

## **Master of Science in Agricultural and Environmental Biotechnology**

Biotechnology is the application of biotechnological techniques in various fields including; agriculture, environment, medical and food industry. For a developing country like Kenya, the importance of biotechnology is paramount in research and innovation for development, which is in line with JKUAT vision and mission. This program is aimed at imparting the most current molecular skills and technologies in the areas of agriculture and environment. The program will be offered in Biochemistry department since biochemistry is multi disciplinary subject in life sciences that encompasses molecular aspects of organismic life.

The Biochemistry department will partner with experts from other National Agricultural and Research organizations such as MoA, KARI, KEPHIS, KEFRI, and KIPi among others during the implementation of this course. The program covers Molecular biology and recombinant DNA technology, Environmental biotechnology, Policies governing use of biotechnology and patenting, Plants and animal biotechnology and Renewable energy sources.

### **COURSE OBJECTIVES**

The students will be expected to demonstrate;

1. Knowledge in agricultural biotechnology and be able to tackle food security issues.
2. Knowledge in environmental biotechnology and skills in use and developing environmentally friendly techniques to resolve environmental pollution
3. Ability to develop marker systems for assay of genetically modified organisms and monitor environmental pollutants.
4. Good understanding of environmental Policies and Acts and applying them appropriately in their areas of operations.
5. Skills in usage of public biodata to enhance research and innovation.

## **COURSE JUSTIFICATION**

Kenya is an agricultural based economy that needs to develop adequate scientific know how in order to offer solutions to challenges of food security and the economy in general. This calls for strong foundation in principles and applications of biotechnology.

The other major challenge facing Kenya, just like any other country, is environmental issues including pollution and its regulation. To be able to resolve this problem, there is need to understand the biotechnologies that are applied to minimize the pollution and use manufacturing processes that generate less pollution to the environment.

This program is designed to provide an insight into the impact of biotechnology in the fields of agriculture and environment. It covers a broad ground in fundamental subjects central to the understanding and harnessing biotechnology in agriculture and environment in a sustainable manner.

It is envisaged that students graduating from this programme will have attained the necessary knowledge and skills to tackle challenges of agriculture and environment locally and regionally that will lead to achievement of food security and clean environment.

### **Regulations and syllabus for the degree of Master of Science in agricultural and environmental biotechnology**

#### **1.0 Entry Requirements**

- 1.1 The common regulations for all masters degrees in the University shall apply.
- 1.2 The general regulations for all Masters' degrees in the College of Health Sciences shall apply.
- 1.3 The following shall be eligible for registration for the Master of Science degree in agricultural and environmental biotechnology;
  - 1.3.1 A holder of at least a Second Class Honors (Upper Division) degree having studied Biochemistry as a major or regular subject. The candidate must have an average of credit (B) in Biochemistry courses.
  - 1.3.2 A holder of a Second Class Honors (Lower Division) Degree in Biochemistry combined

with another science subject but with a credit B in Biochemistry course may, under exceptional circumstances, be considered provided he/she produces evidence of having worked for at least three years in Biochemistry or a closely related field with at least one publication in a refereed journal.

- 1.3.3 A holder of Bachelor of Science degree agricultural, animal and other biological sciences, with at least Second Class Honors (Upper Division) and with an average of credit (B) in Biochemistry courses.
- 1.3.4 A holder of a degree accepted as equivalent to one of the degrees mentioned in 1.3.1 to 1.3.4 above from another University recognized by Senate.

## **2.0 Duration and Pattern of the Course**

- 2.1 The duration of the Master of Science course in Agricultural and Environmental Biotechnology shall be at least two academic years (18 months) from the date of registration.
- 2.2 Students taking a Master of Science course in Agricultural and Environmental Biotechnology shall follow any of the following programme;
- 2.2.1 Course work, examination and thesis,
- 2.3 **In the first year, students shall take ten required units (five units in semester one and five in semester two) and may take two additional units (one in each semester). The unit courses shall be assessed by course-work and examination.** Each unit shall comprise lectures which shall include tutorials and discussions. In addition, students will be required to attend/present Departmental seminars.
- 2.4 In the second year students will undertake research, seminar presentation (at least **two** seminars on their research work) and thesis writing.

## **COURSE DISTRIBUTION**

### **YEAR I SEMESTER I**

<b>UNIT CODE</b>	<b>UNIT TITLE</b>	<b>STATUS</b>
HBB 3100	Research Methodology	<b>senate approved</b>
HBB 3102	Bioinformatics	<b>New</b>

HBB 3203	Methods in Molecular Biology	<b>senate approved</b>
HBB 3240	Microbial Biotechnology	<b>New</b>
HBB 3241	Genetic Engineering and Risk Assessment of Genetically Modified Organisms	<b>New</b>

#### **ADDITIONAL UNIT (OPTIONAL)**

HBB 3242	Biotechnology in Crop Improvement	<b>New</b>
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#### **YEAR I SEMESTER 2**

HBB 3243	Environmental Biotechnology	<b>New</b>
HBB 3244	Biopolicy, Biosafety, and Bioethics	<b>New</b>
HBB 3245	Environmental Toxicology and Safety	<b>New</b>
HBB 3246	Production and Application of Biofertilizers	<b>New</b>
HBB 3248	Agricultural Based Renewable Energy Technologies	<b>New</b>

#### **ADDITIONAL UNITS (ONE UNIT ONLY)**

HBB 3247	Biopesticides	<b>New</b>
HBB 3249	Biotechnology in Animal Production	<b>New</b>