Course Description Form

1. Course Name:
Handling and storage of Horticultural Crops
2. Course Code
HSHC405
3. Semester / Year:
First semester/ Fourth stage/2023-2024
4. Description Preparation Date:
1/2/2024
5. Available Attendance Forms:
Attending
6. Number of Credit Hours (Total) / Number of Units (Total)
2 Theoretical + 3 Practical / 3.5 unite
7. Course administrator's name (mention all, if more than one name)
Name: Assistant Professor.Dr.Ayad Tariq Mahmmaod Email: ayadtariq75@uomosul.edu.iq Name: Assistant Lecturer Badran Sabhan Abdullah Email: Badran.sabhan@uomosul.edu.iq
8. Course Objectives
• The learner will be able to identify the economic and political objectives of horticultural forecasts • The student learns about the stages of growth and maturity through which horticultural results are achieved • The team between the different storage groups and the appropriate ones • Recording the basics of tree growth and using them to acquire emerging fruits for storage • Training between types of fruits and their divisions, depending on the type of large roles of fruits • Familiarity with what information the evidence needs to store and what is called for it to master the work • The student's awareness of the factors affecting the prolongation of the storage life of fruits • Determine the appropriate type of storage to suit the type of fruits • A comprehensive study of all types of fruits and how to cover them, and does not include conditions except for periods of storage for a long period of time
9. Teaching and Learning Strategies
- Interactive lecture - Brainstorming - Dialogue and discussion - Field Training - Practical exercises - Field project - Self-education
10. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method

1	2 Theoretical	A1: The student acquires knowledge and concepts related to the importance of food storage for agricultural and horticultural products B1: He possesses the practical and mental knowledge and concepts that help him in how to conduct good storage of fruits d1: Community members participate and work to educate them about the importance of increasing and storing agricultural products and the impact this has on society E1: Contributes to enhancing the values of stored agricultural products among community members and educating them about the importance of storing agricultural products to ensure they remain for the longest possible period in the market.	The importance of storage and the amount of loss in horticultural crops	Interactive lecture, brainstorming, dialogue and discussion	Short test, written test, and assignment
	3 Practical	A15: He possesses practical and mental knowledge and concepts that help him know the fruit and what its main sections are. a16: Differentiate between clustered and doubled fruits	Classification of fruits	Interactive lecture, brainstorming, dialogue and discussion	Short practical test1
2	2 Theoretical	A2: Determines the stages of growth and maturity of fruits and their types B2: He possesses the practical and mental knowledge and concepts that help him follow the stages of fruit growth. C4: Draws the growth curve of the fruits of the first group	Stages of growth and ripening of fruits	Interactive lecture, brainstorming, dialogue and discussion	Short test, written test, and assignment
	3 Practical	A17: Identifies the types of plant dyes and the main colors of fruits with examples. d4: Possess the skills of measuring the sensory qualities of fruits.	Sensory measures of complete growth and maturity in fruits	Interactive lecture, brainstorming, dialogue and discussion	Short practical test1
3	2 Theoretical	A3: Determines the types of fruits, which group they belong to, and what are the stages of their growth C5: Draws the growth curve of the fruits of the second group	**The second group of fruits**	Interactive lecture, brainstorming, dialogue and discussion	Short test, written test, and assignment
	3 Practical	d5: Possess the skill of measuring the qualitative characteristics of fruits.	**Chemical measures of complete growth and maturity in fruits**	Interactive lecture, brainstorming, dialogue and discussion	Short practical test1
4	2 Theoretical	A4: Determines breathing methods for horticultural crops C5: Draws the fruit respiration	**Breathing and its relationship to maturity and**	Interactive lecture, brainstorming	Short test, written test, and

		curve d2: Community members participate and work to educate them about the importance of increasing cold storage to preserve agricultural products.	**storage.**	, dialogue and discussion	assignment
	3 Practical	B4: Master the methods of cold storage of fruits	**Storage technology for fruits and horticultural crops**	Interactive lecture, brainstorming , dialogue and discussion	Short practical test1
5	2 Theoretical	A5: The student acquires knowledge and concepts related to the phenomenon of climacteric and its relationship to maturity in horticultural crops. C6: Draw the respiration curve for Climacteric and non-Clymbacterial fruits. d3: Community members participate and work to educate them about the importance of increasing cold storage and its impact on controlling the prolongation of the storage period.	The phenomenon of chlorosis and its relationship to maturity in horticultural crops	Interactive lecture, brainstorming , dialogue and discussion	Short test, written test, and assignment
	3 Practical	A18: Identify the factors that affect artificial ripeness. What are the most important methods for measuring respiratory rate?	Artificial ripening Monday	Interactive lecture, brainstorming , dialogue and discussion	Short practical test1
6	2 Theoretical	A6: The student understands what ethylene is and its role in the ripening of fruits. B3: He possesses practical and mental knowledge and concepts that help him in how to produce ethylene naturally in fruits and reduce its production.	production Study of respiratory rate and ethylene	Interactive lecture, brainstorming , dialogue and discussion	Short test, written test, and assignment
	3 Practical	A19: He possesses the practical and mental knowledge and concepts that help him know the factors affecting industrial maturity. B5: Able to measure the respiratory rate of stored fruits.	Study of respiratory rate and ethylene production and the factors affecting them	Interactive lecture, brainstorming , dialogue and discussion	Short practical test1
7	2 Theoretical	A7: The student is familiar with the most important methods of reaping and harvesting fruits C7: Determines the best methods of harvesting and harvesting for each type of fruit	Harvesting and picking operations Chemical	Interactive lecture, brainstorming , dialogue and discussion	Short test, written test, and assignment
	3 Practical	b6: He possesses practical and mental knowledge and concepts that help him reduce damage and deterioration of fruits. Crops	composition of fruits	Interactive lecture, brainstorming , dialogue and discussion	Short practical test1
8	2 Theoretical	A8: The student is familiar with the most important additional procedures for cooling fruits C8: Determines the best cooling methods for each type of fruit	Additional cooling transactions	Interactive lecture, brainstorming , dialogue and discussion	Short test, written test, and assignment

	3 Practical	A20: Different methods are used to harvest horticultural crops B7: Suggest any suitable methods for harvesting and packing fruits and horticultural	Collecting and preparing horticultural crops	Interactive lecture, brainstorming, dialogue and discussion	Short practical test1
9	2 Theoretical	A9: Modern methods are used in storing the fruits in a modified air atmosphere A10: Differentiate between normal storage and storage in a modified air atmosphere C9: Differentiate between normal storage and storage in a modified air atmosphere	Effect of storage in modified air atmosphere	Interactive lecture, brainstorming, dialogue and discussion	Short test, written test, and assignment
	3 Practical	A3: Different methods are used to pack the fruits.	Packaging of horticultural crops	Interactive lecture, brainstorming, dialogue and discussion	Short practical test1
10	2 Theoretical	A11: Modern methods are used for storing fruits in a rarefied air atmosphere A12: Differentiate between normal storage and storage in a rarefied air atmosphere C10: Differentiate between normal storage and storage in a rarefied atmosphere	Storage in a rarefied atmosphere	Interactive lecture, brainstorming, dialogue and discussion	Short test, written test, and assignment
	3 Practical	D6: able of measuring the acidity of fruits	Estimating the acidity of fruits	Interactive lecture, brainstorming, dialogue and discussion	Short practical test1
11	2 Theoretical	A12: Identify plant hormones that affect fruit growth. C11: Shows the effect of plant hormones individually on the growth and ripening of fruits	**The effect of plant hormones on growth and fruit setting**	Interactive lecture, brainstorming, dialogue and discussion	Short test, written test, and assignment
	3 Practical	D7: Measures sugary substances in fruits	**Estimation of carbohydrates in fruits**	Interactive lecture, brainstorming, dialogue and discussion	Short practical test1
12	2 Theoretical	A13: Explains the chemical changes that occur in fruits during growth, ripening, and storage	**Chemical changes that occur in fruits during growth, ripening, and storage**	Interactive lecture, brainstorming, dialogue and discussion	Short test, written test, and assignment
	3 Practical	A21: The student acquires knowledge and concepts related to mechanical and electrical refrigeration devices for cold stores. A22: He knows everything related to mechanical and electrical refrigeration devices for cold stores	**Mechanical pressure refrigeration cycle**	Interactive lecture, brainstorming, dialogue and discussion	Short practical test1
13	2 Theoretical	A14: Discusses topics related to the storage of horticultural crops	Report and discuss	Interactive lecture, brainstorming, dialogue and discussion	Short test, written test, and assignment

	3 Practical	A23: He knows everything related to the mechanical pressure refrigeration cycle	Mechanical pressure refrigeration cycle	Interactive lecture, brainstorming, dialogue and discussion	Short practical test1
14	2 Theoretical	C12: Determines which methods of harvesting and storing are appropriate for each type of fruit	Solve the problem	Interactive lecture, brainstorming, dialogue and discussion	
	3 Practical	B8: Developed from the reality of the cold storage	A field visit to one of the fruit stores	Interactive lecture, brainstorming, dialogue and discussion	Short practical test1
15	2 Theoretical	C13: Shows the effects that occur on fruits when harvested and stored under certain conditions	Solve the problem	Interactive lecture, brainstorming, dialogue and discussion	Short test, written test, and assignment
	3 Practical	B9: It is suggested to add some technologies to develop cold storages	A field visit to one of the vegetable stores	Interactive lecture, brainstorming, dialogue and discussion	Short practical test1

11.Course Evaluation

Evaluation Methods	Evaluation date (week)	Degree	Percentage (%)
Daily spoken examination	Theoretical: 2-15 Practical: 2 – 15	Theoretical 3 Practical 2	5%
Daily written exams	Theoretical: 2-15 Practical: 2 – 15	Theoretical 5 Practical 5	10%
2 semester exams during the semester for both practical and theoretical	Theoretical: 7-13 Practical: 6 – 14	Theoretical 10 Practical 5	15%
Assigning students to prepare reports on study topics	Theoretical: 15 Practical: 15	Theoretical 7 Practical 3	10%
Final exam	Theoretical Practical	Theoretical 40 Practical 20	40% 20%
Total		100	100%

12.Learning and Teaching Resources

Required textbooks (curricular books, if any)	1- Production of evergreen fruits. Dr. Jawad Thanoun Agha 2- Deciduous fruit technology (2017). Prof. Dr. Jassim Mohammed Alwan
Main references (sources)	
Recommended books and references (scientific journals, reports...)	1- Mesopotamia Agriculture Journal
Electronic References, Websites	Google Scholar, Research Gate

Practical lecturer
Assistant Lecturer Badran Sabhan Abdullah
Email: Badran.sabhan@uomosul.edu.iq

Theoretical subject teacher
Assistant Professor.Dr.Ayad Tariq Mahmmaod

جامعة الموصل
كلية الزراعة والغابات
قسم البستنة وهندسة الحدائق

Head of the Scientific Committee

Prof. Dr. Nabil Muhammad amin Al-Alamam

Head of the Department of Horticulture and Landscape Design

Prof. Dr. Asmaa Muhammad Adel