MAE
School of Mechanical and Aerospace Engineering
Power your Future and Take Flight with us
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 on-line 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 and solve problems independently. 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 as well. Innovation is in our DNA, 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, the school is also home to the best minds from the top institutions around the world. We spare no effort in recruiting the best minds from well-respected institutions around the globe in order to give our students the best education they can receive. Our efforts serve to provide our students with a holistic education and to equip them with the right skillsets 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 12th in the world*

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!

*According to QS World University Rankings® by Subject 2019.
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

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.

AEROSPACE ENGINEERING

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

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

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.

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

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

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.
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.

Graduates with a degree in Mechanical Engineering can expect strong prospects in these industries:
- Aeronautical Engineering
- Biomedical Engineering
- Clean Energy
- Defence Organisations
- Finance and Banking
- Logistics
- Manufacturing
- Marine and Offshore Engineering
- Mechatronics and Control
- 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 the Environment
- Manufacturing Engineering
- Naval Architecture and Marine Engineering
- Systems Engineering
- Smart Manufacturing and Digital Factory

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)

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

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

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

MECHANICAL ENGINEERING CURRICULUM

• Mechanics of Materials
• Introduction to Thermo-fluids
• Engineering Graphics
• Engineering Mathematics
• Thermodynamics
• Aerospace Materials and Manufacturing Processes
• Flight Performance
• Laboratory Experiments

3 Specialised Streams
- Mainstream
- Robotics and Mechatronics Stream
- Design Stream

YEAR 01

• Fundamental Engineering Materials
• Dynamics
• Engineering Communication I

YEAR 02

• 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
<table>
<thead>
<tr>
<th>YEAR 03</th>
<th>YEAR 04</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>SCHOOL OF MECHANICAL AND AEROSPACE ENGINEERING (MAE)</strong></td>
<td><strong>SCHOOL OF MECHANICAL AND AEROSPACE ENGINEERING (MAE)</strong></td>
</tr>
<tr>
<td><strong>Heat Transfer</strong></td>
<td><strong>Aircraft Design I</strong></td>
</tr>
<tr>
<td><strong>Fluid Mechanics</strong></td>
<td><strong>Aircraft Structures II</strong></td>
</tr>
<tr>
<td><strong>Aircraft Structures I</strong></td>
<td><strong>Aeroelasticity</strong></td>
</tr>
<tr>
<td><strong>Aerodynamics</strong></td>
<td><strong>Aircraft Navigation and Flight Computers</strong></td>
</tr>
<tr>
<td><strong>Aircraft Propulsion</strong></td>
<td><strong>Engineering Communication</strong></td>
</tr>
<tr>
<td><strong>Flight Dynamics</strong></td>
<td><strong>Major Prescribed Electives 1 and 2</strong></td>
</tr>
<tr>
<td><strong>Aircraft Electrical Devices</strong></td>
<td>- Operations Research</td>
</tr>
<tr>
<td><strong>Aerospace Control Theory</strong></td>
<td>- Computational Fluid Dynamics</td>
</tr>
<tr>
<td><strong>Engineers and Society</strong></td>
<td>- Mechanics of Composite Materials</td>
</tr>
<tr>
<td>20 weeks of Professional Internship</td>
<td>- Non-destructive Testing</td>
</tr>
<tr>
<td></td>
<td>- Aircraft Reliability and Maintainability</td>
</tr>
<tr>
<td></td>
<td>- Unmanned Aerial Vehicles</td>
</tr>
<tr>
<td><strong>Final Year Project</strong></td>
<td><strong>Final Year Project</strong></td>
</tr>
<tr>
<td><strong>Machine Element Design</strong></td>
<td><strong>Engineering Communication</strong></td>
</tr>
<tr>
<td><strong>Solid Mechanics and Vibration</strong></td>
<td><strong>Major Prescribed Electives 1, 2, 3 and 4</strong></td>
</tr>
<tr>
<td><strong>Mathematical Methods in Engineering</strong></td>
<td>5 Specialisations (For Mainstream Students)</td>
</tr>
<tr>
<td><strong>Control Theory</strong></td>
<td>- Aeronautical Engineering</td>
</tr>
<tr>
<td><strong>Fluid Mechanics</strong></td>
<td>- Energy and Environment</td>
</tr>
<tr>
<td><strong>Mechanical Experiments</strong></td>
<td>- Manufacturing Engineering</td>
</tr>
<tr>
<td><strong>Engineers and Society</strong></td>
<td>- Naval Architecture and Marine Engineering</td>
</tr>
<tr>
<td>20 weeks of Professional Internship</td>
<td>- Systems Engineering</td>
</tr>
<tr>
<td></td>
<td><strong>Final Year Project</strong></td>
</tr>
</tbody>
</table>
Our students are given a myriad of opportunities to put theory to the test, ensuring that they are industry-ready even before they graduate.

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.

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
During my overseas exchange at TUO, I enrolled in modules that challenged my design skills and enhanced my engineering knowledge. As a Design Stream student, I picked up Autodesk AutoCAD, Inventor and Ansys Workbench. Through learning these software, I understood the process and requirements that modern engineers had to consider while carrying out rapid prototyping. This proved useful when I returned to Singapore for a management consulting internship at Accenture. I leveraged on my experience in using these software to recommend initiatives to C-level executives, providing tailor-made solutions to transform their businesses through long-term revenue growth and cost savings in the manufacturing industry.

I have always envisioned myself working in Europe and living in Ostrava was a stepping stone to my life-long dream. It was there where I made many foreign friends from all parts of Europe and Asia. The school’s Erasmus Student Network (ESN) Club was proactive in organizing many outings to bond the exchange students. These outings included sightseeing trips to mountains and casual meetups in the schools’ nearby clubs.

Overall, the experience abroad have taught me independence. During my 4 months overseas, I’ve made several solo trips to countries like Germany and Slovakia, learning to cook my own meals at the same time. It was a truly rewarding experience and I look forward to return there in the near future.

Khoo Hong Li, Nicholas
Mechanical Engineering, Year 3, SEM 2
Undergraduate
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.

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
YANG HAONING

I knew I wanted to pursue mechanical engineering degree many years ago, and I chose NTU MAE not only for its’ comprehensive curricular structure, but also for the vibrant image the school gave me. Two years into MAE, my decision was proved right. I made a lot of friends from classmates and club associates to professors. Through the various resources (offered by the school), I have achieved project goals, improved my personality and gained leadership skills.

The school and professors are very supportive and they provide a lot of support to develop and materialise our ideas and initiatives. I worked on many other programmes apart from lab sessions and projects in my courses to enhance my learning, including the URECA research project, international robotics competitions, and community engagement projects. Together, these programmes trained me to excel at group work and be a hands-on student.

I am very glad I joined NTU MAE two years ago and I am looking forward to a brighter future in MAE.

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.

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!
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.

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.