



Higher Certificate in Bioscience

SAQA ID 120666 NQF Level 5

🕒 Qualification duration

Contact

Full-Time (Campus)

- Minimum: 1 year
- Maximum: 3 years

☰ Qualification description

The primary purpose of the qualification is to provide graduates with a Higher Certificate in Bioscience which specialises in the knowledge, specific skills and applied competence in the field of biological science or in a related field. This qualification provides students with skills which are required in the workplace to improve their overall productivity. In addition to bioscience related subject knowledge, students are supported to develop graduate attributes that are essential skills to excel both at personal and professional levels. The combination of theory and practice results in well-rounded students, who on successful completion, are prepared to launch a career as candidate scientists.

Above all, one of the exit-level outcomes is for graduates to be able to demonstrate knowledge and understanding of the key terms, concepts, facts, principles, and theories related to the field of biological science, as well as that of the subject specialisation areas and apply this knowledge to practice.

🏛️ Qualification accreditation

- Accredited by the Higher Education Quality Committee (HEQC) of the Council on Higher Education (CHE)
- Registered with the South African Qualifications Authority (SAQA)

This qualification is offered at the following campuses:

- Midrand

✅ Entry requirements

- South African National Senior Certificate (NSC) with Bachelor's degree, Diploma or Higher Certificate pass.
- Or a National Certificate (Vocational) Level 4 issued by the Council of General and Further Education and Training with a Bachelor's degree, Diploma or Higher Certificate pass.
- Or a certificate of evaluation on a minimum NQF level 4 for foreign qualification issued by SAQA.
- Or a letter or certificate confirming an exemption from Universities South Africa (USAf) for any other school-leaving results.
- Or completion of a Bachelor's degree, Diploma, Higher Certificate or equivalent.

AND

- A minimum of 40% for Grade 12 or equivalent English Language.
- Or a minimum of 40% for Grade 12 or equivalent Mathematics.
- Or a minimum of 50% in Mathematical Literacy.

📁 Possible career options

Graduates will be prepared to work as assistants in relevant:

- Bio-manufacturing
- Pursue further education in biological studies
- Research, diagnostic and industrial laboratories

📦 Qualification structure

Year 1

- Bioethics and Communication
- Biostatistics
- Chemistry
- Introduction to Bioprocessing
- Introduction to Biotechnology
- Laboratory SHEQ
- Laboratory Techniques in Experimental Biosciences
- Mathematics for Science
- Principles of Cell Biology
- Professional Skills Development
- Project Planning



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Module descriptors

Year 1

Bioethics and Communication

This module aims to provide students with the ability to become an active participant in the learning process using several logical reasoning frameworks, thereby stimulating critical reflection on fundamental ethical issues that relates to the study of biotechnology. It intends to enhance ethical knowledge, ethical sensitivity and ethical judgement based on a balanced overview of scientific perspectives and social consciousness.

Bioethics is the study of ethical, social, and legal issues that arise in biomedicine, biomedical research and biotechnology research and innovation. This module includes medical ethics, which focuses on issues in health care; research ethics, which focuses issues on the conduct of research; environmental ethics, which focuses on issues pertaining to the relationship between human activities and the environment, and public health ethics, which addresses ethical issues in public health.

Biostatistics

This module aims to introduce statistical techniques and experimental design within bioscience. It prioritises the understanding and selection of statistical tests, encompassing descriptive methods, tests of significance, linear regression, correlation and analysis of variance.

This module provides students with practical skills in applying statistical techniques and experimental design within the bioscience domain. Emphasising proficiency in data analysis, statistical test selection and result interpretation, students will understand data analysis methodologies comprehensively, including contextual analysis, differentiation of data types and the importance of sound sampling methods. Through hands-on activities, students will develop expertise in data representation techniques such as generating frequency distribution tables, constructing histograms and effectively using various graphical representations. Additionally, students will enhance their statistical analysis skills by defining and calculating central tendency and variation measures, using relative standings measures and constructing informative data representations like box plots. Moreover, the module aims to deepen comprehension and use of probability values and equip students with the ability to estimate population parameters through constructing confidence interval estimates and determining appropriate sample sizes. Furthermore, students will attain proficiency in hypothesis testing by identifying null and alternative hypotheses, performing hypothesis tests and using sample data for hypothesis testing. Lastly, students will analyse paired data to assess correlations between variables, determining the linear correlation coefficient and the equation of the regression line.

Chemistry

This module aims to equip students with the essential skills and knowledge required for proficient laboratory work, precise chemical measurements, and a solid understanding of fundamental chemical concepts, laying the groundwork for further study in chemistry.

This module integrates fundamental laboratory techniques and safety protocols within the context of theoretical concepts, ensuring a practical application to enhance understanding. Topics covered include measurements, properties of matter and energy, atomic structure, compound formations (ionic and molecular), chemical reactions, calculations, acid-base chemistry, and redox reactions. Students gain a comprehensive understanding of chemistry's principles through this integrated approach.

Introduction to Bioprocessing

The aim of this module is to equip students with the knowledge and skills to understand and apply bioprocessing techniques in the biotechnology industry. It focuses on the preparation of raw materials, conversion processes, downstream processing, and final product processing. Additionally, it includes a Work Integrated Learning component, providing students with practical industry experience.

The course includes microbiological monitoring, sampling, testing, validation, identification methods and techniques. Bioprocessing combines living matter, in the form of organisms or enzymes, with nutrients under specific optimal conditions to make the desired product. It is responsible for translating discoveries of life sciences into practical and industrial products, processes and techniques that can serve the needs of society. Bioprocessing is thus the backbone of the biotechnology industry that translates the research and development to the industries. This module will, therefore, focus on the following content: preparation stage of raw materials, substrates and media, the conversion state, biocatalysts, downstream processing, volume production, purification and final product processing. In addition, students will have to spend approximately 40 hours in industry as part of the WIL (Work Integrated Learning) component; this will expose students to the work environment. Graduates from this program will have the knowledge and skills to understand the fundamental bioprocess research and relate it to the relevant industries.



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Introduction to Biotechnology

The aim of this module is to introduce you to the conceptual foundations of biotechnology and the role played by discoveries and applications of molecular biology principles in advancing bioscience discoveries.

This module provides an overview of the key principles and concepts in biotechnology, introducing you to the impact of molecular biology on bioscience research.

Laboratory SHEQ

The aim of this module is to provide students with a complete body of knowledge of Laboratory Safety, Health, Environment and Quality (SHEQ) as a holistic approach in applying Good Laboratory Principles.

This module particularly focuses on laboratory safety, the quality of the product/service delivery (to the internal and external customer), quality of organisation (systems and processes) in the laboratory environment.

Students will acquire fundamental theoretical and practical knowledge in Principles of SHE, Applying SHE principles and procedures and laboratory hazard identification & risk assessment, system documentation tools and good laboratory practices.

Laboratory Techniques in Experimental Biosciences

The aim of this module is to provide you with the fundamental knowledge of Laboratory techniques used in Experimental Bioscience.

This course will provide you with theoretical and practical knowledge of common experimental techniques in bioscience. In addition, you will be able to understand and discuss the advantages and limitations of each approach. This module will include fundamental laboratory techniques as well as an introduction to microbiology, scientific investigations, and analytical techniques. The module will develop the foundational skills required to perform routine laboratory techniques in the work environment.

Mathematics for Science

This module aims to introduce mathematical techniques and prepare students to use mathematics confidently to solve problems, communicate and reason mathematically and make connections between mathematics and its applications in real-world scenarios.

This module will focus on graphs of functions and use a variety of ways to describe them. Specific attention will be given to linear, quadratic, polynomial, rational, exponential and logarithmic functions, and their applications to real-world problems. The focus will also be on sequences and series and their relation to functions, e.g. linear functions.

Principles of Cell Biology

The aim of this module is to provide students with a foundational understanding of cell biology, including the structure and function of eukaryotic and prokaryotic cells, biological chemistry, cellular metabolism, and genetics. The course also introduces experimental methods in cell biology and highlights the link between cell function defects and human diseases. The goal is to prepare students for advanced biology courses.

The aim of this module is to provide students with a basic understanding of the architecture and function of eukaryotic & prokaryotic cells. In addition to introducing students to new facts and vocabulary pertinent to cell biology, also introduces students to experimental methods used by scientists to define and understand cell structure and function. Relationships between defects in basic cell function and human diseases are highlighted. This course covers basic cell biology. Emphasis is on biological chemistry, cell structure and function, cellular metabolism, genetics, and other related topics. Upon completion, students should be able to demonstrate preparedness for college-level biology courses.



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Professional Skills Development

The aim of this module is to facilitate the development of professional skills to enable students to demonstrate personal effectiveness in the Bioscience field and communicate scientific information reliably, accurately, and coherently, using contextually appropriate methods.

This module provides a comprehensive introduction to the corporate sector while fostering individual effectiveness, self-awareness, communication, and networking skills. Students will develop proficiency in communicating scientific information reliably and coherently, employing various mediums such as written, oral, visual, and symbolic forms. Emphasis is placed on understanding and adhering to conventions surrounding intellectual property, copyright, and plagiarism, including legal implications. Additionally, students will acquire the ability to gather information from diverse sources, utilizing effective Information and Communication Technology (ICT) skills. They will learn to discern and select relevant information for specific tasks, applying fundamental processes of analysis, synthesis, and evaluation to enhance critical thinking abilities.

Project Planning

This module aims to provide students with a comprehensive understanding of project planning principles and essential skills for effective project management. Students will explore core project concepts, master fundamental project management terminology, and develop proficiency in organising tasks and creating project timelines. Additionally, students will grasp the basics of resource allocation and management, including cost estimation principles, and cultivate the ability to report on project progress and communicate feedback through basic methods.

The Project Planning module offers a comprehensive exploration of project planning, an indispensable aspect of effective project management. It begins by defining the fundamental concept of a project and delves into essential project management terminology and principles, providing students with a solid foundation. Students will learn to adeptly create and organise project tasks, ensuring clarity and efficiency in project execution. Furthermore, the module covers basic scheduling techniques, empowering students to develop realistic project timelines. Understanding the basics of resource allocation and management, including principles of cost estimation, equips participants with crucial skills for optimising project resources. Additionally, the module emphasises the importance of effective project progress reporting through simple tracking methods and teaches students how to communicate project feedback effectively using basic charts and reports.