

Bachelor of Science in Applied Bioengineering

Applied bioengineering employs scientific and engineering principles to process biological materials from biological agents for provision of goods and related services. It takes advantage of integrated use of biochemistry, microbiology and genetic engineering in order to exploit capabilities of microorganisms, cultured cells and tissues in industrial processes to generate products that address challenges of food security and health as envisioned in vision 2030.

The degree program will be carried out in collaboration with other Science departments to provide students with basic knowledge in microbiology, research methodologies, computer skills and other foundation courses. The students will acquire practical and theoretical understanding of basic biochemistry and applied bioengineering both of which are fundamental to their acquiring of competence in the areas of research and application in bioengineering.

Other areas included in the program are bioinformatics and environmental biotechnology which advance the students knowledge and skill in computing and the impact of biotechnological activities to the environment.

COURSE OBJECTIVES

- 1 To teach students the applicable principles in applied bioengineering.
- 2 To equip students with practical skills on recent methodologies and practice in applied bioengineering.
- 3 To expose students to relevant and recent advances in applied bioengineering.
- 4 To offer students adequate computer skills and research methods for computing and presentation of biological data.

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. Applied bioengineering remains

an essential discipline that will continue to play a catalytic role in the effort to address these challenges.

Resultant from this, applied bioengineering has advanced to include areas of genetic engineering, processing, medical, agricultural and environmental biotechnology which are presently playing a significant role in research directed towards provision of alternative sources of food and medicine.

Courses addressing the said areas are contained in this program making it unique among other similar programs in the country. Consequently students graduating from this program qualify to join local and international research institutions involved in multi-disciplinary life sciences research. 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 Departments. The said institutions and companies form an important part of our country's production and services sector

Regulations for the Degree of Bachelor of Science in Applied Bioengineering

1.0 Entry Requirements

Students wishing to study Applied Bioengineering must satisfy the minimum University requirements and Faculty of Science entry requirements.

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

Either

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 mathematics with a minimum grade of C. A student who has not attained the said grade in mathematics must undertake and pass the respective bridging course in an institution recognized by the university senate to be considered for the degree programme.

or

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

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 of Science 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 unit(s) 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

Course Distribution

First Year

First semester

Code	Unit Title
HRD 2101	Communication Skills

SZL 2111	HIV/AIDS
SMA 2104	Mathematics for Science
SCH 2100	Atomic Structure
SCH 2102	Physical Chemistry 1
HBB 2100	Structure of Biomolecules
HBB 2104	The Cell and External Environment
SBT 2103	Cellular Basis of Life
HRD2102	Development Studies and Social Ethics
SCH 2101	Chemical Bonding and Structures
SCH 2103	Organic Chemistry I
HBB 2101	Proteins and Enzymes I
HBB 2103	Basic Metabolism I
HBB 2108	Principles of Environmental Science in Bioengineering
SBT 2173	Introduction to Microbiology
SZL 2205	Genetics and Cytogenetics

Second Year

First Semester

Code	Unit Title
SCH 2201	Physical Chemistry II
HBB 2200	Basic Metabolism II
HBB 2201	Microbial Metabolism
HBB 2202	Biochemical Techniques and Instrumentation I
HBB 2205	Cell and Molecular Biology
ICS 2240	Introduction to Computer and Data Processing
SCH 2202	Organic Chemistry II
SCH 2203	Nuclear Chemistry and Radiochemistry
ICS 2241	Introduction to Programming
HBB 2105	Plant Biochemistry I
HBB 2204	Chemical Reactions in Bioengineering
HBB 2206	Microbial Molecular Genetics

Third Year

First Semester

Code	Unit Title
HBB 2304	Proteins and Enzymes II
HBB 2306	Cell and Molecular Immunology I
HBB 2307	Biostatistics and Research Methodology
HBB 2308	Bioengineering Techniques I
HBB 2318	Microbial Cell Culture Techniques
HBB 2320	Plant and Animal Tissue Culture Techniques.
HBB 2301	Basic Metabolism I
HBB 2309	Bioengineering Techniques II
HBB 2311	Downstream Processing 1
HBB 2319	Applied Microbial Technologies
HBB 2325	Valuable Biotechnology Products
HBB 2328	Immunotechnology

Fourth Year

First Semester

Code	Unit Title
HRD 2401	Entrepreneurship Skills
HBB 2331	Biosafety, Legal and Ethics in Biotechnology
HBB 2406	Research Project
HBB 2415	Transgenic Plants and Animals
HBB 2428	Environmental Biotechnology
HBB 2433	Industrial Enzymes
HBB 2436	Downstream Processing II
HBB 2405	Proteins for diagnosis
HBB 2406	Research Project
HBB 2408	Translational Biotechnology

HBB 2414 Therapeutic Proteins
HBB 2429 Introduction to Bioinformatics
HBB 2434 Gene Therapy and Nanotechnology

Additional Unit

HBB 2413 Preservation of Industrial Microbes