NANYANG TECHNOLOGICAL UNIVERSITY SINGAPORE

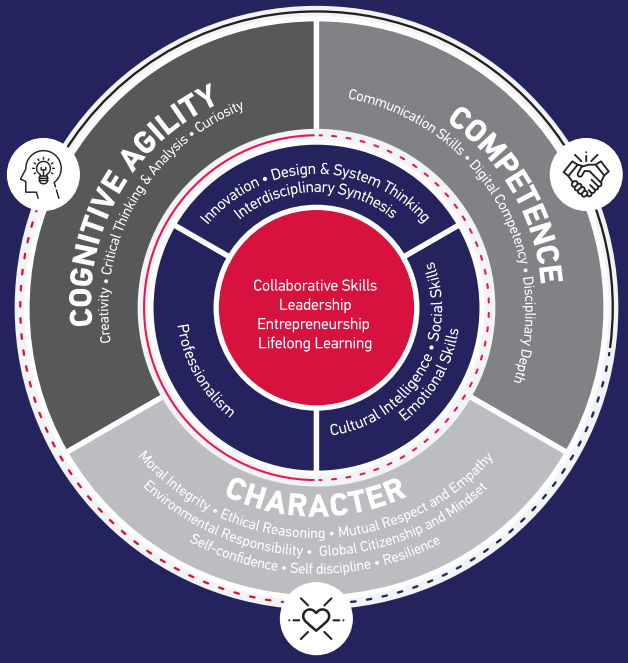
School of Materials Science and Engineering

ENDLESS POSSIBILITIES

ATTRIBUTES OF MATERIALS ENGINEERING GRADUATES

The NTU Education aims to inculcate in all NTU graduates the desired attributes of Cognitive Agility, Character and Competence.

NTU 3Cs



At the completion of the degree in Bachelor of Engineering (Materials Engineering) or its programme variations, students will understand and apply basic sciences, mathematics and materials sciences to materials engineering practice, have the knowledge and skills required as Materials Engineer and be prepared for diverse careers in multidisciplinary environments, and have creativity and spirit of entrepreneurship.

Student Learning Outcomes
bit.ly/3Imdt10

MATERIALS ENGINEERING CURRICULUM

The MSE curriculum is informed by industry and updated through the input of the Industrial Advisory Committee, comprising stakeholders in industries relevant to Materials Engineering. Made up of courses in Fundamental Maths and Sciences, Core Courses, Broadening and Deepening Electives, and Prescribed Electives, the curriculum emphasises authentic and experiential learning to equip students with theoretical knowledge, technical competencies and soft skills, preparing students to value-add in various industry sectors as they take on diverse job roles.

Specialisation Courses for Key Industry Sectors

Core Courses provide the foundation for knowledge, competencies and transferrable skills which allow MSE graduates to be a good fit for a range of industries. Students further gain an edge as they delve into advanced topics in materials that are applicable to key industry sectors under Specialisations, including the following courses.

Aerospace*
- MS4622 Composite Materials
- MS4631 Corrosion Engineering

Electronics*
- MS2018 Electronic and Magnetic Properties of Materials
- MS3012 Micro/Nanoelectronic Materials Processing

Medical Technology, Pharmaceuticals and Biotechnology^
- MS4613 Wearable Sensors for Healthcare
- MS4611 Biomedical Devices
- MS4612 Drug Delivery and Tissue Engineering

Computing And Digital Economy@
- MS003 Data Science and Artificial Intelligence
- MS4671 Introduction to Materials Simulation

Consumer Businesses
- MS4013 Biomaterials
- MS4640 Advanced Analysis of Materials

Energy and Chemicals
- MS2018 Electronic and Magnetic Properties of Materials
- MS4630 Photovoltaics Devices and Energy Storage

Urban Solutions And Sustainability#
- MS4664 Environmental Sustainability and Materials
- MS4666 Environmental Degradation of Plastics

Relevant Specialisations:
* Industrial Materials Engineering
^ Medical Materials
\# Materials and Sustainability
@ Materials and Artificial Intelligence

Specialisations in Year 4

MSE offers six (6) specialisations for students to pursue greater depth in a chosen discipline that is aligned to their interests and subject strengths.

Industrial Materials Engineering
- Semiconductor processing and integration
- Renewable energy production and generation
- Corrosion prevention

Nanoscience and Nanotechnology
- Functional nanostructured materials
- Thin film deposition techniques
- Advanced nanomaterials characterization

Medical Materials
- Healthcare wearable electronics and devices
- Advanced biomaterials
- Biomedical devices
- Drug delivery and tissue engineering

Materials and Sustainability
- Impact of materials on environmental sustainability
- Sustainable development in water, agriculture and aquaculture
- Environmental issues

Materials and Artificial Intelligence
- Data science and artificial intelligence
- Design and programming
- Data structures and algorithms
- Materials simulation

Innovation and Intellectual Property
- Innovation and enterprise process
- Fundamentals of IP in R&D and engineering Industry

Overview of Four-year programme in B.Eng. (Materials Engineering)

bit.ly/3Z18M3s

POTENTIAL INDUSTRY COLLABORATIONS WITH MSE

EDUCATION

1 INTERNSHIP PLACEMENTS

A 20-week internship programme is mandatory for all MSE undergraduate students.
By providing internship places, companies gain a contributor to achieve business goals in the short term, get fresh perspective from students on business operations to spur improvements, and discover prospective candidates for their talent pool.

For internship opportunities, please contact Academic Office at **mseacad@ntu.edu.sg.**


Credit: Hamzah bin Kamaruddin at ARTC

2 WORK-STUDY DEGREE PROGRAMME

The Work-Study Degree Programme (WSDeg) aims to enhance students' readiness for the engineering workforce after graduation by integrating institution-based learning with structured on-the-job training with employers through internships and industry-sponsored WSDeg Final Year Projects (FYP). It provides host companies longer opportunity to assess trainees and groom them as prospective talent.

Credit: Ng Yong Jin

For partnerships in the WSDeg, please contact Career and Attachment Office at **wsdp@ntu.edu.sg.**

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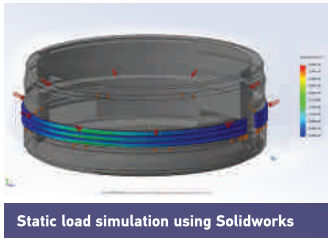
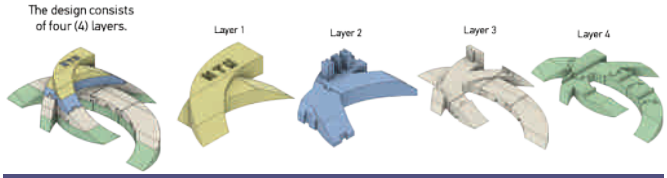
3 MS3015 INDUSTRIAL DESIGN COURSE

Industrial Design (MS3015) is a capstone core module taken by all third year MSE students. In this course, students will work in teams of 5 or 6 to tackle real-world, complex problems provided by industries. Students will learn to apply Design Thinking in their design processes and will be guided by a MSE faculty and their industrial mentor throughout the course to ideate, prototype and evaluate solutions.

Industry Seminar



Static load simulation using Solidworks



Technical drawing of 3D puzzle

To partner MSE in Industrial Design, please contact the Course Coordinator, **Dr Eileen Fong**, at **wmfong@ntu.edu.sg.**

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4 INDUSTRY SPONSORED FINAL YEAR PROJECTS

Spanning two semesters, the Final Year Project (FYP) allows students to demonstrate their application of theoretical knowledge and skills gained from coursework studies and work attachments as they contribute to solving a problem that has direct relevance to the company.

Examples of projects offered by industry partners

Advanced Micro Devices
Optimizing Reactive Ion Etching using End Point Detector

Krosslinker Pte Ltd
Development of surface functionalised aerogels

For FYP proposals, please contact Academic Office at **mseacad@ntu.edu.sg.**

RESEARCH

MSE is an outstanding hub for research in materials science. The research community of professors and research scientists are well-placed to collaborate with industries to achieve new discoveries, explore solutions to challenges and create innovations with high impact on companies' business strategies. Cutting-edge research is enabled by good infrastructure and state-of-the-art facilities.

MSE'S RESEARCH AREAS

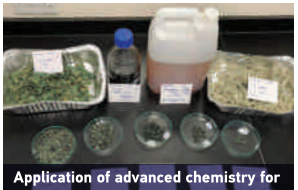
- Bioinspired/ Sustainable Materials
- Biomaterials/ Biological Materials
- Computational / Characterisation Materials Science
- Defence/ Functional Composite Materials
- Energy (Generation and Storage)
- Nanomaterials/ Low Dimensional Materials

RECENT INDUSTRY COLLABORATIONS

- RGE-NTU Sustainable Textile Research Centre (RGE-NTU SusTex) is a partnership with Royal Golden Eagle.
- Cuprina Wound Care Solutions has been given licensing rights on patented clinical-grade collagen.
- JTC and Prostruct Consulting co-developed the proprietary glass-fibre reinforced polymer roll, FasRaP.

For research and development collaborations, please contact Associate Chair (Research) at **vd-mse@ntu.edu.sg.**

FasRaP, a proprietary glass-fibre reinforced polymer



Application of advanced chemistry for selective recovery of polyesters and cellulosic materials from polycotton

MSE research team and Cuprina Wound Care Solutions representatives

ABOUT

School of Materials Science and Engineering (MSE)

01 Offered Singapore's first Materials Engineering degree programme in **1991**

02 The largest Materials Engineering institution in the world, with more than **5,000 alumni**

03 Degrees are accredited by the **Engineering Accreditation Board** and are recognised globally

04 Centre of materials science research helmed by **outstanding** faculty and researcher scientists

05 Consistently ranked **top 3** in world rankings for Materials Science Subject by QS World Universities Ranking and U.S. News Best Global Universities Ranking

MSE'S PROGRAMMES

Undergraduate

Bachelor of Engineering (Honours)

- Materials Engineering
- Materials Engineering with 2nd Major in Medical Biology
- Materials Engineering with 2nd Major in Pharmaceutical Engineering
- Materials Engineering with 2nd Major in Business
- Materials Engineering with 2nd Major in Entrepreneurship
- Materials Engineering with 2nd Major in Data Analytics
- Materials Engineering with 2nd Major in Sustainability
- Materials Engineering with 2nd Major in Semiconductor Engineering (pending)

Double Degree in Bachelor of Engineering (Materials Engineering) and Bachelor of Social Sciences (Economics)

Postgraduate

Coursework Programmes

- Master of Science (Materials Science and Engineering)
- FlexiMasters in Materials Science and Engineering

Research Programmes

- Doctor of Philosophy (Materials Science and Engineering)
- Master of Engineering (Materials Science and Engineering)

Materials and applications for today's industries and future economy

FIND US

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