

## **Bachelor of Science in Biochemistry (Molecular Biology Option)**

Biochemistry is a subject in life sciences whose objective entails understanding the Molecular Basis of life in plants and animals. It is a multi-disciplinary subject that focuses on structure and function of molecules as well as their interplay to create the phenomenon of life. The subject particularly looks at how molecular interplay is translated into basic metabolism, energy transduction, defense and physical responses for purposes of growth and development.

The Molecular basis of the ongoing struggle between higher organisms and disease is aptly captured in subjects like Medical Biochemistry, Biochemistry of parasites and tumors as well as Cell and Molecular Immunology. Strategies designed to control disease and enhance food security are adequately addressed in the areas of pharmacology Molecular biology and biotechnology. These areas of specialization form part of recent advances in biochemistry and are covered in this programme.

The degree program will be offered in collaboration with Biological and Physical Science departments. The students will acquire practical and theoretical understanding of basic metabolism, Molecular Biology and Biotechnology. Other areas included in the programme are cell and Molecular Immunology, Industrial and Nutritional Biochemistry, Biochemical Pharmacology and Medical Biochemistry. These courses are designed to expose students to a wider perspective in Applied Biochemistry

### **COURSE OBJECTIVES**

1. To impart analytical knowledge in Biochemistry and Molecular Biology.
2. To provide students with practical skills in the areas of Biochemistry and Molecular Biology.
3. To train students on relevant and recent advances in Applied Biochemistry and Molecular Biology.

## **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. Biochemistry therefore remains an essential discipline and continues to play a catalytic role.

Resultant from this Biochemistry has advanced to include areas of Molecular Biology and Biotechnology in addition to Medical Biochemistry, Industrial and Nutritional Biochemistry, Biochemical Pharmacology and Cell and Molecular Immunology. All these are presently playing a significant role in provision of alternative sources of food and medicine.

Students graduating from this program will be absorbed in local and international research institutions involved in multi-disciplinary life sciences research. Some develop careers in production, quality assurance and technical sales in food, beverages and pharmaceutical sectors. Cosmetics industries, hospital diagnostics and environmental health protection departments continue to show interest in graduates of this program suggesting improved confidence on graduates of this program by the country's economic sector.

### **Regulations for the Degree of Bachelor of Science in Biochemistry (Molecular Biology option)**

#### **1.0 Entry Requirements**

Students wishing to study Biochemistry (Molecular Biology option) must satisfy the minimum University requirements and Faculty/school 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 either mathematics or physics / Physical Science with a minimum grade of C. A student who has not attained the said grade in mathematics or physics / Physical Science 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 its equivalent,

**or**

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

**or**

1.4 have a diploma in Applied Sciences with at least a contact 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.

1.6 Students who join first year of study in the Bachelor of Science general programme, must take Chemistry and Biological science courses to be eligible for Biochemistry in second year. The students must obtain an average of B in the relevant first year units and admission is subject to availability of facilities.

## **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.
- 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.
- 2.3 Students joining B.Sc Biochemistry (Molecular Biology option) shall take 3:2:1:1 mode, unless otherwise stated each course is one unit.

## **Course Distribution**

### **FIRST YEAR**

#### **First Semester**

<b>Unit Code</b>	<b>Unit Title</b>
HRD 2101	Communication Skills
SBT 2170	Microbial Diversity
SBT 2171	Cell Biology
SCH 2100	Atomic Structure
SCH 2101	Chemical Bonding and Structure
SMA 2104	Mathematics for Science
SZL 2100	Invertebrate Zoology I
SZL 2101	Histology and Cytology
SZL 2111	HIV/AIDS

#### **Second Semester**

<b>Unit Code</b>	<b>Unit Title</b>
HRD 2102	Development Studies and Social Ethics
SBT 2173	Introduction to Genetics
SBT 2174	Plant Diversity
SBT 2172	Introduction to Microbiology
SCH 2102	Physical Chemistry

SCH 2103	Organic Chemistry
SZL 2102	Animal Physiology
SZL 2103	Introduction to Ecology and Bioanalysis
SZL 2205	Genetics and Cytogenetics
SZL 2203	Developmental Biology

## **SECOND YEAR**

### **First Semester**

<b>Unit Code</b>	<b>Unit Title</b>
ICS 2240	Introduction to Computer and Data Processing
HBB 2100	Structure of Biomolecules
HBB 2101	Proteins and Enzymes I
HBB 2205	Cell and Molecular Biology
SCH 2200	A comparative study of S&P block elements
SCH 2201	Physical - Chemistry II

### **Second Semester**

HBB 2202	Biochemical Techniques and Instrumentation I
HBB 2103	Basic Metabolism I
SCH 2202	Organic Chemistry II
SCH 2203	Nuclear Chemistry and Radiochemistry
ICS 2241	Introduction to Programming
HBB 2105	Plant Biochemistry I
HBB 2106	Biochemistry of Microorganisms I

**THIRD YEAR**  
**First Semester**

<b>Unit Code</b>	<b>Unit Title</b>
HBB 2200	Basic Metabolism II
HBB 2317	Biotechnology I
HBB 2302	Biochemical Techniques and Instrumentation II
HBB 2304	Protein and Enzymes II
HBB 2307	Biostatistics and Research Methodology
HBB 2351	Molecular Biology I
HBB 2208	Biochemistry of Microorganisms II
HBB 2220	Plant Biochemistry II

**Second Semester**

HBB 2301	Basic Metabolism III
HBB 2305	Medical Biochemistry I
HBB 2303	Biochemical Endocrinology
HBB 2331	Biosafety and Bioethics in Biotechnology
HBB 2323	Principles of Genetic Engineering I
HBB 2321	Plant Biochemistry III
HBB 2350	Molecular Bioscience
HBB 2352	Molecular Cell Biology
HBB 2353	Molecular Genetics
HBB 2354	Eukaryotic Cell Cycle Regulation

## **FOURTH YEAR**

### **First Semester**

<b>Unit Code</b>	<b>Unit Title</b>
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HRD 2401	Enterpreneurship Skills
HBB 2401	Biochemical Techniques and Instrumentation III
HBB 2404	Comparative Animal Biochemistry
HBB 2420	Genetic Engineering II
HBB 2406	Research Project (2 Units)
HBB 2451	Molecular Mechanisms of Gene Expression and Regulation
HBB 2452	Molecular Ecology and Evolutionary Genetics
HBB 2453	Genetic Manipulation

### **Second Semester**

HBB 2429	Bioinformatics
HBB 2422	Biotechnology II
HBB 2450	Molecular Biology II
HBB 2455	The Human Genome
HBB 2456	Molecular Evolution and Informatics
HBB 2457	Molecular Biology of the Gene
HBB 2428	Environmental Biochemistry