NUS | Engineering
National University of Singapore

# MATERIALS SCIENCE AND ENGINEERING

Programme Brochure

*Engineered materials are everywhere in our life.* From the steel and concrete that build our homes, to the semiconductor nanotechnology that connects us, and the biomedical implants that save our lives. Nearly all materials that you see and interact with have been designed to give them exactly the properties that are needed for their intended function.

*Many challenges we face in the near-future will not be solved without new and better materials.* We will need materials that can better store energy in batteries, materials for more efficient solar cells, in health care, displays, safe air travel, nanoelectronics - the list goes on and on.[1,2]

# TOUCHING OUR LIVES EVERYWHERE

[1] Financial Times - 50 ideas to change the world: *www.ft.com/content/9b9a2374-cec0-11e7-947e-f1ea5435bcc7*

[2] New York Times - The superpowers of super thin materials: *www.nytimes.com/2020/01/07/science/physics-materials-electronics.html*

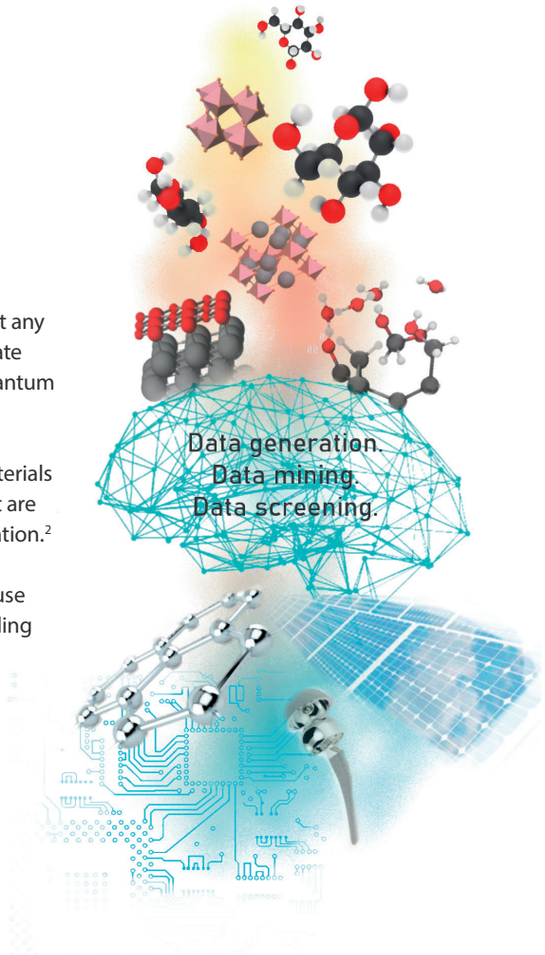
# DATA SCIENCE & MATERIALS

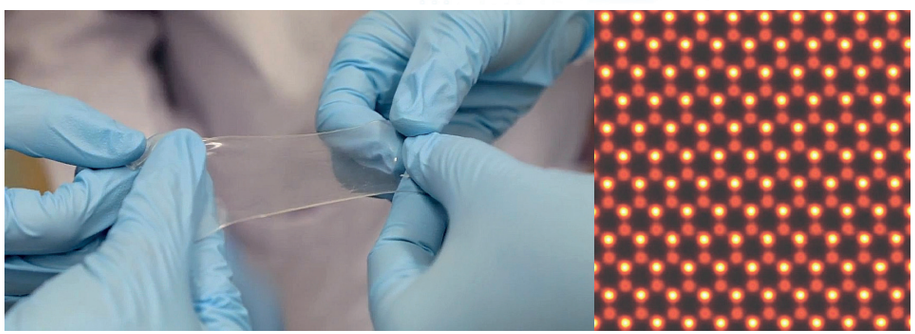
**Materials science may very well be the most important technology for the coming decades.[1]**

New materials are at the center of just about any major challenge we will face in the immediate future, from clean energy generation to quantum engineering and health care technology.

Computational approaches such as The Materials Genome Initiative and The Materials Project are beginning to revolutionize materials innovation.[2] They apply machine learning algorithms to massive databases, and 'materials hackers' use high performance supercomputing, propelling innovation at blazing speed, with less predictive, new outcomes.

Minor undergraduates programmes are available in **Data Engineering**, in **Artificial Intelligence**, and in **Technopreneurship**, to dynamically stimulate innovation and disruptive entrepreneurship.



[1] Inc. Best workplaces: *www.inc.com/greg-satell/materials-science-may-be-most-important-technology-of-next-decade-heres-why.html*
[2] The Economist: *www.economist.com/babbage/2013/06/24/difference-engine-gateway-to-tomorrow*

# WHAT MAKES US DIFFERENT?

## Our Students

Our department takes-in a relatively small number of students: about 80 each year, avoiding large classes. The individualized, diverse environment is also supported by the approximate 3:2 male-to-female student ratio.[1]

As undergraduate student, you will have freedom to engineer your study towards your own goals and interests, via three Pathways (Industry, Research, or Entrepreneur-focused). Also consider doing an exchange at one of the many overseas colleges!

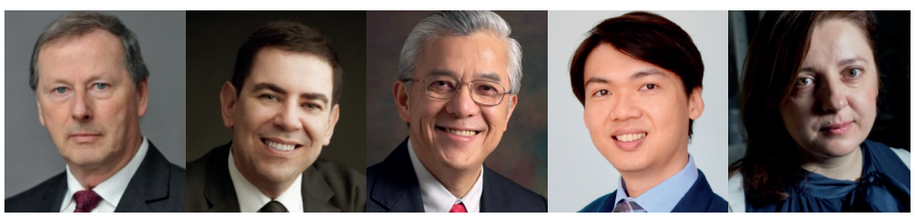
[1] NUS registrar statistics: *www.nus.edu.sg/registrar/student-records/student-statistics*

## Learn from a Nobel Laureate and Other World Experts

The Materials Science and Engineering department ranks 9th in the world,[2] leading research in areas of 2D materials, Bio-inspired Materials, Computational Material Science and Advanced Microscopy. By commercializing our innovations and technologies, we aim to advance the quality of life and realize a sustainable world.

[2] US News: *www.usnews.com/education/best-global-universities/materials-science?int=994b08*

*^ Prof. Sir Konstantin Novoselov, the youngest Nobel laureate in physics since 1973, and the first Nobel laureate to join a university in Singapore*



*^ (From left to right) Prof. Sir Anthony K. Cheetham, Prof. Antonio H. Castro Neto, Prof. Shih Choon Fong, President's Asst. Prof. Tee Chee Keong Benjamin, Prof. Silvija Gradečak*

# OUR CURRICULUM

Materials Science and Engineering (MSE) is a four-year undergraduate study that combines **theoretical and experimental** training. Entrepreneurship, data analytics, artificial intelligence and advanced manufacturing are integrated into our curriculum. New innovation modules are offered, giving students numerous opportunities for overseas and industry exposure. We were ranked 4th for Teaching[1] and 2nd in employer reputation in Asia[2].

Besides the materials modules, MSE students follow five Engineering-wide **core modules** in their first year, after which they specialize into a Research-focused, Practicing Professional, or Innovation & Design specialization. More information on this can be found in the Engineering Brochure.

[1] Times Higher Education 2020: *www.timeshighereducation.com/world-university-rankings*
[2] QS ranking 2020: *www.topuniversities.com/university-rankings/world-university-rankings/2020*

## Broaden Your Skillset with a Double Degree, Second Major or Minor

- BEng Double Degree in MSE with Business Administration.
- BEng in MSE + Doctor of Medicine (7 years programme with Duke-NUS).
- Double major in MSE with Innovation & Design.
- Minor programmes are available in Data Engineering, Optics and Semiconductors, Mathematics, Cultural studies, Technopreneurship, Analytical Chemistry, Physics, Economics, Artificial Intelligence, and many more.

## MORE INFORMATION

For details on the BEng programme in Materials Science and Engineering:

*www.eng.nus.edu.sg/mse/undergraduate/mse/*

More details on Minor programmes, Double degrees and Specializations:

*www.eng.nus.edu.sg/undergraduate/degree-programmes/specializations/*

# EXTRACURRICULAR ACTIVITIES

Check us out

NUSMSECLUB

## MSE Student Club

The NUS MSE Club is the official department student club, organizing workshops, campus tours. The MSE Club also provides advice for internships, overseas programmes and modules. Importantly, they organize the annual freshmen orientation camp (MSE camp) - highly recommend as a fun way to make new friends at the start of your study!

## Industry Visits & Social Activities

The MSE club helps you find a balance between academic and social life by regularly organizing activities such as industry visits, welcome events, the sports day, etc.

# CAREER PROSPECTS

**MSE graduates are highly sought after for their interdisciplinary background and holistic training.**

## MSE Alumni are Found in

- **Energy & Utilities:** REC Solar, Keppel Energy, Singapore Power
- **Microelectronics:** Micron, GlobalFoundries, AMD, IBM, Apple, UMC, IM Flash Technologies, Seagate, Intel
- **Aerospace & Defense technology:** Rolls Royce, GE Aviation, Pratt & Whitney, Singapore Technologies, Bombardier, DSTA
- **Banking & Investing:** Citibank, OCBC, UOB
- **Petrochemical:** ExxonMobil, Shell, SCG, Nippon Paint, Johnson Matthey
- **Research Institutes:** A*STAR, SPRING Singapore, DSO National Labs, Local and Overseas Universities
- **Transport & Logistics:** SMRT, Keppel Shipyard
- **Life Sciences & Healthcare:** Bayer, Ciba Vision, Clarins, Micro Technologies, P&G
- **Materials Engineering & Industrial Technology:** Bosch, Lloyd's Register, Applied Materials, Mitsui Kinzoku, Saint-Gobain, STM Engineering

# ADMISSIONS REQUIREMENTS

| Qualifications | Requirements |
|---|---|
| Singapore-Cambridge 'A' Levels | H2 Maths & H2 Chemistry or H2 Physics (O Level pass required to take Physics bridging modules) |
| International Baccalaureate Diploma | HL Maths & HL Chemistry or HL Computer Science or HL Physics (bridging modules are required without HL Physics) |
| Polytechnic Diploma | Polytechnic applicants may apply |

For more information and to submit your application: www.nus.edu.sg/oam/

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**www.eng.nus.edu.sg/mse/undergraduate**

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