



Biotechnology
heals, feeds &
fuels the world

Higher National Diploma in
Biotechnology

leading to final year of **BSc (Hons) Biotechnology**



BMS takes pride in being the pioneer in Sri Lanka to offer a higher level Diploma in Biotechnology leading to a BSc (Hons) in Biotechnology Degree at Northumbria University, UK, with a view to developing the needed Biotechnology Scientists for the country. The addition of the Biotechnology programme to our courses was a fulfillment of a long - felt need to provide an opportunity for A/L Science students who are interested to pursue studies in this emerging branch of Science.

“ BMS is committed to grooming scientists for the betterment of our country”

Higher National Diploma in Biotechnology

Programme Structure

Higher National Diploma in Biotechnology is made up of sixteen modules which comprise a total of 240 credits. The programme can be completed within two academic years.

Semester 1

Module Code	Module	Learning Hours	Credits
BIOM 501 (1)	Cell Biology	150	15
BIOM 502 (1)	Biochemistry	150	15
BIOM 503 (1)	Chemistry for Biology	150	15
BIOM 512 (1)	Immunology	150	15
BIOM 508	Laboratory Techniques	100	10

(18 weeks)

Semester 2

BIOM 506 (1)	Molecular Biology & Genetics	150	15
BIOT 601	Plant Physiology & Environmental Adaptation	150	15
BIOT 602	Food Molecules, Additives & their Roles	150	15
BIOT 510	Medical Microbiology	150	15
BIOT 603	Bioinformatics	100	10

(18 weeks)

Semester 3

BIOT 605	Applied Genetics of Industry Agriculture & Medicine	150	15
BIOT 604	Industrial Microbiology	150	15
BIOT 606	Nanotechnology	150	15
BIOM 514	Analysis of Scientific Data and Information	100	10
BIOM 517	Biology of Disease	150	15

(18 weeks)

Semester 4

BIOM 511	Project	300	30
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(12 weeks)

Biotechnology

Biotechnology is technology based on biology. It binds cellular and biomolecular processes to develop technologies and products that help improve our lives. Modern biotechnology provides breakthrough products and technologies to combat diseases, reduce environmental damages, feed the hungry and offer safer and efficient manufacturing processes. Biotechnology is a cutting edge technology as well as an applied science.

Biotechnologist

Biotechnologists use biological organisms to create and improve products and processes in fields such as medicine, agriculture and environmental conservation. They study the genetic, chemical and physical attributes of cells, tissues and organisms, and identify industrial uses for this knowledge. The applications of biotechnology are widespread and include developing new medicines and vaccinations, cross-breeding plants and animals.

Semester 1

Cell Biology

This module will enable the learner to appreciate the cell as the basic unit of life. Learners will have the opportunity to explore the structural features of cells, cellular diversity, and the growth and development of cells. The importance of the cell membrane in controlling the internal environment of the cell and in communication will be emphasised, and a study of the cell's internal organisation will be used to explain how cells can develop and perform specialized roles in multicellular organisms.

Biochemistry

This module provides an introduction to the fundamental principles of biochemistry. It examines the chemical characteristics of some major biological building block molecules and uses these to develop an understanding of the structure and functions of related biological macromolecules. The key features of principle metabolic pathways and their relationship to each other are introduced.

Chemistry for Biology

This module provides learners with an understanding of the chemical concepts that underpin many of the other modules within the biological sciences. It is designed to cater for those learners who need the foundations of chemistry and includes enthalpy and equilibrium, organic chemistry, thermodynamics and bonding.

Immunology

This module is designed to extend the knowledge and understanding of normal body systems. This module will provide the learner with an appreciation of the importance of the immune response, and will also include the basic mechanisms of immunity, the role of immune response in diseases, and the study of components of the immune system using laboratory investigations.

Laboratory Techniques

This module develops learners' practical skills in chemical and biochemical techniques and allows them to carry out practicals and evaluate and interpret the results. The experiments carried out will relate to various methods of analysis. Theoretical aspects of various techniques, which may not be available in the laboratory, will also be covered.

Semester 2

Molecular Biology and Genetics

This module will enable the learner to explain the cellular processes leading to the modification and inheritance of phenotype characteristics. The role of nucleic acids in directing protein synthesis and the regulation of these processes *in vivo* is introduced. Methods used to manipulate genetic material *in vitro* are covered. This technological approach is complemented by an investigation of classical genetics relevant to individuals and populations.

Plant Physiology & Environmental Adaptations

The module will explore the areas of plant anatomy and function which can be applied to look at how plant species have become adapted to their particular habitats. The module includes the inbreeding of genetically modified and natural species and the effects this could have on the natural population. Learners also develop skills in assessing the use of plants in environmental restoration.

Food Molecules, Additives and their Roles

This module look at macro-nutrients and their function in food products in detail, the opportunity to observe the effect of food processing on each nutrient and turn to identify their nutritional value after process. Food additives also show how they can be used positively within the manufacturing of food and why food labeling is so important.

Medical Microbiology

The overall aim of this module is to give the learner a broad grounding in the theory and practice of medical microbiology. Pathogenic microorganisms will be presented in context. For each of the major groups of pathogens the module considers collection, , transport of specimens, isolation and identification of pathogens.

Bioinformatics

This module will review key methods, data sources and the aims of bioinformatics, including its use in medical diagnosis and the treatment and prevention of genetic diseases. Learners will gain a theoretical and practical understanding of computational biology, data collection, how to manage biological databases and how to analyse data appropriate software tools.

- Modern Science Lab
- Internship practical sessions at hospitals
- Residential presentation workshops
- Industrial visits

Semester 3

Biology of Disease

The module will provide a thorough grounding in the causes and consequences of damage to cells, increase understanding of the pathological effects of cellular injury, and explore the consequences of changes in external environment and disease on the physiology of the human body.

Applied Genetics of Industry, Agriculture and Medicine

The module will provide to experience and apply mendelian principles, molecular biology and microbial genetics in disease and medication, genetic counselling and selective breeding. Molecular techniques will be studied in the context of industry, agriculture and medicine. Learners also study the positive aspects of genetic manipulation and modification.

Industrial Microbiology

The module will undertake practical investigation to study microbial growth, growth cycles and factors which affect population growth and the yield of products. Learners will understand how growth can be manipulated to influence the end product, role of genetic engineering in industrial microbiology, physical and chemical used to control microbial contamination and quality control measures.

- Digital Library
- Wi-Fi facility
- Modern Class Rooms
- Industry expert lecturers
- All core original text books

Nanotechnology

The module provides an introduction to the fundamental principles and commercial use of nanotechnology and embraces the interdisciplinary nature of the subject. Learners will also cover key concepts in engineering, physics, chemistry, biology and their application in solving nanotechnology problems. Learners will also gain an appreciation of the commercial application of nanotechnology and the challenges for the future.

Analysis of Scientific Data and Information

This module is designed to introduce and or develop some of the mathematical and statistical techniques commonly used to process scientific data. In the 21 century, much data processing is performed by computer. The importance of understanding how and in what circumstances to use individual mathematical and statistical techniques and the significance of the results obtained is not diminished by the availability of computational facilities.

Semester 4

Project

The module enables students to engage in a research project and to present their evaluation of the relevant primary literature and their own findings in a written report. Scientists are frequently required to select and apply appropriate knowledge and skills to unfamiliar situations. Students will have the opportunity to integrate the knowledge and skills that they have acquired from the modules by applying them to an extended individual study.

Programme Structure

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Programme Accreditation

The academic quality management systems of Higher National Diploma in Biotechnology are quality assured by Pearson (Edexcel), UK, an internationally recognised body which ensures and certifies academic quality.

Progression

On successful completion of Higher National Diploma in Biotechnology with an overall 'Merit' grade, students will be able to progress to the final year of BSc (Hons) in Biotechnology Degree from Northumbria University, UK.

Entry Requirements

Applicants are welcome from a wide range of backgrounds in science and each application is assessed individually on its Merits. As a minimum entry requirement, students are expected to have (a) "Pass" grades in chemistry, and biology in GCE A/Ls or (b) foundation programme in science with overall 'Merit' grade or (c) equivalent which demonstrates sufficient knowledge in chemistry and biology.

Biotechnology

Biotechnology is the practice of using plants, animals and micro organisms as well as biological processes to develop technologies and products that help improve our health & life.



Teaching

Modules (units) are delivered using a combination of lecture and laboratory based teaching allowing you to learn biotechnology in a practical context.

Assessment

A wide range of assessment methods are utilised, including examinations, assignments, laboratory work and presentations.