BIO 206 – Plant Physiology

COURSE PARTICULARS

Course Code: BIO 206
Course Title: Plant Physiology
No. of Units: 2
Course Duration: One hour of theory and three hours of practicals per week for 15 weeks.
Status: Compulsory
Course Email Address: bio206@gmail.com
Course Webpage: http://www.bio.futa.edu.ng/courseschedule.php?coursecode=BIO%20206
Prerequisite: Bio 203

COURSE INSTRUCTORS

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and

Mr. O. O. Oladele
Room 16, Adamu Building,
Dept. of Biology,
COURSE DESCRIPTION

This course is designed primarily for students in biology (storage technology option) and other biology related disciplines. The course explores the physiological processes pertinent to plants, it enhance the knowledge of the students in biological molecules, photosynthesis, respiration, transport, growth, flowering plant, growth substances and the physiological aspects of crop yield. The practical aspect of the course focuses on carrying out simple tests to identify some of the common biochemicals (qualitative analysis) in plants and to measure their amounts (quantitative analysis), to practically study and be able to explain the different physiological activities necessary for growth and development of plants. Determine the underlining physiological activities that explain the characteristics of plant materials observed when still attached onto the parent plant, after harvesting and during storage. The understanding of the rationale behind the practical procedures will enhance the student’s ability to design their own procedures if necessary as they advance to higher levels.

COURSE OBJECTIVES
The objectives of this course are to:

- build up the knowledge of the students in pertinent plant physiological processes such as photosynthesis, respiration, transport, growth, flowering, growth substances and the physiological aspects of crop yield; and
- open up the students to detailed plant physiological studies to pave way for advance studies in biotechnology and molecular biology.

### COURSE LEARNING OUTCOMES / COMPETENCIES

Upon successful completion of this course, the student will be able to:

**Knowledge based**

- list the different classes of carbohydrate with examples, write the molecular formula and the structures of the examples, state functions of carbohydrate and differentiate the different classes of carbohydrates; describe the structure of lipids, state the constituents of lipids, describe the functions and properties of triglycerides, phospholipids and glycolipids, classify proteins according to structure, size, composition etc, describe the different structures of proteins and state the differences between the different protein structures;
- state the importance of photosynthesis, factors affecting photosynthesis, the photosynthetic pigment, and describe the biochemistry of photosynthesis;
- define respiration and itemize detailed processes of cell respiration and gaseous exchange in flowering plants;
- list and describe the three pathways through which water can flow during the transpiration and movement of water through the leaf: apoplast pathway, symplast pathway and vascular pathway, list the environmental factors that have significant effect on transpiration;
- list and describe the features of phloem translocation;
- draw the different types of growth curve from growth parameters, list the different types of patterns of growth and give specific examples of each;
- list and describe the plant growth substances;
- itemize and describe the important physiological factors affecting crop yield;

**Skills**

- use the qualitative and quantitative analytical methods to determine the presence of biochemicals in food and in pure forms;
o draw the structural forms, open chains or ring forms of carbohydrate, proteins and lipids;
o use the proportion of the unsaturated fatty acid to determine the lipid that will be oil or fat;
o represent the dark and light phases of photosynthesis using flow diagram;
o demonstrate osmosis in living plants;
o use the method of incipient plasmolysis to determine the mean solute potential of cell sap in a sample of plant cell;
o use a potometer to determine the factors affecting the rate of transpiration in plants.

**GRADING SYSTEM FOR THE COURSE**

This course will be graded as follows:

<table>
<thead>
<tr>
<th>Component</th>
<th>Percentage</th>
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<tbody>
<tr>
<td>Attendance</td>
<td>5%</td>
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<tr>
<td>Practical Class Report and Activity</td>
<td>10%</td>
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<tr>
<td>Assignments</td>
<td>5%</td>
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<tr>
<td>Test(s)</td>
<td>20%</td>
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<tr>
<td>Final Examination</td>
<td>60%</td>
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<td><strong>TOTAL</strong></td>
<td><strong>100%</strong></td>
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**GENERAL INSTRUCTIONS**

*Attendance:* It is expected that every student will be in class for lectures and also participate in all practical exercises. Attendance records will be kept and used to determine each person’s qualification to sit for the final examination. In case of illness or other unavoidable cause of absence, the student must communicate as soon as possible with any of the instructors, indicating the reason for the absence.

*Academic Integrity:* Violations of academic integrity, including dishonesty in assignments, examinations, or other academic performances are prohibited. You are not allowed to make copies of another person’s work and submit it as your own; that is plagiarism. All cases of academic dishonesty will be reported to the University Management for appropriate sanctions in accordance with the guidelines for handling students’ misconduct as spelt out in the Students’ Handbook.
Assignments and Group Work: Students are expected to submit assignments as scheduled. Failure to submit an assignment as at when due will earn such candidate zero for that assignment. Only under extenuating circumstances, for which a student has notified any of the instructors in advance, will late submission of assignments be permitted.

Code of Conduct in Lecture Rooms and Laboratories: Students should turn off their cell phones during lectures. Students are prohibited from engaging in other activities (such as texting, watching videos, etc.) during lectures. Food and drinks are not permitted in the laboratories.

READING LIST


Legend
1- Available in Departmental/School Libraries

COURSE OUTLINE

<table>
<thead>
<tr>
<th>Week</th>
<th>Topic</th>
<th>Remarks</th>
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<tbody>
<tr>
<td>1</td>
<td>• Introduction and Course Overview&lt;br&gt;• Carbohydrate and metabolism of carbohydrate</td>
<td>During this first class, the expectation of the students from the course will also be documented.</td>
</tr>
<tr>
<td>2</td>
<td>• Protein and Lipid&lt;br&gt;• Metabolism of protein and lipid</td>
<td>Practical exercise will involve qualitative analysis of carbohydrate, protein and lipid in food and pure form.</td>
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<tr>
<td>3, 4 &amp; 5</td>
<td>Photosynthesis</td>
<td>Practical exercise will involve the separation of chloroplast by paper</td>
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<tr>
<td>6 &amp; 7</td>
<td>Respiration</td>
<td>The practical exercises will involve the investigation of the oxidation of the Krebs cycle intermediate. Respiratory chain and Krebs cycle will be simplified and presented to the students.</td>
</tr>
<tr>
<td>8 &amp; 9</td>
<td>Transport</td>
<td>The practical exercise will involve the investigation and the measurement of the factors affecting the rate of transpiration using a potometer and the investigation of stomata distribution. MID-SEMESTER TEST</td>
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<tr>
<td>10</td>
<td>Translocation</td>
<td>Demonstrate the movement of organic solute in phloem by ringing experiment.</td>
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<tr>
<td>Week</td>
<td>Topics</td>
<td>Details</td>
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| 11 & 12 | Coordination and control in plants  
- Plant movements  
- Plant growth substances  
  Growth and development  
- Measuring growth  
- Patterns of growth  
- Growth and development in flowering plants | Horizontally placed seedling will be studied to observe the redistribution of auxin |
| 13 & 14 |  
- Dormancy  
- Germination  
- Senescence  
- Physiological aspects of crop yield | Students will be divided into groups to discuss the importance of the different growth substances in commercial agriculture. |
| 15   | REVISION                                                              | This is the week preceding the final examination. At this time, evaluation will be done to assess how far the students’ expectations for the course have been met. |