



**Kingdom of Saudi Arabia**

**The National Commission for Academic Accreditation &  
Assessment**

**COURSE SPECIFICATION**

**Plant Physiology 1**

**374 BOT**

## Course Specification

Institution: **King Khalid University**

College/Department **College of Science - Department of Biology**

### A Course Identification and General Information

1. Course title and code: <b>Plant Physiology I (374 BOT)</b>
2. Credit hours: <b>3 hours</b>
3. Program(s) in which the course is offered. (If general elective available in many programs indicate this rather than list programs)  <b>BSc Program - Department of Biology - College of Science</b>
4. Name of faculty member responsible for the course:  <b>Dr Ahmed Abdalla Hussain</b>
5. Level/year at which this course is offered: <b>6<sup>th</sup> level- 3<sup>rd</sup> year, 1433-1434</b>
6. Pre-requisites for this course (if any) <b>Plant anatomy</b> <b>General Biology (101 BIO)</b>
7. Co-requisites for this course (if any) <b>None</b>
8. Location if not on main campus <b>Main campus</b>

## B Objectives

1. Summary of the main learning outcomes for students enrolled in the course.

**At the end of this course the students will be able to acquire the knowledge regarding:**

- 1. Knowledge of the physiological aspects of plant cells and their functions.**
- 2. Structure and functions of the cellular membranes and the mechanisms of diffusion through these membranes.**
- 3. The components of plant water relations .**
- 4. The mineral nutrition of plants and differentiation between the macro and micro elements and their deficiency symptoms.**
- 5. Acquiring the skills of tracing the different paths of the translocation of assimilates from the sources to the sinks.**

2. Briefly describe any plans for developing and improving the course that are being implemented. (eg increased use of IT or web based reference material, changes in content as a result of new research in the field)

- 1- Usage of the relevant animations and audio visual tools during the lectures.**
- 2- consulting the most recent literature with regard to the topics of the lectures.**
- 3- coordination between the topics demonstrated during the practical sessions and those delivered over the lecture.**
- 4- Implantation of e-learning facility.**

**C. Course Description** (Note: General description in the form to be used for the Bulletin or Handbook should be attached)

<b>1.1 Topics to be Covered</b>		
<b>List of Topics</b>	<b>No of Weeks</b>	<b>Contact hours</b>
<b>1- Course orientation and explanation of course evaluation</b>	<b>1</b>	<b>2</b>
<b>2-Definition of plant physiology and study of the physiological aspects of plant cells.</b>	<b>1</b>	<b>2</b>
<b>3-Structure and functions of plant cellular membranes</b>	<b>1</b>	<b>2</b>
<b>4-Properties of the colloidal solutions (protoplasm)</b>	<b>1</b>	<b>2</b>

<b>5-Colloides: imbibitions, diffusion and permeability</b>	<b>1</b>	<b>2</b>
<b>6-Plant water relations at the cellular level: active and passive transport systems, the concept of symplast apoplast pathways</b>	<b>1</b>	<b>2</b>
<b>7-structure of stomatal apparatus and the mechanism of stomatal closure and opening.</b>	<b>1</b>	<b>2</b>
<b>8- whole plant water relations (transpiration – transpiration ratio)</b>	<b>1</b>	<b>2</b>
<b>9- Determination of transpiration rate in the field and laboratory</b>	<b>1</b>	<b>2</b>
<b>10- Plant mineral nutrition (classification of mineral elements)</b>	<b>1</b>	<b>2</b>
<b>11- The elements deficiency symptoms</b>	<b>1</b>	<b>2</b>
<b>12- Chnges in the rhizosphere pH and the mechanisms of nutrient acquisition.</b>	<b>1</b>	<b>2</b>
<b>13-The ascending plant sap (xylem transport)</b>	<b>1</b>	<b>2</b>
<b>14- The descending plant sap (phloem transport) from source to sink.</b>	<b>1</b>	<b>2</b>
<b>15- seed germination, physiological drought, transient wilting and permanent wilting</b>	<b>1</b>	<b>2</b>
<b>Total</b>	<b>15</b>	<b>30</b>

-مكونات المقرر الدراسي (إجمالي عدد ساعات التدريس لكل فصل دراسي):

1.2- Course components (total of teaching hours for each semester)			
<b>Lecture:</b> <b>30</b>	<b>Tutorial:</b> -----	<b>Practical/Field work/Internship:</b> <b>14</b>	<b>Other:</b> -----

3. Additional private study/learning hours expected for students per week. (This should be an average:for the semester not a specific requirement in each week)

**No more than the contact hours at the course instruction site**

#### 4. Development of Learning Outcomes in Domains of Learning

For each of the domains of learning shown below indicate:

- A brief summary of the knowledge or skill the course is intended to develop;
- A description of the teaching strategies to be used in the course to develop that knowledge or skill;
- The methods of student assessment followed in the course to evaluate learning outcomes in the domain concerned.

##### **a. Knowledge**

(i) Description of the knowledge to be acquired

- 1- The student may acquire knowledge about subjects related to plant physiology such as plant morphology, plant anatomy genetics ....etc.**
- 2- The student may acquire knowledge about the response of plants to their ambient environments conditions.**

(ii) Teaching strategies to be used to develop that knowledge

- **Lectures**
- **Linking between theoretical concepts and actual practice**
- **Multimedia, videos and animations..... etc.**
- **Experiments applied to plants in the greenhouse**
- **Writing of scientific reports about some selected physiological processes and phenomena**

(iii) Methods of assessment of knowledge acquire

- **Two practicals and two theoretical exams per semester all comprising 50% of the final evaluation.**
- **Final exam which includes a combination of types of questions such as explaining the following phenomena – graph and naming the parts- matching - mentioning- comprehensive definition - multiple-choice questions - short essay questions. This exam represents 50% of the final evaluation.**

##### **b. Cognitive Skills**

(i) Description of cognitive skills to be developed

- 1- Interpretation : i.e the ability to explain the different pathways for a specified physiological process i.e sucrose translocation from the leave to the different plant parts through the xylem and the phloem.
- 2- Drawing conclusions : for example, the student may appreciate that the concentration gradient of ions acts as the driving force for diffusion.
- 3- Suggestions: the conclusion stated above (section2) would allow the student to suggest that plants not to be grown in salty soils as this would mean flow of water from the plants into the soil by diffusion resulting in physiological drought.

(ii) Teaching strategies to be used to develop these cognitive skills

- (1) Conducting small independent experiments inside the greenhouse.**
- (2) Using the network technology (Internet) in the previously mentioned material**

(iii) Methods of assessment of knowledge acquired

- **Practical and theoretical exams**

### **c. Interpersonal Skills and Responsibility**

(i) Description of the interpersonal skills and capacity to carry responsibility to be developed

- 1. Work independently and as a team work**
- 2. Communicate results of work with others**

(iii) Teaching strategies to be used to develop these skills and abilities

- **Home work.**
- **A student may be asked to stand in front of his colleagues to explain a theoretical problem related to the specified lecture .**

<p>(iii) Methods of assessment of students interpersonal skills and capacity to carry responsibility</p> <p><b>Writing essays and short articles on topics relevant to the course material</b></p>
<p><b>d. Communication, Information Technology and Numerical Skills</b></p>
<p>(i) Description of the skills to be developed in this domain.</p> <ul style="list-style-type: none"> <li>• <b>The ability to use a software package (Microsoft office) in its basic, simplified form</b></li> <li>• <b>Use computer programs to facilitate dealing with the university network</b></li> <li>• <b>Link the course material with the University’s academic website</b></li> </ul>
<p>(ii) Teaching strategies to be used to develop these skills</p> <ul style="list-style-type: none"> <li>▪ <b>The use of computer programs</b></li> <li>▪ <b>The use of microscopes and other tools needed for practical training</b></li> <li>▪ <b>The use of scientific instruments in experiments, applications and measurements related to the course</b></li> </ul>
<p>(iii) Methods of assessment of students numerical and communication skills</p> <ol style="list-style-type: none"> <li><b>1. Short tests (Quizes)</b></li> <li><b>2. Practical and theoretical exams</b></li> <li><b>3. Mutual scientific dialogue and panel discussions among students and the faculty member</b></li> <li><b>4. Assessment of the students reports on their experiments in the field or in the greenhouse</b></li> </ol>
<p><b>e. Psychomotor Skills (if applicable)</b></p>
<p>(i) Description of the psychomotor skills to be developed and the level of performance required</p> <p style="text-align: center;"><b>NA</b></p>
<p>(ii) Teaching strategies to be used to develop these skills</p>

<b>NA</b>
(iii) Methods of assessment of students psychomotor skills
<b>NA</b>

5. Schedule of Assessment Tasks for Students During the Semester			
Assessment	Assessment task (eg. essay, test, group project, examination etc.)	Week due	Proportion of Final Assessment
1	<b>First practical exam</b>	<b>6</b>	<b>10%</b>
2	<b>First theoretical exam</b>	<b>6</b>	<b>10%</b>
3	<b>Second theoretical exam</b>	<b>13</b>	<b>10%</b>
4	<b>Reports</b>	<b>14</b>	<b>5%</b>
5	<b>Final practical exam</b>	<b>15</b>	<b>15%</b>
6	<b>Final theoretical exam</b>	<b>16</b>	<b>50%</b>

#### **D. Student Support**

<p>1. Arrangements for availability of teaching staff for individual student consultations and academic advice. (include amount of time teaching staff are expected to be available each week)</p> <ul style="list-style-type: none"> <li>▪ <b>10 hours / week for counselling.</b></li> <li>▪ <b>2 credit hours (theoretical).</b></li> <li>▪ <b>1 credit hour (practical)</b></li> </ul>
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#### **E. Learning Resources**

<p>1. Required Text(s)  - <b>Hussain, A (2009). Fundamentals of plant physiology – 1<sup>st</sup>. Edition (approved by the department)</b></p>
<p>2. Essential References</p> <p><b>-Hopkins W.H. (1991): Introduction to plant physiology. Mc. Graw Hill, USA -</b>  <b>- Knox L, Ladiges B, Evans D. and Saint A (2001): Biology, 2<sup>nd</sup>. Ed.</b></p>



3- Recommended Books and Reference Material (Journals, Reports, etc) (Attach List)
<p>4-.Electronic Materials, Web Sites etc</p> <ul style="list-style-type: none"> <li>- <b>Biology Pages <a href="https://lms.kku.edu.sa/webapps/portal/frameset.jsp">https://lms.kku.edu.sa/webapps/portal/frameset.jsp</a></b></li> <li>- <b>Websites on the internet that are relevant to the topics of the course</b></li> <li>- <b>Elsevier</b></li> <li>- <b>Science Direct.</b></li> </ul>
<p>5- Other learning material such as computer-based programs/CD, professional standards/regulations</p> <p style="text-align: center;"><b>Multimedia associated with the text book and the relevant websites</b></p>

## F. Facilities Required

<p>Indicate requirements for the course including size of classrooms and laboratories (ie number of seats in classrooms and laboratories, extent of computer access etc.)</p>
<p>1. Accommodation (Lecture rooms, laboratories, etc.)</p> <ul style="list-style-type: none"> <li>▪ <b>50 seats/classroom</b></li> <li>▪ <b>Computers with data show and internet</b></li> <li>▪ <b>Greenhouse equipped with all the tools, materials and equipment needed to grow the plants</b></li> </ul>
<p>2. Computing resources</p> <p><b>Computer room containing about 15 computers with internet connections</b></p>
<p>3. Other resources (specify --eg. If specific laboratory equipment is required, list requirements or attach list)</p> <ul style="list-style-type: none"> <li>• <b>display devices connected to the PC</b></li> <li>• <b>Microscopes</b></li> <li>• <b>Stereoscopic models and diagrams of the most important physiological processes in plants</b></li> </ul>

## G Course Evaluation and Improvement Processes

1 Strategies for Obtaining Student Feedback on Effectiveness of Teaching
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<ul style="list-style-type: none"> <li>• <b>Course evaluation by students through questionnaires</b></li> <li>• <b>A meeting between faculty members and students</b></li> </ul>
<p>2 Other Strategies for Evaluation of Teaching by the Instructor or by the Department</p> <ul style="list-style-type: none"> <li>• <b>Peer consultation on teaching the course</b></li> <li>• <b>A discussion with a group of faculty members that teach the same course</b></li> <li>• <b>Department's council discussions</b></li> <li>• <b>Analysis of the results of students</b></li> <li>• <b>Studying the course report through workshops held by the department and the Committee on Development and Quality Assurance</b></li> </ul>
<p>3 Processes for Improvement of Teaching</p> <ul style="list-style-type: none"> <li>• <b>Conduct workshops in the department performed by specialists</b></li> <li>• <b>Conducted periodic revisions done by the department on teaching methods</b></li> <li>• <b>Monitor the activities of education by a faculty member who has extensive experience in teaching</b></li> <li>• <b>Develop a parental relationship between teachers and students</b></li> <li>• <b>Organize visits for students to the institutions that will benefit from them in the future</b></li> <li>• <b>The faculty member has to follow up new scientific results and keep up with any developments and the possibility of amending any content deletion and addition in agreement with the surrounding environment to the student</b></li> </ul>
<p>4. Processes for Verifying Standards of Student Achievement (eg. check marking by an independent member teaching staff of a sample of student work, periodic exchange and remarking of tests or a sample of assignments with staff at another institution)</p> <p><b>assigning a group of faculty members teaching the same course to correct the same question for different students</b></p>
<p>5. Describe the planning arrangements for periodically reviewing course effectiveness and planning for improvement.</p> <ul style="list-style-type: none"> <li>• <b>The course material is periodically reviewed and the changes to be taken are approved by the department council and the higher councils</b></li> <li>• <b>The head of the department takes the responsibility of implementing the proposed change.</b></li> <li>• <b>Regular meetings with outstanding students to discuss the problems they are facing</b></li> <li>• <b>Comparison between similar courses in relevant faculties of various universities</b></li> </ul>

Created for the 2<sup>nd</sup> semester 1433-1434 H  
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