




**NANYANG
TECHNOLOGICAL
UNIVERSITY**



School of Materials Science and Engineering

Bachelor of Engineering (Materials Engineering)

A School of the College of Engineering



**“A college degree is not a sign
that one is a finished product
but an indication a person is
prepared for life.”**

Edward A. Malloy

In a globalised world with countless degree programmes available, the undergraduate programme from the School of Materials Science and Engineering (MSE), Nanyang Technological University (NTU) rises above the rest! Beginning as a division in 1991, MSE has become one of the largest materials science institutions in the world today, boasting more than 1000 undergraduates and over 200 research students. Recognised worldwide as a premier materials research institution, MSE has strong collaborations with top institutions and multinational corporations like Northwestern University, Mayo Clinic, University of California, Los Angeles (UCLA), Advanced Micro Devices, Rolls Royce, BASF and Robert Bosch.

In MSE, we believe in delivering beyond your expectations of an undergraduate programme. A degree in Materials Engineering will enrich you beyond the boundaries of specialised knowledge. With our broad spectrum of collaborations, you will have the privilege of gaining invaluable experience, nurturing skills that accelerate the learning curve in your career.

Come and experience a fulfilling and enriching undergraduate programme with us!



Go Accelerated!

Challenge yourself to be in the top 5% of your cohort where you will be awarded the privilege of completing your Bachelor of Engineering (Materials Engineering) with Honours in only 3½ years! This Accelerated Honours Stream will be available if you achieve outstanding results in the first semester of Year 1. Jumpstart your career and take the fastlane to success!

Go Minor!

So you would like to take business studies while maintaining your interest in science and engineering? You can do so by taking up a Minor Programme in any of the disciplines available in NTU while pursuing your Major in Materials Science and Engineering. Students taking the Minor Programme are recommended to put in more time and effort; thus we encourage all interested applicants to be strong in their studies and able to manage their time effectively.

Every tool available to mankind is made from materials. Cars, jewellery, flat screen LCD televisions, solar panels - all of these require materials with specific functions, without which we would have nothing more than a pile of gaseous matter. From another perspective, the breakdown of these tools is largely due to materials failure. Slippery car tires have its rubber compounds to blame while an overheated computer chip can be traced to heat intolerance of circuit boards.

In the MSE undergraduate programme, you will be given the key to unlock the mysteries of everyday applications. Begin your journey by opening the mind to the

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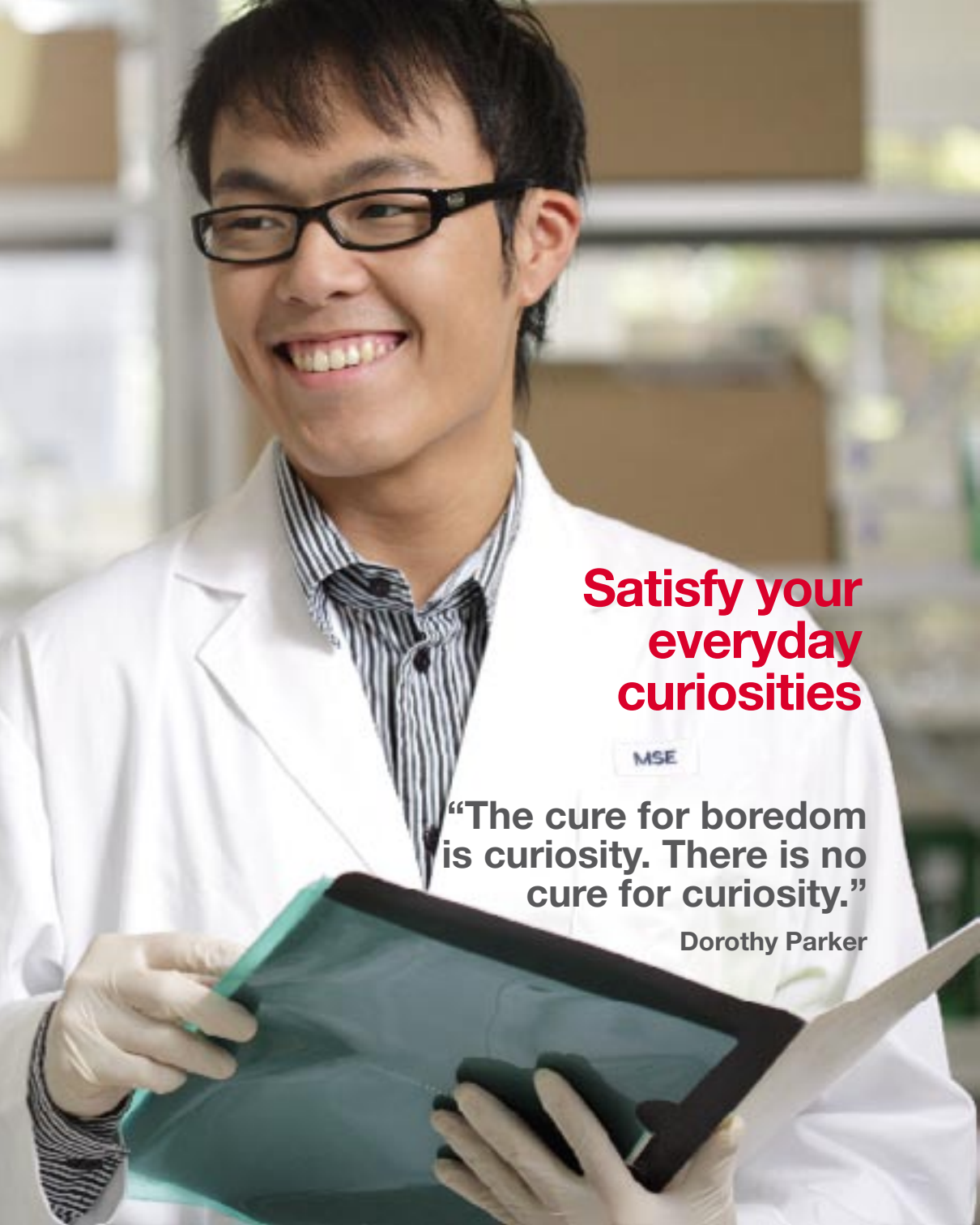
wonders of science hidden in everyday items around you. What are crystals? How does glass shatter? Why is aluminium non-magnetic? You will discover these answers and understand more than you can foresee about the world around us!

Core Studies

In the first year of your degree programme, you will build a strong foundation of physical and life sciences. Years 2 and 3 will bring you into the fascinating world of materials where you begin to understand

materials fundamentals and their characterisation techniques. In order to fuse this knowledge with real-life applications in the industry, you will undergo an enriching industrial attachment programme in Year 3 with our affiliated institutions and corporations. This is your chance to take part in the Global Immersion Programme (GIP) and International Student Exchange Programme (INSTEP) where you will undertake your overseas attachment in China, France, Germany, India or USA. By Year 4, you would have obtained a clear inclination for the materials specialisation that you are most passionate about. You can choose from a range of Prescribed Elective modules that will complete your degree programme in materials science and engineering.

In order to broaden your education, you will also fulfil 30% criterion in General Education Requirement (GER) courses. This is the perfect opportunity to pursue various interests outside of curriculum to widen your knowledge and complement your professional discipline. Popular courses under the GER include taking up a foreign language, modules in critical thinking and analysis, and modules in the arts and literature.



**Satisfy your
everyday
curiosities**

**“The cure for boredom
is curiosity. There is no
cure for curiosity.”**

Dorothy Parker

Solving Mysteries at the Technological Frontier

There is no better way to integrate acquired knowledge than through realising future applications. At MSE, every student will be given the opportunity to engage in the forefront of scientific research in their Final Year project in one of the following fields:

- Biomaterials
- Defence Materials
- Nano-Electronics and Interconnects
- Rare Earth Nano-Materials
- Organic/Polymer Electronics
- Ecomaterials and Clean Energy Research
- Computational Materials Science

In a competitive world where decisions have to be made based on credible and reliable information, analytical and research competencies rank as one of the most important skills that any successful person must possess. At MSE, we believe in nurturing these skills through problem-solving projects and experimental modules. As a graduate from MSE, these analytical experience and abilities will be your greatest asset for your future career!

“The only way to discover the limits of the possible is to go beyond them into the impossible.”

Arthur C. Clarke



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Communicate with Confidence

In everyday interactions with people, you can recognise a confident person when you meet one and can sense the depth of that person's knowledge during conversation. There is no argument that social etiquette and charisma are imperative to forging a supportive network of friends and business partners. This is why MSE emphasizes on presentation and communication skills that go beyond the borders of science. Undergraduates are given a multitude of opportunities to discuss and vocalise their ideas, as well as present to an audience.

We believe that clear and concise communication of our thoughts, be it to one close friend or an audience of 2000 people, is the defining mark of excellence. At MSE, we are committed to producing top graduates with an aura of confidence in their work and life.

“You never get a second chance to make a first impression.”

Anonymous



One Big Family

MSE prides itself as a close-knit community where everyone is taken care of and a helping hand is readily extended. We promote interaction between students and faculty as much as possible. Students who require additional attention are always under the care of our dedicated counsellors.



The School has implemented a Work-Study Scheme (WSS) for students facing financial difficulties. We understand the distress experienced by students who need to juggle their studies and work just to make ends meet. With WSS, MSE students can earn additional income by providing services ranging from administrative tasks to technical assistance in the School.

“In MSE, we treat everyone like family.”

Professor Freddy Boey, Chair of MSE



Admission Requirements

To obtain full details on general entry requirements, please visit the NTU Office of Admissions and Financial Aid website at <http://www.ntu.edu.sg/admissions/home/>

G.C.E. Advanced Level

A pass in H2 Level (a) Mathematics, and (b) Physics/Physical Science/Chemistry/Biology. A pass in Physics at least at H1 Level or at G.C.E. Ordinary Level is required where Chemistry or Biology is offered as the advanced level pass subject in (b).

Polytechnic Diploma

Polytechnic graduates with relevant diplomas in engineering will be considered for direct entry into the second year. A list of the relevant diplomas is available from the Office of Admissions and Financial Aid. NTU also admits students with foreign qualifications equivalent to the Singapore-Cambridge Advanced Level.

Exemptions

G.C.E. Advanced Level

Courses include Mathematics, Chemistry, Computing, Physics I or Physics II. Students who have obtained at least 3 As in the H2 Level subjects (Mathematics, Physics, Chemistry or Biology) at the 'A' Level exam and at least a B4 in the General Paper will be eligible for the exemption of courses.

Polytechnic Diploma

Polytechnic graduates may be exempted from courses for which they have obtained good grades during their diploma studies.

Prescribed Electives

Microelectronics

- Materials and Processes for Electronic Displays
- Microelectronics Packaging
- Microelectronics Process Integration
- Photonic Materials and Devices
- Principles of Semiconductor Devices

Biomaterials

- Advanced biomaterials
- Drug Delivery and Tissue Engineering
- Implanted Biomedical Devices

Advanced Functional Materials

- Environmental Degradation of Materials
- Materials and Energy
- Nanostructure of Functional Materials
- Photovoltaics Devices and Energy Storage
- Polymer Physics
- Polymer Science
- Polymer Synthesis

Other Technologies

- Advanced Analysis of Materials
- Composite Materials Science
- Introduction to Materials Simulation Methods
- Introduction to Modeling and Simulation in Materials Engineering
- Special Topics *
- Polymer Technology
- Solidification Processing
- Thin Film

* A course on a useful topic will be offered on an ad hoc basis when the School has visiting staff with unique expertise in special area.

Programme Structure

01 •First Year

- Chemistry
- Computing
- Effective Communication
- English Proficiency*
- General Education Requirement 1
- General Education Requirement 2
- Laboratory IA
- Laboratory IB
- Life Science
- Materials Science
- Mathematics IA
- Mathematics IB
- Physics I
- Physics II

* Students who have at least C6 in GCE AL General Paper and those who pass the Qualifying English Test are exempted.

02 •Second Year

- Applied Chemistry
- Electronic, Magnetic Properties of Materials
- Essential Mathematics*
- Essential Materials Science*
- General Education Requirement 3
- General Education Requirement 4
- Human Resource Management & Entrepreneurship
- Introduction to Manufacturing Processes
- Laboratory IIA
- Laboratory IIB
- Materials Structure & Mechanical Behaviour
- Mathematics II
- Mechanics of Materials
- Polymers & Composites
- Technical Communication
- Thermodynamics & Kinetics of Materials

* Additional courses for Polytechnic Direct Entry students.

03 •Third Year

- Advanced Materials Processing
- Analysis of Materials
- General Education Requirement 5
- Industrial Attachment*
- Material Aspects in Design
- Materials Failure
- Metallic & Ceramic Materials

* Students are required to be attached to industry for 22 weeks (1 semester).

04 •Fourth Year

- Nanomaterials and Biomaterials
- Engineers & Society
- Professional Communication
- Project*
- Prescribed Electives (choose 5)**
- Quality Control

* The final year project is carried over two semesters.

** Not all the prescribed electives are offered in every semester.

In addition to the above courses, students are required to obtain 9 AUs for Unrestricted Electives.

Application Details

Visit www.ntu.edu.sg/admissions/home/ for details on how to apply for the 2009 MSE Undergraduate Programme.

Synergy of Success

In your four years with MSE, there will be a wealth of knowledge and skills that will come your way. Our goal is for every student to take full opportunity of every resource we can provide to become leaders equipped with the skills necessary for the future:

- Specialised knowledge in the materials field
- Clarity of mind to solve any problem
- Astute in communicating thoughts and ideas
- Burning passion to achieve beyond known capabilities
- Compassion in the midst of relentless progress

There is one last attribute that would complete the MSE graduate, and that is the initiative to reach out for what you desire. At MSE, we will provide you with opportunities for learning; it is through your initiative, participation and desire that you will reap the most out of your undergraduate experience.


Congratulations!

In reaching out for this booklet, you have already taken that crucial first step.

The rest is ahead in your four years with us.

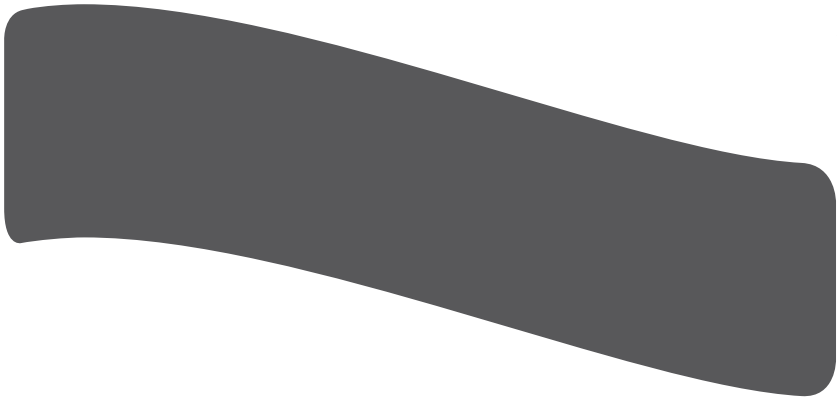
We welcome you into the MSE family!





“When you leave college, there are thousands of people out there with the same degree you have; but you are the only person alive who has sole custody of your life.”

Anna Quindlen



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