COURSE SYLLABUS

ACP010 INTRODUCTION TO MICROBIOLOGY

1. COURSE INFORMATION

Classes taught: Diploma in Crop Protection

Pre-requisite courses: High school biology, chemistry, or agriculture

Course duration: 45 contact hours spread over one semester

Course venue: ___________________________________________; Practical:________________________

2. INSTRUCTOR’S CONTACT INFORMATION

Instructor; Dr. James W. Muthomi, Senior lecturer, Department of Plant Science and Crop Protection
Range Management Building, Room 212
Office hours: Monday to Friday 8.00 am to 10.am, except when in class, attending meetings or in the field
Cell phone 0722 984 179
e-mail: james.muthomi@uonbi.ac.ke

3. COURSE DESCRIPTION

Importance of microorganisms; prokaryotic and eucaryotic cells; sterization procedures; culture media: preparation, types of culture media; smearing and staining: simple staining, negative staining, differential staining, Ziehl-Neelsen staining, special staining; microscopy; microbial growth: factors affecting growth, growth pattern, determination of microbial growth; morphology and classification of major groups of microorganisms: fungi, bacteria, viruses, protozoa, algae, nematodes.

4. COURSE LEARNING OUTCOMES AND OBJECTIVES

Course learning outcomes:
By the end of the course, the students will be able to:

1. Identify and describe the uses of basic apparatus and equipment used in a microbiology laboratory
2. Carry out basics aseptic procedures used in the handling and study of microorganisms
3. Isolate or extract and culture microorganisms
4. Understand the general characteristics of different groups of microorganisms

Course objectives
1. To familiarize with the apparatus and equipment used in a microbiology laboratory
2. To gain knowledge and skills in maintenance of aseptic conditions in microbiological procedures
3. To prepare culture media, isolate and culture bacteria and fungi and to extract nematodes
4. To study the general morphological features of different microorganisms

5. COURSE OUTLINE AND SCHEDULE

Course outline
1. **Introduction** – definitions and units of measurement in microbiology; economic importance of microorganisms; prokaryotic and eukaryotic cells; safety precautions.

2. **Equipment and apparatus in microbiology** – laboratory equipment and apparatus and their uses; types and parts of microscopes, use and care of microscopes.

3. **Aseptic procedures** – cleanliness of the laboratory, sterilization procedures: use of direct heat, dry heat, moist heat, irradiation, filtration, and chemical sterilization agents.

4. **Groups of microorganisms** – fungi: general characteristics, morphology, types of spores; bacteria: cell morphology, arrangement of cells, flagellation; viruses: general characteristics, morphological groups of viruses based on shape and size; nematodes: morphology and characteristics.

5. **Isolation and culture of microorganisms** – definitions, types of culture media, preparation of culture media, isolation and sub-culturing of bacteria and fungi, extraction of nematodes.

6. **Microscopic study of microorganisms** – definitions, preparation of bacterial smear, staining procedures for bacteria, mounting and staining of fungal specimens, microscopic examination of bacteria, microscopic examination of fungi, microscopic examination of nematodes.


8. **Preservation of microorganisms** – use of refrigerator (cooling), agar slant culture on fresh media, agar slant culture covered with mineral oil, storage in saline suspension, drying in vacuum, cryo-preservation, freeze drying, use of silica gel.

**Course schedule:**

<table>
<thead>
<tr>
<th>Week No</th>
<th>Date</th>
<th>Lecture Topic</th>
<th>Week No.</th>
<th>Date</th>
<th>Laboratory topic</th>
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</thead>
<tbody>
<tr>
<td>1</td>
<td></td>
<td>Units of measurement, economic importance, prokaryotic and eukaryotic cell, safety precautions</td>
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<td></td>
<td>Tour of the lab – laboratory practices and safety rules, equipments, and apparatus</td>
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<td>2</td>
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<td>Laboratory equipment and apparatus, types and parts of microscopes, use and care of microscopes</td>
<td>2</td>
<td></td>
<td>Microscopes – types, parts, use and care of microscopes</td>
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<tr>
<td>3</td>
<td></td>
<td>Cleanliness in lab, sterilization methods</td>
<td>3</td>
<td></td>
<td>Aseptic procedures – sterilization of apparatus by direct heat, use of ethanol and sodium hypochlorite, use of autoclave, hot air oven, laminar flow hood</td>
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<td>4</td>
<td></td>
<td>Types of culture media, preparation of culture media</td>
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<td>Culture media – preparation of potato dextrose agar (PDA) and nutrient agar (NA) from natural ingredients; preparation of commercial</td>
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<td>Media</td>
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<tr>
<td>5</td>
<td>Isolation of fungi, bacteria and extraction of nematodes</td>
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<td>6</td>
<td>Morphology and general characteristics of fungi and bacteria</td>
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<tr>
<td>7</td>
<td>Morphology and general characteristics of viruses and nematodes</td>
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<td>8</td>
<td>Preparation of bacterial smear, staining procedures for bacteria</td>
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<td>9</td>
<td>Mounting and staining of fungal specimens, microscopic examination of bacteria, fungi and nematodes</td>
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<tr>
<td>10</td>
<td>Growth, factors affecting microbial growth, growth phases of microorganisms</td>
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<td>11</td>
<td>Measurement of population of microorganisms</td>
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<td>12</td>
<td>Methods of preserving microorganisms</td>
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<td>13</td>
<td>Continuous Assessment Test 2</td>
<td>13</td>
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**6. REFERENCES**
7. SAMPLE QUESTIONS AND ASSIGNMENTS

- Sample review questions will be provided at the beginning of the course.
- Each practical will be accompanied by questions that will contribute to the continuous assessment marks.

8. EXAMINATION GRADING

As per the University of Nairobi policy, the Diploma in Crop Protection examination will be out of 100, of which 50% will be for main examination and 50% for continuous assessment tests (CAT). The marks will be distributed as follows:

<table>
<thead>
<tr>
<th>Component</th>
<th>Percentage</th>
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<tbody>
<tr>
<td>Laboratory exercise</td>
<td>30%</td>
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<tr>
<td>Written tests (CAT)</td>
<td>20%</td>
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<tr>
<td>Main Examination</td>
<td>50%</td>
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</tbody>
</table>

- Answers to the questions for each practical must be handed in before leaving the laboratory during each session.
- All students must take the continuous assessment test (CAT) as per schedule.
- As per University of Nairobi regulations, students who miss more than one third of the classes/practical sessions will not be allowed to take the final examination.

9. COURSE POLICY

- Attendance and participation in practical sessions is mandatory.
- During practical sessions, students will work in the assigned groups of 2 to 3 students. Each student must stay in the assigned group during all the practical sessions.
- Observance of order is expected of every student during lecture and practicals, including timeliness, observance of silence while a lecture is in progress.