



Wollo University
College of Natural Sciences
Department of Biology

A Course Guide for Advanced Plant Physiology

I. General Information

A Course Guide for Advanced Plant Physiology	COURSE TITLE: Advanced Plant Physiology
Module Name:	COURSE CODE : BIOB 511
MODULE CODE :	COURSE ECTS : 5ECTS
MUDULE CATEGORY:	Instructor's Contact Information: Dr. Nasiruddin Ansari E-mail: hinasru@gmail.com Phone: +251922937185 Office Hours: Monday and Tuesday 9.00 to 11.00 AM
YEAR : 1st	
SEMESTER : II	
TARGET GROUP : I YEAR BOTANY STUDENTS	
M.Sc. I year, II semester Botany students	Location: Classroom: TBS

II Course Objectives

After completing the course, the students should be able to:

- Explain plant water relations.
- Describe plant nutrients, their uptake mechanisms, their roles and deficiency symptoms.
- Identify various factors affecting plant growth and development.
- Explain the plant physiological basics of photosynthesis, nutrition and translocation of substances.
- Differentiate nutrient deficiency symptoms in plants and propose solutions
- Describe the mechanisms used by plants to adapt to different environments
- Discuss the defence mechanisms used by plants.
- Explain Growth and Development of Plant
- Describe Dormancy and Seed Germination

III. Mode of Assessment Methods:

Mid Exam	30%
Assignment & Presentation.....	20%
Final written exam.....	50%
Total	100%.

IV. Course Policies

The instructor expects that students will have read the appropriate chapters in the reference books BEFORE the class. Students are responsible for all material covered in lecture, whether it comes directly from the text or not. Students arrive on time to class. We will conduct this class in an atmosphere of mutual respect. The instructor encourages your active participation in class discussions. You should expect that if your conduct during class discussions seriously disrupts the atmosphere of mutual respect we expect in this class, you will not be permitted to participate further and penalized for your act. If you feel that you need individual help or would like to come by to talk (about this course or anything else).

- o Attending all class is **a must**
- o Disabling a cellular phone is **a must**

1. V. Reference Materials

1. Devlin, RM and Witham, FH (1986). *Plant Physiology*. (4th ed.) CBS, New Delhi.
2. Kocchar PL and Krishnamoorthy, L (1989). *A Textbook of Plant Physiology*. (17th ed.) Atmaran and Sons, New Delhi.
3. Pandey SN and Sinha BK (1986). *Plant Physiology*. Vikas Publishing house, New Delhi.
4. Taiz, L. and Zeiger, E. (1991, 1998, 2002, 2006). *Plant Physiology*. Sinauer Associates, Inc., Publishers. Massachusetts.(Text)
5. Wilkins, M.B. (1984). *Advanced Plant Physiology*. John Wiley and Sons, New York.
6. Verma, V. (2007). *Textbook of Plant Physiology*. Ane Books India, New Delhi
7. Pandey, S.N. and Sinha, B.K. (2006). *Plant Physiology*, 4th ed. Viskas Publishing House PVT LTD, New Delhi.

VI. Course Content

Week	Contents
1	1. Plant water relations 1.1. Introduction 1.2. Importance of water, Water Potential 1.3. The Soil-Plant-Atmosphere Continuum 1.4. Mechanism of water uptake via Apoplast, Symplast and transmembrane pathway 1.5. Structure of Aquaporins
2	2. The Ascent of xylem sap 2.1. Mechanism of Ascent of sap 2.2. Transpiration (a phenomenon of water loss) 2.3. Types of transpiration 2.4. Mechanisms of stomatal movement 2.5. Factors affecting the rate of transpiration (stomatal movement) 2.6. The Role of Transpiration and Water use Efficiency
3	3. Plant Nutrition 3.1. Macronutrients 3.2. Micronutrients 3.3. Uptake and translocation of nutrients 3.4. Factors affecting the uptake of nutrients 3.5. Role of Nutrients and their Deficiency Symptoms 3.6. Mechanism of Phloem conduction 3.6.1. Phloem Anatomy 3.7. Pattern of Translocation
4.	4. Nitrogen Metabolism 4.1. Biochemistry of nitrogen fixation 4.2. Nodule Development 4.3. Leghaemoglobin 4.4. Assimilation Ammonium and nitrate 5. Glycolate Cycle 5.1. The significance of Photorespiration
5.	6. Photosynthesis 6.1. Light and light absorption by pigment molecules 6.2. The Pigments involved in Light absorption and Photosynthesis 6.3. The structure of Photosynthetic Apparatus 6.4. Molecular organization of thylakoid 6.5. Important metabolic pathways of photosynthesis (C_3 , C_4 and CAM cycle)
6.	7. Growth and Development of Plant 7.1. Phytohormone (Chemistry, biosynthesis, bioassay and mode of action of Auxins Gibberellins, (GA), Cytokinins, Ethylene, Absciscic Acid) 7.2. Role of Phytochrome 7.3. Environmental and Genetic Factors Affecting Plant Growth and Development 8. Plant Stress Physiology 8.1. Stress factors and plant responses to stressors 8.2. Salinity 8.3. Effect of salinity

7.	9. Plant Defense Mechanism 9.1. Pre-existing structural and biochemical defense 9.2. Induced Structural and Biochemical Defences Mechanism
8.	10. Dormancy and Seed Germination 10.1. Germination 10.2. Factors affecting germination 10.3. Dormancy 10.4. Factors responsible for dormancy Final Exam=50%

Course Instructor

Dr. Nasiruddin Ansari

Name

Date

Signature

Department head

Dr. Moges Kibret

Name

Date

Signature