



**The University of Jordan**

**Accreditation & Quality Assurance Center**

**COURSE Syllabus**

1	Course title	Plant Physiology
2	Course number	0334352
3	Credit hours (theory, practical)	3 Credit Hour
	Contact hours (theory, practical)	6 Credit Hour
4	Prerequisites/corequisites	Biology 0304101
5	Program title	Bachelor of Biological Sciences
6	Program code	0304
7	Awarding institution	The University of Jordan
8	Faculty	Faculty of Science
9	Department	Department of Biological Sciences
10	Level of course	Third Year
11	Year of study and semester (s)	Second semester 2015/2016
12	Final Qualification	B.Sc. in Biological Sciences
13	Other department (s) involved in teaching the course	None
14	Language of Instruction	English
15	Date of production/revision	2015

**16. Course Coordinator:**

Office numbers, office hours, phone numbers, and email addresses should be listed.

Dr. Khaldoun J. Al-Hadid

Office No.: 208

Office Hour: Sunday 09:00 a.m - 10:00 a.m., Monday: 9:30 a.m. - 10:30 a.m.

Email address: kalhadid@ju.edu.jo

**17. Other instructors:**

*Office numbers, office hours, phone numbers, and email addresses should be listed.*

*None.*

**18. Course Description:**

*As stated in the approved study plan.*

This course is a basic plant physiology class that covers the following areas: water -plant relationship, transpiration, nutrients uptake & plant nutrition, photosynthesis, plant hormones, phytochromes and plant response to stress. This course includes weekly two lectures and one laboratory session, which includes experiments dealing with the mentioned topics.

**19. Course aims and outcomes:**

**A- Aims:**

The students will gain the knowledge of applying plant physiology concepts to explain how plants work and contribute to ecological system and all forms of life.

**B- Intended Learning Outcomes (ILOs):** Upon successful completion of this course students will be able to ...

1. Understand the relationship between water and plants.
2. Understand how plant uptake water and minerals.
3. Understand the basic concepts of plant nutrition.
3. Understand how photosynthesis steps happen.
5. Understand how phytoassimilates are translocated through plant parts.
6. Understand how plant growth happen and the role of cell wall in plant cell growth.
7. Understand the role of plant hormones in regulating plant activities & processes.
8. Understand the physiological response to environment.
9. Understand the effect of plant stress on plant and how plant response to stress.



<b>20. Topic Outline and Schedule:</b>					
Topic	Week	Instructor	Achieved ILOs	Evaluation Methods	Reference
<b>Plant cells and Water</b> 1.1 Water has Unique Physical & Chemical Properties 1.2 The Thermal Properties of Water are Biologically Important 1.3 Water is The Universal Solvent 1.4 Property of Water Molecules results in Cohesion & Adhesion 1.8 Water Potential is the Sum of Its Component Potentials	1	Dr. Khaldoun Al-Hadid	1	Exam	<b>01-04</b>       <b>11-12</b>
<b>Whole Plant Water Relationship</b> 2.1 Transpiration is driven By Differences in Vapor Pressure 2.2 The Driving Force of Transpiration is Differences in Vapor Pressure 2.3 The Rate of Transpiration is Influenced By Environmental Factors 2.4 Water Conduction Occurs Via Treachery Elements 2.5 The Ascent of Xylem Sap is Explained By Combining Xylem Transpiration With The Cohesive Forces of Water 2.9 Radial Movement of Water Through The Roots Involves Two Possible Pathways	2	Dr. Khaldoun Al-Hadid	1	Exam	<b>19- 32</b>          <b>36</b>
<b>Roots, Soils, and Nutrient Uptake</b> 3.2 Nutrient Uptake 3.6 Cellular ion Uptake Processes are Interactive 3.7 Root Architecture Is Important to Maximize Ion Uptake 3.8 The Radial Path of Ion Movement Through Roots	3	Dr. Khaldoun Al-Hadid	2	Exam	<b>42-43</b> <b>54-55</b>
<b>Plants and Inorganic Nutrients</b> 4.2 The Essential Nutrient Elements 4.3 Beneficial Elements 4.4 Nutrient Functions and Deficiency Symptoms 4.5 Toxicity of Micronutrients	4	Dr. Khaldoun Al-Hadid	3	Exam	<b>65-75</b>

<b>Energy Conservation in Photosynthesis: Harvesting Sunlight</b> 7.1 Leaves are photosynthetic Machines that Maximize the Absorption of Light 7.2 Photosynthesis is an Oxidation-Reduction Process 7.3 Photosynthetic Electron Transport 7.4 Photophosphorylation is the Light-dependent Synthesis of ATP	I 5	Dr. Khaldoun Al-Hadid	4	Exam	<b>109-124</b>
<b>Energy Conservation in Photosynthesis: CO<sub>2</sub> Assimilation</b> 8.1 Stomatal Complex Controls Leaf Gas Exchange and Water Loss 8.2 CO <sub>2</sub> Enters the Leaf by Diffusion 8.3 How Do Stomata Open and Close? 8.4 External Stomatal Movement are also Controlled by External Environmental Factors 8.5 The Photosynthetic Carbon Reduction (PCR) Cycle 8.6 The PCR Cycle is Highly Regulated 8.7 Chloroplasts of C <sub>3</sub> Plants also Exhibit Competing Carbon Oxidation Process	6	Dr. Khaldoun Al-Hadid	4	Exam	<b>129-149</b>
<b>Allocation, Translocation, and Partitioning of Photoassimilates</b> 9.5 Sieve Elements are Principal Cellular Constituents of the Phloem 9.6 Direction of Translocation is Determined by Source-Sink Relationship 9.7 Phloem Translocation Occurs by Mass Transfer 9.8 Phloem Loading and Unloading Regulate Translocation and Partitioning	7	Dr. Khaldoun Al-Hadid	5	Exam	<b>159-163</b>
<b>Growth And Development of Cells</b> 17.1 Growth of Plant Cells is Complicated by the Presence of a Cell Wall 17.2 Cell Division 17.3 Cell Walls and Cell Growth	8	Dr. Khaldoun Al-Hadid	6	Exam	<b>289-298</b>
<b>Hormones I: Auxins</b> 18.1 The Hormone Concept in Plants 18.2 Auxin is Distributed Throughout the Plant 18.3 The Principal Auxin in Plants is Indole-3-Acetic Acid (IAA) 18.8 Auxin is Involved in Virtually Every Stage of Plant Development	9	Dr. Khaldoun Al-Hadid	7	Exam	<b>305-307</b> <b>311-313</b>
<b>Hormones II: Gibberellins</b> 19.1 There are a Large Number of Gibberellins	10	Dr. Khaldoun Al-Hadid	7	Exam	<b>323-324</b> <b>330-332</b>

19.2 There are Three Principal Sites for Gibberellin Biosynthesis 19.8 Gibberellins Affect Many Aspects of Plant Growth and Development						
<b>Hormones III: Cytokinins are Adenine Derivatives</b> 20.2 Cytokinins are Synthesized Primarily in the Root and Translocated in the Xylem 20.3 Cytokinins are Required for Cell Proliferation	<b>11</b>	Dr. Khaldoun Al-Hadid	7	Exam	<b>341-350</b>	
<b>Hormones IV: Abscisic Acid, Ethylene, and Brassinosteroids</b> 21.1 Abscisic Acid 21.2 Ethylene 21.3 Brassinosteroids	<b>12</b>	Dr. Khaldoun Al-Hadid	7	Exam	<b>355-369</b>	
<b>Photomorphogenesis: Responding to Light</b> 22.1 Photomorphogenesis is Initiated by Photoreceptors 22.2 Phytochromes : Responding to Red and Far-Red Light 22.4 Phytochrome and Cryptochrome Mediate Numerous Developmental Responses	<b>13</b>	Dr. Khaldoun Al-Hadid	8	Exam	<b>373-378</b> <b>379-383</b>	
<b>Tropisms and Nastic Movements :Orienting Plants in Space</b> 23.1 Phototropism: Reaching for the Sun 23.2 Gravitropism	<b>14</b>	Dr. Khaldoun Al-Hadid	8	Exam	<b>392-401</b>	
<b>Measuring Time: Controlling Development by Photoperiod and Endogenous Clocks</b> 24.1 Photoperiodism	<b>15</b>	Dr. Khaldoun Al-Hadid	8	Exam	<b>414-421</b>	
<b>Responses of Plants to Environmental Stress</b> 13.1 What is Plant Stress? 13.2 Plants Respond to Stress in Several Different Ways 13.4 Water Stress is a Persistent Threat to Plant Survival 13.5 Plants are Sensitive to Fluctuations in Temperature	<b>16</b>	Dr. Khaldoun Al-Hadid	9	Exam	<b>223-224</b> <b>229-234</b>	

**21. Teaching Methods and Assignments:**

Development of ILOs is promoted through the following teaching and learning methods:  
Lectures and Discussions.

**22. Evaluation Methods and Course Requirements:**

Opportunities to demonstrate achievement of the ILOs are provided through the following assessment methods and requirements:  
Written exams and Reports.

**23. Course Policies:**

A- Attendance policies:

Students are allowed to not attend seven lectures (15%) in the whole semester. In this case, students must attend every lab weekly. If a student does not attend a lab, then he/she has a maximum numbers of four lectures to skip.

B- Absences from exams and handing in assignments on time:

If a student does not attend an exam, he/she will get zero grade in that exam, unless, he/she shows a medical report that proves he/she could not attend the exam. In this case, a makeup exam will be offered to the student as soon as possible.

C- Health and safety procedures:

Students need to be aware of the basic procedure of laboratory safety. Part of the first lab in the first week of the semester is assigned to teach students these basic laboratory procedures.

D- Honesty policy regarding cheating, plagiarism, misbehavior:

University regulations will be implemented for any cheating attempt, plagiarism and misbehavior.

E- Grading policy:

<b>Evaluation</b>	<b>Grade</b>
<b>Midterm Lecture Exam</b>	30
<b>Midterm Lab Exam</b>	10
<b>Lab Reports</b>	10
<b>Final Lab Exam</b>	15
<b>Final Lecture Exam</b>	35

F- Available university services that support achievement in the course:

The university provides lab materials and equipment. Moreover, the university provides personnel to help in exams.



**24. Required equipment:**

1. Centrifuge.
2. Water bath.
3. Incubators.
4. Spectrophotometer.
5. Compound Microscopes.

**25. References:**

A- Required book (s), assigned reading and audio-visuals:

**Introduction to Plant Physiology**, William G. Hopkins and Norman P. A. Huner, 4<sup>th</sup> Ed., 2009, John Wiley & Sons, Inc.

B- Recommended books, materials, and media:

Plant Physiology by F.Salisbury and C. Ross. 4th edition, 1992. Wads-Worth Publishing Company.

**26. Additional information:**

Name of Course Coordinator: ---Dr. Khaldoun Al-Hadid -Signature: ----- Date: ----Jun.08.2016----

Head of curriculum committee/Department: ----- Signature: -----

Head of Department: ----- Signature: -----

Head of curriculum committee/Faculty: ----- Signature: -----

Dean: ----- -Signature: -----

Copy to:  
 Head of Department  
 Assistant Dean for Quality Assurance  
 Course File