MSE Master of Science Course Baskets (Cohort Matriculated in AY2024/2025)

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MLE Core Basket (Requirements at least 12 Unit)

MLE Core basket	MLE5001* Basics of Structures & Properties of Materials
	MLE5002* Materials Characterization
	MLE5101 Thermodynamics for Sustainability
	MLE5102 Mechanical Behaviours of Materials
	MLE5104 Physical Properties of Materials
	MLE5211 Nanomaterials
	MLE5212 Energy Conversion & Storage
	MLE5214 Advances in Polymeric Materials
	MLE5215 Atomistic Modelling of Molecules and Materials
	MLE5216 Introduction to Microscopy for Material Research

** You are strongly advised to take MLE5001 and MLE5002, if you do not have a B.Eng degree in a subject related to MSE.*

Elective Basket

Elective Basket	MLE5003 Materials Science & Engineering Project (8 Unit)
	MLE5208 Photovoltaic Materials
	MLE5210 Modelling and Simulation of Materials
	MLE5213 Magnetic Materials
	MLE5217 Foundations of Machine Learning for Materials Science
	MLE5218 Materials Discovery with AI
	MLE5219 Materials Informatics: The Role of Big Data
	MLE5220 Finite Element Method in Materials: Basic Concepts and Problem Solving
	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
	MLE5228 Superconductivity and Superconducting Devices
	MLE5229 Advanced Materials for Microelectronics
	MLE5230 Characterizations of Microelectronic Materials
	MLE5231 Optoelectronics with Organics and Nanocrystals
	MLE5232 Dielectric Materials and Applications
	MLE5233 Functional Electronic Devices of Tomorrow
	MLE5234 Materials for Optics: From Quantum Light to Nanodevices
	MLE5235 Two-Dimensional Materials
	MLE5236 Electron Transport in Novel Quantum Materials
	MLE5238 Bioelectronics
	MLE5239 Materials for Biointerfaces
	MLE5240 Light-Harvesting Materials for Sustainability
	MLE5241 Robotic Materials
	MLE5243 Current Topics in Materials AI
	MLE5244 Materials and Devices for Quantum Photonics

	MLE5247 Soft Materials for Flexible & Wearable Electronics
	MLE4207 Microfabrication Process and Technology
	MLE6103 Structures of Materials
	CE5604 Advanced Concrete Technology
	ME5513 Deformation, Fracture and Fatigue of Materials

All 4 Unit unless stated differently. ^

Specialization in Advanced Materials for Energy and Sustainability***

Advanced Materials for Energy and Sustainability	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
	MLE5240 Light-Harvesting Materials for Sustainability

*** 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 Core Basket, Elective Basket

^ 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.

Specialization in Artificial Intelligence for Functional Materials**

Artificial Intelligence for Functional Materials Elective Basket	MLE5217 Foundations of Machine Learning for Materials Science†††
	MLE5003 Materials Science & Engineering Project (8 Unit)
	MLE5215 Atomistic Modelling of Molecules and Materials
	MLE5218 Materials Discovery with Artificial Intelligence
	MLE5219 Materials Informatics: The Role of Big Data
	MLE5220 Finite Element Method in Materials: Basic Concepts and Problem Solving
	MLE5243 Current Topics in Materials AI

**** To qualify for Specialization in Artificial Intelligence for Functional Materials

- Students must take 1 compulsory course: MLE5217 Foundations of Machine Learning for Materials Science†††
- Students must take 16 Units from the Artificial Intelligence for Functional Materials basket.
- Total 20 units of specialized courses

^ 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:

- Part-time students are not allowed to take MLE5003 due to high time commitment and heavy workload.
- MLE5208 and MLE4208 are preclusions to each other. You can only take either 1.
- MLE5212 and MLE4210 are preclusions to each other. You can only take either 1.
- MLE5214 and MLE4202 are preclusions to each other. You can only take either 1.
- MLE5221 and MLE4221 are preclusions to each other. You can only take either 1.
- MLE5222 and MLE4506 are preclusions to each other. You can only take either 1.
- MLE5225 and MLE4225 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.
- MLE5232 and MLE3105 are preclusions to each other. You can only take either 1.
- MLE5233 and PC5233 are preclusions to each other. You can only take either 1.
- MLE5234 and MLE4219 are preclusions to each other. You can only take either 1.
- MLE5235 and MLE4220 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.
- MLE5238 and EEK5104 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 12 Unit from MLE Core Basket	12	Refer to MLE Core Basket.
2. Pass 20 Unit from MLE Core Basket and Elective Basket	20	Refer to MLE Core Basket and Elective Basket.
3. Pass 8 Unit from the Elective Basket OR NCE Courses OR Credit Transfer	8	Refer to Elective Basket. 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 Advanced Materials for Energy and Sustainability):

Requirements	Pass 40 Units of MSE and MSE recognized courses as per breakdown below:	Remarks
1. Pass 12 Unit from MLE Core Basket	12	Refer to MLE Core Basket.
2. Pass 4 Unit from MLE Core Basket and Elective Basket	4	Refer to MLE Core Basket and Elective Basket.
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 Elective Basket OR NCE Course OR Credit Transfer	4	Refer to Elective Basket. 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 Artificial Intelligence for Functional Materials):

Requirements	Pass 40 Units of MSE and MSE recognized courses as per breakdown below:	Remarks
1. Pass 12 Unit from MLE Core Basket	12	Refer to MLE Core Basket.
2. Pass 4 Unit from MLE Core Group and Elective Basket	4	Refer to MLE Core Basket and Elective Basket.
3. Pass 20 Unit for Specialization (Specialization-related Courses)	20	MLE5217 (Compulsory) (4 Unit) Remaining 16 Unit of courses refer to table from **Specialization in Artificial Intelligence for Functional Materials.**
4. Pass 4 Unit from the Elective Basket OR NCE Course OR Credit Transfer	4	Refer to Elective Basket. 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