3101 Materials Characterization	3		
Laboratory	5		
GE	4		
UE	4		
Sub-total	22	Sub-total	22

Semester 7	Units	Semester 8	Units
CDE4301 Innovation & Design Capstone	6	CDE4301 Innovation & Design Capstone	6
MLE3103 Materials Design: Aerospace to	Δ	MLE3112 Machine Learning Approaches	2
Biomedical Applications	4	in Materials Laboratory	Z
MLE3111A Materials Properties and	2	Technical Elective 1	4
Processing Laboratory	Z		4
CDE2000 Creating Narratives	4	Technical Elective 2	4
		UE	2
Sub-total	16	Sub-total	18

A one-semester NOC programme comprises the following courses:

- ETP3201L Innovation & Enterprise Internship (12 units) replaces EG3611A (10 units) and EG2401A (2 units)
- ETP3204S Innovation & Enterprise Internship Practicum (4 units) replaces Innovation & Enterprise Elective 1 (4 units)
- Entrepreneurship course (4 units) replaces Innovation & Enterprise Elective 2 (4 units)
- ETP2271 Discovering Resilience and Purpose (2 units) counted as UE (2 units)

(for students in Engineering Scholars Programme)

Semester 1	Units	Semester 2	Units
MLE1001B Materials Science &	4	MLE2001A Materials Science &	4
Engineering Principles & Practice I	4	Engineering Principles & Practice I	4
GEA1000 Quantitative Reasoning with	4	MLE2105 Electronic Properties of	4
Data	4	Materials	4
DTK1224 Decign Thinking	4	MA1512 Differential Equations for	
DTK1234 Design Thinking	4	Engineering	2
MA1513 Linear Algebra with Differential	2		4
Equations	Z	UTCP course 2 (replaces GE)	4
CE2407A Uncertainty Analysis for	2	CDE3301/EG3301R Ideas to Proof-of-	6
Engineers	2	Concept	0
PF1101 Fundamentals of Project	4	Group A/B course for Second Major	4
Management	4	Group A/B course for Second Major	4
	4	UE (or IE2141 Systems Thinking &	4
UTCP course 1 (replaces GE)	4	Dynamics if not in RC4)	4
Sub-total	24	Sub-total	28

Semester 3	Units	Semester 4 – NOC	Units
MLE2102 Thermodynamics and	4		
Renewable Energy Technologies	4		
MLE2103A Materials Kinetics and	2		
Processing	Z		
MLE3101A Materials Characterization	3		
MLE3101 Materials Characterization	3	NOC	
Laboratory	5		
CDE2501 Liveable Cities	4		
UTCP course 3 (replaces GE)	4		
CDE3301/EG3301R Ideas to Proof-of-	6		
Concept	0		
Sub-total	26	Sub-total	22

Semester 5	Units	Semester 6	Units
CDE4301 Innovation & Design Capstone	6	CDE4301 Innovation & Design Capstone	6
Group A/B course for Second Major	4	MLE3112 Machine Learning Approaches in Materials Laboratory	2
UTCP course 4 (replaces ES2631 Critique and Communication of Thinking and Design)	4	Technical Elective 1	4
EE2211 Introduction to Machine Learning	4	Technical Elective 2	4
MLE3103 Materials Design: Aerospace to Biomedical Applications	4	CDE2000 Creating Narratives	4
MLE3111A Materials Properties and Processing Laboratory	2	UE	4
Sub-total	24	Sub-total	24

Students are highly encouraged to complete the following courses before Semester 1 through advanced placement credits:

- CS1010E Programming Methodology (4 units)
- EG1311 Design & Make (4 units)
- MA1505 Mathematics I (4 units) replaces MA511 Engineering Calculus (2 units) and counted as UE (2 units)

A one-semester NOC programme comprises the following courses:

- ETP3201L Innovation & Enterprise Internship (12 units) replaces EG3611A (10 units) and EG2401A (2 units)
- ETP3204S Innovation & Enterprise Internship Practicum (4 units) replaces Innovation & Enterprise Elective 1 (4 units)
- Entrepreneurship course (4 units) replaces Innovation & Enterprise Elective 2 (4 units)
- ETP2271 Discovering Resilience and Purpose (2 units) counted as UE (2 units)

Recommended semester schedule – poly-intake students

Semester 1	Units	Semester 2	Units
MLE1001B Materials Science &	4	MLE2001A Materials Science &	4
Engineering Principles & Practice I	4	Engineering Principles & Practice I	4
GEA1000 Quantitative Reasoning with	4	CS1010E Programming Methodology	4
Data	4		4
MA1301 Introductory Mathematics *	4	MA1E11 Engineering Calculus	2
(UE)	4	MA1511 Engineering Calculus	Z
PC1201 Fundamentals of Physics	4	MA1512 Differential Equations for	2
(UE)	4	Engineering	Z
Crown A/R course for Second Major	4	PF1101 Fundamentals of Project	4
Group A/B course for Second Major	4	Management	4
		CDE3301/EG3301R Ideas to Proof-of-	6
		Concept	0
		Group A/B course for Second Major	4
Sub-total	20	Sub-total	26

Semester 3	Units	Semester 4	Units
MLE2102 Thermodynamics and Renewable Energy Technologies	4	Innovation & Enterprise Elective 1	4
MLE2103A Materials Kinetics and Processing	2	MLE2105 Electronic Properties of Materials	4
MLE3101A Materials Characterization	3	ES2631 Critique and Communication of Thinking and Design	4
MLE3101 Materials Characterization Laboratory	3	IE2141 Systems Thinking & Dynamics	4
MA1513 Linear Algebra with Differential Equations	2	GE	4
CE2407A Uncertainty Analysis for Engineers	2	GE	4
EG2401A Engineering Professionalism	2		
CDE3301/EG3301R Ideas to Proof-of- Concept	6		
Sub-total	24	Sub-total	24

Semester 5	Units	Semester 6	Units
CDE4301 Innovation & Design Capstone	6	CDE4301 Innovation & Design Capstone	6
CDE2501 Liveable Cities	4	Innovation & Enterprise Elective 2	4
EE2211 Introduction to Machine	Δ	MLE3112 Machine Learning Approaches	2
Learning	4	in Materials Laboratory	Z
MLE3103 Materials Design: Aerospace to	4	4 Technical Elective 1	4
Biomedical Applications	4		4
MLE3111A Materials Properties and	2	2 Technical Elective 2	4
Processing Laboratory	2		4
CDE2000 Creating Narratives	4	GE	4
Sub-total	24	Sub-total	24

 * Students who are exempted from MA1301 can take MA1513 and CE2407A in Semester 1.

Poly-intake students with accredited diplomas will receive the following exemptions:

- DTK1234 Design Thinking (4 units)
- EG1311 Design & Make (4 units)
- EG3611A Industrial Attachment (10 units)
- Unrestricted electives (20 units)