

MSE Master of Science Module Baskets (Cohort matriculated in AY2022/2023)

Page 1, 2 & 3: Module Lists and Other Important Pointers

Page 4: Graduation Requirements (No Specialization)

Page 5: Graduation Requirements (Specialization in Materials Innopreneurship)

Page 6: Graduation Requirements (Specialization in Advanced Materials for Energy & Sustainability)

Core Modules (Requirements 8 MC)

- For NUS Graduates with B.Eng. in Materials Science & Engineering or related discipline which has relevant Materials Modules in their curriculum, to waiver the core modules requirement, the candidate must attain overall CAP > 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 modules requirement, the candidate need to score at least 85% (China U) based on their University's Grading Scale for the relevant Materials Modules in their curriculum. (India or UK Universities at least 70%).
- Students who waiver the 2 MLE Core Modules will need to take 2 MLE Elective Group Modules in place to fulfil the MC required for graduation. Only MLE Electives are allowed to replace MLE Core. Other General/MIB Electives are **NOT** allowed.

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

All 4 Unit unless stated differently. ^

MLE Elective Group (Requirements at least 8 MC)

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 MC 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 MC 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 MC unless stated differently. ^

** To qualify for Specialization in **Materials Innopreneurship**:

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

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

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

^ All modules are 4 MC unless stated differently, please double check the Unit in the NUSMods website used for timetable planning. Not all modules 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 modules 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.

Modules 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.
- MLE5218 and MLE5219 require the **pre-requisite** of MLE5217.
- MLE5221 and MLE5225 require the **pre-requisite** of MLE5101.
- MLE5223 requires the **pre-requisite** of MLE5001 or equivalent.
- Candidates are allowed to take the modules together with their pre-requisites in the same semester.
- Please make sure to check all the modules for any prerequisites/preclusions before selecting/requesting the modules during ModReg.

Curriculum Requirements

(No Specialization):

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

Curriculum Requirements

(With Specialization in **Materials Innopreneurship**):

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

		3.00
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Curriculum Requirements

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

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