

BIOMEDICAL SCIENCE COURSE MODULES (YEAR 3)

Learn to integrate and apply biological and chemical sciences knowledge to solve problems that our world faces, including infectious diseases, cancer, neurodegenerative diseases and an increasing demand for better nutrition and safer foods. Our Diploma in Biomedical Science [BMS] combines knowledge from bioinformatics, chemistry, molecular biology, immunology, microbiology, and proteomics to offer innovative solutions to these challenges. BMS is a launch pad for you to embark on a diversity of careers in the manufacturing, research and development, regulatory affairs and clinical trials, and clinical diagnoses industries.

In your first year, you will take modules such as Anatomy & Physiology, Cell Biology & Genetics, Biostatistics, Chemistry and Microbiology that will give you a firm foundation in chemistry and bioscience. You can build upon this solid foundation and choose one of our two specialisation options in your second year.

SPECIALISATION OPTIONS

General Biomedical Science

Develop analytical, research and problem solving skills that are highly valued by the industry. You will acquire knowledge and skills in analytical chemistry, molecular biology, biopharmaceutical analysis, and biomanufacturing practices. This option includes a six-month local or overseas internship at biopharmaceutical or food manufacturing companies, laboratory testing and analysis companies, research institutes, and healthcare organisations.

Clinical Laboratory Technology

This option includes a two-year Integrated Clinical Laboratory Training Programme at NUH, where you will learn about clinical laboratory techniques and get trained alongside professionals such as doctors, nurses and medical technologists. You will also receive an additional certification in phlebotomy.

GENERAL BIOMEDICAL SCIENCE SPECIALISATION OPTION

LEVEL 3.1

Capstone Project

Students will complete a final year research project under the guidance of an academic staff or industry mentor. The Capstone Project can cover any of the key areas in life science research including Molecular Biosciences, Industrial Biotechnology, Food Technology, Aquatic Science & Technology, Environmental Technology and Urban Horticulture and Greenscape. Students will be able to integrate and apply the knowledge and skills learned from the course. They will be involved in report writing as well as presenting the outcomes of the project in poster and oral presentations. The Capstone Project will further strengthen their writing and communication skills as well as analytical and problem solving skills, thus preparing them for the industry or further studies.

Genomics & Proteomics

This module provides an insight into the fields of genomics and proteomics. Students will study the functions of genes and their interaction within a genome, the human genome project, next-generation sequencing, genetically modified organisms and gene therapy, protein expression with emphasis on the structure and functions of proteins and methods of purification and analyses of proteins and applications of proteomics.

Translational Medicine & Clinical Trials

This module builds on the previous modules taken in the first and second year of the Biomedical Science course. Upon completion of this module, students will be able to appreciate the difference between basic and clinical research and apply the knowledge learnt in conducting translation research. This module also covers bioethics, clinical trials and regulatory compliance, clinical informatics and big data analysis as well as emerging technologies in biomedical science.

Project ID: Connecting the Dots[^]

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

6-month Internship

The six-month internship will provide students with exposure to real work environment, give them opportunities to relate and apply the knowledge acquired to work situations and enable them to make a better transition into the workplace. Clear learning outcomes, close mentorship, meaningful and real work activities allow for structured learning throughout the duration of the internship. Students will be attached to companies and institutes in various industries such as the pharmaceuticals, biologics manufacturing, laboratory testing, food, healthcare and bioinformatics sectors. Students will also have the opportunity to go for overseas internships.

CLINICAL LABORATORY TECHNOLOGY SPECIALISATION OPTION

LEVEL 3.1

Integrative Module

This module will cover the basic phlebotomy course focusing on the techniques, and theories of phlebotomy as well as the basic skills to interact with the patients. Besides, polyclinic attachment is also covered under this module.

Laboratory Endocrinology

This module introduces the physiology and pathogenesis of endocrine disorders, as well as laboratory testing related to endocrine disorders. This provides important background and understanding to use of laboratory tests in diagnosis, monitoring and prognosticating endocrine diseases.

Molecular Diagnostics

This module explores basic molecular biology techniques used in the diagnostic laboratory. Topics include the molecular testing of inherited and infectious diseases, haematological disorders, and cancer. Related laboratory tests are covered.

Level 3.2

Capstone Project

Students will complete a final year research project under the guidance of an academic staff or industry mentor. The Capstone Project can cover any of the key areas in life science research including Molecular Biosciences, Industrial Biotechnology, Food Technology, Aquatic Science & Technology, Environmental Technology and Urban Horticulture and Greenscape. Students will be able to integrate and apply the knowledge and skills learned from the course. They will be involved in report writing as well as presenting the outcomes of the project in poster and oral presentations. The Capstone Project will further strengthen their writing and communication skills as well as analytical and problem solving skills, thus preparing them for the industry or further studies.

Clinical Chemistry II

This module covers more advanced scopes of clinical chemistry, including topics such as acid base physiology and disorders, lipid metabolism, calcium regulation, organ system review and diseases (gastrointestinal tract, cardiac markers, infectious disease testing, autoimmune diseases).

Clinical Haematology II

This module covers the normal and pathophysiology of bone marrow, haematological malignancies such as leukemias, lymphoma, myeloproliferative disorders and non-malignancies disorders such as anemias, myelodysplasia, coagulation disorders. Advanced haematological investigation using Flow Cytometry and conventional as well as Fluorescence In-situ Hybridisation (FISH) cytogenetics will be taught.

Clinical Microbiology II

This module focuses on less frequently encountered infectious diseases which are associated with significant morbidity and mortality. Students will learn more about processing blood culture and cerebrospinal fluid specimens, susceptibility testing methods, non-culture based diagnostic tests, infections associated with bacteria, fungi, viruses and parasites along with an introduction to the antibiotic classes.

Translational Medicine & Clinical Trials

This module builds on the previous modules taken in the first and second year of the Biomedical Science course. Upon completion of this module, students will be able to appreciate the difference between basic and clinical research and apply the knowledge learnt in conducting translation research. This module also covers bioethics, clinical trials and regulatory compliance, clinical informatics and big data analysis as well as emerging technologies in biomedical science.

COURSE CURRICULUM (YEAR 3)

Module Name	Credit Units
YEAR 3	
GENERAL BIOMEDICAL SCIENCE SPECIALISATION OPTION	
Level 3.1 (20 hours per week)	
Capstone Project	8
Genomics & Proteomics	5
Translational Medicine & Clinical Trials	3
Project ID: Connecting the Dots ^	4
Level 3.2 (20 hours per week)	
6-Month Internship	20
CLINICAL LABORATORY TECHNOLOGY SPECIALISATION OPTION	
Level 3.1 (13 hours per week)	
Integrative Module	6
Laboratory Endocrinology	3
Molecular Diagnostics	4
Level 3.2 (29 hours per week)	
Capstone Project	8
Clinical Chemistry II	6
Clinical Haematology II	6
Clinical Microbiology II	6
Translational Medicine & Clinical Trials	3

Notes:

^ For more details on Interdisciplinary Studies (IS) electives, please log on to 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.