MAE

School of Mechanical and Aerospace Engineering

Power your Future and Take Flight with us
The School of Mechanical and Aerospace Engineering, one of the three pioneering schools of Nanyang Technological University, stands firm on the fundamentals of mechanical and aerospace engineering, while continuing to break new grounds in teaching and research.

As we stand on the cusp of the 4th Industrial Revolution and in an ever changing global economy, the school is committed to provide the very best education one can ever have.

In teaching, engineering fundamentals form the bedrock of our curriculum. Students are encouraged to broaden their scope and explore their interests through electives that they can freely choose. Lectures, with the assistance of online learning technologies, are the central platform of delivery. Our students are frequently challenged and stretched through projects as well, many of which they have to define, discover the problems and then solve themselves. In addition, the school encourages our students to embrace the uncertainty in the global markets today and to cultivate a culture of lifelong learning through a plethora of hands-on workshops, invited talks with industry leaders as well as training sessions with our professional in-house career coaches.

In research, we have attracted large grants that allow us to establish research centres on areas of current interest to the industry and Singapore. These areas include 3D Printing, Aerospace Engineering, Air Traffic Management, Naval Architecture and Marine Engineering, Optical Engineering, Remanufacturing, Robotics and Intelligent Systems and Sports Research. These grants enable us to strengthen our research and work with industry partners. Very importantly, they are also the vehicle for us to bring front-line industry problems to the classroom, exposing our students to deep relevant issues and, in many cases, involving them in solving the problems too. Innovation is in our DNA as well, some of our faculties and even our students have taken their research further and commercialise them through spin-off companies.

To deliver the best education, we spare no effort in recruiting the best minds from well-respected institutions around the globe. Our efforts serve to provide students with a holistic education by equipping them with the right skill sets and knowledge that is future-ready. Our track record speaks for itself. Majority of our students secure employment within three months of their graduation, and many well before. Many of our alumni are now in senior positions in their organisations or leaders in their field.

We build our students not just to be good engineers, but wholesome human beings, creative and ready to face challenges head on. Our graduates are clearly the wealth and value creators of the future. I invite students wholeheartedly to join the school of MAE, so that together we can build a better future for all.
Be everything you’ve ever aspired to be at NTU MAE

1st in Singapore 11th in the world*

*According to QS World University Rankings® by Subject 2017.

Innovate!
NTU MAE is home to innovative projects that you can be a part of, such as the world’s first flexible endoscope with small robotic fingers, solar cars, 3D printed parts, and unmanned aerial vehicles that fly and navigate using GPS.

Collaborate!
Our alliances with industry leaders keeps our curriculum and projects on the cutting edge, as we work with renowned partners such as Rolls Royce, Leonardo, the Civil Aviation Authority of Singapore (CAAS), Sembcorp Marine, and many others.

Grow!
We believe in moulding well-rounded graduates with the technical know-hows, communication skills, and leadership qualities to excel in professional careers. With our versatile curriculum, graduates can specialise in different fields, including marine & offshore, oil & gas, aerospace, robotics, nanotechnology, and more.

Student Life @ MAE
There’s so much to experience at NTU MAE, explore the possibilities!
AEROSPACE
ENGINEERING

The aerospace industry in Singapore encompasses a broad spectrum of activities. Being a global aviation hub, high air traffic growth in Singapore is expected with the operation of fourth passenger terminal and additional runways. To ensure the smooth flow of flights in and out of Singapore, CAAS has built a $72 million research centre in School of MAE to develop its air traffic management capabilities.

Why choose Aerospace Engineering?

- Ranked as one of the top undergraduate programmes in Singapore
- The first and only full-fledged aerospace engineering degree in Singapore
- World class facilities

CAREER PROSPECTS

On graduating with a degree in Aerospace Engineering, you can look forward to a career in:

- Aerospace Consulting
- Air Traffic Management
- Aircraft Design and Manufacturing
- Aircraft Operations and Maintenance
- Aviation Regulatory Bodies
- Defence Systems and Management
- Finance and Banking
- Project Planning and Management
- Research and Development
- Teaching

...and many other (engineering and non-engineering) jobs

A seamless journey, from graduate to master’s degree

Through train degree programme with École Nationale de l’Aviation Civile, (ENAC, University of Toulouse, France), one of the top aerospace Universities in Europe.

From NTU to ENAC

- Pursue a Private Pilot License at ENAC
- Paid Internship Opportunities in France
- B.Eng (AE) + MSc. in 5.5 years
- Your choice of Master’s Degrees
  - MSc. Aerospace Systems-Navigation and Telecommunications; or
  - MSc. International Air Transport Operations Management
Mechanical engineering has been described as the ‘mother of all engineering’, thanks to its all-encompassing nature. Over the years, the study of mechanical engineering has grown from producing basic, functional products, to designing advanced, technology-based items that are smaller, smarter, and greener than ever before.

The specialisations within MAE reflect the diverse nature of the discipline, and are testament to MAE’s comprehensive approach to mechanical engineering teaching and researching. Additionally, our curriculum is constantly updated to match various industries’ evolving trends, so NTU MAE graduates always have the most modern, relevant, and immediately applicable knowledge at their fingertips.

**CAREER PROSPECTS**

- Aeronautical Engineering
- Biomedical Engineering
- Clean Energy
- Defence Organisations
- Finance and Banking
- Logistics
- Manufacturing
- Marine and Offshore Engineering
- Mechatronics and Control

Graduates with a degree in Mechanical Engineering can expect strong prospects in these industries:

- Power Generation and Distribution
- Product Design
- Project Planning and Management
- Research and Development
- Robotics
- Semiconductors
- Teaching
- ...and many other (engineering and non-engineering) jobs
MECHANICAL ENGINEERING
SPECIALISED STREAMS

Main Stream

Under the main stream, students learn essential mechanical engineering fundamentals – materials, mechanics, thermodynamics, heat transfer, control, design, and advanced manufacturing. In your final year of study, you can choose your preferred specialisation.

- Aeronautical Engineering
- Energy and Environment
- Manufacturing Engineering
- Naval Architecture and Marine Engineering
- Systems Engineering

Robotics and Mechatronics Stream

Modern mechanical systems are controlled by electronics, making the combination of robotics and mechatronics disciplines a highly sought-after skill set. The multidisciplinary nature of mechatronics involves the integration of mechanical systems with electronics, computers, and control theories – and students in this stream will be able to create new systems that will outperform purely mechanical ones.

- Machine Intelligence
- Mechatronics Interfacing Systems
- Mechatronics System Design
- Microprocessor Systems
- Real-time Software
- Robotics

Design Stream

In collaboration with the NTU School of Art, Design and Media (ADM), the design stream combines creativity, technology and design methodologies, with a concern for human values and the needs of society.

- Computer-aided Engineering
- Creative Thinking and Design
- Human Factors Engineering
- Industrial Design
- Product Design Engineering
- Product Development Management
- Product Presentation
PROGRAMMES & ADMISSION REQUIREMENTS

Single Degree Programmes
- Aerospace Engineering
- Mechanical Engineering

Second Majors
- Aerospace Engineering with a Second Major in Business
- Mechanical Engineering with a Second Major in Business
- Mechanical Engineering with a Second Major in Society and Urban Systems

Double Degree Programmes
- Aerospace Engineering and Economics
- Mechanical Engineering and Economics

ADMISSION REQUIREMENTS

GCE ‘A’ Level
- Pass in H2 Level Mathematics, and
- Pass in H2 Level Biology/Chemistry/Computing/Physics, and
- Pass in H1 Level/O’ Level Physics or equivalent (Pass in ‘O’ Level Physics is only applicable to applicants who have not read H2/H1 Level Physics)

International Baccalaureate (IB)
- Mathematics at higher level, and
- Physics/Chemistry/Biology/Computer Science at higher level, and
- Pass in Physics at Standard Level or equivalent (Only applicable to applicants who have not read Physics at Higher Level)

Local Polytechnic Diploma
- Polytechnic graduates with relevant diplomas in engineering and good ‘O’ Level results
- Exemplary academic records may be granted course exemptions accelerating their course of study

NUS High School Diploma
- Major CAP of 2.0 in Mathematics, and
- Major CAP of 2.0 in Physics/Chemistry/Biology, and
- Overall CAP of 2.0 in Physics or equivalent (Only applicable to applicants who have not majored in Physics)

For detailed admission requirements and application, please visit: http://admissions.ntu.edu.sg
AEROSPACE ENGINEERING CURRICULUM

- Aerospace Discovery Course
- Introduction to Aerospace Engineering
- Engineering Communication I
- Dynamics
- Mathematics I and II
- Computing
- Mechanics of Materials
- Introduction to Thermo-fluids
- Engineering Graphics
- Engineering Mathematics
- Thermodynamics
- Aerospace Materials and Manufacturing Processes
- Flight Performance
- Laboratory Experiments

Engineering Innovation and Design

YEAR 01

- Fundamental Engineering Materials
- Dynamics
- Engineering Communication I

YEAR 02

3 Specialised Streams
- Mainstream
- Robotics and Mechatronics Stream
- Design Stream
- Mechanics of Materials
- Theory of Mechanism
- Introduction to Thermo-fluids
- Manufacturing Processes
- Engineering Graphics
- Engineering Mathematics
- Introduction to Electrical Circuits and Electronics Devices
- Laboratory Experiments

Engineering Innovation and Design

MECHANICAL ENGINEERING CURRICULUM
• Heat Transfer
• Fluid Mechanics
• Aircraft Structures I
• Aerodynamics
• Aircraft Propulsion
• Flight Dynamics
• Aircraft Electrical Devices
• Aerospace Control Theory
• Engineers and Society

20 weeks of Professional Internship

• Aircraft Design I
• Aircraft Structures II
• Aeroelasticity
• Aircraft Navigation and Flight Computers
• Engineering Communication II
• Major Prescribed Electives 1 and 2
  - Operations Research
  - Computational Fluid Dynamics
  - Mechanics of Composite Materials
  - Non-destructive Testing
  - Aircraft Reliability and Maintainability
  - Unmanned Aerial Vehicles

Final Year Project

YEAR 03

• Machine Element Design
• Solid Mechanics and Vibration
• Mathematical Methods in Engineering
• Control Theory
• Fluid Mechanics
• Mechanical Experiments
• Engineers and Society

20 weeks of Professional Internship

YEAR 04

• Engineering Communication
• Major Prescribed Electives 1, 2, 3 and 4

5 Specialisations (For Mainstream Students)
  - Aeronautical Engineering
  - Energy and Environment
  - Manufacturing Engineering
  - Naval Architecture and Marine Engineering
  - Systems Engineering

Final Year Project
EXPERIENTIAL LEARNING

THE BEST WAY TO LEARN IS TO EXPERIENCE

Our students are given a myriad of opportunities to put theory to the test, ensuring that they are industry-ready even before they graduate.

Hands-on Learning
- 6-hour compulsory module in Year 2
- Practical experience in operating and performing machining tasks

Engineering Innovation Design (EID)
- Technopreneurship in action!
- Students are mentored to plan, produce and pitch a product prototype to an industry panel
- All year 2 students will be required to participate in EID

Undergraduate Research Experience on Campus (URECA)
- University-wide research programme for top undergraduates
- Over 800 research projects to choose from

Product Development Challenge
- Open-ended team project to define real-world problems and develop solutions
- Opportunity to participate in international competitions

Final Year Project (FYP)
- In-depth study and investigation of chosen project
- Develop project plan and detailed reports
- Deliver an oral presentation
- FYP is compulsory for all final year students

Engineering Innovation Design (EID)

Project: Handle Safe
A 3D printed J-shaped mechanism for safe and easy laundry.

Product Development Challenge

Testimonial

Ng Kok Choong
Mechanical Engineering (Mechatronics)
Year 3 undergraduate
Solar Car Team

I have been involved with the Nanyang Venture Series of Cars in my first year with NTU, particularly Nanyang Venture 8 – Singapore’s first 3D printed urban solar electric car.

I appreciate how these projects place a greater emphasis on the passion and dedication of students to learn and innovate, rather than on academic grades. The hands-on activities and teamwork that I’ve experienced, go well beyond classroom learning.

Besides that, representing NTU MAE and driving our solar car in overseas competitions have given me treasured memories. There’s a sense of pride and achievement every time I walk past the school and see our trophies on display.
In recognition of academic excellence and leadership potential, NTU offers a variety of scholarships to new as well as current students pursuing their full-time undergraduate studies in NTU. Scholarships are generally awarded to students based on academic merit and good co-curricular records.

Nanyang Scholarships

The Nanyang Scholarship, NTU’s foremost undergraduate scholarships, are awarded to outstanding freshmen pursuing undergraduate programmes. Nanyang Scholarship recognises students who excel academically, demonstrate strong leadership potential, and possess outstanding co-curricular records.

Nanyang Scholarship covers up to the normal programme duration on condition that the scholarship holder maintains a record of good academic performance and conduct satisfactory to the University.

- Travel Grant S$5,000 (one-off)
- Priority for Overseas Programme
- Eminent Speaker Series
- Settling-in Allowance S$250 (one-off)
- Bond-free^*
- Subsidised Tuition Fees
- Living Allowance S$6,000 yearly
- Book Allowance S$500 yearly
- Accommodation Allowance* up to S$2,000 yearly
- Computer Allowance S$1,500 (one-off)

College Scholarships

The College Scholarship is awarded to outstanding freshmen pursuing full-time undergraduate programmes in NTU.

College Scholarship covers up to the normal programme duration on condition that the scholarship holder maintains a record of good academic performance and conduct satisfactory to the University.

*Applicable to scholarship holders who reside in NTU hostels only.
^No bond is attached to the Nanyang Scholarship apart from the three-year bond applicable to all Singapore PRs and international students under the MOE Tuition Grant Scheme.

For more information on scholarships, please visit: http://admissions.ntu.edu.sg/UndergraduateAdmissions/Pages/Scholarships.aspx
Overseas Exchange Programmes are unique opportunities for students to read courses and/or to work overseas. Earned academic units will be counted towards graduation requirements!

These programmes give students once-in-a-lifetime experiences, including:

- International education experience
- Developing global perspectives
- Cultural immersion

STUDENT TESTIMONIAL

“I was fortunate to experience living and studying abroad. During the first semester of AY2016/2017, I embarked on an overseas exchange at the VSB-Technical University of Ostrava (TUO) in Ostrava, Czech Republic.”

At TUO, I picked up a module that interests me, Renewable Energy. It provided me with insight into the usage of (and demand for) energy globally, as well as the sources of energy that Singapore and some European countries use. I received an introduction to the basics of renewable energy, which proved useful when I went on to intern at Sun Electric, a local solar company.

Living in TUO was an engaging and enriching experience. TUO’s professors were kind and approachable. I could always consult them when I had any concerns about topics. The student committee arranged various events for both the exchange and local students, so I had countless opportunities to meet new people and make friends. What’s more, I also had the flexibility to take up extra activities and sports.

Coincidentally, there was a group of NTU students who were on exchange in Ostrava as well. We would organise dinners together and short trips around the rest of Europe. Although it was my first time in Europe, I was fortunate to visit many countries throughout the semester, such as Austria, Poland, Spain, and others.

Overall, the exchange experience was fulfilling and gave me plenty of opportunities to grow and learn. I made many friends, learnt about European culture, their way of life, and relished their history.

And these experiences have taught me to better appreciate what I have in Singapore.

Aylwin Pong Jun Lin
Mechanical Engineering, Year 4 undergraduate

On a road trip together with NTU engineering students.
Our 20-week Professional Internship Programme builds on our belief that the best way to learn, is through experience. The programme is offered to third year students, and provides them with valuable work experience at a local company. Through their positive attitudes and performance during the programme, many students have been offered full-time employment – even before graduation!

**Oh Shao Chong**  
Engineering Product Line Manager  
Schlumberger Oilfield (S) Pte Ltd  
Graduation Year, 2009  
Mechanical Engineering (Mechatronics Stream)  
Graduation Year, 2010  
Singapore-MIT Alliance  
Master of Engineering in Manufacturing  
Master of Science in Manufacturing

My key role in the Demand Planning Team of Johnson & Johnson is to manage, review and optimise Medical Devices’ inventory in the Asia Pacific region. This position requires me to liaise with people who are key stakeholders in the global, regional and country planning team.

With the support and persistent effort from the team, we have brought over 1M USD inventory reductions and identification of another 7M USD opportunities to be realised, a memorable accomplishment! Through the internship, I learned how the supply chain function works, and how to communicate and interact with others. Most importantly, I realised that solving challenging cases really motivates me to learn more, every day!

**Steven Aditya**  
Mechanical Engineering, Year 4 undergraduate  
Internship in the Supply Chain department at Johnson & Johnson

Johnson & Johnson is one of the largest healthcare companies in the world, and I’m glad to work in the Supply Chain department – where communication and technical skills meet.

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**Aerospace**

- DSO National Laboratories
- Honeywell Aerospace
- Nordam Singapore
- Pratt & Whitney
- Rolls-Royce International
- Singapore Airlines
- ST Aerospace Engineering

**Mechanical**

- 3M Singapore
- Dyson
- ExxonMobil
- Johnson & Johnson
- Keppel Offshore & Marine
- Rolls-Royce International
- ST Engineering
LIANG SI WEI

I enrolled in NTU MAE because of its reputation for providing holistic education, and my first two years here have certainly been enriching. Successfully completing a 1-year research program, and winning the top prize in my category during an EID open house competition really helped me to discover myself, and gave me clearer insight on my future career path. Undergoing these programmes also helped me to develop skills outside the usual curriculum, such as research, report writing, prototype fabrication, leadership, and the ability to draft business and marketing plans. I’ve witnessed the art of engineering here, which has inspired me and ignited my passion for engineering.

YANG SIDA

My first year in NTU MAE has been a fulfilling one, as the rigorous curriculum has sharpened my thinking and provided me with opportunities for experiential learning. I remember the times when our team trimmed our glider wings to perfection, and handled experimental equipment with excitement and extreme care.

The programme also offers me the flexibility to explore my interests in business and other subjects. With plenty of resources and support offered in NTU MAE, there are limitless possibilities to explore. I’m glad I’m here, ready to realise my dream.

ALENSON TOH JUN WEI

I have learnt a lot from being an undergraduate in NTU MAE. Besides acquiring engineering knowledge, there are many soft skills, such as analytical and problem solving skills, which I’ve picked up and applied in real life.

As a scholar in the CN Yang Scholars Programme, I have the privilege of conducting aerodynamics and fluid mechanics research, under the supervision of Associate Professor Daniel New – and I am working towards publishing a research paper. This would not have happened without the support of my professor.

I’m glad to say that my journey in MAE has been a fulfilling and meaningful one!
PUSHPARAJ KIRANRAJ
Aerospace Engineering
B.Eng. / Class of 2017

One of the first things that struck me as a MAE student was the myriad of opportunities available to us. We were encouraged to explore various fields and figure out what career paths matched our passions, personalities, and strengths. Through these experiences, we built on our strengths and worked on our weaknesses, emerging as contemporary 21st century engineers who can tackle modern day issues.

Joining the Leadership Development Programme (LDP) at MAE allowed me to develop my leadership style, along with other skills such as public speaking, events management and crisis management. The experience also provided me with an ecosystem of seniors who mentored me on all matters.

LDP played a big part in shaping me into the engineer and leader that I am today.

ASTRINI SIE
Mechanical Engineering
B.Eng. / Class of 2011

My dreams evolved from being an astronaut, to an archaeologist, a scientist, a physics Nobel Prize winner, and finally, an expert in classical physics and robotics. Choosing mechatronics as my specialisation was one of the best decisions I made in my undergraduate years.

I was honoured to participate in the Undergraduate Research Experience on Campus (URECA), and the Nanyang Venture Solar Car team.

If I could redo my undergraduate experience, I wouldn’t change a thing.

To future undergraduates, I hope you enjoy every opportunity that comes your way during this once-in-a-lifetime, four-year experience. Focus on your studies, but expose yourself to everything else NTU MAE offers – including student organisations, volunteer positions, internships, research, exchange programmes and more.