

Part-Time Student Handbook 2020



School of Mechanical
and Aerospace
Engineering

MAE PT Student Handbook 2020 e-version 1.1

This Handbook is based on information available at the time of publication. The School reserves the rights to make changes without notice. Students are advised to check the School's website (www.mae.ntu.edu.sg) and their NTU emails regularly for updated information.

Table of Contents

The School	<u>1</u>
Key Faculty Members	<u>2</u>
Part-Time Programme Committee	<u>5</u>
Pastoral Care Unit	<u>6</u>
Undergraduate Office.....	<u>7</u>
General Contact Information	<u>8</u>
Programme Educational Objectives	<u>10</u>
Overview of Curriculum	<u>11</u>
Course Description	<u>18</u>
Academic System	<u>29</u>
Administrative Matters	<u>35</u>
Financial Assistance	<u>43</u>

The School

Vision

A global leader in education and research in Mechanical and Aerospace Engineering, preferred by students, industry and the community.

Mission

To provide world-class education and conduct cutting-edge research to achieve international eminence and to nurture leaders and professionals to serve society with integrity and excellence.

Key Faculty Members



Chair
Professor Ooi Kim Tiow
Phone: 6790 5486 Office: N3-02a-04
Email: d-mae@ntu.edu.sg

Associate Chair (Academic)
Assoc Professor Sunil Chandrakant Joshi
Phone: 6790 4725 Office: N3-02a-10
Email: vd-mae-acad@ntu.edu.sg



Associate Chair (Faculty)
Professor Yang Chun, Charles
Phone: 6790 6874 Office: N3-02a-06
Email: ac-mae-faculty@ntu.edu.sg

Associate Chair (Research)
Assoc Professor Wan Man Pun
Phone: 6790 6957 Office: N3-02a-25
Email: vd-mae-res@ntu.edu.sg



Key Faculty Members



Associate Chair (Students)
Assoc Professor Yeong Wai Yee
Phone: 6790 5130 Office: N3-02b-60
Email: ac-mae-students@ntu.edu.sg

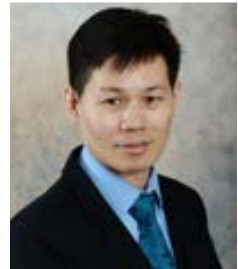
Assistant Chair (Academic)
Assoc Professor Seah Leong Keey
Phone: 6790 4824 Office: N3-02b-47
Email: asc-mae-acad@ntu.edu.sg



Assistant Chair (Faculty)
Assoc Professor Wong Teck Neng
Phone: 6790 5587 Office: N3-02c-100
Email: asc-mae-faculty@ntu.edu.sg



Assistant Chair (Graduate Studies)
Dr Chen Songlin
Phone: 6790 5935 Office: N3-02b-43
Email: asc-mae-gs@ntu.edu.sg



Key Faculty Members



Assistant Chair (Research)
Assoc Professor Domenico Campolo
Phone: 6790 5610 Office: N3.2-02-74
Email: asc-mae-res@ntu.edu.sg

Assistant Chair (Research)
Assoc Professor Anutosh Chakraborty
Phone: 6790 4222 Office: N3-02c-68
Email: asc-mae-res-pg@ntu.edu.sg



Assistant Chair (Students)
Assoc Professor Marcos
Phone: 6790 5867 Office: N3-02a-08
Email: asc-mae-students@ntu.edu.sg

Assistant Chair (Alumni & Development)
Dr Heng Kok Hui, John Gerard
Phone: 6790 5900 Office: N3.2-01-24
Email: asc-mae-alumni@ntu.edu.sg



PT Programme Committee



Programme Director
Assoc Professor Tai Kang
Phone: 6790 4444 Office: N3.2-02-76
Email: mktai@ntu.edu.sg

Academic Coordinator
Assoc Professor Hoon Kay Hiang
Phone: 6790 5523 Office: N3-02c-94
Email: mkhhoon@ntu.edu.sg



Lab Coordinator
Dr Sellakkutti Rajendran
Phone: 6790 6891 Office: N3-02c-78
Email: msrajendran@ntu.edu.sg

FYP Coordinator
Assoc Professor Li Hua
Phone: 6790 4953 Office: N3-02c-79
Email: lihua@ntu.edu.sg



Pastoral Care Unit

The Pastoral Care Unit is an embodiment of skills, knowledge and services which the School offers to promote a healthy, enjoyable and fruitful campus life for students. It ensures that all MAE students have access to counselling pertaining to academic matters, financial issues, relationships problems et cetera. Where academic performance is concerned, this unit assists the students in identifying their areas of difficulty and developing strategies to improve their academic performance. This unit also helps to administer the School's Peer Tutoring Programme. ([More information](#))

Contact Point



Mr Koh Wee Hock
Pastoral Care Manager
Phone: 6790 5507 Office: N3-02a-22
Email: mwhkoh@ntu.edu.sg

Undergraduate Office

This unit provides a variety of administrative services for our undergraduate students. Tel: 6790 5492 Location: N3-02a-14 Email: askMAE@ntu.edu.sg



Ms Agatha Ho (FYP Matters)
mklho@ntu.edu.sg



Ms Soh Mei Zhen (Course Registration)
mzsoh@ntu.edu.sg



Mr Tan Wei Zhe (Examination Matters)
tanwz@ntu.edu.sg



Ms Susan Tan (PT Student Matters)
susantanpp@ntu.edu.sg



Ms Tiana (EID Matters)
thaiyana@ntu.edu.sg

General Contact Information

Department / Enquiry of General Issues such as...	Location / General Contact
<p>Office of Academic Services</p> <p><i>Please refer to OAS website for more information on:</i></p> <p><i>-Course Registration Matters (Step-by-Step Guide, STARS planner, Registration schedule, Class schedule)</i></p> <p><i>-Examination Matters (examination timetable and venue, examination results, GPA system)</i></p> <p><i>-Administrative Matters (change of personal particulars, apply for semester leave, change of programme, withdraw from NTU)</i></p>	<p>Location: Student Services Centre, Level 2</p> <p>Office Operating Hours: Mon to Thu: 8.30am to 5.45 pm Fri: 8.30am to 5.15 pm</p> <p>For further enquiries on Matriculation/Change of Programme/Leave of Absence Tel: 6592 2451 Email: matric@ntu.edu.sg</p> <p>For further enquiries on Course Registration Tel: 6592 2445/ 2446 Email: regn_course@ntu.edu.sg</p> <p>For further enquiries on Examinations/Transcripts/ Degree Certificates Tel: 6592 2447/ 2448 Email: exam@ntu.edu.sg</p>
<p>Student Wellbeing Centre</p> <p><i>Professional counseling, group programmes and talks, training workshops</i></p>	<p>Location: University Health Service Building, #02-01</p> <p>Office Operating Hours: Mon to Thu: 8.30am to 5.45 pm Fri: 8.30am to 5.15 pm</p> <p>Tel: 6790 4462 Email: UWCstudents@ntu.edu.sg</p> <p>(More Information)</p>
<p>Centre for IT Services</p> <p><i>Computer account, resetting password, unlocking of NTU Network or Windows Live account, email application matters</i></p>	<p>IT Service Desk:</p> <ol style="list-style-type: none"> 1) Phone Hotline 6790 4357 2) Online Chat 3) Self-Service Case Logging via StudentLink 4) Website <p>IT Service Counter:</p> <ul style="list-style-type: none"> • One Stop @ SAC, NS3-01-03/03A

General Contact Information

Department / Enquiry of General Issues such as...	Location / General Contact
<p>Centre for Excellence in Learning and Teaching</p> <p><i>NTULearn e-learning portal</i></p>	<p>Location: One Stop @ SAC, N3-01-03</p> <p>Tel: 6790 4357 (from 7:00am to 11:00pm daily)</p> <p>https://www.ntu.edu.sg/cits/Pages/index.aspx</p>
<p>Medical Centres</p> <p><u>Fullerton Healthcare @ NTU</u></p> <p><u>NTU Chinese Medicine Clinic @ School of Biological Sciences</u></p>	<p>Location: University Health Service Building</p> <p>Consultation Hours: Mon to Fri: 0830 - 2100 Sat: 0930 - 1200</p> <p>Tel: 6793 6974 or 6793 6828</p> <p>Location: School of Biological Sciences, SBS-01s-68</p> <p>Consultation Hours: Mon, Tue, Wed, Fri, Sat: 0900 - 1700 Thu: 0900 – 1730, 1800 – 2030</p> <p>Tel: 6592 1732 or 6592 1733</p>
<p>Office of Finance</p> <p><i>All financial matters</i></p>	<p>Location: One Stop @ SAC, N3-01-03</p> <p>Office Operating Hours: Mon to Thu: 8.30am to 5.00 pm Fri: 8.30am to 4.45 pm Closed on Sat, Sun & Public Holidays</p> <p>Tel: 6790 4619 / 6790 5060 Email: UBS@ntu.edu.sg</p>

Programme Educational Objectives

The Programme Educational Objectives of the B.Eng. (Mechanical) programme are to:

- (i) Produce graduates with the fundamental knowledge and skills for the practice of mechanical engineering in a broad range of industries.
- (ii) Provide students with a broad and flexible curriculum with specialized electives that tailor to students' career goals and to inspire them to pursue specialized and graduate studies.
- (iii) Develop students' communication, practical and innovative skills through group design, project work, and "technopreneurship" activities.
- (iv) Provide students with opportunities to read courses in business and management so that they will be equipped to take on leadership and managerial roles.
- (v) Promote student's awareness of professional ethics, societal and moral responsibility, and the need to engage in life-long learning.

Overview of the Curriculum

Curriculum Structure

Academic Unit Requirement

Core	Major PE	GER-Core	GER-PE	Total
73	9	12	3	97

The curriculum structure for the Part-Time B.Eng. (Mech) Engineering programme comprises of the following categories of requirements:

- I. Core Courses – These are compulsory courses required to satisfy a programme’s requirement.
- II. Major Prescribed Electives (Major PE) – These are courses for specialisation in a particular degree programme.
- III. General Education Requirement (GER) – This is a curriculum requirement for broadening study.

The compulsory GER-Cores are:

- **GC0001** Sustainability: Seeing Through the Haze (1 AU)
- **HY0001** Ethics and Moral Reasoning (1 AU)
- **HW0188** Engineering Communication I (2 AUs)
- **HW0288** Engineering Communication II (2 AUs)
- **MA0101** Engineers and Society (3 AUs)
- **MA0218** Introduction to Data Science & Artificial Intelligence (3 AUs)

The compulsory GER-Prescribed Elective (GER-PE) is:

- **MA8103** Human Resource Management (3 AUs)

Prerequisites

Some courses may only be offered to students who have obtained at least the specified grade in related courses offered at a lower level. These lower-level courses are called the “prerequisites” for the higher-level courses.

Table of Curriculum

Courses offered are subject to changes due to future curriculum planning. Students are advised to check the part-time programme [webpage](#) for updated information.

Year of Study	Semester 1	Semester 2	Special Term
Year 1 24 AU	MH2810 Mathematics A (4 AU) PH1012 Physics A (4 AU) MA1002 Fundamental Engineering Materials (3 AU) GC0001 Sustainability: Seeing Through the Haze (1 AU) HW0001 Introduction to Academic Communication (0 AU) *	MA1001 Dynamics (3 AU) MA1008 Introduction to Computational Thinking (3 AU) MA2001 Mechanics of Materials (3 AU) MA2006 Engineering Mathematics (3 AU)	
Year 2 25 AU	MA2003 Introduction to Thermo-fluids (3 AU) MA2004 Manufacturing Processes (3 AU) MA2005 Engineering Graphics (3 AU) MA2009 Introduction to Electrical Circuits & Electronic Devices (3 AU)	EG0001 Engineers & Society (3 AU) MA2002 Theory of Mechanism (3 AU) MA3002 Solid Mechanics and Vibration (3 AU) HW0188 Effective Communication (2 AU) HY0001 Ethics & Moral Reasoning (1 AU)	MA2071 Laboratory Experiments (1 AU)

* For students who fail Qualifying English Test.

Year of Study	Semester 1	Semester 2	Special Term
Year 3 25 AU	MA3001 Machine Element Design (3 AU) MA3010 Thermodynamics & Heat Transfer (3 AU) MA3005 Control Theory (3 AU)	MA4079 Final Year Project (2 AU) ** MA3004 Mathematical Methods in Engineering (3 AU) MA3006 Fluid Mechanics (3 AU) MA0218 Introduction to Data Science & Artificial Intelligence (3 AU) HW0288 Engineering Communication (2 AU)	MA4079 Final Year Project (2 AU) ** MA3071 Engineering Experiments (ME) (1 AU)
Year 4 23 AU	MA4079 Final Year Project (2 AU) ** MA4001 Engineering Design (4 AU) MA4002 Fluid Dynamics (3 AU) MA48xx Major PE 1 (3 AU)	MA4079 Final Year Project (2 AU) ** MA48xx Major PE 2 (3 AU) MA48xx Major PE 3 (3 AU) MA8103 Human Resource Management (3 AU)	

** The 8 AU academic workload of MA4079 Final Year Project is spread over three semesters and one special term (i.e. 2+2+2+2 = 8 AU); however, the tuition fees for this module are billed over the first two semesters (i.e. 4 AU will be billed in Year 3 Semester 2 and 4 AU will be billed in Year 4 Semester 1).

Laboratory Experiments and Project

MA2071 Laboratory Experiments (ME) and MA3071 Engineering Experiments (ME) are scheduled in the special terms of your second and third year of study respectively.

For MA2071, students are required to complete ten (10) laboratory experiments consisting of nine (9) Log-Sheet and one (1) technical report submissions.

For MA3071, students are required to complete six (6) laboratory experiments and one (1) project.

Attendance for Laboratory Experiments and Project is COMPULSORY. A medical certificate/approved leave of absence will be required if you are absent.

Assessment is based on performance during the laboratory sessions (CAs) and written assessment (Log sheet and technical report). Each student will be assessed on both their CAs and individual written assessments (Log sheet or technical report). If you were absent for any Experiment Session you will be marked Absent (ABS) and will be given No Marks for that session.

The weights for MA2071 experiments and technical report are given in the table below:

9 Log-Sheet Experiments		1 Technical Report Experiment	
50%		50%	
CA	Log Sheets	CA	Report
50%	50%	50%	50%

The weights for MA3071 experiments and project are given in the table below:

6 Experiments		1 Project	
50%		50%	
CA	Log Sheets	CA	Report
50%	50%	50%	50%

Submission of Reports

Students will submit the project report to the respective supervisor for assessment by the last lab session or as instructed by the course coordinator.

It is the student's responsibility to complete the report before the assessment deadline.

Locations of Laboratories

- CAE Lab 1 (N3-B3b-05)
- Energy Systems Lab (N3.1A-B4-01)
- Fluid Mechanics Lab (N3-B2b-03)
- Heat Transfer Lab (N3-02a-01)
- Manufacturing Process Lab 1 (LHN-B4-03)
- Manufacturing Process Lab 2 (LHN-B3-06)
- Materials Lab 1 (N3.1-B2b-02)
- Mechanics of Machines Lab (N3-B1c-03)
- Mechanics of Materials Lab (N3.2-B2-01)
- Mechatronics Lab (N3.2-B1-03)
- Metrology Lab (N3.1-B3b-03)
- Precision Lab (N3-B4-03)
- Thermal & Fluids Lab (N3-B2c-06)



For more information, students may contact **Dr Sellakkutti Rajendran** (Lab Coordinator) | 6790 6891 | N3-02c-78 | msrajendran@ntu.edu.sg

Final Year Project

The final year project (FYP) is an integral and important part of the degree programme. It is equivalent to 8 academic units (AUs), and the award of honours is dependent upon the student's performance in the FYP.

You would commence your FYP in Semester 2 of the third year of study. It is to be completed over three semesters and one special term. No extension of this period is allowed.

In order to qualify for commencement of the FYP, students must have:

- (a) Gained Waiver of MA2079 Engineering Innovation & Design (EID) and MA3079 Professional Internship (PI) and
- (b) Accumulated at least 56 AUs

All students who have met the above requirements are required to embark on the FYP immediately at the beginning of the next semester. No delay in the commencement of the FYP is allowed.

If a student has successfully obtained waiver of EID/PI, but is unable to accumulate the required number of AUs after completing his third year of study, he will be permitted to commence his FYP only after he has accumulated the required number of AUs following another semester of study.

All FYP students are strongly advised to see their project supervisors on a regular basis as such meetings are very necessary and important to the students' progress and performance in the projects. All FYP students are required to submit FYP reports and undergo oral presentations for their FYP at the end of the project. The oral presentations are scheduled immediately after the examination period.

FYP students who have to go for in-camp training or overseas business assignment on the scheduled date of the oral presentation are required to submit supporting documents to the FYP coordinator as soon as it is known so that an alternative (earlier) date can be arranged for their oral presentation.

If the student's progress is unsatisfactory, the supervisor may recommend an extension of the project beyond the three (3) semesters and one (1) special term duration. Such extension, if approved by the School, will come with a serious penalty on the student's grade for the FYP. If a student fails his/her FYP, he/she has to do a new FYP with a different supervisor for another three (3) semesters and one (1) special term period.

The School will notify students by email when they become eligible to start FYP.



For more information, students may contact **Assoc Prof Li Hua** (FYP Coordinator) | 6790 4953 | N3-02c-79 | lihua@ntu.edu.sg

Course Description

Year 1 Courses

GC0001 Sustainability: Seeing Through the Haze (1 AU)	Pre-requisite:
Sustainability from perspectives of various disciplines, including humanities, business, policy, economics, and science. Students will learn about sustainability through a case study of oil palm plantation.	Nil

HW0001 Introduction to Academic Communication (0 AU)	Pre-requisite:
Introduction; Drafting clear paragraphs; Constructing clear and concise sentences; Reading and oral skills	Nil

MA1001 Dynamics (3 AU)	Pre-requisite:
Kinematics of Particles; Kinematics of Rigid Bodies; Kinetics of Particles; Kinetics of Rigid Bodies	Having read PH1012 and MH2810

MA1002 Fundamental Engineering Materials (3 AU)	Pre-requisite:
Engineering materials and their mechanical properties; Bonding, Crystal Structure, Defects, and Diffusion; Strengthening and toughening mechanisms; Creep, fatigue and fracture; Ceramic Materials, Structure and Properties; Structure of Polymers; Corrosion and Degradation	Nil

MA1008 Introduction to Computational Thinking (3 AU)	Pre-requisite:
Concepts of Computational Thinking; Overview Programming Language; Basic internal operation of computer; Basic program structure; CT concept; Limit of computing; Computing Trends; Social-Ethical Issues and Ramifications of Computing	Nil

MA2001 Mechanics of Materials (3 AU)	Pre-requisite:
Review, Stress and Strain; Torsion; Shearing Stress in Beams; Transformation of Stress and Strain; Deflection of Beams; Columns	Nil
<hr/>	
MA2006 Engineering Mathematics (3 AU)	Pre-requisite:
Linear algebra; vector calculus; Laplace transformation; Fourier Analysis	MH2810
<hr/>	
MH2810 Mathematics A (4 AU)	Pre-requisite:
Functions and Derivatives; Integration; Complex numbers and Vectors; Power Series; Multivariable Functions & Partial Derivatives; Ordinary Differential Equations	Nil
<hr/>	
PH1012 Physics A (4 AU)	Pre-requisite:
Vectors; Kinematics; Forces and Torques; Newton's Laws of Motion; Impulse and Momentum; Work and Energy; Thermal Physics; Electric Field; Magnetic Field; Motion of Charged Particles and Applications; Circuits	Nil

Year 2 Courses

HW0188 Effective Communication (2 AU)	Co-requisite:
Basic academic literacy skills; written and oral communication skills for the field of engineering	HW0001
HY0001 Ethics and Moral Reasoning	Pre-requisite:
Introduction to three major ethical theories' utilitarianism, Kant's deontology, and virtue ethics; ethical principles underlying academic integrity, research ethics, and intellectual property; ethics of environmental sustainability and conservation	Nil
EG0001 Engineers and Society (3 AU)	Pre-requisite:
History of Engineering; Pre-independence history of Singapore; Social and political development issues; Economic and industrial development issues; National cohesion and total defense; Engineering practice in Singapore; Engineering ethics; Our neighbours and international; Challenges of globalization and the new economy; Contribution of engineers in the new millennium	Nil
MA2002 Theory of Mechanism (3 AU)	Pre-requisite:
Fundamental Concepts of Mechanisms; Gears and Gear Train; Motion in Mechanisms: Kinematic Analysis; Motion in Mechanisms: Static-Force Analysis; Motion in Mechanisms: Dynamic-Force Analysis; Design and Analysis of Cam-and-Follower Systems	MA1001
MA2003 Introduction to Thermo-fluids (3 AU)	Pre-requisite:
Properties of pure substances; Work and heat; Energy and the first law; Energy balance for closed systems and steady state control volumes; Submerged surfaces and bodies; Elementary fluid dynamics	Nil
MA2004 Manufacturing Processes (3 AU)	Pre-requisite:
Introduction and overview of manufacturing; Dimensions and surfaces measurement; Casting; Shaping processes for polymers;	Nil

Sheet metalworking; Materials removal processes; Joining processes;
Microelectronics manufacturing

MA2005 Engineering Graphics (3 AU)

Pre-requisite:

Orthographic projections; Pictorial views and technical sketching;
Drawing standards and practices; Sectional views and machine
drawings; Development of surfaces; Dimensioning standards,
systems and conventions; Dimensioning features and finishes;
Tolerance dimensioning and limits; Geometric dimensioning

Nil

MA2009 Introduction to Electrical Circuits & Electronic Devices (3 AU)

Pre-requisite:

Analysis of Resistive Linear Networks; Energy Storage Elements
and Transient Analysis; AC Network Analysis; Operational
Amplifiers and applications; Basic semiconductor devices and
applications; Logic Circuits

Nil

MA2071 Laboratory Experiments (ME) (1 AU)

Pre-requisite:

Consists of 10 experiments related to Year 2 core courses

Nil

MA3002 Solid Mechanics and Vibration (3 AU)

Pre-requisite:

Energy Methods of Analysis; Fracture Mechanics; Fatigue;
Vibrations for Single-Degree-of-Freedom System; Vibrations for
Two-Degree-of-Freedom System

MA2001

Year 3 Courses

MA0218 Introduction to Data Science & Artificial Intelligence (3 AU)	Pre-requisite:
Data-Analytic Thinking; Data Pipeline; Data Presentation; Data-driven Inference; Data-driven Identification; Digital Storytelling; Artificial Intelligence; Reinforcement Learning and AI; Ethics in DS&AI; State-of-Art in DS&AI	MA1008

HW0288 Engineering Communication (2 AU)	Pre-requisite:
Concepts in engineering communication and advanced professional communication skills, with reference to technical communication and the Final Year Project, and Communication in the contemporary workplace	HW0188

MA3001 Machine Element Design (3 AU)	Pre-requisite:
Power transmission components; Dimensioning and tolerancing according to ISO standards, surface finish; Bearings; Threaded fasteners, power screw; Design of load carrying joints; Designing against fatigue loading and wear; Design of machine structures	Having read MA2001 and MA2002

MA3004 Mathematical Methods in Engineering (3 AU)	Pre-requisite:
Partial Differential Equations (PDEs); Finite Element Method (FEM); Computational Fluid Dynamics (CFD)	MH2810

MA3005 Control Theory (3 AU)	Pre-requisite:
Introduction and Revision of Laplace Transform; System Responses - transient and steady; PID Controls; Root Locus Technique; Frequency Response Methods	Having read MA2006

MA3006 Fluid Mechanics (3 AU)	Pre-requisite:
Momentum equation and its applications; Dimensional analysis and similitude; Internal flows and piping systems; Principles and applications of fluid machines	MA2003
<hr/>	
MA3010 Thermodynamics & Heat Transfer (3 AU)	Pre-requisite:
Second law and entropy. Entropy balance for closed systems and steady state control volumes. Ideal gas mixtures and psychometrics. Heat transfer: conduction, convection and radiation	MA2003
<hr/>	
MA3071 Engineering Experiments (ME) (1 AU)	Pre-requisite:
Consists of 6 experiments and 1 project related to Year 3 core courses	Nil

Year 4 Courses

MA4001 Engineering Design (4 AU)	Pre-requisite:
Product Definition; Conceptual Design; Embodiment Design; Detailed Design & Engineering; Analysis & Documentation; Mechanical Power Transmission Systems; Hydraulic & Pneumatic Systems; Electric Motors & Linear Motion Systems; Programmable Logic Control (PLC) techniques; Review of basic engineering materials properties & failure modes; Basics materials selection in design; Effect of component geometry in materials selection; Compound objectives & multiple constraint problems; Cost estimation tools	Having read MA3001
MA4002 Fluid Dynamics (3 AU)	Pre-requisite:
General equations of motion; Potential flow; Isentropic compressible flow; Normal shock waves, Fanno & Rayleigh line flows; Boundary layer flow; External flow; Performance characteristics of pumps & turbines; Unsteady flow	MA3006
MA8103 Human Resource Management (3 AU)	Pre-requisite:
Nature of Human Relations; Study of Individual Behavior; Behavior of Groups and Productivity Practices; Managing Technological Change; Managing in Knowledge-based Futures; Fundamentals of Leadership; HRM Skills of a Leader: Developing, Appraising and Rewarding Staff; Managing Performance: Corporate, Group and Individual; Productivity Innovation, Creativity and Inventive Culture; Internationalization and HRM; Managing Industrial Relations; Personal Career Development; Topical HRM Issues.	Nil
MA4079 Final Year Project (8 AU)	Pre-requisite:
<u><i>This project spans across 3 semesters and 1 special term.</i></u>	
Students are required to analyze and synthesize problems in any of the disciplines of mechanical and production engineering through a project requiring application of basic engineering principles. The project may take any one or a combination of the following forms: feasibility study,	Accumulated at least 56 AU and obtained

product development, computer modelling and analysis, design and construction, testing and experimental investigation.

waiver of
EID/PI

Major Prescribed Electives

In addition to the year-4 core courses, students have to read three Major Prescribed Electives. Students may choose their Major Prescribed Electives (PEs) from any of the below specialisation groups. Those who have passed at least three Major PEs from one specialization group will be deemed to have specialised. Specialisation is optional.

Manufacturing Engineering

This provides students with a broad knowledge of materials engineering and a fundamental understanding of automated flow lines, vibratory bowl feeders, industrial robots, rapid prototyping and computer-aided manufacturing. Students are taught the roles of engineering logistics in achieving corporate goals of reducing manufacturing costs and the savings that come from planning and managing supply chains effectively.

Major PEs (Manufacturing Engineering)
MA4837 Net Shape Manufacturing
MA4838 Non-conventional Manufacturing Processes
MA4842 Engineering Metrology
MA4845 Manufacturing Automation
MA4853 Manufacturing Systems

Systems Engineering

Systems Engineering helps to integrate both engineering and non-engineering disciplines in the conceptualisation, design, development (or manufacture) and distribution of products and in the collection of used products for reuse, recycling and disposal. Systems Engineers help to realise the notion of integrated development in each sector of the economy.

Major PEs (Systems Engineering)
MA4849 Operations Research
MA4850 Supply Chain & Logistics Management
MA4853 Manufacturing Systems
MA4854 Quality Assurance & Management

Course Description

MA4837 Net Shape Manufacturing (3 AU)

Advanced metal casting; Powder metallurgy; Powder shaping and full density processes; Bulk deformation processes; Sheet metal forming processes; Plastics shaping processes; New and emerging technologies

MA4838 Non-Conventional Manufacturing Processes (3 AU)

Non-conventional manufacturing processes with relevance to industries such as biomedical, aerospace and precision engineering and comparing non-conventional processes with the more traditional manufacturing approaches

MA4842 Engineering Metrology (3 AU)

Introduction to the fundamentals of measurement; SI system; Terminology; Calibration; Areas of metrology; Principles, Instrumentation; Application; Case studies of historical examples of famous metrological failures, various measurement examples as well as industry-based problems.

MA4845 Manufacturing Automation (3 AU)

Basic knowledge of manufacturing automation; Types of manufacturing automation; Additive Manufacturing (AM) and its applications; Computer-aided manufacturing and automatic assembly

MA4849 Operations Research (3 AU)

Refresher on probability models; Decision-making under uncertainty; Utility and risk analysis; Forecasting; Queuing models; Inventory models, planning and control; linear and integer programming; transportation and assignment problems; network optimization; Application to manufacturing, logistics and healthcare systems

MA4850 Supply Chain and Logistics Management (3 AU)

Introduction to supply chain management; Value of information; Multi-echelon Inventory models; Supply Chain strategies; Supply chain and logistics network design; Warehousing and transportation management; SC benchmarking and performance measurement.

MA4853 Manufacturing Systems (3 AU)

Introduction to Manufacturing Systems, Facility layout design and line balancing, Production planning, Variability, Production scheduling and shop floor control.

MA4854 Quality Assurance and Management (3 AU)

Introduction to Quality Assurance and Management including the fundamentals, philosophies, practices, tools and international standards

Academic System

The University's academic structure for its undergraduate programmes is based on the Academic Unit System. The system provides opportunities for students to broaden their learning experience and progress at a pace most suited to their individual needs while maintaining high academic standards.

The main features of the Academic Unit System are the semester arrangement of the academic year and the use of Academic Units (AU) for measuring academic workload.

Academic Calendar

The academic year starts off with an orientation week. It is divided into two semesters, Semester 1 of 18 weeks and Semester 2 of 17 weeks. Examinations are held at the end of each semester. There are two special terms during the Semester 2 vacation.

Academic Units

Under the Academic Unit System, each course is assigned a certain number of AU. The AU is a measure of the student's workload associated with both class attendance and preparation. For a typical one-semester course, the number of AU is calculated as follows:

- 1 hour of lecture/tutorial per week: 1 AU
- 3 hours of laboratory/fieldwork per week: 1 AU

Academic Workload

To complete the degree requirements within the normal specified period of candidature, students are encouraged to carry an academic load as specified in the Table of Curriculum. Overloading of courses is subject to School's approval. Students on Academic Warning or Academic Probation are not allowed to overload beyond 3 courses.

Registration of Courses

All students must register their courses through the Student Automated Registration System (STARS) according to the schedule announced by the Office of Academic Services. Students who join any classes without registration will not be allowed to take the examination(s) for the course(s) involved.

Students with outstanding fees will be barred from course registration. Students must clear their outstanding fees at least three working days before their scheduled date of course registration or they will be denied access to STARS for course registration.

Students may add or drop any course within the add/drop period as announced by the Office of Academic Services. A course that is dropped during the add/drop period will not appear in the official transcript. A student who is still registered for a course after the add/drop period but did not subsequently sit for the examination will be deemed to have read and failed the course. An 'F' will appear on his official transcript.

Freshmen in their first semester of study do not need to register as the courses will be pre-allocated by the School. However, they would have to register for courses on their own from their second semester onwards.

Freshmen Course Exemption

Students who were awarded a Certificate of Merit and/or have obtained a Diploma-Plus Certificate in Mathematics and/or Science and have met the exemption criteria may be considered for exemption from:

- MH2810
- PH1012
- MA1008

The School will notify students via email to apply for these exemptions before the start of their matriculating semester.

Waiver of Practical Training Modules

A Full-Time B.Eng. (Mech) student is required to pass the practical training courses, MA2079 Engineering Innovation & Design (EID) and MA3079 Professional Internship (PI), in the Second and Third Year of study, respectively.

However, a Part-Time B.Eng. (Mech) student must apply for waiver of these courses by obtaining the relevant industrial work experience on a technical job.

For waiver of EID, you need six (6) months of industrial work experience on a technical job. For waiver of PI, you need another six (6) months of industrial work experience on a technical job.

You must have gained these twelve (12) months of experience preferably between the start of Year 1 Semester 1 and end of Year 2 Semester 1. However, if you already have prior work experience before joining NTU, your prior experience may be considered.

Waiver of EID and PI is a pre-requisite for commencing MA4079 Final Year Project (FYP) in the fourth year of study. Hence, any delay in obtaining EID and PI waiver may lead to a delay in the completion of FYP.

The School will notify students via email to apply for waiver of MA2079 and MA3079.

Classification of Students

Students are classified as Year 1 to Year 4 according to the number of AU earned. Students placed on Academic Warning and Academic Probation will not be re-classified until they have been restored to good academic standing.

Number of Academic Units Earned (Core and Prescribed Electives)			
Year 1	Year 2	Year 3	Year 4
0 - 16	17 - 39	40 - 55	56 and above

Period of Candidature

The period of candidature is as follows:

Normal:	4 years
Minimum:	3.5 years
Maximum:	6 years

Examination

An examination for each of the courses offered in the semester is held at the end of the semester. Students are not allowed to retake courses they have passed in order to improve on the grades of these courses. The grades for all attempts in all courses taken by a student are shown in his official transcript.

Grade Point Average (GPA) System

Grades and grade points are assigned as follows:

Letter-Grade	Grade Point
A+	5.00
A	5.00
A-	4.50
B+	4.00
B	3.50
B-	3.00
C+	2.50
C	2.00
D+	1.50
D	1.00
F	0.00

The Cumulative Grade Point Average (CGPA) represents the grade average of all courses (including failed courses) attempted by a student. The computation of CGPA is as follows:

$$\frac{[Grade\ Point\ x\ AU\ for\ Course\ 1] + [Grade\ Point\ x\ AU\ for\ Course\ X] + \dots}{[Total\ AU\ attempted\ in\ all\ the\ semesters\ so\ far]}$$

CGPA calculator can be found [here](#).

Freshmen Year GPA Exemption

Effective from AY2014-15, up to 6 letter-graded courses with fail grades on first attempt in the Freshmen Year will be excluded from GPA computation. This applies to examinable and non-examinable courses taken in the student's first 2 semesters of study in NTU, including adjoining Special Terms.

GPA exemption is not applicable for courses with fail grade taken on the second or subsequent attempts in the Freshmen Year.

The unused quota of 6 courses will lapse after the Freshmen Year.

Students are not eligible for promotion to the next study year if their CGPA is nil arising from GPA exemptions, even if they meet the AU criteria.

The fail grade exempted from GPA computation will remain on the transcript.

Graduation Requirements

To be eligible for the award of a Bachelor's degree from NTU, a part-time student must fulfill the following conditions:

- i. Successful completion of the prescribed academic unit requirement as set out by the course curriculum.
- ii. A minimum CGPA of 2.00 at the end of the final semester.

The criteria for satisfactory academic standing in any given semester are:

- i. Maintaining a minimum CGPA of 2.00
- ii. Completing at least 75% of the normal AU workload

Academic Standing

- i. Students with poor results will be accorded the following academic standing and subjected to performance review:

- Academic Warning – if the CGPA falls below 2.00 for any given semester.
- Academic Probation – if the CGPA stays below 2.00 for the following semester.
- Academic Termination – if the CGPA is still below 2.00 for the 3rd consecutive semester, or at the end of the final semester of study.

A letter of termination will be issued. Appeal against termination on the grounds of extenuating circumstances may be made, subject to the following rules:

- The appeal must be submitted to the relevant School within 2 weeks after the release of the semester examination results or before the start of the next semester, whichever is earlier.
 - Normally only one appeal is allowed per candidature.
- ii. A minimum CGPA of 2.0 must be maintained at the end of each semester to qualify for the overloading of courses.

Classification of Degree

The cut-off for each degree class is as follows:

CGPA Range	Degree Classification
	4-year Courses
4.50 - 5.00	Honours (Highest Distinction) with at least an 'A-' grade for the Final Year Project
4.00 – 4.49	Honours (Distinction)
3.50 – 3.99	Honours (Merit)
3.00 – 3.49	Honours
2.00 – 2.99	Pass

Administrative Matters

Change in Personal Particulars

Postal address and contact numbers are important means of correspondence. To avoid any communication lapse, all students are advised to update his/her personal particulars via **Studentlink** whenever there is a change in address, employment or contact number(s).

Leave of Absence

Students must apply for medical leave or short leave of absence with their respective Schools if they cannot attend classes on the following occasions:

- On days when there are laboratory sessions
- On days when quizzes or tests are conducted during classes
- On any other occasions that tutor(s) or lecturer(s) deemed as compulsory for students' attendance

i. **Categories of Leave Not Approved**

- Returning to home country during festive periods e.g. Chinese New Year, Hari Raya, etc.
- Participating in activities (in and outside campus) organised by student bodies

ii. **Medical Leave during Term Time**

Students who are granted medical leave on the various abovementioned occasions must complete a Medical Certificate Leave Form and deposit the form attached with the medical certificate to the Collection Box at the MAE Undergraduate Office at N3-02a-14.

All medical certificates must be submitted not later than 7 working days after the medical leave. If students submit the medical certificate after the deadline, they will be given zero mark for any test or quiz that they were absent from. Medical certificate leave forms can be downloaded from the School's website for [part-time undergraduate programme](#).

iii. Medical Leave taken during Examination Periods

Students who are absent from an examination due to illness are required to submit the original medical certificate (MC) using the MC Submission Form, together with the Authorisation for Release of Information and Acknowledgement (AAA) Form.

These forms are available online and must be submitted to the Office of Academic Services at the same time and within two working days of absence from the examination. For further details, please click [here](#).

iv. Short Leave of Absence (< 7 days)

Students who are absent from school due to non-medical reasons like in-camp training, business trip or other personal commitments are required to fill up the Short Leave of Absence (LOA) Form. The completed form must be submitted with supporting documents to the MAE Undergraduate Office. A generated email will be sent to the student's NTU email account to notify of the approved status. The form is available [here](#).

v. Compassionate Leave

Compassionate leave will be granted in the event of the demise of an immediate family (defined as parents, siblings and grandparents). Normally absence from School within 7 days of the event and on the day of the funeral is accepted as valid leave of absence on compassionate ground.

vi. Semester Leave (1 – 2 semesters)

Students who wish to apply for leave of absence for 1 – 2 semesters need to apply for their leave online via Studentlink → Administrative Matters →

Semester Leave of Absence and upload the relevant supporting documents. **Application must be submitted by the end of Week 2 of the semester, otherwise the student will be required to pay the tuition and miscellaneous fees for the entire semester.** Upon receipt of the student's application, he/she will be called in for an interview if necessary. The purpose of the interview is to advise the student from an academic perspective to make sure that he/she is fully aware of the implications of taking semester leave. The Office of Academic Services will write to the student about the outcome of the application.

Student Intranet Account / Studentlink / PIN

All students who are admitted into NTU will be given access to the NTU student network account. Students are required to log into their account with their PIN number within the first week of the semester. If student forget their PIN number, he/she can re-set it at his/her own convenience via the Self-Service Student-Link PIN Reset. More details are available [here](#).

The Centre for IT Services (CITS) can be contacted at 6790 4357 or CITS helpdesk via servicedesk@ntu.edu.sg.

A host of important information and notices such as examination time-table, examination seating arrangement, semester time-table, make-up class schedule, report submission schedule, academic calendar, application to appeal for examination results, subject registration, FYP selection, etc. can be obtained through NTU Internet website and **StudentLink**.

All students are strongly encouraged to log into the website regularly to update themselves with the latest news, events and happenings.

NTU E-Mails

NTU students' E-mail account will be allocated to all students at the beginning of his/her entry to the Part-Time B.Eng Programme. All students are strongly encouraged to **read NTU e-mails** regularly as important information to

students from the School/NTU will be disseminated through this media. Lecturers may also contact students through this avenue.

Time-Table

Students may have to attend classes for 4 or 5 weekday evenings depending on the number of courses they have registered. The semester timetable can be obtained at the School website for [part-time undergraduate programme](#).

Submission of Reports / Correspondence

Any reports to be submitted for assessment, or any correspondences, can be dropped into the collection box marked “Deposit Box” at the MAE Undergraduate Office (N3-02a-14) during or after office hours.

The opening hours of MAE Undergraduate Office are from 8.30am to 5.30pm, Monday to Thursday and 8.30am to 5.00pm for Friday, unless otherwise informed. Kindly indicate clearly the name of lecturer/tutor on the reports/correspondences intended for them.

Make-Up Classes / Lab Sessions

Should any class sessions fall on a public holiday, the School will arrange make-up classes if the lecturers deemed that it is necessary. You will be notified of all make-up classes accordingly by the lecturer.

If a student misses any class test/quiz (for continuous assessment) during the semester, he/she should make an alternative arrangement with the lecturer concerned to take the test/quiz. Please be informed that these continuous assessments contribute towards the overall grades for the course. In addition, the student is also required to submit the respective application forms for submission of Medical Leave or application of Short Leave, whichever is applicable, to the MAE Undergraduate Office.

Please note that there is no make-up lesson for laboratory sessions should the student fail to attend it.

Academic Counselor

To provide students with academic guidance, student may approach the academic coordinator of the Programme for academic advice:

Associate Professor Hoon Kay Hiang

Phone: 6790 5523

Email: mkhhoon@ntu.edu.sg

Office: N3-02c-94

Conversion from Part-Time to Full-Time

After the end of year-2 semester-2, students may be allowed to convert their candidature to full-time study. Consideration for conversion is on a case-by-case basis and students who convert to full-time study **ARE NOT** permitted to revert back to part-time study.

Students who wish to convert to full-time study are required to apply for conversion at the end of year-2 semester-2. More information can be found [here](#).

Please note that no conversion is allowed from Year-3 semester-2 onwards.

Examination Issues

All examination matters such as examination time-table, examination rules and regulations, examination hall, seat allocation, etc. are planned by the Office of Academic Services (Examination Branch). The School may relay relevant information to you.

You will be required to sit for the examination of a course once you are registered for it, except for non-examinable courses such as lab experiments and projects. Under Statute 14 of the University's Regulations, a student who has been registered for a course and fails to take the examination for the course shall be deemed to have sat and failed the examination unless the

Board of Examiners is satisfied that there is good and sufficient reason for such failure to take the examination.

All calculators to be used in the examination hall must be registered and bear a valid seal from the School. A list of approved calculators and the registration period for calculators will be made known to you at least one month before the examination period in each semester.

A certification letter can be obtained from the School to facilitate the application of examination leave from your work. Please contact the School if you require the letter.

A student who is absent from an examination on account of illness is permitted to appear for the examination at the next period of the examination provided that he submits a medical certificate (MC) and an Authorisation for Release of Information and Acknowledgement Form (AAA) endorsed by a medical practitioner (registered with the Singapore Medical Council) to the Office of Academic Services within two (2) working days of the absence from the examination. Any fee payable for the medical examination shall be paid by the candidate.

Examination Seating Arrangement

All students will be required to check their Examination Seating Arrangements on-line by logging onto the **StudentLink**.

Examination Papers

Questions of past years' examination papers submitted by the various schools are managed by NTU Libraries and made available [here](#).

For solutions, please consult your respective instructors.

Facilities within the School

For computer facilities, the following labs will be available to you, provided that you do not interrupt any scheduled activities such as lessons, VIP visits or maintenance.

Laboratory	Location	Time Available For Use
Computer Aided Engineering Lab 1	N3-B3b-05	0830 to 1700hrs on weekdays Closed on Saturdays, Sundays and Public Holidays
Computer Aided Engineering Lab 2	N3.2-01-34	0830 to 1700hrs on weekdays Closed on Saturdays, Sundays and Public Holidays

For the use of other lab facilities apart from the scheduled lessons such as projects, you will need to get permission from your project supervisor. Your project supervisor will inform the lab concerned. Please bring along your student card for identification when you use any of the School's facilities.

Library Services

NTU Libraries provide a wide and diverse range of resources to support the NTU scholarly and research community. Currently there are eight NTU libraries on campus providing space, resources and services to support learning and research. Some of these libraries open extended hours before and during examination periods. All libraries are wireless enabled and there are more than 700 work stations available for use.

All NTU students (including part-time students) are automatically library members.

LIBRARY	LOCATION
Art, Design & Media Library	ART-01-03, 81 Nanyang Avenue
Business Library	N2-B2b-07, 50 Nanyang Avenue
Chinese Library	S3.2-B5-01, 50 Nanyang Avenue
Communication & Information Library	CS-01-18, 31 Nanyang Link

Humanities & Social Sciences Library	S4-B3c-05, 50 Nanyang Avenue
Lee Wee Nam Library	NS3-03-01, 50 Nanyang Avenue
Library Outpost	LHS-01-03, 52 Nanyang Avenue

More information can be found [here](#). Students are encouraged to browse through the websites to familiarize themselves with the rules and regulations governing the use and loan of the library materials, as well as the procedure of searching the library through OPAC.

Photocopying Services

Photocopying services are available at all libraries, provided by commercial suppliers for user's convenience. Payment is by CashCard only except for Wang Gungwu Library which requires cash payment. CashCards are sold at Chinese Library, Lee Wee Nam Library Printing Room and Business Library Copy Room and can be topped up at the e-payment kiosks at all libraries.

Financial Assistance

NTU believes that no student should be denied the opportunity of a university education because of financial difficulties. In order to enable such students to pursue a university education, NTU offers several financial assistance programmes for students pursuing a part-time degree programme:

Financial Scheme	Brief Details (for updated info, please enquire at the Office of Admissions and Financial Aid)
Post-Secondary Education Account (PSEA)	<ul style="list-style-type: none"> • Full-time and part-time undergraduates who have a PSEA account • PSEA scheme allows students to utilize their own and/or their siblings' PSEA funds for the payment of their tuition fees and miscellaneous fees
NTU Study Loan	<ul style="list-style-type: none"> • Singaporean part-time students pursuing their first undergraduate degree • Must be held concurrently with the maximum 90% Tuition Fee Loan • Per capita monthly household income (PCI) \leq S\$2,700 • Balance of 10% of tuition fee payable, no living allowance loan option
Tuition Fee Loan	<ul style="list-style-type: none"> • Singaporean part-time students pursuing their first undergraduate degree • Pursuing a part-time programme due to financial reasons • Loan covers up to 90% of the subsidised tuition fee payable, does not cover compulsory miscellaneous fees and hostel fee
Higher Education Bursary	<ul style="list-style-type: none"> • Singaporean students pursuing their part-time undergraduate degree course and receiving MOE Subsidy • Must not concurrently hold other bursaries or scholarships • Not eligible if taking only repeat modules for that semester • Gross monthly per capita household income (PCI) \leq \$2,250 • Awarded depending on your financial situation and criteria set down by MOE

Details of the above financial schemes are posted in the Office of Admissions and Financial Aid [website](#).

MOE Tuition Fee Subsidy

With effect from Academic Year 2011 onwards, eligible students enrolled in NTU part-time degree programmes can pay subsidized tuition fees funded by Ministry of Education (MOE):

Students must meet the following criteria in order to qualify for the subsidy:

- i) Singapore Citizen (SC) or Singapore Permanent Resident (SPR) who has not previously received government subsidy/sponsorship for a first degree;

(Students who change their SC / SPR status after the admission period must update Office of Academic Services before they submit their application)

- ii) Be at least 21 years of age;
- iii) Has 2 years of full-time work experience or has fully discharged his full-time national service liability or is currently employed on a full-time basis.

Applications for MOE fee subsidy are submitted online when students accept an NTU Offer of Admission. Students who become eligible in their subsequent years of study may apply at the beginning of each new semester. Application guidelines and deadlines are available at the Centre for Professional and Continuing Education [website](#). For enquiry, students may email [PaCE](#).

School of Mechanical and Aerospace Engineering

Nanyang Technological University

50 Nanyang Avenue Singapore 639798

Tel: (65) 6790 5492 | Fax: (65) 6795 4172

www.mae.ntu.edu.sg