MSE Master of Science Course Baskets (Cohort matriculated in AY2023/2024)

Core Courses (Requirements 8 Unit)

- *For NUS Graduates with B.Eng. in Materials Science & Engineering or related discipline which has relevant Materials Courses in their curriculum, to waiver the core courses requirement, the candidate must attain overall GPA > 4.00 or attain at least 2nd Upper Class Honours equivalent for their Bachelor's Degree.*
- *For candidates who are from Overseas Universities who have Materials Science and Engineering Bachelor's Degree/background, to waiver the core courses requirement, the candidate need to score at least 85% (China U) based on their University's Grading Scale for the relevant Materials Courses in their curriculum. (India or UK Universities at least 70%).*
- *Students who waiver the 2 MLE Core Courses will need to take 2 MLE Elective Group Courses in place to fulfil the Unit required for graduation. Only MLE Electives are allowed to replace MLE Core. Other General/MIB Electives are **NOT** allowed.*

MLE Core Courses	MLE5001 Basics of Structures & Properties of Materials
	MLE5002 Materials Characterization

All 4 Unit unless stated differently. ^

MLE Elective Group (Requirements at least 8 Unit)

MLE Elective Group	MLE5101 Thermodynamics for Sustainability
	MLE5102 Mechanical Behaviours of Materials
	MLE5104 Physical Properties of Materials
	MLE5208 Photovoltaic 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
	MLE5216 Introduction to Microscopy for Material Research
	MLE5217 Foundations of Machine Learning for Materials Science
	MLE5228 Superconductivity and Superconducting Devices
	MLE5232 Dielectric Materials and Applications
	MLE6103 Structures of Materials

All 4 Unit unless stated differently. ^

General Elective Group

General Elective Group	MLE	MLE5003 Materials Science & Engineering Project (8 Unit)
		MLE5218 Materials Discovery with AI
		MLE5219 Materials Informatics: The Role of Big Data
		MLE5220 Computation of Macroscopic Materials Behaviours
		MLE5221 Designing Materials for Renewable Fuels and Clean Water
		MLE5222 Nano and 2D Materials for Energy Applications
		MLE5223 Rational Materials Design for Sustainability

		MLE5224 Degradation of Materials
		MLE5225 Electro-Active Materials for Sustainability
		MLE5226 Problem Solving for Future Sustainability Challenges
		MLE5229 Advanced Materials for Microelectronics
		MLE5233 Functional Electronic Devices of Tomorrow
		MLE5236 Electron Transport in Novel Quantum Materials
	BN	BN5201 Advanced Biomaterials
	CE	CE5604 Advanced Concrete Technology
	CN	CN5161 Polymer Processing Engineering
		CN5251 Membrane Science & Technology
	ME	ME5506 Corrosion of Materials
		ME5513 Deformation, Fracture and Fatigue of Materials

All 4 Unit unless stated differently. ^

Materials Innopreneurship Basket (MIB) Elective Group**

***Only for students who are specializing in Materials Innopreneurship.*

MIB Elective Group	MLE	MLE4213 Innovation & Product Development for Material Engineers †
		MLE5004 Innovation & Translation Research Project in MSE (8 Unit) †
	MT	MT5001 Intellectual Property Management & Innovation Strategy
		MT5002 Management of Industrial R&D
		MT5006 Value Creation Through Product Development
		MT5007 Management of Technological Innovation
		MT5008 Internal and Collaborative Corporate Entrepreneurship
		MT5010 Technology Forecasting, Intelligence & Foresighting
		MT5020 Managing the Human Elements of Technology Management
		MT5022 Digital Disruption and Technology Strategy
		MT5023 Technology-Based Entrepreneurial Strategy
		MT5024 Maximising Innovation Value through Patent Analytics
		MT5911 Venture Capital Funding for TechVenture
		MT5912 Frugal Innovation
		MT5913 TechLaunch – Experiential Entrepreneurship
		MT5920 Enterprise Development

All 4 Unit unless stated differently. ^

** To qualify for Specialization in Materials Innopreneurship:

- Students must pass 20 Unit of specialization-related courses.
- Students must take 2 compulsory courses: *MLE4213 Innovation & Product Development for Material Engineers (4 Unit*) **AND** *MLE5004 Innovation & Translation Research Project in MSE (8 Unit) which will add up to 12 Unit. Only by pre-allocation.* †
- The remaining 8 Unit can be chosen from the other elective courses in the MIB Elective Group.

Specialization in Advanced Materials for Energy and Sustainability***

Advanced Materials for Energy and Sustainability	MLE	MLE5101 Thermodynamics for Sustainability ††
		MLE5003 Materials Science & Engineering Project (8 Unit)
		MLE5208 Photovoltaic Materials
		MLE5212 Energy Conversion & Storage
		MLE5221 Designing Materials for Renewable Fuels and Clean Water

		MLE5222 Nano and 2D Materials for Energy Applications
		MLE5223 Rational Materials Design for Sustainability
		MLE5224 Degradation of Materials
		MLE5225 Electro-Active Materials for Sustainability
		MLE5226 Problem Solving for Future Sustainability Challenges

All 4 Unit unless stated differently. ^

*** To qualify for Specialization in Advanced Materials for Energy and Sustainability:

- Students must pass 20 Unit of specialization-related courses.
- Students must take 1 compulsory course: *MLE5101 Thermodynamics for Sustainability (4 Unit).* ††
- The remaining 16 Unit can be chosen from the table above.
- For students who does not meet requirements to complete specialization at the end, the courses will be classified where relevant e.g., MLE Elective Group, General Elective Group.

^ All courses are 4 Unit unless stated differently, please double check the Unit in the NUSMods website used for timetable planning. Not all courses will be available every semester or every academic year.

Other Important Pointers:

- Students are not allowed to take both MLE5003 and MLE5004 together as both are project courses which requires high time commitment and heavy in workload.
- Part-time students are not allowed to take MLE5003 or MLE5004 due to high time commitment and heavy workload.
- For part-time students who wish to specialise in Materials Innopreneurship, please email department administrator to check on arrangement for MLE5004.
- MLE4213 and MLE5004 are only open to specialization student.

Courses in Blue Fonts are newly-added into our curriculum.

- MLE5208 and MLE4208 are **preclusions** to each other. You can only take either 1.
- MLE5232 and MLE3105 are **preclusions** to each other. You can only take either 1.
- MLE5236 and MLE4222 are preclusions to each other. You can only take either 1.
- MLE5228 and PC5218 are **preclusions** to each other. You can only take either 1.
- MLE5224 and ME5506 are **preclusions** to each other. You can only take either 1.
- MLE5221 and MLE5225 require the **pre-requisite** of MLE5101.
- MLE5223 requires the **pre-requisite** of MLE5001 or equivalent.
- Candidates are allowed to take the courses together with their pre-requisites in the same semester.
- Please make sure to check all the courses for any prerequisites/preclusions before selecting/requesting the courses during ModReg.

Curriculum Requirements
(No Specialization):

Requirements	Pass 40 Unit of MSE and MSE recognized courses as per breakdown below:	Remarks
1. Pass 8 Unit of MLE Core Courses	8	MLE5001 & MLE5002 Students granted waiver will still need to take other MLE Elective group courses to replace the MLE Core Courses and fulfil the Unit requirements.
2. Pass 8 Unit from MLE Elective Group	8	Refer to MLE Elective Group.
3. Pass 16 Unit from MLE and General Elective Group	16	Refer to MLE Elective Group and General Elective Group.
4. Pass 8 Unit from the MLE and General Elective Group OR NCE Courses OR Credit Transfer	8	Refer to MLE Elective Group and General Elective Group. OR NCE Courses: Level 5000/6000 Courses from other Engineering departments, subjected to availability and approval. NUSRI Students who credit transfer their courses will use up NCE Unit quota. Can transfer **a maximum of 2 courses** (8 Unit).
Total Unit	40	Required Units for Graduation: Pass 40 Unit Minimum GPA for Graduation: 3.00

Curriculum Requirements
(With Specialization in Materials Innopreneurship):

Requirements	Pass 40 Units of MSE and MSE recognized courses as per breakdown below:	Remarks
1. Pass 8 Unit of MLE Core Courses	8	MLE5001 & MLE5002 Students granted waiver will still need to take other MLE Elective group courses to replace the MLE Core Courses and fulfil the Unit requirements.
2. Pass 8 Unit from MLE Elective Group	8	Refer to MLE Elective Group.
3. Pass 20 Unit for Specialization (Specialization-related Courses)	20	MLE5004 (Compulsory) (8 Unit) MLE4213 (Compulsory) (4 Unit) MLE5004 and MLE4213 are only by pre-allocation, students who are approved to take this specialization and declared for this specialization need to email Ms Hu Kai (hkmse@nus.edu.sg) for these 2 courses. Remaining 8 Unit of courses from **MIB Elective Group**.
4. Pass 4 Unit from the MLE Elective Group/General Elective Group OR NCE Course OR Credit Transfer	4	Refer to MLE Elective Group and General Elective Group. OR NCE Courses: Level 5000/6000 Courses from other Engineering departments, subjected to availability and approval. NUSRI Students who credit transfer their courses will use up NCE Unit quota. Can transfer **only 1 course** to complete this 4 Unit requirement.
Total Unit	40	Required Unit for Graduation: Pass 40 Unit Minimum GPA for Graduation: 3.00

Curriculum Requirements
(With Specialization in Advanced Materials for Energy and Sustainability):

Requirements	Pass 40 Units of MSE and MSE recognized courses as per breakdown below:	Remarks
1. Pass 8 Unit of MLE Core Courses	8	MLE5001 & MLE5002 Students granted waiver will still need to take other MLE Elective group courses to replace the MLE Core Courses and fulfil the Unit requirements.
2. Pass 8 Unit from MLE Elective Group	8	Refer to MLE Elective Group.
3. Pass 20 Unit for Specialization (Specialization-related Courses)	20	MLE5101 (Compulsory) (4 Unit) Remaining 16 Unit of courses refer to table from **Specialization in Advanced Materials for Energy and Sustainability.**
4. Pass 4 Unit from the MLE Elective Group/General Elective Group OR NCE Course OR Credit Transfer	4	Refer to MLE Elective Group, General Elective Group. OR NCE Courses: Level 5000/6000 Courses from other Engineering departments, subjected to availability and approval. NUSRI Students who credit transfer their courses will use up NCE Unit quota. Can transfer **only 1 course** to complete this 4 Unit requirement.
Total Unit	40	Required Unit for Graduation: Pass 40 Unit Minimum GPA for Graduation: 3.00