

VETERINARY BIOSCIENCE COURSE MODULES (YEAR 2)

Do you love animals and care for their welfare? Keen to work with animals in the future? Our Diploma in Veterinary Bioscience [VBS] will teach you how to care for, handle and manage various animals, ranging from laboratory animals to pets. You will be trained to assist veterinarians in a clinical setting, as well as learn about the importance of animal models in the search for new drugs and vaccines. You will also get a head start in a career in biomedical research.

In your first year, you will learn about the maintenance and well-being of animals through modules such as Animal Anatomy & Physiology, Animal Nutrition and Animal Welfare, Behaviour & Handling. Modules such as Wildlife Conservation & Biodiversity will give you an understanding of animals in their natural habitats.

You will learn about the importance of the animal immune system in the prevention of infection, as well as the clinical diagnosis and treatment of animal diseases in your second year. The role of genes in animal health will be covered through modules such as Animal Developmental Biology & Genetics.

In your final year, you will carry out a research project and undertake a four-month internship either locally or abroad, where you could be attached to research laboratories, veterinary clinics or animal theme parks such as the Singapore Zoo and River Safari.

LEVEL 2.1

Applied Biostatistics

This module covers advanced statistical skills to analyse and interpret a wide range of biological, preclinical and clinical data, and preparation of data for scientific presentation. The statistical skills covered include biological experiment design, hypothesis testing, quantitative data analysis by parametric and non-parametric methods, qualitative data analysis by Chi-square and Fisher tests, and simple correlation and regression analysis for non-linear data. The scientific presentation section covers how to organise data, prepare and incorporate statistical results on graphs and interpretation of results.

Aquaculture & Fish Diseases

This module equips students with the knowledge of anatomy, physiology, nutritional requirements and reproductive systems in mainly Teleost fish as well as provides an introduction to aquaculture and the various aquaculture systems employed today. Students will also be introduced to a variety of common and significant fish diseases, the principles of disease diagnosis, treatment and health management of various fisheries and aquariums.

Career & Professional Preparation II

This module is part of the Education and Career Guidance framework to provide students with the tools and resources necessary for their further career and/ or education. In this module, students will explore basic job search strategies, practice writing effective resumes and cover letters, and learn interview skills. Students will also learn professional and intercultural communication skills to prepare them for a dynamic and diverse workplace.

Cell Culture & Tissue Applications

This module is a detailed study of the techniques used in the culturing of cells and tissues. Topics include the preparation of media, cell viability checks, passaging of inherent cells, cryopreservation, cloning and mycoplasma assays. Applications of animal cell culture, tissue engineering, and rapid prototyping are also covered.

Veterinary Immunology

This module introduces students to the fundamentals of immunology and provides an understanding of how the immune system functions as an integrated defense system against disease. Topics include an overview of the immune system of vertebrates, innate and adaptive immunity, humoral and cell-mediated immunity, immunisation, vaccination, laboratory immunological techniques, diseases of the immune system and antibody-based therapies.

Veterinary Pharmacology & Toxicology

This module covers the basic principles of veterinary pharmacology, pharmacodynamics, pharmacokinetics

(absorption, distribution, metabolism, elimination), the major drug classes, basic anaesthesiology, and an introduction to toxicology. Clinical and research applications of the drugs will be discussed in relation to the drug effects and mechanisms of action. Students will have the opportunity to practise animal handling skills and techniques for the administration of medication, as well as perform drug calculations.

World Issues: A Singapore Perspective[^]

This module develops a student's ability to think critically on world issues. Students will discuss a wide range of social, political and cultural issues from the Singapore perspective. It also looks at how city-state Singapore defied the odds and witnessed close to half a century of rapid economic growth, strong political ties and social harmony.

LEVEL 2.2

Animal Developmental Biology & Genetics

This module discusses developmental biology, genetics approaches to understanding animal embryonic development, and genes that are involved in body plan formation and morphogenesis. Other topics include the pattern of inheritance, mutation, and roles of genes and environmental factors in relation to animal health are also covered.

Animal Diseases & Pathology

This module trains students in the skills necessary for the investigation, prevention, and control of common infectious and non-infectious animal diseases. The study of pathogenic mechanisms and the morphological aspects of the disease will also be covered. Emphasis will be given to common diseases affecting small laboratory animals. Common diseases affecting laboratory animals will also be briefly discussed.

Clinical Biochemistry & Haematology

This module focuses on disease diagnosis and monitoring in clinical biochemistry and haematology as reflected in veterinary clinic practice. The clinical biochemistry component will cover enzyme kinetics and metabolism, and give students an understanding of metabolic diseases. The haematology component will cover aspects of blood analysis and will provide practical training in performing blood smears, carrying out blood biochemistry and completing blood count profiles, which are routinely conducted in veterinary clinics.

Clinical Diagnostics, Surgical & Veterinary Practices

This module covers introductory clinical diagnostics and basic surgical techniques. Students will be taught how to handle clinical samples, prepare and examine skin scrapings, urine, fecal bacteriological and cytological samples. Students will also learn to perform histological sections and stain tissues for diagnostic purposes. Students will be introduced to the perioperative preparation of an animal for surgery, monitoring of an animal during surgery, and surgical instrumentation. Management of a veterinary practice will also be briefly covered.

Molecular Biology & Bioinformatics

This module covers the fundamentals of molecular biology coupled with techniques in bioinformatics in order to provide students with analytical skills that are useful in the analysis of molecular data. The molecular biology component covers topics such as DNA structure and replication, gene expression, gene mutation, DNA repair mechanisms, and recombinant DNA technology. Students will learn how biological data such as nucleic acid and protein sequences are archived and how to retrieve such information from public databases. Students will be introduced to current bioinformatics software that can be used for analysis of nucleic acid and protein sequences, and for designing of PCR primers.

COURSE CURRICULUM (YEAR 2)

Module Name	Credit Units
YEAR 2	
Level 2.1 (27 hours per week)	

Applied Biostatistics	3
Aquaculture & Fish Diseases	5
Career & Professional Preparation II	2
Cell Culture & Tissue Applications	5
Veterinary Immunology	6
Veterinary Pharmacology & Toxicology	4
World Issues: A Singapore Perspective ^	2

Level 2.2 (25.5 hours per week)

Animal Developmental Biology & Genetics	2.5
Animal Diseases & Pathology	6
Clinical Biochemistry & Haematology	4.5
Clinical Diagnostics, Surgical & Veterinary Practice	4.5
Molecular Biology & Bioinformatics	6
Interdisciplinary Studies (IS) elective ^	2

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.