

Specialisation

Specialisations allow students to pursue greater depth in a chosen area and add value to their degrees. The specialisation will be reflected on the academic transcript, which would assist students in their job search/career as well as in their higher studies.

Criteria

In order to obtain the specialisation, students have to meet the following criteria:

1. Complete a minimum of 15 AUs from one specialisation group.
2. FGO-declared courses can be counted towards a specialisation.
3. Only one specialisation will be reflected on the transcript.
4. Students who do not wish to obtain a specialisation may choose courses of their interest from different specialisation areas.

Note: MA48xx courses will usually offered in either Sem 1 or Sem 2 only, please take note of this when planning your study plan. Students may refer to [here](#) for offering semester and pre-requisite required for courses.

Please see below for the list of specialisations available for your programme or stream.

*Note that the list of specialisation offered may differ based on your programme/stream.

AERONAUTICAL ENGINEERING		AEROSPACE	MECHANICAL (Mainstream)
Course Code	Course Title	Course Type	Course Type
Compulsory			
MA3003	Heat Transfer	Not offered to Aerospace Student.	Core
MA4002	Fluid Dynamics		Core
Any 3 of the following courses:			
MA3700	Aircraft Structures I		MPE
MA3701	Aerodynamics		MPE
MA3702	Aircraft Propulsion		MPE
MA4814	Computational Fluid Dynamics		MPE
MA4870	Mechanics of Composite Materials		MPE
MA4871	Non-Destructive Testing		MPE
MA4872*	Aircraft Reliability & Maintainability		MPE
MA4880	Airport Operations and Systems		MPE
MA4881	Air Traffic Management		MPE

*MA4872 is mutually exclusive to MA4854

AUTONOMOUS SYSTEMS		AEROSPACE	MECHANICAL (Mainstream)
Course Code	Course Title	Course Type	Course Type
Compulsory			
MA3705	Aerospace Control theory	Core	N.A.
MA3005	Control Theory	N.A.	Core
MA0218	Introduction to Data Science and Artificial Intelligence	Ger-Core	Ger-Core
MA4891	AI/ML to Engineering Applications	MPE/UE	MPE
Any 2 of the following courses:			
MA4822	Measurements and Sensing System	MPE/UE	MPE
MA4825	Robotics	MPE	MPE
MA4829	Machine Intelligence	MPE/UE	MPE
MA4878	Autonomous Flight	MPE/UE	N.A.
MA4890	Autonomous Driving	MPE/UE	MPE

ENERGY & THE ENVIRONMENT		AEROSPACE	MECHANICAL (Mainstream)
Course Code	Course Title	Course Type	Course Type
Compulsory			
MA2007	Thermodynamics	Core	Core
MA3003	Heat Transfer	Core	Core
Any 3 of the following courses:			
MA4803	Noise & Vibration Control	MPE/UE	MPE
MA4811	Psychometry & Air Conditioning	MPE/UE	MPE
MA4813	Building Services Engineering	MPE/UE	MPE
MA4819	Energy Technologies for Sustainability	MPE/UE	MPE

MANUFACTURING ENGINEERING		AEROSPACE	MECHANICAL (Mainstream)
Course Code	Course Title	Course Type	Course Type
Compulsory			
MA2001	Mechanics of Materials	Core	Core
MA2700	Aerospace Materials & Manufacturing Processes	Core	N.A.
MA2004/MA2024	Manufacturing Processes/ Engineering Materials and Manufacturing Processes	N.A.	Core
Any 3 of the following courses:			
MA4804	Optimization Theory & Applications	MPE/UE	MPE
MA4842	Engineering Metrology and Materials Characterization	MPE/UE	MPE
MA4845	Additive Manufacturing in Industry 4.0	MPE/UE	MPE
MA4853	Manufacturing Systems	MPE/UE	MPE
MA4882	Advanced Manufacturing and Materials Processing	MPE/UE	MPE

MECHANICAL ENGINEERING		AEROSPACE	MECHANICAL (Mainstream)
Course Code	Course Title	Course Type	Course Type
Compulsory			
MA3704	Aircraft Electrical Devices	Core	Not offered to Mechanical Student.
MA2002	Theory of Mechanism	UE	
MA2009	Introduction to Electrical Circuits & Electronic Devices	UE	
MA3001	Machine Element Design	MPE	
MA4002	Fluid Dynamics	MPE	

This new specialisation will enable graduates to apply for registration as Professional Engineers, if other requirements (4 years of relevant practical experience in engineering, FEE & PPEE examinations, interview) are also fulfilled. Please see the following [extract](#):

The Professional Engineers Board registers professional engineers in the branches of civil, electrical mechanical and chemical engineering. A person applying for registration as a professional engineer to the Professional Engineers Board is required to hold an approved degree or qualification listed in the [Professional Engineers \(Approved Qualifications\) Notification / Amendment Notification 2016](#) and acquired relevant practical experience. The applicant is required to sit and pass the Fundamentals of Engineering Examination and the Practice of Professional Engineering Examination or the oral examination (for a person previously registered as a professional engineer or is an experienced applicant). In addition, the applicant is required to attend a professional interview.

Further details on Professional Engineer registration from PEB can be found [here](#).

NAVAL ARCHITECTURE & MARINE ENGINEERING		AEROSPACE	MECHANICAL (Mainstream)
Course Code	Course Title	Course Type	Course Type
Compulsory			
MA3005	Control Theory	Not offered to Aerospace Student.	Core
MA4002	Fluid Dynamics		Core
MA4856	Naval Architecture & Marine Engineering		MPE
Any 2 of the following courses:			
MA4803	Noise & Vibration Control		MPE
MA4807	Marine Structural Integrity		MPE
MA4808	Marine Control Systems		MPE
MA4871	Non-Destructive Testing		MPE

SMART MANUFACTURING AND DIGITAL FACTORY		AEROSPACE	MECHANICAL (Mainstream)
Course Code	Course Title	Course Type	Course Type
Compulsory			
MA2004/MA2024	Manufacturing Processes/ Engineering Materials and Manufacturing Processes	N.A.	Core
MA2700	Aerospace Materials & Manufacturing Processes	Core	N.A.
MA0218	Introduction to Data Science and Artificial Intelligence	Ger-Core	Ger-Core
Any 3 of the following courses:			
MA4804	Optimisation Theory and Applications	MPE/UE	MPE
MA4822	Measurements & Sensing Systems	MPE/UE	MPE
MA4829	Machine Intelligence	MPE/UE	MPE
MA4831	Computer-Aided Engineering	MPE/UE	MPE
MA4853	Manufacturing Systems	MPE/UE	MPE
MA4884**	Systems Thinking and Systems Engineering	MPE/UE	MPE

**Old Course Code is MA5004/MA9004. MA5004 is offered to NTU students as Unrestricted Elective - MA5004 (MA9004) is classified as an UE therefore it will not fulfil the AU requirement for Major-PE. Existing students who had read MA5004/MA9004 in AY2022 and before and did not S/U will be allowed to use this course to count towards this specialisation.

SYSTEMS ENGINEERING		AEROSPACE	MECHANICAL (Mainstream)
Course Code	Course Title	Course Type	Course Type
Compulsory			
MA2006	Engineering Mathematics	Core	Core
MA4001	Engineering Design	N.A.	Core
MA4701	Aircraft Design	Core	N.A.
Any 3 of the following courses:			
MA4804	Optimisation Theory & Applications	MPE/UE	MPE
MA4849	Operations Research	MPE/UE	MPE
MA4850	Supply Chain & Logistics Management	MPE/UE	MPE
MA4853	Manufacturing Systems	MPE/UE	MPE
MA4854**	Quality Assurance & Management	MPE/UE	MPE
MA4884*	Systems Thinking and Systems Engineering	MPE/UE	MPE
MA4892	Engineering Project Management: Principles and Practice	MPE/UE	MPE

*Old Course Code is MA5004/MA9004. MA5004 is offered to NTU students as Unrestricted Elective - MA5004 (MA9004) is classified as an UE therefore it will not fulfil the AU requirement for Major-PE. Existing students who had read MA5004/MA9004 in AY2022 and before and did not S/U will be allowed to use this course to count towards this specialisation.

**MA4854 is mutually exclusive to MA4872

Design Stream (Only applies to Design Stream students)

Course Code	Course Title	Course Type
Compulsory to choose following courses to take as MPE:		
MA4829	Machine Intelligence	MPE
MA4831	Computer-Aided Engineering	MPE
MA4843	Management of Product Development	MPE
MA4846	Sustainable Design	MPE
MA4858	Product Design	MPE
MA4892	Engineering Project Management: Principles and Practice	MPE

Robotics and Mechatronics (Only applies to Robotics and Mechatronics Stream students)

Course Code	Course Title	Course Type
Compulsory to choose following courses to take as MPE:		
MA4822	Measurements and Sensing System	MPE
MA4825	Robotics	MPE
MA4829	Machine Intelligence	MPE
MA4830	Realtime Software for Mechatronics Systems	MPE
MA4831	Computer-Aided Engineering	MPE
MA4832	Microprocessor Systems	MPE
MA4845	Additive Manufacturing in Industry 4.0	MPE
MA4892	Engineering Project Management: Principles and Practice	MPE

Intelligent Manufacturing Stream (Only applies to Intelligent Manufacturing Stream students)

Course Code	Course Title	Course Type
Compulsory to choose following courses to take as MPE:		
MA4804	Optimisation Theory & Applications	MPE
MA4822	Measurements and Sensing System	MPE
MA4825	Robotics	MPE
MA4829	Machine Intelligence	MPE
MA4832	Microprocessor Systems	MPE
MA4845	Additive Manufacturing in Industry 4.0	MPE
MA4853	Manufacturing Systems	MPE
MA4884	Systems Thinking and Systems Engineering	MPE
MA4892	Engineering Project Management: Principles and Practice	MPE