

Module title: Introductory Plant physiology

Lecturer: A. Einali (assistant prof.)

Assessments: 40% mid-term exam
50% final exam
10% Quiz

References:

1. Plant Physiology, 2002

Lincoln Taiz and Eduardo Zieger

2. Introduction to Plant Physiology, 4th edition, 2008

William G. Hopkins and Norman P. A. Huner

3. Introductory Plant Physiology, 1983

Glenn Ray Noggle, George John Fritz

Module subjects:

1. Photosynthesis: The Light Reactions

- 1st week: General concepts, Photophysiology
- 2nd week: Photosynthetic Pigments, Absorption and action spectrum
- 3rd week: Key experiments in understanding photosynthesis
- 4th week: Organization of the photosynthetic apparatus
- 5th week: Organization of light-absorbing antenna systems
- 6th week: Electron and proton transport mechanisms
- 7th week: Photophosphorylation, chemiosmotic mechanism
- 8th week: Repair and regulation of the photosynthetic machinery

2. Photosynthesis: Carbon Reactions

- 9th week: The Calvin cycle
- 10th week: The C₂ oxidative photosynthetic carbon cycle
- 11th week: The C₄ carbon cycle, Crassulacean acid metabolism
- 12th week: Synthesis of sucrose and starch, Effects of environmental factors on photosynthesis, Phloem transport, *mid-term exam*

3. Respiration

- 13th week: Glycolysis, Pentose Phosphate Pathway of Glucose Oxidation
- 14th week: TCA cycle, Electron transport chain, Oxidative phosphorylation

4. Water and Plant Cell

- 15th week: Plant physiology definition, the structure and properties of water, Water transport processes, Osmosis
- 16th week: Water potential, Entrance of water to the cell, Hoffer's diagram, water transport rate

5. Water Balance of Plants

- 17th week: Water in the soil, Water absorption by roots, Root pressure, guttation, Water transport through the xylem
- 18th week: The cohesion-Tension theory, water evaporation in the leaf, Water movement from the leaf to the atmosphere

6. Mineral Nutrition

- 19th week: Essential nutrients, deficiencies, and plant disorders, Mineral deficiencies symptoms, analysis of plant tissue
- 20th week: Treating nutritional deficiencies, fertilizers
- 21th week: Soil, roots, and microbes, root systems, mycorrhizae

7. Assimilation of mineral nutrients

- 22th week: Nitrogen in the environment, Nitrate assimilation, ammonium assimilation
- 23th week: Biological nitrogen fixation, Nitrogenase enzyme
- 24th week: Sulfur assimilation, phosphate assimilation, cation assimilation, oxygen assimilation, *Preparation for final exam*