



## Description of the plant tissue culture course

1. Course Name:	
Plant Growth Regulators	
2. Course Code:	
PLGR307	
3. Semester / Year	
First semester/third 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 Dr. Angham Talal Chalabi	
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8. Course Objectives	
<b>Course Objectives</b>	<ul style="list-style-type: none"><li>• Enable the student to identify different plant growth regulators.</li><li>• Enable the student to understand the working mechanism of these plant organizations.</li><li>• The student learns about its different effects on plants.</li></ul>
9. Teaching and Learning Strategies	
<b>Strategy</b>	<ol style="list-style-type: none"><li>1- Interactive lecture</li><li>2- Brainstorming</li><li>3- Dialogue and discussion</li><li>4- Field training</li></ol>

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	A1: Learn about the history of the beginning of scientific discoveries that contributed significantly to the discovery and manufacture of industrial growth regulators that were later used. B1: He possesses the practical and mental knowledge and concepts that help him learn about plant growth regulators. D3: Community members participate and work to educate them about the importance of plant growth regulators and their impact on plant propagation. E1: It contributes to enhancing the values of the importance of these organizations among members of society and making them aware of their application to improve plants and serve society.	Introduction to the scientific discoveries that contributed to the discovery of growth regulators	Interactive lecture, brainstorming, dialogue and discussion, self-learning	Reports, lectures, tests
	practical 3	C3: Uses the practical applications of growth regulators, their features and uses, and learns about the physiological effect of different growth regulators on different aspects of the plant.	Plant hormones and their effect on plants	Interactive lecture, brainstorming, dialogue and discussion, self-learning	Short practical 1 test 1
2	theoretical 2	A2: Determines the various practical application systems and identifies auxins and their natural locations B1: He possesses practical and mental knowledge and concepts that help him preserve genetic resources, in addition to drawing their biological structure, knowing the different groups of auxins, distinguishing between free auxin and bound auxin, and how auxin and auxiliary factors are broken down. C5: Successfully balances the investment and use of ornamental plants and their use in a manner compatible with the production of medicinal drugs >	Auxins, their natural existence - their biological structure - manufactured auxin groups - free and bound auxin - auxin catabolism	Interactive lecture, brainstorming, dialogue and discussion, self-learning	Reports, lectures, tests

	practical 3	C3: He uses what he needs to learn about growth regulators, the history of their discovery by scientists, and the factors that helped make this happen	Introducing growth organizations and the experiences that led to their discovery	Interactive lecture, brainstorming, dialogue and discussion, self-learning	Short practica 1 test 1
3	theoretical 2	A2: Explaining the mechanism of auxin transport and its mechanism of action, and addressing auxin antagonists that prevent its action, the physiological effects of auxins, in addition to the structural formulas of a number of auxins.	Auxin transport - mechanism of action of auxin - auxin antagonists - physiological effects of auxin - structural formula of some auxins	Interactive lecture, brainstorming, dialogue and discussion, self-learning	Reports , lectures , tests
	practical 3	C3: Identifying growth inhibitors and their role in inhibition is used in practice C4: Draw an enumeration and prior visualization of the mechanism of action of these inhibitors within the plant. D1: Acquiring the communication skills necessary to deal with confidence and certainty at the individual and group levels	The role of growth inhibitors and their effects on vital processes in plants	Interactive lecture, brainstorming, dialogue and discussion, self-learning	Short practica 1 test 1
4	theoretical 2	A2: Defines systems and methods for detecting and identifying cytokinins. D3: Community members participate and work to raise their awareness of the importance of increasing the various methods for identifying cytokinins, with an explanation of the types of cytokinins, the method of action of cytokinins, the locations of the presence and synthesis of cytokinins, and an explanation of methods for its biological detection. E1: It contributes to enhancing the values of work among members of society, how it is done and how it was discovered, the efficiency of the various compounds of cytokinins, and how to destroy or inhibit cytokinins.	Cytokinins discovery - efficiency of different compounds of cytokinins - catabolism or inhibition of cytokinins - types of cytokinins - method of action of cytokinins - locations of the presence and synthesis of cytokinins - methods of biodetection	Interactive lecture, brainstorming, dialogue and discussion, self-learning	Reports , lectures , tests
	practical 3	C3: Uses the information the researcher needs and the tools available to him to master his work C4: Draws plans and programs for development in the field of clarifying the role of growth constraints in plants 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.	The role of growth obstacles in plants and their effects on vital processes in plants	Interactive lecture, brainstorming, dialogue and discussion, self-learning	Short practica 1 test 1
5	theoretical 2	C4: Draws up plans and programs for development in the field of identifying the structural formulas of some cytokinins and studying the effect of cytokinins on microorganisms in accordance with the requirements of the environment and society.	Structural formulas of some cytokinins - The effect of cytokinins on microorganisms - The effect of	Interactive lecture, brainstorming, dialogue and discussion,	Reports , lectures , tests

		D3: Community members participate and work to raise their awareness of the importance of the effect of cytokinins on leaf growth and senescence, the transport of cytokinins, and the physiological effects of cytokinins. E1: It contributes to enhancing the growth rate of cells, their metabolic efficiency, and the cultivation of various plants.	cytokinins on leaf growth and senescence - Cytokinin transport - Physiological effects of cytokinins	self-learning	
	practical 3	C3: Uses the information the researcher needs and what is available to him to master his work C4: Draws plans and programs for distributing equipment to the different rooms of the laboratory (laboratory) and a practical lesson on clarifying the molar solution and the molar solution. D1: Acquiring the communication skills necessary to deal with confidence and certainty at the individual and group levels	Molar solution and molar solution	Interactive lecture, brainstorming, dialogue and discussion, self-learning	Short practical 1 test 1
6			Semester exam		
7	theoretical 2	A2: The definition outlines how gibberellins were discovered and explains the structural formula of gibberellins. C4: Draws up plans and programs for development in the field of using gibberellin isolation methods in accordance with the requirements of the environment and society D1: Acquiring the communication skills necessary to deal with confidence and certainty at the individual and group levels D3: Community members participate and work to educate them about the importance of using protoplasts E1: It contributes to enhancing the values of beauty among members of society and making them aware of the importance of using and the conditions that must be met in the compound to be considered a gibberellin, in addition to clarifying the chemical properties of gibberellins to improve the environment and serve society.	Gibberellins Discovery - Structural formula of gibberellins - Isolation of gibberellins - Conditions that must be met in the compound to be considered gibberellins - Chemical properties of gibberellins	Interactive lecture, brainstorming, dialogue and discussion, self-learning	Reports, lectures, tests

	practical 3	C2: Innovates and simplifies practical ways to use growth regulators and explains the various and multiple ways to use growth regulators and the ability to select plants according to prevailing climatic conditions. C3: Uses the information the researcher needs and what is available to him to master his work C4: Draws up plans and programs for development in the field of steps followed in the use of plant growth regulators in accordance with the requirements of the environment and society C5: Successfully balances the investment and use of ornamental plants and uses them to suit different propagation processes	Practical ways to use growth regulators	Interactive lecture, brainstorming, dialogue and discussion, self-learning	Short practica 1 test 1
8	theoretical 2	A3: The laboratory is used to introduce methods for knowing the characteristics of gibberellins and draw a diagram of the biosynthesis of gibberellins to enhance the functional and aesthetic value of the plant. C4: Draws up plans and programs to develop the process of catabolism of gibberellins, introduce growth obstacles and their role in studying gibberellins and the mechanism of action of gibberellins, and clarify the physiological effects of gibberellins and their role in influencing plants, in accordance with the requirements of the environment and society.	Characteristics of gibberellins - biosynthesis of gibberellins - catabolism of gibberellins - growth obstacles and their role in the study of gibberellins - mechanism of action of gibberellins - physiological effects of gibberellins	Interactive lecture, brainstorming, dialogue and discussion, self-learning	Reports , lectures , tests
	practical 3	C2: Innovates the clarification of auxins and their role in plant growth practically, knowledge of their types, and the ability to select plants according to the prevailing climatic conditions. C3: Uses the information the designer needs and what is available to him to perfect his work C4: Draws up plans and programs for development in the field of the main methods of work within plant growth regulators laboratories and in accordance with the requirements of the environment and society C5: Successfully evaluates, reviews, and demonstrates key methods for learning about growth organizations.	Auxins and their practical identification in the laboratory	Interactive lecture, brainstorming, dialogue and discussion, self-learning	Short practica 1 test 1

9	theoretical 2	A4: It is used to identify abscisic acid, methods discovering it, and its natural locations, explain the chemical properties of abscisic, clarify the effective composition of abscisic from a chemical standpoint and study abscisic metabolism with the biological test for abscisic acid. C3: Uses the information the designer needs and what is available to him to perfect his work	Abscisic acid discovery - natural existence - chemical properties of abscisic - effective composition of abscisic from a chemical standpoint - metabolism of abscisic - biological test for abscisic acid	Interactive lecture, brainstorming, dialogue and discussion, self-learning	Reports , lectures , tests
	practical 3	C2: Study the identification and practical identification of the physiological effects of auxins in the laboratory C3: Uses the information the researcher needs and what is available to him to master his work C4: Draws up plans and programs for development in the field of a practical lesson on the physiological effects of auxins on plants and knowledge of their types, in accordance with the requirements of the environment and society C5: Successfully balances the investment and use of ornamental plants and their employment in a way that compatible with tissue propagation processes.	The physiological effects of auxins and their practical identification in the laboratory	Interactive lecture, brainstorming, dialogue and discussion, self-learning	Short practical 1 test 1
10	theoretical 2	C2: Demonstrating knowledge of the methods of transporting abscisic acid, studying the interaction of abscisic with other regulators, and clarifying the physiological effects of abscisic. C3: Uses the information the designer needs and what is available to him to perfect his work. C4: Draws up plans and programs for development in the field of tissue reproduction in accordance with the requirements of the environment and society C5: Successfully balances the investment and use of ornamental plants and their employment in a way that suits the various propagation processes.	Transmission of Abscisic - Interaction of Abscisic with other organizations - Physiological effects of Abscisic	Interactive lecture, brainstorming, dialogue and discussion, self-learning	Reports , lectures , tests
	practical 3	A2: Identify the mechanism of action of cytokinin. C5: Successfully balances how to include clarification of cytokinins and their role in plant growth in practice and knowledge of their types in a way that is appropriate for the coordination processes of different types and models of plants.	Cytokinins and their practical identification in the laboratory	Interactive lecture, brainstorming, dialogue and discussion, self-learning	Short practical 1 test 1

11	theoretical 2	A2: Identifying ethylene and how to detect it, explaining the locations of ethylene, mentioning ethylene antagonists, explaining the methods of transporting ethylene, and drawing a diagram of the biosynthesis of ethylene, with a statement of ethylene-like compounds. C5: Successfully balances how ethylene is incorporated into cell components and utilized in a way that suits the coordination processes of different plant species and models:	Ethylene discovery - locations of ethylene - antiethylene - ethylene transport - ethylene biosynthesis - ethylene-like compounds	Interactive lecture, brainstorming, dialogue and discussion, self-learning	Reports , lectures , tests
	practical 3	C2: Studies the interaction of cytokinin with gibberellin and auxin. C3: Uses the information the researcher needs and what is available to him to perfect his work. C4: Draws up plans and programs for development in the field of interaction of cytokinin with gibberellin and auxin, in accordance with the requirements of the environment and society. C5: Successfully balances the investment and use of ornamental plants and their employment in a way that is compatible with the processes of using plant growth regulators.	Interaction of cytokinin with gibberellin and auxin	Interactive lecture, brainstorming, dialogue and discussion, self-learning	Short practical test 1
12	theoretical 2	A2: Determines knowledge of the biodegradation of ethylene and explains the uses of ethylene in horticulture C5: Successfully balances recognition of the different physiological effects of ethylene.	Biodegradation of ethylene - uses of ethylene in horticulture - physiological effects of ethylene	Interactive lecture, brainstorming, dialogue and discussion, self-learning	Reports , lectures , tests
	practical 3	C2: Learn about a practical lesson that shows the effects of cytokinin on leaf growth and senescence C3: Uses the information the researcher needs and what is available to him to master his work C4: Draws up plans and programs for development in the field of cytokinin effects on leaf growth and senescence, in accordance with the requirements of the environment and society. C5: Successfully balances the investment and use of ornamental plants and their employment in accordance with cytokinin propagation processes.	Effects of cytokinin on leaf growth and senescence	Interactive lecture, brainstorming, dialogue and discussion, self-learning	Short practical test 1
13			Semester exam		

14	theoretical 2	A2: Identify and clarify growth inhibitors and their role in plant growth, their types and physiological effects. C3: Uses the information the designer needs and what is available to him to perfect his work	Growth inhibitors and their uses in plants, their types and ways of affecting the plant	Interactive lecture, brainstorming, dialogue and discussion, self-learning	Reports , lectures , tests
	practical 3	C2: Learn how to conduct biological tests gibberellins C3: Uses the information the researcher needs and what is available to him to master his work C4: Draws plans and programs for development in field of biotesting for gibberellins in accordance with the requirements of the environment and society Successfully balances the investment and use of ornamental plants and their employment in accordance with bioassay processes for gibberellins.	Bioassays for gibberellins	Interactive lecture, brainstorming, dialogue and discussion, self-learning	Short practical 1 test 1
15	theoretical 2	C3: The researcher uses the information he needs and what is available to him to master his work and identify and clarify growth obstacles and their role in plant growth, their types and their physiological effects. C5: Successfully balances the investment and use of ornamental plants and uses them in accordance with coordination processes. Explaining growth constraints and their role in plant growth, their types and physiological effects.	Growth retardants and their uses in plants, their types and ways of affecting the plant	Interactive lecture, brainstorming, dialogue and discussion, self-learning	Reports , lectures , tests
	practical 3	C1: Identify the different stages of studying the physiological effects of gibberellins practically. C3: Uses the information the researcher needs and what is available to him to master his work C4: Draws up plans and programs for development in the field of studying the physiological effects of gibberellins practically and in accordance with the requirements of the environment and society C5: Successfully balances the investment and use of ornamental plants and their employment in a manner consistent with the processes of studying the major role played by gibberellins in affecting plants. D2: Dealing with modern technology efficiently that enables him to accomplish his	Physiological effects of gibberellins	Interactive lecture, brainstorming, dialogue and discussion, self-learning	Short practical 1 test 1



scientific and practical tasks

### 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- Abdul, Karim Saleh (1987). Plant growth regulators, part one. Ministry of Education and Scientific Research. 2- Abdul, Karim Saleh (1987). Plant growth regulators, part two. Ministry of Education and Scientific Research.
Main references (sources)	1- Muhammad, Abdul Muttalib Sayyed (1982). Plant hormones, their physiology and biochemistry (translator). 2- Abu Zaid, Al-Shahat Nasr. 2000. Plant hormones and agricultural applications
Recommended books and references (scientific journals, reports...)	There is no
Electronic References, Websites	There is no

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