I. COURSE DESCRIPTION

The course deals with the procedures and techniques for the study of biology. It includes microscopic techniques, preparation of microscope slides from both plants and animals; culturing microorganisms; housing and handling of experimental animals, operation of common laboratory equipment and techniques in the preservation and propagation of biological specimen.

II. COURSE OBJECTIVES

At the end of the course, the students should be able to:

1. manipulate common laboratory equipment effectively;
2. perform procedures in culturing and preservation of plant and animal specimen;
3. prepare plant and animal tissues for microscopic examination;
4. recognize the need to preserve specimen for the purpose of conservation and elimination of the waste of plant and animal material in the course of repeated study;
5. manifest an appreciation of the biological techniques utilized in various industries;
6. apply the methods and techniques in resolving scientific problems.

Pre-requisites: All major subjects except those which are concurrently offered together with the subject
## III. COURSE CONTENT

### SPECIFIC OBJECTIVES

At the end of the unit, the students should be able to:

1. describe the importance and use of the microscope and the microtome
2. define and explain the terminologies in microscopy
3. enumerate the uses of the different kinds of microscope
4. enumerate in sequence the preparation of tissues for microscopic examination
5. perform the different kinds of slide-making techniques/methods
6. appreciate the importance of microscope and microtome in biological study

### CONTENT OUTLINE

**Unit I – Microscopic Techniques**

1. The Microscope
   A. Light Microscope
      1. Resolution
      2. Numerical aperture
      3. Objective and ocular lenses
      4. Micrometry
   B. Phase Contrast Microscopy
   C. Electron Microscopy
   D. Scanning Electron Microscopy
2. The Microtome, Parts & Functions
   A. Making the paper box
   B. Making the paper boat
   C. Preparation of tissues for microscopic examination
      1. Collection and selection
      2. Killing and fixation
      3. Washing
      4. Dehydration
      5. Clearing
      6. Embedding
      7. Sectioning
      8. Affixing sections
      9. Staining
      10. Mounting
      11. Drying, cleaning and labeling
      12. Isolation of tissue elements

### TEACHING STRATEGIES

Socialized discussion
Lecture demonstration
Laboratory Work
Slide Preparation and operation of microtome

### TIME ALLOTMENT

7 weeks

### EVALUATIVE MEASURES

Quizzes recitation
Project (Graded with Rubrics)
Submitted slides (Graded with Rubrics)
### SPECIFIC OBJECTIVES

At the end of the unit, the students should be able to:

1. demonstrate the correct procedures in the collection and preservation to each kind of specimen
2. identify and classify the animals inhabiting the different ecosystems
3. enumerate and apply the different preservation techniques
4. appreciate the importance of plant and animal specimen preservation

### CONTENT OUTLINE

D. Slide-Making Techniques
   1. Non-section method
      a. the smearing method
      b. the free hand sectioning
      c. maceration and dissociation
      d. honing method
      e. whole mount method
      f. spreading method
      g. squash method
   2. The section method
      a. Paraffin method
      b. Serial sections

E. Difficulties, their causes and remedies during tissue sectioning using rotary microtome

### TEACHING STRATEGIES

Cooperative learning
Concept mapping
Socialized discussion
Lecture demonstration
Brainstorming
Laboratory Work

### TIME ALLOTMENT

5 weeks

### EVALUATIVE MEASURES

Quizzes
Recitation
Submitted output/project (graded with rubrics)
<table>
<thead>
<tr>
<th>SPECIFIC OBJECTIVES</th>
<th>CONTENT OUTLINE</th>
<th>TEACHING STRATEGIES</th>
<th>TIME ALLOTMENT</th>
<th>EVALUATIVE MEASURES</th>
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</thead>
<tbody>
<tr>
<td>At the end of the unit, the students should be able to:</td>
<td>Unit III – Culturing Techniques</td>
<td>Lecture-demonstration Cooperative learning Small group discussions Video presentation Laboratory work</td>
<td>2 weeks</td>
<td>Quizzes Participation to group project (graded with rubrics) Submitted output</td>
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<tr>
<td>1. practice the aseptic techniques in culturing microorganisms</td>
<td>1. Pure culture techniques</td>
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<td>2. identify and prepare the different kinds of bonsai styles</td>
<td>2. Bonsai culture</td>
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<td>3. list and follow in sequence the steps in the preparation of bonsai culture, hydroponics and terrarium</td>
<td>3. Hydroponics</td>
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<td>4. use appropriate housing of animals according to safety standards</td>
<td>4. Terrarium</td>
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<td>5. Housing and handling laboratory animals</td>
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<td>At the end of the unit, the students should be able to:</td>
<td>Unit IV – Instrumentation</td>
<td>Lecture demonstration Reporting Laboratory work</td>
<td>3 weeks</td>
<td>Quizzes Laboratory Reports (Graded with Rubrics) Participation to Laboratory experiments (Graded with Rubrics)</td>
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<tr>
<td>1. get acquainted with the different laboratory instruments</td>
<td>1. The pH Meter</td>
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<td>2. learn to care and value for the different laboratory instruments</td>
<td>a. Definition of pH, acid base, buffer</td>
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<td>b. Use of the pH meter</td>
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<td>2. The Centrifuge</td>
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<td>a. Types of centrifuge</td>
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<td>b. Differential centrifugation</td>
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<td>3. Chromatography</td>
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<td>a. partition and absorption</td>
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<td>b. paper chromatography</td>
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<td>c. gel-filtration chromatography</td>
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<td>d. ion-exchange chromatography</td>
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<td>e. high-performance liquid chromatography</td>
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<td>4. Photometry</td>
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<td>a. absorbance and transmittance</td>
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<td>b. The spectrophotometer</td>
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IV READING MATERIALS


ELECTRONIC MATERIALS

[http://www.elsevier.com/inca/publications/store/5/0/6/0/2/7/]

Prepared by:                                                                                                   Approved by:

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