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Facilities

The School is housed in two buildings totaling 30,000 square meters, providing learning experiences essential to a first-rate education in chemical and biomedical engineering. The buildings are designed with ample room to conduct lectures and tutorials in seminar style, undergraduate laboratory work and postgraduate research. By every measure, the facilities are set to emphasise a quality learning environment – from state-of-the-art laboratory equipment and high-tech teaching stations to aesthetically soothing interior design conducive for learning and research.
Introduction

The School of Chemical and Biomedical Engineering (SCBE) at Nanyang Technological University (NTU) aims to empower a new generation of engineers through a rigorous curriculum that integrates principles of engineering with fundamentals of biomedical and chemical sciences. With its dynamic faculty from internationally renowned universities and state-of-the-art research and teaching facilities, the School provides a stimulating learning environment and opportunities for students to identify and pursue personal and professional goals.

Goals and Missions

The School aims to provide educational experiences that facilitate the students to:

- gain thorough understanding of the fundamentals of biomedical and chemical sciences.
- deftly solve challenging problems in biomedical and chemical engineering and related areas while considering the implications of such solutions on the society.
- develop good communication and management skills through team work in the execution of experimental and design projects.

Programme in Bioengineering

The School offers a four-year undergraduate degree programme in Bioengineering (BIE). Upon graduation, successful students will be awarded a Bachelor of Engineering degree. The programme combines modern biological principles with advanced engineering methods in electronics, materials, mechanics, biocomputing and informatics to train high standard engineers for biomedical and biotechnology industries as well as healthcare and clinical services.

Admission Requirements

In addition to satisfying the general entry requirements of NTU, candidates seeking admission to the BIE undergraduate programme must have a minimum of H2 level (or equivalent) passes in mathematics and biology / chemistry / physics / physical sciences and a GCE ‘O’ Level (or equivalent) pass in English. An ‘O’ level in any of the above subjects is only applicable to candidates without H2 level (or equivalent) pass in physics.

Candidates with relevant diplomas from local polytechnics may apply for admission. Eligible candidates who hold a diploma with merit / distinction may be considered for direct entry into the second year of the programme (i.e. completion of the programme in three years). Other eligible candidates may be admitted into the first year with exemption of courses granted on a case-by-case basis.

Overview of the Curriculum

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Accreditation

The degree programme in Bioengineering is accredited by the Engineering Accreditation Board (EAB) of the Institution of Engineers Singapore (IES).

Unique Features

- Strong grounding in both engineering and biomedical principles.
- Rigorous training in systematic problem solving skills.
- Multi-disciplinary training in emerging bioengineering areas.
- Good manufacturing practice (GMP) training for engineers in biomedical and biotechnology industries.
- Solid science foundation for medical and advanced research programmes.
- Industrial attachment – Valuable experience either at local or overseas firms in manufacturing or R&D.
- Global Immersion Programme (GIP) – Opportunities for six-month stints in one or more of the following countries: China, India, France, Switzerland and USA.
- Accelerated Bachelors Programme (ABP) – Fast track programme enabling completion of undergraduate degree in three and a half years.
- Undergraduate REsearch on CAmpus (URECA) programme* – Opportunities for research attachments within NTU.

Bioengineering

Bioengineering is an interdisciplinary field, which applies engineering principles and state-of-the-art techniques in a systematic, quantitative, and integrative way to solve problems or enable technologies important to medicine, biology and health care. Bioengineering is an exciting and growing field that encompasses a wide range of industrial and research areas such as diagnostic and therapeutic devices, medicines, novel biosensors, biomaging, bioinformatics, artificial tissues and organs, systems biology and biomedical equipment. Bioengineers invent tools to explore life at molecular, cellular and system level, which have brought unique impacts in various clinical and biomedical applications.

In a broad sense, bioengineering can be dated back even thousands of years ago when Egyptians started to use artificial materials to make limb prosthesis. Since then, many milestones have been created at the interface between engineering science and medicine. For example, X-ray, not discovered in 1895 by Wilhelm Roentgen has led to the modern array of medical imaging technologies. The detection of electrical signals (ECS) from the human heart in 1903 by William Einthoven has provided an important non-invasive diagnostic method for heart diseases. The academic endeavor of bioengineering can find its roots in the early development of electrophysiology about 200 years ago when DuBois Reymond applied engineering principles to a problem in physiology and identified the resistance of muscle and nervous tissues to direct current. Biomedical technologies are continuously advanced by bioengineers with high-throughput biochips, intelligent nanomedicines, implantable biosensors, advanced bioimaging / biophotonics and artificial organs, etc. The annals of history are filled with significant contributions of bioengineers towards technologies that have resulted in the improved management of health and quality of life.

It is envisaged that major contributions to improving human health would come from the confluence of medicine and engineering. To this effect, almost all major universities have established formal bioengineering training programme during the recent 40 years. Bioengineering programmes have attracted many young and budding students not only because of the excitement of its interdisciplinary nature, but also because both industry and academia recognize that students with a solid footing in both bioscience and engineering can contribute in ways that students with traditional engineering training cannot.

Employment Opportunities

The biomedical engineering and sciences sector has seen a healthy growth and is slated to be a key engine of future growth in Singapore. In the recent five years, Singapore has invested approximately $32 billion in biomedical industry and institutions. Graduates who can understand both languages of engineering and biomedical sciences can find attractive opportunities in industries, research institutes, hospitals and organisations that deal with biomedical instrumentation, medical devices, biomaterials, drug discovery and others. Specifically, they may find jobs in companies such as Agilent Technologies, GE Medical, Siemens Medical Instruments, Altoros Biosystems, and WelchAllyn International; research institutions such as Institute of Bioengineering and Nanotechnology, Institute of Molecular and Cellular Biology, Bioinformatics Institute; hospitals such as Singapore General Hospital, National University Hospital; or they may continue their study in medical schools or top Ph.D. programmes around the world.

For the creative and adventurous, the opportunities are limitless!