# UNIVERSITY OF NAIROBI

## SCHOOL OF BIOLOGICAL SCIENCES

### SBT 413: APPLIED MICROBIOLOGY AND BIOTECHNOLOGY

## A. COURSE SUMMARY

This course examines the important aspect of microbiology i.e. how are they amenable to man? Or how can man make microbes amenable? Advances in this aspect of microbiology are explored in such fields as industry, environment, and biotechnology. This course provides an understanding of application of microorganisms (covering bacteria, viruses, fungi, and protozoa) for the benefit of man, animals, environment and in agriculture. It also aims at understanding how microbial products (enzymes, antibiotics, microbial insecticides etc), can be used in industrial fermentation technology, and how the various microbial products can be used. It also addresses how Biotechnology can be harnessed improved production of food, pharmaceutical products, energy, cleaning of the environment, bioleaching of ores etc.

## B. COURSE OBJECTIVES

At the end of this course learners should be able to:

- Å Discuss the microbial associations in different environments/ habitats.
- Å Describe the application of microorganisms in energy, agriculture, pharmaceutical and food industries.
- Å Relate the metabolic activities of microorganisms to their potential use in solving the pollution problems (bioremediation)
- Å Design a bioremediation strategy.
- Å Assess microbial potential for use in biotechnology innovations.
- Å Describe the applications of microorganisms in production of industrially valuable products.
- Å Describe how biotechnology can be used for enhanced production of crops and livestock.
- Å Describe the hazards and controversies associated with Biotechnology e.g. cloning.

## C. COURSE OUTCOMES

The aim of the course is to give the students broad theoretical and practical skills in Applied Microbiology and Biotechnology. In the course, the students will learn classical as well as novel, advanced molecular methods for the characterization of microorganisms and for the study of interactions between microorganisms. In the course, the students will achieve theoretical as well as practical knowledge on microorganisms, plants and animals related to environmental and biotechnological issues.

## D. COURSE CONTENT

A. Applied Microbiology

- Å Application of microorganisms in medicine, agriculture & industry
- Å Microbial production of:

- ✓ Energy
- ✓ Pharmaceutical products
- ✓ Biofertilizers
- ✓ Foods (Single Cell Protein) etc.
- ✓ Bioleaching of ores.

B. Applied Biotechnology

- Recombinant DNA technology
- Applications
- Hazards
- Cloning

## E. COURSE EVALUATION

i. Continuous Assessment Tests - 20%
ii. Practical Reports and Assignments ï 10%
iii. Exam ï 70%

## F. RESOURCES AND REFERENCES


1. Industrial Microbiology. (2001) An Introduction (M.J. Waites, N.L. Morgan, J.S. Rockney & G. Highton), Blackwell Science Publishers.

2. Hurst, C. J., Crawford, R. L., Knudsen, G. R., Mcinerney, M. J and Stetzenbach, L. D. (2002) Ed. Manual of Environmental Microbiology, 2nd Edition. American Society for Microbiology Press, Washington, DC