

Bachelor of Science in Industrial Biotechnology

Industrial biotechnology is a science applied in Industrial manufacture of bioproducts and processing bioenergy. The focus of the technology taught in this programme is the use of biological resources as input to biobased processes which are economically and environmentally sustainable.

The programme envisages that as the technology is gradually embraced, there will be unfriendly fossil oil and agricultural manufacturing practices but will increase food security and generate sustainable economic growth and jobs.

In this degree programme students will learn Industrial biotechnology applications which can be used to create new bioproducts, such as plant-based biodegradable plastics, using biorefineries to generate electricity, transport fuels and chemicals, modify and develop new industrial processes, such as using enzymes to replace harsh chemicals used in textiles, pulp and paper industry, treating industrial waste water onsite using biological mediums such as microbes, reduce the adverse environmental impact of manufacturing to provide energy and water savings by adding enzymes in detergents thus allowing clothes to be washed in lower temperatures and less water.

COURSE OBJECTIVES

1. To teach students the basic principles of processing of bioproducts from biological resources in the areas Industrial Biotechnology.
2. To equip students with skills on recent Methodologies and practice in industrial biotechnology.
3. To expose students to relevant and recent advances in industrial biotechnology.

COURSE JUSTIFICATION

Like other developing countries Kenya needs to develop its scientific base in order to find effective and logically relevant solutions to problems of health, food security, industrial development and environmental protection. Industrial Biotechnology therefore remains an essential discipline and continues to play a catalytic role.

Industrial Biotechnology has advanced to include areas such as Textile Processing, Pharmaceutical Biotechnology, Antimicrobial plant products, Bioenergy systems, Marine Biotechnology. All these courses are presently playing a significant role in research directed towards provision of alternative sources of food, energy and medicine as well as in prevention of environmental pollution.

Students graduating from this programme qualify to join local and international industries. Others will be able to develop careers in production, quality assurance and technical sales in food, beverages and pharmaceutical sectors as well as environmental health protection. These institutions and companies form an important part of our country's production and services sector.

Regulations for the Degree of Bachelor of Science in Industrial Biotechnology

1.0 Entry Requirements

Students wishing to study Industrial Biotechnology must satisfy the minimum University requirements and Faculty/school entry requirements.

A student to be admitted must satisfy any of the following minimum requirements:

1.1 Must have passed Biology or Biological Sciences and chemistry in KCSE at a minimum grade of C+. In addition a student must have passed either maths or physics / Physical Science with a minimum grade of C (C plain). A student who has not attained the said grade in mathematics or physics/physical sciences must undertake and pass the respective bridging course in an institution recognized by the University Senate in order to be considered for the degree program

or

1.2 have a minimum of 2 principal passes in biology and chemistry subjects in Kenya Advanced Certificate of Education (KACE),

or

1.3 have a diploma in relevant science subjects and with at least a credit pass from an Institution recognized by the University Senate,

or

1.4 have a diploma in Applied Sciences with at least a credit pass in relevant science subjects from an Institution recognized by the University Senate,

or

1.5 have any other qualifications accepted by the University Senate as equivalent to 1.1 to 1.4.

Students who hold any of the qualifications 1.2, 1.3 and 1.4 above may at the discretion of the Faculty /school be admitted directly to the second year of the course in which case they may complete their course in a minimum of three academic years and a maximum of five academic years.

2.0 Course Structure

2.1 In each year a student will be required to take twelve (12) core units. In addition each student will be required to take three (3) University units and one (1) Faculty unit in the first year and one (1) University unit in the fourth year of study. No elective units will be offered unless subscribed for by at least 15 students.

2.2 A student who takes additional unit(s) will have the grade(s) indicated in the transcript but will not count towards classification of the degree.

Unless otherwise stated each course is one unit.

FIRST YEAR

First Semester

Unit Code	Unit Title
HRD 2101	Communication Skills
SZL 2111	HIV/AIDS
SMA 2104	Mathematics for Science
SCH 2100	Atomic Structure
SCH 2102	Physical Chemistry I
SBT 2103	Cellular basis of life
HBB 2100	Structure of Biomolecules
HBB 2104	The Cell and its External Environment

Second Semester:

HRD 2102	Development Studies and Social Ethics
SCH 2101	Chemical Bonding and Structure
SCH 2103	Organic Chemistry I
HBB 2101	Proteins and Enzymes I
HBB 2103	Basic Metabolism I
HBB 2105	Plant Biochemistry I
HBB 2106	Biochemistry of Microorganisms I
HBB 2108	Principles of Environmental Science in Bioengineering
SZL 2205	Genetics and Cytogenetics

SECOND YEAR

First Semester:

SCH 2201	Physical Chemistry II
ICS 2240	Introd To Computer And Data Processing

- HBB 2204 Chemical Reaction in Bioengineering
- HBB 2205 Cell and Molecular Biology
- HBB 2209 Analytical Techniques in Biotechnology I
- HBB 2306 Cell and Molecular Immunology1

Second Semester

- SCH 2202 Organic Chemistry II
- SCH 2203 Nuclear Chemistry and Radiochemistry
- ICS 2241 Introduction To Programming
- HBB 2208 Biochemistry of Microorganisms II
- HBB 2210 Analytical Techniques in Biotechnology II
- HBB 2220 Plant Biochemistry II

THIRD YEAR

Semester 1

- HBB 2332 Principles of Animal Cell Technology
- HBB 2333 Biosystems in Microbial Technology
- HBB 2329 Protein Biotechnology
- HBB 2311 Downstream Processing I
- HBB 2312 Pharmaceutical biotechnology I
- HBB 2313 Pharmaceutical biotechnology II

Semester 2

- HBB 2314 Bioprocess Engineering
- HBB 2315 Industrial Enzymes Technology
- HBB 2316 Bioenergy systems
- HBB 2319 Applied Microbial Technologies

HBB 2334 Microbial Biochemistry

HBB 2307 Biostatistics and Research Methodology

FOURTH YEAR

Semester 1

HRD 2401 Entrepreneurship Skills

HBB 2405 Proteins for Diagnosis

HBB 2406 Research Projects

HBB 2409 Marine Biotechnology

HBB 2421 Applied Microbial Biochemistry

HBB 2331 Bioethics and Policy in Biotechnology

HBB 2436 Downstream processing II

HBB 2420 Recombinant DNA Technology

Semester 2

HBB 2406 Research Project

HBB 2408 Translational Biotechnology

HBB 2411 Antimicrobial Plant Products

HBB 2412 Industrial Fermentation

HBB 2413 Preservation of Industrial Microbes

HBB 2429 Bioinformatics

HBB 2437 Biotechnology in Textile Industry