

## **BIOMEDICAL ENGINEERING COURSE MODULES**

Intrigued by how the marriage of engineering technology and life sciences can benefit mankind? That's where biomedical engineering comes into play. This forward-thinking field is responsible for the design of sophisticated medical equipment such as diagnostic and therapeutic machines and lifesaving devices like the artificial heart and dialysis machine. In fact, you can be part of this fascinating industry when you join the Diploma in Biomedical Engineering [BME]

The first diploma of its kind in Singapore, BME is jointly delivered by Ngee Ann Polytechnic's School of Engineering and School of Life Sciences & Chemical Technology. Besides teaching you how to develop medical equipment, BME also gives you a firm grounding in research that could lead to discovery of new treatments for medical conditions.

In your first year, you will acquire a strong foundation in engineering in topics covering electrical, electronic and mechanical engineering. You will also gain an overview of biomedical engineering. Then in your second year, you will study cell and molecular biology alongside medical instrumentation and physiological systems. You will also be equipped with electronic design prototyping skills.

In your final year, you will focus on areas such as clinical engineering as well as various types of medical equipment. You will also work in teams to design and develop biomedical products. What's more, you will have the opportunity to go on a six-month local or overseas internship with a university, hospital, MNC or research institute.

### **LEVEL 3.1**

#### **BME Project Design**

The module aims at providing students with practical experience in the design and implementation of a project to demonstrate their engineering and presentation skills and knowledge gained in the various academic subjects, especially in the field related to a range of medical devices & equipment, the implementation of various designs in electronics for diagnostic and therapeutic treatments are taught and performed. Creativity and initiative will be evaluated during the course of the project. The project also inculcates in students positive work attitude, team spirit and co-operation.

#### **Clinical Engineering**

Students are introduced to the tools and techniques required for understanding the management and organization of a modern clinical engineering department. Students will gain a firm foundation in biomedical equipment usage, operation, calibration, testing and maintenance in order to meet the demands of quality patient care. Patient and operator safety including handling of chemicals, lasers, X-rays and radio-isotopes are emphasized. Other topics include procurement, maintenance and management of medical equipment; inferential statistics & hypothesis testing; medical device tests; equipment calibration. Students will gain a working knowledge of the physiological effects of electricity and understand the application of various electrical safety devices (e.g. GFCI & LIM) in a hospital environment. The IEC601-1 Electrical Safety Test procedures & safety limits are emphasised. Students learn to perform these tests using electrical safety analysers.

#### **Diagnostic, Therapeutic & Laboratory Equipment**

This module exposes students to a broad range of biomedical equipment and prepares them to understand and work with important hospital-based diagnostic, therapeutic and clinical lab equipment. Students will be taught the principles, functions, features & limitations of these equipment, which will help them understand and perform better maintenance, testing and calibrations. Examples of diagnostic equipment taught are electrocardiographs, patient monitors, respiratory measurement equipment, electroencephalographic amplifiers, etc. Examples of therapeutic equipment taught are defibrillators and cardiac pacemakers. Surgical equipment and clinical laboratory instrumentation are also taught which includes spectrophotometers, chromatographs and blood cell analysers.

### Medical Imaging Technology

This module aims to provide students with an understanding and appreciation of the field of Medical Imaging. Students will be taught the different types of medical imaging principles and their application in diagnostic therapy. Image processing theory and concepts are introduced before the various imaging technologies are taught. Specific areas of radiology include topics such as ultrasound imaging, radionuclide imaging, X-ray, Computer Tomography (CT) and Magnetic Resonance Imaging (MRI) are taught. This activity-based module helps students to learn through web research, assignment and exercises, and to identify themselves with their future profession in Biomedical Engineering.

### Project ID - Connecting the Dots (IS Module)

This module aims to prepare students for an increasingly globalized and interconnected world where problems are multi-faceted and require interdisciplinary research and collaboration to solve. Using a project-based learning approach, students will have the opportunity to work in a multi-disciplinary team to investigate and propose comprehensive recommendations for a pressing real-world problem affecting Singapore. They will be guided to step out of their disciplinary silos and effectively communicate and collaborate with peers from different backgrounds. Ultimately, the module seeks to develop independent learning skills and the ability to synthesize diverse strands of knowledge to solve a complex problem, while impressing on students the importance of being a responsible global citizen.

### LEVEL 3.2

#### Six-Month Local/Overseas Internship

In this module, students will be attached to sponsoring companies for a period of approximately six months. During their internships, students will undertake projects assigned by the company / institution. Activities may be related to operations, research, project, maintenance, etc.

| Module Name                                    | Credit Units |
|--|--------------|
| <b>YEAR 3</b>                                  |              |
| <b>Level 3.1 (24 hours per week)</b>           |              |
| BME Project Design                             | 10           |
| Clinical Engineering                           | 4            |
| Diagnostic, Therapeutic & Laboratory Equipment | 3            |
| Medical Imaging Technology                     | 3            |
| Project ID: Connecting the Dots ^              | 4            |
| <b>Level 3.2 (22 hours per week)</b>           |              |
| 6-Month Internship / Final-year Project        | 22           |

Notes:

^ For more details on Interdisciplinary Studies (IS) electives, please log on to [www.np.edu.sg/is/](http://www.np.edu.sg/is/)

### **IS Modules**

The School of Interdisciplinary Studies (IS) delivers a broad-based curriculum, which nurtures a new generation of professionals with multidisciplinary skills and an innovative and entrepreneurial spirit to meet the challenges of a knowledge economy. IS offers both prescribed modules and electives to challenge boundaries. Prescribed modules develop students' competencies in core areas such as Communication, Innovation and Enterprise, Culture and Communication, and Personal Mastery and Development, while elective modules provide insights into Arts and Humanities, Business, Design, and Science and Technology.