Bachelor of Engineering (Materials Science & Engineering)

Overview

At the undergraduate level, the Department of Materials Science & Engineering offers a four-year engineering curriculum leading to a Bachelor of Engineering degree in Materials Science and Engineering (MSE). This is a professional engineering programme, which prepares students for work as a Materials Engineer in different industries and for further study for postgraduate degrees.

This programme consists of many components – University Level Requirements, Unrestrictive Electives, Faculty Requirements and Major Requirements, in order to provide a broad education. The Faculty and Major Requirements are well-balanced in science, general engineering, and materials science and engineering. MSE graduates will have a solid science foundation, basic engineering background and sound knowledge in materials science and engineering. There are three pathways, with focuses on professional practice, research and design. The Department offers two certified specialisations of Polymeric and Biomedical Materials and Nanostructured Materials/Nanotechnology. Department also offers three certified tracks in Energy Materials, Infocom Materials and Structural Materials. Students can choose either one of the specialisations or tracks.

Degree Requirements

The following are the requirements for the degree of B.Eng. (Materials Science and Engineering):

Research-focused Pathway (RfP) and Practising Professional Pathway (PPP)

- Required to complete a minimum of 160 Units with a GPA ≥ 2.0 to graduate from the programme.
- 160 Units will have to be earned by taking courses in accordance with Table 1.

Innovation & Design Programme (iDP)

- Please refer to https://www.eng.nus.edu.sg/idp/academics/curriculum/ for the programme requirements.
- Poly graduates who wish to take the Innovation & Design Programme should approach the department for a bespoke pathway.

All Pathways

- Students should **not read more than 60 Units of level 1000 courses** towards their degree requirements.
- Satisfy all other requirements as prescribed by the College of Design and Engineering or the University.
- A student must also satisfy other additional requirements that may be prescribed by the College of Design and Engineering or the University.

Table 1: Summary of MSE Course Requirements and Credits

Research-focused Pathway

Course Requirements	Units
UNIVERSITY LEVEL REQUIREMENTS	**20**
General Education Courses (5 Courses, each of 4 Units) Quantitative Reasoning (GER1000) Thinking and Expression (GET) Human Cultures (GEH) Singapore Studies (GES) Asking Questions (GEQ1000)	20
UNRESTRICTED ELECTIVES	**30**
Faculty Requirements:	**26**
EG2401A Engineering Professionalism	2
ES2531 Critical Thinking & Writing	4

EG1311 Design and Make	4
IE2141 Systems Thinking and Dynamics	4
EE2211 Introduction to Machine Learning	4
MLE1010 Materials Engineering Principles and Practice	4
CS1010E Programming Methodology	4
English [1]	-
Foundational Requirements	**20**
MA1512 Differential Equations for Engineering	2
MA1513 Linear Algebra with Differential Equations	2
PC1432 Physics IIE [2]	4
CM1501 Organic Chemistry for Engineers [3]	4
MLE1001A Materials Science & Engineering Principles & Practise I	4
MLE2001 Materials Science & Engineering Principles & Practise II	4
MSE Discipline Requirements:	
MSE Core Courses	**26**
MLE2101 Introduction to Structure of Materials	4
MLE2102 Thermodynamics and Phase Diagrams	4
MLE2103 Phase Transformation and Kinetics	3
MLE2104 Mechanical Properties of Materials	4
MLE2105 Electronic Properties of Materials	4
MLE3101 Materials Characterization Laboratory	3
MLE3111 Materials Properties and Processing Laboratory	4
MSE Design and Final-Year Project Courses	**16**
MLE4102 Design Project	4
MLE4101 B.Eng. Dissertation [4]	12
MSE Technical Elective	**4**
MLE Level 3000 Electives	4
Pathway Requirements	**8**
MLE Level 5000 Electives	8
Internships Requirement	**10**
EG3611A Industrial Attachment [5, 6]	10
TOTAL	**160**

[1] Students who have not passed or been exempted from the Qualifying English Test at the time of admissions to the Faculty will have to read ES1000 and/or ES1103. This will be decided by CELC. ES1103 carries 4 Units which may be counted as UEM.

[2] Bridging Course: Students without A-Level pass in Physics must read PC1221 Fundamentals of Physics I and PC1222 Fundamentals of Physics II as a prerequisite for PC1432.

[3] Bridging Course: Students without A-level pass in Chemistry must read CM1417 Fundamentals of Chemistry as a prerequisite for CM1501.

[4] Over two semesters.

[5] For BEng students in the following special programmes: DDPs, CDPs, E-Scholars Programme & CSP, internship/ industrial-attachment is optional and the course credits for the internship/industrial-attachment will be become Unrestricted Electives (UE).

[6] RfP students will have to carry out internship in Research Institutions or R&D Labs.

Professional Practice Pathway

Course Requirements	Units
UNIVERSITY LEVEL REQUIREMENTS	**20**
General Education Courses (5 Courses, each of 4 Units) Quantitative Reasoning (GER1000) Thinking and Expression (GET) Human Cultures (GEH) Singapore Studies (GES) Asking Questions (GEQ1000)	20
UNRESTRICTED ELECTIVES	**32**
Faculty Requirements:	**26**
EG2401A Engineering Professionalism	2
ES2531 Critical Thinking & Writing	4
EG1311 Design and Make	4
IE2141 Systems Thinking and Dynamics	4
EE2211 Introduction to Machine Learning	4
MLE1010 Materials Engineering Principles and Practice	4
CS1010E Programming Methodology	4
English [1]	-
Foundational Requirements	**20**
MA1512 Differential Equations for Engineering	2
MA1513 Linear Algebra with Differential Equations	2
PC1432 Physics IIE [2]	4
CM1501 Organic Chemistry for Engineers [3]	4
MLE1001A Materials Science & Engineering Principles & Practise I	4
MLE2001 Materials Science & Engineering Principles & Practise II	4
MSE Discipline Requirements:	
MSE Core Courses	**26**
MLE2101 Introduction to Structure of Materials	4
MLE2102 Thermodynamics and Phase Diagrams	4
MLE2103 Phase Transformation and Kinetics	3
MLE2104 Mechanical Properties of Materials	4
MLE2105 Electronic Properties of Materials	4
MLE3101 Materials Characterization Laboratory	3
MLE3111 Materials Properties and Processing Laboratory	4
MSE Design and Final-Year Project Courses	**14**
MLE4102A Design Project [4]	8
MLE4101A B.Eng. Dissertation	6
MSE Technical Elective	**4**
MLE Level 3000 Electives	4
Pathway Requirement	**8**

Professional Electives (IE4240 or PF1101) and MLE4213 [7]	8
Internships Requirement	**10**
EG3611A Industrial Attachment [5, 6]	10
TOTAL	**160**

[1] Students who have not passed or been exempted from the Qualifying English Test at the time of admissions to the Faculty will have to read ES1000 and/or ES1103. This will be decided by CELC. ES1103 carries 4 Units which may be counted as UEM.

[2] Bridging Course: Students without A-Level pass in Physics must read PC1221 Fundamentals of Physics I and PC1222 Fundamentals of Physics II as a prerequisite for PC1432.

[3] Bridging Course: Students without A-level pass in Chemistry must read CM1417 Fundamentals of Chemistry as a prerequisite for CM1501.

[4] Over two semesters.

[5] For BEng students in the following special programmes: DDPs, CDPs, E-Scholars Programme & CSP, internship/ industrial-attachment is optional and the course credits for the internship/industrial-attachment will be become Unrestricted Electives (UE).

[6] PPP students will have to carry out internship in industrial companies.

[7] PF1101 will not be counted to level 1000 60 Units limit. It is eligible for S/U.

Table 2: MSE Elective Courses

MLE LEVEL 2000/3000 ELECTIVES

MLE2106 Metallic Materials and Processing
MLE2107 Ceramic Materials and Processing
MLE3102 Degradation and Failure of Materials
MLE3104 Polymeric and Composite Materials
MLE3105 Dielectric and Magnetic Materials
MLE3202 Materials for Biointerfaces
MLE3203 Engineering Materials

MLE LEVEL 4000 ELECTIVES

MLE4201 Advanced Materials Characterisation
MLE4202 Selected advanced Topics on Polymers
MLE4203 Polymeric Biomedical Materials
MLE4204 Synthesis and Growth of Nanostructures
MLE4205 Theory & Modelling of Material Properties
MLE4206 Current topics on Nanomaterials
MLE4207 Microfabrication Process and Technology OR EE4436 Semiconductor Process Technology
MLE4208 Photovoltaics Materials
MLE4209 Magnetism and Magnetic Materials
MLE4210 Materials for Energy Storage and Conversion
MLE4211 Nanoelectronics and information technology
MLE4212 Advanced Structural Materials
MLE4213 Innovation & Product Development for Material Engineers
MLE4217 Application of Big Data in Materials Science
MLE4218 AI for Biomaterials Discovery
MLE4219 Materials for Optics: from Quantum Light to Nanodevices
MLE4220 Two-Dimensional Materials
MLE4221 Emerging materials for renewable fuels and clean water
MLE4222 Electron transport in novel quantum materials
MLE4230 Current Topics in Materials AI
MLE4231 Optoelectronics with Organics and Nanocrystals
BN3301 Introduction to Biomaterials
BN4109 Special topics in Bioengineering
BN4301 Principles of Tissue Engineering
BN4404 Bioelectromechanical Systems – Biomems
CM4266 Current Topics in Materials Chemistry *(No longer offered)*
CN4203R Polymer Engineering
CN4217R Processing of Microelectronic Materials

CN4223R	Microelectronic Thin Films
EE4437	Photonics – Principles and Applications
EG4211	Energy Storage Systems for Electric Grids
ME4283	Micro-fabrication Process
ME4253	Biomaterials Engineering
ME4293	Microelectronics Packing
PC4253	Thin film Technology
PC4268	Biophysical Instrumentation and Biomolecular Electronics

MLE LEVEL 5000 ELECTIVES

MLE5102	Mechanical Behaviours of Materials
MLE5104	Physical Properties of Materials
MLE5210	Modelling and simulation of Materials
MLE5211	Nanomaterials
MLE5212	Energy Conversion & Storage
MLE5213	Magnetic Materials
MLE5214	Advances in Polymeric Materials
MLE5215	Atomistic Modelling of Molecules and Materials (open to those with level 4 standing and minimum GPA of 3.5)
MLE5216	Introduction to Microscopy for Material Research
MLE5223	Rational Materials Design for Sustainability
BN5201	Advanced Biomaterials
CN5251	Membrane Science and Technology

Specialization in POLYMERIC AND BIOMEDICAL MATERIALS (minimum 20 Units)

FYP in related area
MLE3104 Polymeric and Composite Materials
MLE3202 Materials for Biointerfaces
Select electives courses from list below MLE4201 Advanced Materials Characterisation MLE4202 Selected Advanced Topics on Polymers OR MLE5214 Advances in Polymeric Materials MLE4203 Polymeric Biomedical Materials ME4253 Biomaterials Engineering BN4109 Special Topics in Bioengineering BN4301 Principles of Tissue Engineering PC4268 Biophysical Instrumentation and Biomolecular Electronics

Specialization in NANOSTRUCTURED MATERIALS & NANOTECHNOLOGY (minimum 20 Units)

FYP in related area
Select electives courses from list below MLE4201 Advanced Materials Characterisation MLE4204 Synthesis and Growth of Nanostructures MLE4205 Theory & Modelling of Material Properties OR MLE5210 Modelling and simulation of Materials MLE4206 Current topics on Nanomaterials OR MLE5211 Nanomaterials MLE4207 Microfabrication Process and Technology MLE4208 Photovoltaics Materials MLE4210 Materials for Energy Storage and Conversion OR MLE5212 Energy Conversion & Storage MLE4211 Nanoelectronics and information technology MLE4220 Two-Dimensional Materials PC4253 Thin Film Technology CN4223R Microelectronic Thin Films

Specialization in ARTIFICIAL INTELLIGENCE IN MSE (minimum 20 Units) **(Available from AY23/24)**

EE2211 Introduction to Machine Learning
Select electives courses from list below MLE4101B B.Eng. Dissertation in related area or MLE4101 B.Eng. Dissertation in related area or MLE4101A B.Eng. Dissertation in related area (only 4 Units from B.Eng. Dissertation will count towards the specialization) MLE4217 Application of Big Data in Materials Science MLE4218 AI for Biomaterials Discovery MLE4230 Current Topics in Materials AI MLE5215 Atomistic Modelling of Molecules and Materials (open to those with level 4 standing and minimum GPA of 3.5) MLE5223 Rational Materials Design for Sustainability

Specialization in BIOMEDICAL MATERIALS (minimum 20 Units)

Select electives courses from list below

MLE3202	Materials for Biointerfaces
MLE4203	Polymeric Biomedical Materials
MLE4201	Advanced Materials Characterisation
BN3301	Introduction to Biomaterials
BN4404	Bioelectromechanical Systems – Biomems
BN5201	Advanced Biomaterials
BN2001	Independent Study [Footnote 1]
EG2605	Undergraduate Research Opportunities Programme (UROP) [Footnote1]
BN4101	B.Eng. Dissertation in related area (8 Units) or MLE4101B B.Eng. Dissertation in related area (8 Units) or MLE4101 B.Eng. Dissertation in related area (only 8 Units will count towards the specialization)

[Footnote1]
The projects involved in this course must be approved by the Head (or Deputy Head or Specialisation Coordinator) of the student's home Department to be in the area of biomedical materials in order to count towards the specialisation.

* Prerequisites of MLE courses can be waived for Non-MSE students. They are recommended to take MLE2301 Introduction to Materials Science & Engineering

Certificate in "Energy Materials Track" (minimum 18 Units)

FYP in related area
Select electives courses from list below MLE4201 Advanced Materials Characterisation MLE4205 Theory & Modelling of Material Properties OR MLE5210 Modelling and simulation of Materials MLE4208 Photovoltaics Materials MLE4210 Materials for Energy Storage and Conversion OR MLE5212 Energy Conversion & Storage EG2605 Undergraduate Research Opportunities Programme in related area

Certificate in "Infocom Materials Track" (minimum 18 Units)

FYP in related area
MLE3105 Dielectric and Magnetic Materials
Select electives courses from list below MLE4201 Advanced Materials Characterisation MLE4204 Synthesis and Growth of Nanostructures MLE4207 Growth Aspects of Semiconductor OR EE4436 Semiconductor Process Technology MLE4209 Magnetism and Magnetic Materials OR MLE5213 Magnetic Materials MLE4211 Nanoelectronics and information technology MLE5201 Principles, Technology and Properties of Thin Films OR PC4253 Thin film Technology OR CN4223R Microelectronic Thin Films EE4437 Photonics – Principles and Applications EG2605 Undergraduate Research Opportunities Programme in related area

Certificate in "Structural Materials Track" (minimum 18 Units)

FYP or design project in related area
MLE3102 Degradation and Failure of Materials
MLE3203 Engineering Materials
MLE4212 Advanced Structural Materials

Table 3: Recommended Semester Schedule

Recommended Schedule for Research-focused Pathway

Course	Units	Course	Units
Semester 1		**Semester 2**	
MLE1010 Materials Engineering Principles and Practice	4	CS1010E Programming Methodology	4
CM1501 Organic Chemistry for Engineers	4	PC1432 Physics IIE	4
MA1512 Differential Equations for Engineering	2	EG1311 Design and Make	4
MA1513 Linear Algebra with Differential Equations	2	MLE1001A Materials Science & Engineering Principles & Practise I	4
GEH/GES/GET/UE	4	ES2531 Critical Thinking & Writing	4
GEH/GES/GET/UE	4	GER1000 Quantitative Reasoning	4
Sub-total	**20**	**Sub-total**	**24**
Semester 3		**Semester 4**	
MLE2001 Materials Science & Engineering Principles & Practise II	4	MLE2104 Mechanical Properties of Materials	4
MLE2101 Introduction to Structure of Materials	4	MLE2105 Electronic Properties of Materials	4
MLE2102 Thermodynamics and Phase Diagrams	4	MLE3101 Materials Characterization Laboratory	3
MLE2103 Phase Transformation and Kinetics	3	IE2141 Systems Thinking and Dynamics	4
EE2211 Introduction to Machine Learning	4	EG2401A Engineering Professionalism	2
GEQ1000 Asking Questions	4	GEH/GES/GET/UE	4
Sub-total	**23**	**Sub-total**	**21**
Semester 5 #		**Semester 6 #**	
MLE3111 Materials Properties and Processing Laboratory	4	EG3611A Industrial Attachment #	10
MLE Level 3000 Elective	4	GEH/GES/GET/UE	4
GEH/GES/GET/UE	4		
GEH/GES/GET/UE	4		
GEH/GES/GET/UE	4		
Sub-total	**20**	**Sub-total**	**14**
Semester 7		**Semester 8**	
MLE4101 B.Eng. Dissertation	6	MLE4101 B.Eng. Dissertation	6
MLE4102 Design Project	4	MLE Level 5000 Elective 2	4
MLE Level 5000 Elective 1	4	GEH/GES/GET/UE	4
GEH/GES/GET/UE	4	GEH/GES/GET/UE	4
		UE	2
Sub-total	**18**	**Sub-total**	**20**
Total Units			**160**

EG3611A Industrial Attachment can be taken in either semester such that Semesters 5 and 6 in the above schedule can be transposed.

Recommended schedule for Professional Practice Pathway

Course	Units	Course	Units
Semester 1		**Semester 2**	
MLE1010 Materials Engineering Principles and Practice	4	CS1010E Programming Methodology	4
CM1501 Organic Chemistry for Engineers	4	PC1432 Physics IIE	4
MA1512 Differential Equations for Engineering	2	EG1311 Design and Make	4
MA1513 Linear Algebra with Differential Equations	2	MLE1001A Materials Science & Engineering Principles & Practise I	4
GEH/GES/GET/UE	4	ES2531 Critical Thinking & Writing	4
GEH/GES/GET/UE	4	GER1000 Quantitative Reasoning	4
Sub-total	**20**	**Sub-total**	**24**
Semester 3		**Semester 4**	
MLE2001 Materials Science & Engineering Principles & Practise II	4	MLE2104 Mechanical Properties of Materials	4
MLE2101 Introduction to Structure of Materials	4	MLE2105 Electronic Properties of Materials	4
MLE2102 Thermodynamics and Phase Diagrams	4	MLE3101 Materials Characterization Laboratory	3
MLE2103 Phase Transformation and Kinetics	3	IE2141 Systems Thinking and Dynamics	4
EE2211 Introduction to Machine Learning	4	EG2401A Engineering Professionalism	2
GEQ1000 Asking Questions	4	Professional Elective	4
Sub-total	**23**	**Sub-total**	**21**
Semester 5 #		**Semester 6 #**	
MLE3111 Materials Properties and Processing Laboratory	4	EG3611A Industrial Attachment #	10
MLE Level 3000 Elective	4	GEH/GES/GET/UE	4
GEH/GES/GET/UE	4		
GEH/GES/GET/UE	4		
GEH/GES/GET/UE	4		
Sub-total	**20**	**Sub-total**	**14**
Semester 7		**Semester 8**	
MLE4101A B.Eng. Dissertation	6	MLE4102A Design Project	4
MLE4102A Design Project	4	GEH/GES/GET/UE	4
Professional Elective	4	GEH/GES/GET/UE	4
GEH/GES/GET/UE	4	GEH/GES/GET/UE	4
		GEH/GES/GET/UE	4
Sub-total	**18**	**Sub-total**	**20**
Total Units			**160**

EG3611A Industrial Attachment can be taken in either semester such that Semesters 5 and 6 in the above schedule can be transposed.

Recommended Schedule for Research-focused Pathway (Poly)

Assumes maximum exemptions of **40 Units** given; actual schedule will depend exemptions given on case-by-case basis and any requirements to do bridging courses

Course	Units	Course	Units
Semester 1		**Semester 2**	
MA1512 Differential Equations for Engineering	2	PC1222 Fundamentals of Physics 2	4
MA1513 Linear Algebra with Differential Equations	2	MLE1001A Materials Science & Engineering Principles & Practise I	4
PC1221 Fundamentals of Physics 1	4	GER1000 Quantitative Reasoning	4
GEH/GES/GET/UE	4	GEH/GES/GET/UE	4
GEH/GES/GET/UE	4	GEH/GES/GET/UE	4
GEH/GES/GET/UE	4		
Sub-total	**20**	**Sub-total**	**20**
Semester 3		**Semester 4**	
MLE2001 Materials Science & Engineering Principles & Practise II	4	MLE2104 Mechanical Properties of Materials	4
MLE2101 Introduction to Structure of Materials	4	MLE2105 Electronic Properties of Materials	4
MLE2102 Thermodynamics and Phase Diagrams	4	MLE3101 Materials Characterization Laboratory	3
MLE2103 Phase Transformation and Kinetics	3	IE2141 Systems Thinking and Dynamics	4
EE2211 Introduction to Machine Learning	4	PC1432 Physics IIE	4
GEQ1000 Asking Questions	4	EG2401A Engineering Professionalism	2
Sub-total	**23**	**Sub-total**	**21**
Semester 5		**Semester 6**	
MLE4101 B.Eng. Dissertation	6	MLE4101 B.Eng. Dissertation	6
MLE4102 Design Project	4	MLE Level 5000 Elective	4
MLE3111 Materials Properties and Processing Laboratory	4	MLE Level 5000 Elective	4
MLE Level 3000 Elective	4	GEH/GES/GET/UE	4
Sub-total	**18**	**Sub-total**	**18**
Total Units			**120**

[1] The schedule assumes the exemptions of 40 Units, CM1501 (4 Units), CS1010E (4 Units), EG1311 (4 Units), ES2531 (4 Units), MLE1010 (4 Units), UEM (20 Units), and advanced math being taken by the students in poly.

[2] The exemption of CS1010E is subject to the Department approval.

[3] EG3611A (10 Units) is waved and replaced by UEM (10 Units).

[4] Actual schedule will depend on exemptions of each case and any requirements to do bridging courses.

Recommended Schedule for Research-focused Pathway (Poly)

Assumes maximum exemptions of **36 Units** given; actual schedule will depend exemptions given on case-by-case basis and any requirements to do bridging courses

Course	Units	Course	Units
Semester 1		**Semester 2**	
MA1512 Differential Equations for Engineering	2	PC1222 Fundamentals of Physics 2	4
MA1513 Linear Algebra with Differential Equations	2	MLE1001A Materials Science & Engineering Principles & Practise I	4
PC1221 Fundamentals of Physics 1	4	GER1000 Quantitative Reasoning	4
MLE1010 Materials Engineering Principles and Practice	4	GEH/GES/GET/UE	4
GEH/GES/GET/UE	4	GEH/GES/GET/UE	4
GEH/GES/GET/UE	4		
Sub-total	**20**	**Sub-total**	**20**
Semester 3		**Semester 4**	
MLE2001 Materials Science & Engineering Principles & Practise II	4	MLE2104 Mechanical Properties of Materials	4
MLE2101 Introduction to Structure of Materials	4	MLE2105 Electronic Properties of Materials	4
MLE2102 Thermodynamics and Phase Diagrams	4	MLE3101 Materials Characterization Laboratory	3
MLE2103 Phase Transformation and Kinetics	3	IE2141 Systems Thinking and Dynamics	4
EE2211 Introduction to Machine Learning	4	PC1432 Physics IIE	4
GEQ1000 Asking Questions	4	EG2401A Engineering Professionalism	2
Sub-total	**23**	**Sub-total**	**21**
Semester 5		**Semester 6**	
MLE4101 B.Eng. Dissertation	6	MLE4101 B.Eng. Dissertation	6
MLE4102 Design Project	4	MLE Level 5000 Elective	4
MLE3111 Materials Properties and Processing Laboratory	4	MLE Level 5000 Elective	4
MLE Level 3000 Elective	4	GEH/GES/GET/UE	4
GEH/GES/GET/UE	4		
Sub-total	**22**	**Sub-total**	**18**
Total Units			**124**

[1] The schedule assumes the exemptions of 36 Units, including CM1501 (4 Units), CS1010E (4 Units), EG1311 (4 Units), ES2531 (4 Units), UEM (20 Units), and advanced math being taken by the students in poly.

[2] The exemption of CS1010E is subject to the Department approval.

[3] EG3611A (10 Units) is waved and replaced by UEM (10 Units).

[4] Actual schedule will depend on exemptions of each case and any requirements to do bridging courses.

Recommended Schedule for Research-focused Pathway (Poly)

Assumes maximum exemptions of **32 Units** given; actual schedule will depend exemptions given on case-by-case basis and any requirements to do bridging courses

Course	Units	Course	Units
Semester 1		**Semester 2**	
MA1512 Differential Equations for Engineering	2	PC1222 Fundamentals of Physics 2	4
MA1513 Linear Algebra with Differential Equations	2	MLE1001A Materials Science & Engineering Principles & Practise I	4
PC1221 Fundamentals of Physics 1	4	CS1010E Programming Methodology	4
MLE1010 Materials Engineering Principles and Practice	4	GER1000 Quantitative Reasoning	4
GEH/GES/GET/UE	4	GEH/GES/GET/UE	4
GEH/GES/GET/UE	4	GEH/GES/GET/UE	4
Sub-total	**20**	**Sub-total**	**24**
Semester 3		**Semester 4**	
MLE2001 Materials Science & Engineering Principles & Practise II	4	MLE2104 Mechanical Properties of Materials	4
MLE2101 Introduction to Structure of Materials	4	MLE2105 Electronic Properties of Materials	4
MLE2102 Thermodynamics and Phase Diagrams	4	MLE3101 Materials Characterization Laboratory	3
MLE2103 Phase Transformation and Kinetics	3	IE2141 Systems Thinking and Dynamics	4
EE2211 Introduction to Machine Learning	4	PC1432 Physics IIE	4
GEQ1000 Asking Questions	4	EG2401A Engineering Professionalism	2
Sub-total	**23**	**Sub-total**	**21**
Semester 5		**Semester 6**	
MLE4101 B.Eng. Dissertation	6	MLE4101 B.Eng. Dissertation	6
MLE4102 Design Project	4	MLE Level 5000 Elective	4
MLE3111 Materials Properties and Processing Laboratory	4	MLE Level 5000 Elective	4
MLE Level 3000 Elective	4	GEH/GES/GET/UE	4
GEH/GES/GET/UE	4		
Sub-total	**22**	**Sub-total**	**18**
Total Units			**128**

[1] The schedule assumes the exemptions of 32 Units, including CM1501 (4 Units), EG1311 (4 Units), ES2531 (4 Units), UEM (20 Units), and advanced math being taken by the students in poly.

[2] EG3611A (10 Units) is waved and replaced by UEM (10 Units).

[3] Actual schedule will depend on exemptions of each case and any requirements to do bridging courses.

Recommended Schedule for Professional Practice Pathway (Poly)

Assumes maximum exemptions of **40 Units** given; actual schedule will depend exemptions given on case-by-case basis and any requirements to do bridging courses

Course	Units	Course	Units
Semester 1		**Semester 2**	
MA1512 Differential Equations for Engineering	2	PC1222 Fundamentals of Physics 2	4
MA1513 Linear Algebra with Differential Equations	2	MLE1001A Materials Science & Engineering Principles & Practise I	4
PC1221 Fundamentals of Physics 1	4	GER1000 Quantitative Reasoning	4
GEH/GES/GET/UE	4	GEH/GES/GET/UE	4
GEH/GES/GET/UE	4	GEH/GES/GET/UE	4
GEH/GES/GET/UE	4		
Sub-total	**20**	**Sub-total**	**20**
Semester 3		**Semester 4**	
MLE2001 Materials Science & Engineering Principles & Practise II	4	MLE2104 Mechanical Properties of Materials	4
MLE2101 Introduction to Structure of Materials	4	MLE2105 Electronic Properties of Materials	4
MLE2102 Thermodynamics and Phase Diagrams	4	MLE3101 Materials Characterization Laboratory	3
MLE2103 Phase Transformation and Kinetics	3	IE2141 Systems Thinking and Dynamics	4
EE2211 Introduction to Machine Learning	4	PC1432 Physics IIE	4
GEQ1000 Asking Questions	4	EG2401A Engineering Professionalism	2
		Professional Elective	4
Sub-total	**23**	**Sub-total**	**25**
Semester 5		**Semester 6**	
MLE4102A Design Project	4	MLE4102A Design Project	4
MLE3111 Materials Properties and Processing Laboratory	4	MLE4101A B.Eng. Dissertation	6
MLE Level 3000 Electives	4	UE	2
Professional Elective	4		
GEH/GES/GET/UE	4		
Sub-total	**20**	**Sub-total**	**12**
Total Units			**120**

[1] The schedule assumes the exemptions of 40 Units, including CM1501 (4 Units), CS1010E (4 Units), EG1311 (4 Units), ES2531 (4 Units), MLE1010 (4 Units), UEM (20 Units), and advanced math being taken by the students in poly.

[2] The exemption of CS1010E is subject to the Department approval.

[3] EG3611A (10 Units) is waved and replaced by UEM (10 Units).

[4] Actual schedule will depend on exemptions of each case and any requirements to do bridging courses.

Recommended Schedule for Professional Practice Pathway (Poly)

Assumes maximum exemptions of **36 Units** given; actual schedule will depend exemptions given on case-by-case basis and any requirements to do bridging courses

Course	Units	Course	Units
Semester 1		**Semester 2**	
MA1512 Differential Equations for Engineering	2	PC1222 Fundamentals of Physics 2	4
MA1513 Linear Algebra with Differential Equations	2	MLE1001A Materials Science & Engineering Principles & Practise I	4
PC1221 Fundamentals of Physics 1	4	GER1000 Quantitative Reasoning	4
MLE1010 Materials Engineering Principles and Practice	4	GEH/GES/GET/UE	4
GEH/GES/GET/UE	4	GEH/GES/GET/UE	4
GEH/GES/GET/UE	4		
Sub-total	**20**	**Sub-total**	**20**
Semester 3		**Semester 4**	
MLE2001 Materials Science & Engineering Principles & Practise II	4	MLE2104 Mechanical Properties of Materials	4
MLE2101 Introduction to Structure of Materials	4	MLE2105 Electronic Properties of Materials	4
MLE2102 Thermodynamics and Phase Diagrams	4	MLE3101 Materials Characterization Laboratory	3
MLE2103 Phase Transformation and Kinetics	3	IE2141 Systems Thinking and Dynamics	4
EE2211 Introduction to Machine Learning	4	PC1432 Physics IIE	4
GEQ1000 Asking Questions	4	EG2401A Engineering Professionalism	2
		Professional Elective	4
Sub-total	**23**	**Sub-total**	**25**
Semester 5		**Semester 6**	
MLE4102A Design Project	4	MLE4102A Design Project	4
MLE3111 Materials Properties and Processing Laboratory	4	MLE4101A B.Eng. Dissertation	6
MLE Level 3000 Electives	4	GEH/GES/GET/UE	4
Professional Elective	4	UE	2
GEH/GES/GET/UE	4		
Sub-total	**20**	**Sub-total**	**16**
Total Units			**124**

[1] The schedule assumes the exemptions of 36 Units, including CM1501 (4 Units), CS1010E (4 Units), EG1311 (4 Units), ES2531 (4 Units), UEM (20 Units), and advanced math being taken by the students in poly.

[2] The exemption of CS1010E is subject to the Department approval.

[3] EG3611A (10 Units) is waved and replaced by UEM (10 Units).

[4] Actual schedule will depend on exemptions of each case and any requirements to do bridging courses.

Recommended Schedule for Professional Practice Pathway (Poly)

Assumes maximum exemptions of **32 Units** given; actual schedule will depend exemptions given on case-by-case basis and any requirements to do bridging courses

Course	Units	Course	Units
Semester 1		**Semester 2**	
MA1512 Differential Equations for Engineering	2	PC1222 Fundamentals of Physics 2	4
MA1513 Linear Algebra with Differential Equations	2	CS1010E Programming Methodology	4
PC1221 Fundamentals of Physics 1	4	MLE1001A Materials Science & Engineering Principles & Practise I	4
MLE1010 Materials Engineering Principles and Practice	4	GER1000 Quantitative Reasoning	4
GEH/GES/GET/UE	4	GEH/GES/GET/UE	4
GEH/GES/GET/UE	4		
Sub-total	**20**	**Sub-total**	**20**
Semester 3		**Semester 4**	
MLE2001 Materials Science & Engineering Principles & Practise II	4	MLE2104 Mechanical Properties of Materials	4
MLE2101 Introduction to Structure of Materials	4	MLE2105 Electronic Properties of Materials	4
MLE2102 Thermodynamics and Phase Diagrams	4	MLE3101 Materials Characterization Laboratory	3
MLE2103 Phase Transformation and Kinetics	3	IE2141 Systems Thinking and Dynamics	4
EE2211 Introduction to Machine Learning	4	PC1432 Physics IIE	4
GEQ1000 Asking Questions	4	EG2401A Engineering Professionalism	2
		Professional Elective	4
Sub-total	**23**	**Sub-total**	**25**
Semester 5		**Semester 6**	
MLE4102A Design Project	4	MLE4102A Design Project	4
MLE3111 Materials Properties and Processing Laboratory	4	MLE4101A B.Eng. Dissertation	6
MLE Level 3000 Electives	4	GEH/GES/GET/UE	4
Professional Elective	4	UE	2
GEH/GES/GET/UE	4		
GEH/GES/GET/UE	4		
Sub-total	**24**	**Sub-total**	**16**
Total Units			**128**

[1] The schedule assumes the exemptions of 32 Units, including CM1501 (4 Units), EG1311 (4 Units), ES2531 (4 Units), UEM (20 Units), and advanced math being taken by the students in poly.

[2] EG3611A (10 Units) is waved and replaced by UEM (10 Units).

[3] Actual schedule will depend on exemptions of each case and any requirements to do bridging courses.

Last update: 12 Feb 2025