

## **Master of Science in Medical Biotechnology**

Medical Biotechnology is a field of applied biology that involves living organisms and bioprocessing in engineering, technology and medicine. It offers both conventional and innovative solutions to problems associated with clinical, surgical and medical situations. This degree programme focuses on biological processes, technologies and skills used in research and development of pharmaceutical products, vaccines, diagnostics and devices for the medical industry. Students in this interdisciplinary programme will receive in-depth training in modern biotechnology.

Varied aspects of Medical Biotechnology are covered adequately in this programme to impart knowledge and skills amongst the trainees who at the end of this course, qualify to join bodies and institutions mandated to find solutions to challenges related to health. The course explores the underlying scientific principles of how biotechnology can be used to address current medical issues.

The degree programme will be carried out in the Department of Biochemistry. As Medical Biotechnology is a rapidly changing field that requires interdisciplinary insight, teaching of the programme will include expertise from other educational and research institutions. Main areas of study include: Recombinant DNA Technology, Nanobiotechnology, Tissue culture and Stem Cell Biotechnology, Bioinformatics and Diagnostics. Students graduating from this program will have subject specific skills as well as knowledge integrating science with technology, business and policy issues.

## **COURSE OBJECTIVES**

Upon a successful completion of the program, students will gain:

1. Advanced knowledge in the area of cellular and molecular biology, protein biochemistry and immunology necessary for professional practice in the field of Medical Biotechnology.
2. Understanding of the use and application of relevant analytical techniques within the field of Medical Biotechnology.
3. Increased awareness of professional, ethical and social responsibilities with relationship to Medical Biotechnology.

## **COURSE JUSTIFICATION**

Recent advances in biology have generated new insights in the causes of disease. This new level of understanding has provided unprecedented opportunities for the development of new therapies, diagnostic tools and research/clinical instrumentation. Kenya and other developing countries need to develop an adequate scientific foundation able to support effective and regionally relevant solutions to problems of health. Medical Biotechnology can provide effective means of dealing with the major health challenges faced by developing countries.

Breakthroughs in Medical Biotechnology have revolutionized the practice of medicine; use of bio-sensors for diagnostic purposes, development of non-invasive imaging, cell and tissue engineering, the use of stem cells for curative purposes, the possibility of gene therapy and gene intervention to cure diseases that were previously incurable. These are the thrust areas in the future and the main opportunities in Medical Biotechnology lie in these areas. Graduates of this programme will be able to find employment with pharmacy companies, hospitals and hi-tech diagnostic centers among others.

## **Regulations and syllabus for the Degree of Master of Science in Medical 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 Medical Biotechnology.
  - 1.3.1 A holder of at least a Second Class Honours (Upper Division) degree having studied Biological sciences from a university recognized by senate.
  - 1.3.2 A holder of a Second Class Honours (Lower Division) Degree in Biological sciences from a university recognized by senate may, under exceptional circumstances, be considered provided he/she produces evidence of having worked for at least two years in a closely related field.

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

- 2.1 The duration of the Master of Science course in Medical 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 Medical Biotechnology shall follow the programme of course work, examination and thesis,
- 2.3 In the first year students shall take ten units which shall be assessed by course-work and examination. Each unit shall comprise lectures which shall include tutorials, discussions and practicals. 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**

### **FIRST YEAR**

#### **FIRST SEMESTER**

##### **Core units**

1. HBB 3100     Research Methodology
2. HBB 3102     Applied Bioinformatics
3. HML 3123     Immunotechnology
4. HBB 3229     Applied Molecular Biology
5. HBB 3233     Cell Culture and Stem Cell Technology

##### **Additional (Optional)**

1. HBB 3102     Bioinformatics
2. HBB 3117     Advanced Cell Biology

#### **SECOND SEMESTER**

##### **Core units**

1. HML 3127     Bioethics
2. HBB 3235     Efficacy testing in Medical Biotechnology
3. HBB 3236     Medical Nanobiotechnology
4. HBB 3237     Biomaterials and Tissue Engineering
5. HBB 3239     Entrepreneurship in Medical Biotechnology

##### **Additional (Optional)**

1. HBB 3214     Molecular Modeling and Chemoinformatics
2. HML 3125     Biopharmaceutics