



## Description of the plant tissue culture course

1. Course Name:	
Plants Tissue Culture	
2. Course Code:	
PLTC414	
3. Semester / Year	
Second semester/fourth stage/2023-2024	
4. Description Preparation Date:	
1/2/2024	
5. Available Attendance Forms:	
In-person	
6. Number of Credit Hours (Total) / Number of Units (Total)	
2 theoretical + 3 practical (5 hours) / Number of units: 3.5	
7. Course administrator's name (mention all, if more than one name)	
Name: Prof. Dr. Alaa Hashem Al-Tae	
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Dr. Angham Talal Chalabi	
8. Course Objectives	
<b>Course Objectives</b>	<ul style="list-style-type: none"> <li>• Enable the student to understand the technology of plant tissue culture.</li> <li>• Enable the student to understand how this technology works.</li> <li>• The student learns about its various effects on plant production and breeding.</li> </ul>
9. Teaching and Learning Strategies	
<b>Strategy</b>	1- Interactive lecture 2- Brainstorming

3- Dialogue and discussion  
 4- Field training  
 5- Practical exercises  
 6- Field project  
 7- Self-learning  
 8- In-person lectures in which PowerPoint slides, illustrations, and video recordings are used, with a general discussion with the students in each lecture, asking questions and explaining how to answer them, conducting field experiments and observing plants naturally, while teaching methods of cultivation for these plants.

#### 10. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	theoretical 2	<p>A1: Learn about the history of the beginning of this technology, the experiments that led to its discovery, and its importance in our current situation.</p> <p>B1: He possesses the practical and mental knowledge and concepts that help him in the technique of plant tissue culture.</p> <p>D3: Community members participate and work to educate them about the importance of plant tissue culture technology and its impact on plant propagation.</p> <p>E1: It contributes to enhancing the value of the importance of this technology among community members and making them aware of its application to improve plants and serve society.</p>	An introduction to the history, origins and discovery of tissue culture and its current status.	Interactive lecture, brainstorming, dialogue and discussion, self-learning	Reports, lectures, tests
	practical 3	C3: Uses the practical applications of plant tissue culture and its features and uses.	Practical applications of plant tissue culture	Interactive lecture, brainstorming, dialogue and discussion, self-learning	Short practical test 1

2	theoretical 2	<p>A2: Defines the various practical application systems for plant tissue culture in terms of plant breeding</p> <p>B1: He possesses the practical and mental knowledge and concepts that help him conserve genetic resources and produce healthy plants free of disease.</p> <p>C5: Successfully balances the investment and use of ornamental plants and their use in a manner compatible with the production of medicinal drugs and rapid phylogenetic propagation.</p>	<p>Practical applications of tissue culture</p> <p>Plant breeding and conservation of genetic resources</p> <p>Producing healthy plants free of disease infections</p> <p>Production of medical drugs</p> <p>Rapid phylogenetic propagation</p>	<p>Interactive lecture, brainstorming, dialogue and discussion, self-learning</p>	<p>Reports, lectures, tests</p>
	practical 3	<p>C3: Uses what he needs to learn about the components of a tissue culture laboratory and plant cells</p>	<p>Components of the plant cell and tissue culture laboratory</p>	<p>Interactive lecture, brainstorming, dialogue and discussion, self-learning</p>	<p>Short practical test 1</p>
3	theoretical 2	<p>A2: The tissue culture laboratory determines its needs, accessories, and various parts, in addition to methods for preparing agricultural media, how to sterilize them, and addresses the special conditions required for the success of plant tissue culture.</p>	<p>Tissue culture laboratory needs and accessories</p> <p>Food environments</p> <p>Sterilization</p> <p>Conditions for storing crops</p>	<p>Interactive lecture, brainstorming, dialogue and discussion, self-learning</p>	<p>Reports, lectures, tests</p>
	practical 3	<p>C3: What complementary accessories are used for the plant cell and tissue culture laboratory</p> <p>C4: Draws an enumeration and prior visualization of the equipment that may be available in the plant cell and tissue culture laboratory.</p> <p>D1: Acquiring the communication skills necessary to deal with confidence and certainty at the individual and group levels</p>	<p>Complementary accessories for the plant cell and tissue culture laboratory</p>	<p>Interactive lecture, brainstorming, dialogue and discussion, self-learning</p>	<p>Short practical test 1</p>

4	theoretical 2	<p>A2: Determines systems and methods for creating callus</p> <p>C4: Draws plans and programs to know and study the external appearance and cellular composition of callus tissue</p> <p>D3: Community members participate and work to educate them about the importance of increasing the different methods of planting callus</p> <p>E1: It contributes to enhancing work values among community members and how to replant callus in addition to measuring the growth and success of the callus.</p>	<p>Callus formation and growth</p> <p>The external appearance and cellular composition of callus tissue</p> <p>Callus cultivation methods</p> <p>Callus induction</p> <p>Callus replanting</p> <p>Measurement of callus growth</p>	<p>Interactive lecture, brainstorming, dialogue and discussion, self-learning</p>	<p>Reports, lectures, tests</p>
	practical 3	<p>C3: Uses the information the designer needs and the tools available to him to perfect his work</p> <p>C4: Draws plans and programs for development in the field of equipment necessary for the laboratory and in accordance with the requirements of the environment and society</p> <p>C5: Successfully balances the investment and use of devices and tools and employs them in a manner appropriate to the cultivation operations of different types and models of plants.</p>	<p>Devices and tools that must be available in the tissue culture laboratory</p>	<p>Interactive lecture, brainstorming, dialogue and discussion, self-learning</p>	<p>Short practical test 1</p>
5	theoretical 2	<p>C4: Draws up plans and programs for development in the field of suspension cell cultivation and the development of cell farms in accordance with the requirements of the environment and society</p> <p>D3: Community members participate and work to educate them about the importance of suspension cell culture methods, cell cultures, and the minimum cell density.</p> <p>E1: It contributes to enhancing the rate of cell growth, their metabolic efficiency, and the cultivation of single cells</p>	<p>Suspension cell culture</p> <p>Development of cell cultures</p> <p>Suspension cell culture methods</p> <p>Cell cultures and minimum cell density</p> <p>Cell growth rate and metabolic efficiency</p> <p>Single cell culture</p>	<p>Interactive lecture, brainstorming, dialogue and discussion, self-learning</p>	<p>Reports, lectures, tests</p>

	practical 3	<p>C3: Uses the information the research needs and what is available to him to master his work</p> <p>C4: Draws plans and programs for distributing equipment to the different rooms of the laboratory.</p> <p>D1: Acquiring the communication skills necessary to deal with confidence and certainty at the individual and group levels</p>	Distributing equipment to the different rooms of the laboratory	Interactive lecture, brainstorming, dialogue and discussion, self-learning	Short practical test 1
1	6		Semester exam		
7	theoretical 2	<p>A2: Determines the systems of protoplast separation and cultivation and the foundations and elements of their cultivation.</p> <p>C4: Draws up plans and programs for development in the field of use of protoplast cultivation in accordance with the requirements of the environment and society</p> <p>D1: Acquiring the communication skills necessary to deal with confidence and certainty at the individual and group levels</p> <p>D3: Community members participate and work to educate them about the importance of using protoplasts</p> <p>E1: It contributes to enhancing the values of beauty among members of society and making them aware of the importance of using protoplast cultivation and the sources from which protoplasts are obtained and addressing the enzymes and solutions that are used in preserving protoplasts to improve the environment and serve society.</p>	<p>Protoplast separation and cultivation</p> <p>Areas of use of protoplast cultivation</p> <p>Protoplast sources</p> <p>Enzymes and solutions used in preserving protoplasts</p>	Interactive lecture, brainstorming, dialogue and discussion, self-learning	Reports, lectures, tests

	practical 3	<p>C2: Innovates new designs and formats for plant cell and tissue cultivation, using modern computer applications and the ability to select plants according to prevailing climatic conditions.</p> <p>C3: Uses the information the designer needs and what is available to him to perfect his work</p> <p>C4: Draws up plans and programs for development in the field of steps used for cultivating plant cells and tissues in accordance with the requirements of the environment and society</p> <p>C5: Successfully balances the investment, use and employment of ornamental plants</p>	Steps used to culture plant cells and tissues	Interactive lecture, brainstorming, dialogue and discussion, self-learning	Short practical test 1
	theoretical 2	<p>A3: The laboratory is employed in introducing methods of protoplast separation and protoplast purification to enhance the functional and aesthetic value of the plant.</p> <p>C4: Draws up plans and programs for development in protoplast vitality</p> <p>Protoplast cultivation density and protoplast cultivation methods in accordance with the requirements of the environment and society</p>	<p>Protoplast separation methods</p> <p>Protoplast purification</p> <p>Protoplast vitality</p> <p>Protoplast culture density</p> <p>Protoplast cultivation methods</p>	Interactive lecture, brainstorming, dialogue and discussion, self-learning	Reports, lectures, tests
8	practical 3	<p>C2: Innovates new designs and formats for sterilization, using modern computer applications, and the ability to select plants according to prevailing climatic conditions.</p> <p>C3: Uses the information the designer needs and what is available to him to perfect his work</p> <p>C4: Draws up plans and programs for development in the field of the main methods of sterilization within tissue culture laboratories in accordance with the requirements of the environment and society</p> <p>C5: Successfully balances investment, review and demonstration of key methods of sterilization within tissue culture laboratories</p>	The main methods of sterilization within tissue culture laboratories	Interactive lecture, brainstorming, dialogue and discussion, self-learning	Short practical test 1

9	theoretical 2	<p>A4: It is used to identify the nutrient medium used in growing protoplasts, how the cell wall of the protoplast is formed, and how the protoplast division process takes place.</p> <p>C3: Uses the information the designer needs and what is available to him to perfect his work</p>	<p>The nutritional medium of protoplasts</p> <p>Formation of the cell wall of protoplasts</p> <p>Protoplast division</p>	<p>Interactive lecture, brainstorming, dialogue and discussion, self-learning</p>	<p>Reports, lectures, tests</p>
	practical 3	<p>C2: Study the identification of components of Nutrient media</p> <p>C3: Uses the information the researcher needs and what is available to him to master his work</p> <p>C4: Draws up plans and programs for development in the field of Nutrient media types in accordance with requirements of the environment and society</p> <p>C5: Successfully balances investment and use of ornamental plants and their employment in a way that is compatible with tissue propagation processes.</p>	<p>Nutrient media</p>	<p>Interactive lecture, brainstorming, dialogue and discussion, self-learning</p>	<p>Short practical test 1</p>
10	theoretical 2	<p>A2: It defines the systems of how plants arise from protoplast cultivation, how the protoplast fusion process takes place, and its importance.</p> <p>C5: Successfully balances the investment and use of ornamental plants and their employment in accordance with the methods used in protoplast fusion.</p>	<p>Origination of plants from protoplast culture</p> <p>Protoplast fusion</p> <p>Methods used in integration</p>	<p>Interactive lecture, brainstorming, dialogue and discussion, self-learning</p>	<p>Reports, lectures, tests</p>
	practical 3	<p>C2: Statement of the pH suitable for agriculture, along with the negatives of high and low acidity of the medium.</p> <p>C3: Uses the information the designer needs and what is available to him to perfect his work.</p> <p>C4: Draws up plans and programs for development in the field of tissue reproduction in accordance with the requirements of the environment and society</p> <p>C5: Successfully balances the investment and use of ornamental plants and their employment in a manner compatible with the various propagation processes of tissue culture.</p>	<p>The pH of the nutrient medium</p>	<p>Interactive lecture, brainstorming, dialogue and discussion, self-learning</p>	<p>Short practical test 1</p>

11	theoretical 2	<p>A2: Identify the mechanism of protoplast fusion</p> <p>C5: Successfully balances how protoplasts incorporate cell components and employ them to suit the coordination processes of different plant species and models.</p>	<p>Integration mechanism</p> <p>Embedding protoplasts with cell components</p>	<p>Interactive lecture, brainstorming, dialogue and discussion, self-learning</p>	<p>Reports, lectures, tests</p>
	practical 3	<p>C2: Study different types of food environments and identify the different types of environment depending on the prevailing climatic conditions</p> <p>C3: Uses the information that the researcher needs and what is available to him to master his work</p> <p>C4: Draws plans and programs for development in the field of types of food environments in accordance with the requirements of the environment and society</p> <p>C5: Successfully balances the investment and use of ornamental plants and their use in accordance with tissue culture operations</p>	<p>Types of nutritional environments</p>	<p>Interactive lecture, brainstorming, dialogue and discussion, self-learning</p>	<p>Short practical test 1</p>
12	theoretical 2	<p>A2: Determines the cultivation of embryos, the factors influencing their various cultivation, and their importance in reproduction</p> <p>C5: Successfully balances learning about the technology of embryo cultivation, the factors affecting its cultivation, and how to cultivate embryos and pollen grains.</p>	<p>Embryo cultivation and factors affecting its cultivation</p> <p>Cultivation of anther and pollen.</p>	<p>Interactive lecture, brainstorming, dialogue and discussion, self-learning</p>	<p>Reports, lectures, tests</p>



	practical 3	<p>C2: Identifying callus tissue and its types practically, in addition to the somatic embryos.</p> <p>C3: Uses the information the researcher needs and what is available to him to master his work</p> <p>C4: Draws plans and programs for development in the field of callus tissue and somatic embryos, in accordance with the requirements of the environment and society</p> <p>C5: Successfully balances the investment and use of ornamental plants and their employment in accordance with the processes of propagation using callus tissue and somatic embryos.</p>	Callus tissue and somatic embryos	Interactive lecture, brainstorming, dialogue and discussion, self-learning	Short practical test 1
13			Semester exam		
	theoretical 2	<p>A2: Identifying the physiological problems of tissue culture, the most important of which is vitrification - browning.</p> <p>C3: Uses the information the designer needs and what is available to him to perfect his work</p>	Physiological problems of tissue culture - vitrification - browning	Interactive lecture, brainstorming, dialogue and discussion, self-learning	Reports, lectures, tests
14	practical 3	<p>C2: Learn how to grow protoplasts</p> <p>C3: Uses the information the researcher needs and what is available to him to master his work</p> <p>C4: Draws up plans and programs for development in the field of protoplast cultivation and suspension cell cultures in accordance with the requirements of the environment and society</p> <p>C5: Successfully balances the investment and use of ornamental plants and their employment in a manner compatible with protoplast and suspension cell culture operations, as well as addressing suspension cell culture.</p>	Protoplast culture and suspension cell cultures	Interactive lecture, brainstorming, dialogue and discussion, self-learning	Short practical test 1

15	theoretical 2	<p>C3: Uses the information the designer needs and what is available to him to master his work and learn about the technique of somatic embryos, their source and stages, and how the embryos are obtained.</p> <p>C5: Successfully balances the investment and use of ornamental plants and their employment in accordance with the coordination processes of tissue propagation</p>	Somatic embryos, their origin and stages	Interactive lecture, brainstorming, dialogue and discussion, self-learning	Reports, lectures, tests
	practical 3	<p>C1: Identify the different stages of micropropagation of plants using plant tissue culture in practice.</p> <p>C3: Uses the information the researcher needs and what is available to him to master his work</p> <p>C4: Draws up plans and programs for development in the field of precise propagation of plants using plant tissue culture and in accordance with the requirements of the environment and society.</p> <p>C5: Successfully balances the investment and use of ornamental plants and their use with micropropagation of plants using plant tissue culture.</p> <p>D2: Dealing with modern technology efficiently that enables him to accomplish his scientific and practical tasks</p>	Stages of micropropagation of plants using plant tissue culture	Interactive lecture, brainstorming, dialogue and discussion, self-learning	Short practical test 1

11. Course Evaluation

ت	Evaluation methods	Evaluation date (week)	Degree	Relative weight %
1	Report 1	fourth week	2.5	2.5
2	Report 2	The fifth week	2.5	2.5
3	Short test (1) Quiz	the sixth week	2	2
4	Short test (2) Quiz	The fourteenth week	2	2
5	Short test (3) Quiz	The fifteenth week	1	1
6	Semester test (1)	the sixth week	7.5	7.5
7	Semester test (2)	The eleventh week	7.5	7.5
8	Final theoretical test	Final semester exams	40	40
9	Practical field project	The fifteenth week	5	5
10	Field evaluation	The third and fifth week	2	2
11	Practical short test (1) Quiz	The first week	1	1
12	Short practical test (2) Quiz	fourth week	0.5	0.5
13	Short practical test (3) Quiz	The fourteenth week	1	1
14	Direct and homework	Weeks 6, 8, 9, 10, 11, 12 and 13	5.5	5.5
15	Final practical test	Final semester exams	20	20
	the total	100	%100	%100

## 12. Learning and Teaching Resources

Required textbooks (curricular books, if any)	1- Salman, Muhammad Abbas, 1988. Fundamentals of plant cell and tissue culture
Main references (sources)	1- Muhammad, Abdul Muttalib Sayyid and Omar, Mubasher Saleh. 1990. Key concepts in cultivation, tissues and organs of plants 2- Al-Rifai, Abdul Rahim Tawfiq and Al-Shoubaki, Samir Abdul Razzaq. 2002. 21st century techniques for plant improvement using tissue culture
Recommended books and references (scientific journals, reports...)	There is no
Electronic References, Websites	There is no

Professor of the subject:

Prof. Dr. Alaa Hashem Younis Al-Tae

Head of the department:

Prof. Dr. Asmaa Muhammad Adel

Chairman of the Scientific Committee

Prof. Dr. Nabil Muhammad Amin Al-Imam