



Ajloun National University

جامعة عجلون الوطنية

## **Faculty of Agriculture**

### **Department of Plant Production, Smart and Sustainable Agriculture**

**Study Plan for the Bachelor's Degree  
In Plant Production,  
Smart and Sustainable Agriculture  
Academic year 2024/2025**



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## Mission

Providing the local and regional market with qualified and competent graduates and creative entrepreneurs in agribusiness, with modern knowledge and skills in smart agriculture, and achieving sustainable agricultural development through applied scientific research, targeted services, and community partnerships that target all stakeholders in the agriculture and food sector.

## Vision

Leadership, creativity and activation of applied research based on the needs of the agricultural sector and the graduation of agricultural engineers capable of facing the global challenges facing the agricultural sector and food security.

## Goals

- 1) Providing appropriate education for students in smart and sustainable agricultural methods and related sciences.
- 2) Educating and preparing agricultural engineers according to modern education and training methods .
- 3) Promote research and training with the aim of sustaining agricultural productivity and reducing costs by utilizing modern technologies for smart agriculture.
- 4) Encouraging youth entrepreneurship and community development.
- 5) Providing the labor market with specialized scientific competencies in the field of sustainable plant production and smart agriculture.
- 6) Effective contribution to the development of society and the development of agriculture in Jordan by providing consultations and holding conferences and workshops in agriculture to disseminate modern and smart methods.
- 7) Qualifying those enrolled in the department to enable them to compete in them.
- 8) career endeavors and continue their higher studies.



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## Learning Outcomes

### Knowledge

Knowledge of the basic concepts of plant production, smart and sustainable agriculture.

Know how to implement smart and sustainable farming strategies.

The ability to use smart and sustainable farming methods to preserve the components of the natural environment.

### Skills

Understand the essential knowledge and skills required in the field of plant science for smart and sustainable agriculture.

Ability to use artificial intelligence and remote sensing systems in the fields of smart and sustainable agriculture.

Ability to apply different technologies (biological, chemical, cultural, and physical) in smart and sustainable agriculture.

The ability to predict environmental factors that affect plant growth in plant science for smart and sustainable agriculture.

Ability to design and develop appropriate management strategies for smart and sustainable agriculture in an environmentally friendly manner.

### Competencies

Teach students the scientific and practical courses required to obtain a bachelor's degree in the Plant Production Smart and Sustainable Agriculture program.

Providing the local, regional and international market with distinguished graduates in plant production and smart and sustainable agriculture.

Providing students with the basic sciences that enable them to pursue postgraduate studies in local and international universities.

The program's graduates contribute to the advancement of the agricultural sector, and engage in the formulation of legislation and laws that facilitate the sector's growth.



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## Contents of the Study Plan

The study plan for the bachelor's degree in Plant Production, Smart and Sustainable Agriculture consists of (140) credit hours distributed as follows:

Certified On Campus learning (1+1, An hour and a half of on campus learning + one half hour of campus learning).

Certified Electronic (1+1, An hour and a half synchronous Electronic + campus learning).

Certified Blended (1+1, An hour and a half synchronous Blended + campus learning).

Number	Type of Requirement	Credit Hours	percentage%
First	University requirements	27	19.2 %
Second	Faculty requirements	21	15.00 %
Third	Mandatory Specialization Requirements	80	57.24%
	Elective Specialization Requirements	09	06.42%
Fourth	Free requirements	03	02.14%
Total		140	100%

## University Coding System

Faculty Code   Department Code   ( Level Year)   Knowledge Area   Course sequence

9

03

0 Remedial

1 First

2 Second

3 Third

4 Fourth





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## Knowledge Area

Knowledge Number	Knowledge Area	Number of Credit Hours
1	Principles of irrigation, Fruit tree production, Vegetable production and protected agriculture, Landscaping and Ornamental Plants, Field crop production, Cut flower production, Evergreen trees, Plant physiology, Organic farming, Plant propagation by tissue culture.	30
2	Sustainable farming method, Precision Agriculture, Digital Farming, Geographic Information Systems and Remote Sensing, Artificial Intelligence Applications in Agriculture, Environment and sustainable production, Post-harvest technology, Soil fertility and sustainable practice, Soilless farming, The Internet of Things.	30
3	Principles of biology, general chemistry, general chemistry practical, principles of biology practical, biocontrol.	11
4	6-credit field training and 3-credit graduation project	9



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First: University Requirements (27) Credit Hours

A. University Compulsory Requirement (12) Credit Hours

Course code	Course Name	Credit Hour	Prerequisite	Learning Type		
				Electronic	Blended	On Campus
704107	Entrepreneurship and Innovation	1			√	
704109	Leadership and Social Responsibility	1			√	
704116	Life Skills	1			√	
704117	English Language Skills (1)	2	714099	√		
704118	Arabic Language Skills (1)	2	704099		√	
704119	National Education	2	-		√	
704200	Military Sciences	3	-	√		

B. University Elective Requirements (15) Credit Hours

Course code	Course Name	Credit Hour	Prerequisite	Learning Type		
				Electronic	Blended	On Campus
201101	The Law in our Lives	3			√	
202132	Human Rights	3			√	
401100	Principles of Administration	3			√	
704103	Arab Library and Lexicography	3	-	√		
704104	International and Arab Contemporary Issues	3				√
704108	Islamic Culture	3	-	√		
704110	Integrity and Transparency	3			√	
704113	Digital Culture	3			√	
704115	Arabic Language Skills (2)	3	704118		√	
704141	Art of Rhetoric and Dialogue	3				√
704151	Development and Family Planning in Islam	3			√	
704163	History of Jerusalem	3			√	
704172	Computer Skills (1)	3	724099		√	
201101	Computer Skills (2)	3	704151		√	
202132	Foreign Language other than English	3			√	
401100	Sports and Health	3				√



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## Second: Faculty Requirements (21) Credit Hours

### A. Mandatory Faculty Requirements (21) Credit Hours

Course code	Course Name	Credit Hour	Prerequisite	Learning Type		
				Electronic	Blended	On Campus
901113	Principles of agricultural extension	3	-		√	
901135	Principles of agricultural economics	3	-			√
901153	Principles of agricultural statistics	3	-	√		
901161	Principles of plant production	3	901162		√	
901165	Principles of animal production	3	901162			√
901167	Principles of plant protection	3	-		√	
901265	Principles of nutrition and food processing	3	901162			√

## Third: Specialization Requirements (89) credit hours

### A. Mandatory specializations Requirements (80) Credit Hours:

Course code	Course Name	Credit Hour	Prerequisite	Learning Type		
				Electronic	Blended	On Campus
-	General chemistry	3	502108		√	
502108	Practical General Chemistry	1	502109			√
-	Principles of Biology	3	901162		√	
901162	Principles of Practical Biology	1	901268			√
901161	Vegetable production and protected agriculture	3	901361		√	
903463	Geographic Information Systems and Remote Sensing	3	903111		√	
903116	Soil fertility and sustainable practices	3	903112			√
903111	Artificial Intelligence Applications in Agriculture	3	903114			√
903111	Digital Farming Apps	3	903115		√	
-	Principles of irrigation	3	903116	√		
901161	Fruit tree production	3	903221		√	
901161	Landscaping and Ornamental Plants	3	903222		√	
901161	Field crop production	3	903223		√	
901161	Cut flower production	3	903224		√	
903111	Precision farming	3	903331		√	
901161	Plant physiology	3	903332			√



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-	Evergreen trees	3	903333	√		
901361	Organic farming	3	903334		√	
903332	Plant propagation by tissue culture	3	903335		√	
901167	Biocontrol	3	901364	√		
903332	Post-harvest technology	3	903441			√
901361	Sustainable farming methods	3	903442			√
903112	Environment and sustainable production	3	903443			√
901361	Sustainable farming methods	3	903442			√
903112	Environment and sustainable production	3	903443			√
90 hour	Graduation project	3	903445			√
901361	Soilless farming	3	903446			√
Exceeding 90 hours	Field Training	6	903444			√
-	The Internet of Things	3	901463			√

## B. Specialization Elective Requirements [9] Credit Hours

Course code	Course Name	Credit Hour	Prerequisite	Learning Type		
				Electronic	Blended	On Campus
601101	Calculus(1)	3	-		√	
901263	Principles of agricultural machinery	3	-			√
901264	Agricultural insurance	3	-		√	
901266	Principles of soil science and irrigation	3	704186			√
901267	Agricultural risk management	3	901135		√	
901341	E-Marketing	3	901249	√		
901396	Marketing Services	3	-		√	
901363	Beekeeping	3	-			√
901445	Agricultural financing	3	-		√	
901462	Poultry farm management	3	901165			√





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## Indicative Plan for a Bachelor's Degree in Plant Production, Smart and Sustainable

### First year

First Semester			
Course number	Course title	* Credited hours	Prerequisite
502108	General chemistry	3	-
502109	Practical General Chemistry	1	502108
901162	Principles of Biology	3	-
901268	Principles of Practical Biology	1	901162
901161	Principles of Plant Production	3	-
-	Mandatory University Requirement	3	-
-	University elective requirement	3	-
Total		17	

Second Semester			
Course number	Course title	* Credited hours	Prerequisite
903116	Principles of irrigation	3	-
903332	Plant physiology	3	901161
901135	Principles of Agricultural Economics	3	-
901361	Vegetable production and protected agriculture	3	901161
-	Mandatory University Requirement	3	-
-	University elective requirement	3	-
Total		18	



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## Second year

### First semester

Course number	Course title	* Credited hours	Prerequisite
903223	Field crop production	3	901161
903221	Fruit tree production	3	901161
901113	Principles of Agricultural Extension	3	-
901167	Principles of Plant Protection	3	-
-	Free course	3	-
-	University elective requirement	3	-
Total		18	

### Second semester

Course number	Course title	* Credited hours	Prerequisite
901153	Principles of Agriculture Statistics	3	-
903442	Sustainable farming methods	3	901361
903224	Cut flower production	3	901161
903364	Biocontrol	3	901167
901165	Principles of Animal Production	3	-
-	Mandatory University Requirement	3	-
Total		18	



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### Third year

First semester			
Course number	Course title	* Credited hours	Prerequisite
903222	Landscaping and Ornamental Plants	3	901161
903335	Plant propagation by tissue culture	3	903332
903333	Evergreen trees	3	-
903446	Soilless farming	3	901361
901265	Principles of Nutrition and Food Processing	3	-
-	Elective Specialization Requirement	3	-
Total		18	

Second semester			
Course number	Course title	* Credited hours	Prerequisite
903334	Organic farming	3	901361
903331	Precision farming	3	903111
901463	The Internet of Things	3	-
903115	Digital Farming Apps	3	903111
903112	Soil fertility and sustainable practices	3	903116
-	Elective Specialization Requirement	3	-
Total		18	



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## Fourth year

### First semester

Course number	Course title	* Credited hours	Prerequisite
903111	Geographic Information Systems and Remote Sensing	3	903463
903115	Artificial Intelligence Applications in Agriculture	3	903111
903441	Post-harvest technology	3	903332
903443	Environment and sustainable production	3	903112
-	Elective Specialization Requirement	3	-
-	University elective requirement	3	-
Total		18	

### Second semester

Course number	Course title	* Credited hours	Prerequisite
903444	Field training	6	Exceeding 90 hours
903445	Graduation project	3	90 hours
-	University elective requirement	3	-
-	Mandatory University Requirement	3	-
Total		15	





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## Course description

### Mandatory Specialisation Courses (80 Credit Hours)

Course number : 901361  
Course title : Vegetable production and protected agriculture  
Credit hours : 3  
prerequisite : 901161

The basics of production and the vegetable seedling industry. Vegetable crops: Their importance, division, favorable environmental conditions for their growth, various agricultural processes for their production, flowering, fruiting, ripening, harvesting and storage. Protected agriculture: Its importance, its facilities (greenhouses, plastic and tunnels), design, components, installation and maintenance of these facilities. Agricultural processes for the production of economic crops under protected conditions with an emphasis on modern technical techniques.

Course number : 903111  
Course title : Geographic Information Systems and Remote Sensing  
Credit hours : 3  
prerequisite : 903463

The theoretical part covers topics such as GIS definitions, GIS applications, types, characteristics and quality of spatial data, coordinates, reference systems, and mapping. In addition to an overview of the GIS programs ArcGIS, MapInfo, and QGIS (used in the practical lessons). In the practical part, four exercises will be solved: The content of the first and second exercises is the same, but the exercise must be solved using different software (ArcGIS and MapInfo) and covers the most common GIS tasks: Georeferencing, digitization, querying, computation, statistics and map design). In the third exercise, QGIS will be used to analyze and design maps of water bodies. In the fourth exercise, ArcGIS will be used to analyze historical maps.



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**Course number : 903112**  
**Course title : Soil fertility and sustainable practices**  
**Credit hours : 3**  
**prerequisite : 903116**

**This course deals with the principles of soil fertility in smart and sustainable farming systems; nutrient management; interactions between soil minerals, soil organic matter, soil organisms and plants; the relationship between soil fertility, plant health and plant resistance and resilience to disease; soil fertility improvers; organic matter dynamics; organic fertilizer quantification; soil fertility management program; soil fertility assessment; relevant environmental legislation.**

**Course number : 903114**  
**Course title : Artificial Intelligence Applications in Agriculture**  
**Credit hours : 3**  
**prerequisite : 903111**

**Conducting agricultural applications through the use of artificial intelligence in carrying out experiments and practical practices.**

**Course number : 903115**  
**Course title : Digital farming apps**  
**Credit hours : 3**  
**prerequisite : 903111**

**Namely, so-called e-agriculture, are tools that collect, store, analyze, and share electronic data and/or information in agriculture digitally. It is that agriculture that utilizes ICT and ecosystems data to support the timely delivery and development of information and services to farmers.**



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**Course number** : 903116  
**Course title** : Principles of irrigation  
**Credit hours** : 3  
**prerequisite** : -

**Introduction to irrigation and drainage science, plant-soil-water relationship, soil moisture and its estimation methods, water movement in the soil, plant water needs, irrigation scheduling, irrigation methods (surface, sprinkler and drip irrigation), evaluation of irrigation water systems and management.**

**Course number** : 901221  
**Course title** : Fruit tree production  
**Credit hours** : 3  
**prerequisite** : 901161

**The course addresses the importance of planting fruit trees, classifying fruit trees, establishing orchards (site selection, varieties, varieties, origins, planting systems, and frost resistance), planting and frost resistance) Flowers, flowering, fruit setting, fruit fall, fruit growth and ripening, and agricultural operations, breeding systems, pruning, thinning, fertilization, irrigation, pest control), harvesting and handling of fruits, and the use of plant growth regulators.**

**Course number** : 903222  
**Course title** : Landscaping and Ornamental Plants  
**Credit hours** : 3  
**prerequisite** : 901161

**This course deals with the process of plant cultivation as part of horticulture. In gardens, ornamental plants are grown for their flowers, foliage, or general appearance, and useful plants such as root vegetables, vegetable leaves, medicinal plants, fruits, and herbs are grown for consumption as dyes: Root vegetables, leaf vegetables, medicinal plants, fruits, and herbs are grown for consumption, as dyes, or medicinal medicine, or cosmetics.**





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**Course number : 903223**  
**Course title : Field crop production**  
**Credit hours : 3**  
**prerequisite : 901161**

**Economic and nutritional importance, botanical division, major field crops, native habitat, botanical description, production areas, suitable soil and fertilization, land preparation for cultivation, sowing quantities and dates, service operations, their environmental needs, suitable soil and fertilization, preparing the land for planting, sowing quantities and dates, service operations After planting, maturity and harvesting, methods of utilization of field crop products.**

**Course number : 903224**  
**Course title : Cut flower production**  
**Credit hours : 3**  
**prerequisite : 901161**

**Recognize the different types of cut flowers, ornamental bulbs and potted plants and the economic importance of their production and marketing locally, regionally and globally. Recognize the most suitable conditions and modern techniques for producing the most important commercial cut flowers, such as roses, jasmine, carnations, gerberas and others under local environmental conditions, whether in the open field or under protected conditions. Also, identify the most suitable conditions and modern techniques for the production of the most important commercial ornamental bulb plants, such as gladiolus, tulips, etc. under local environmental conditions.**

**Course number : 903331**  
**Course title : Precision Farming**  
**Credit hours : 3**  
**prerequisite : 903111**

**Agriculture relies on technology, satellites, GPS, and GIS to understand different variables related to the agricultural process, such as determining the appropriate irrigation amounts, fertilizers, and predicting harvest periods and quantities.**





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**Course number** : 903332  
**Course title** : Plant physiology  
**Credit hours** : 3  
**prerequisite** : 901161

different environments. It helps in understanding the rationale for understanding plant form and function. Also to help understand the importance of sunlight as the ultimate source of energy, water relations, growth, development and metabolism on the basic principles of energy flow. As well as understanding the tension of physiology in different environments

**Course number** : 903333  
**Course title** : Evergreen trees  
**Credit hours** : 3  
**prerequisite** : -

This course focuses on developing the growth and fruit production of evergreen trees, including citrus, olives, palms, bananas, guava and other subtropical crops, growth patterns and tolerance habits, alternative tolerances, training and pruning, fruit trees, and establishing new orchards. Cultural practices (fertilization, irrigation, fruit reduction, spraying programs). Sexual and sexual reproduction

**Course number** : 903334  
**Course title** : Organic farming  
**Credit hours** : 3  
**prerequisite** : 901361

This course discusses the methods of organic farming and gardening. In addition to the biological, environmental and social factors associated with organic food production. Emphasis is on the practical application of scientific principles to create sustainable food production systems.



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**Course number** : 903335  
**Course title** : Plant propagation by tissue culture  
**Credit hours** : 3  
**prerequisite** : 903332

**This course covers the art of plant tissue culture, media, micro propagation, virus elimination and testing. Adaptation, in vitro fertilization, somatic differentiation and genetic manipulation.**

**Course number** : 903364  
**Course title** : Biocontrol  
**Credit hours** : 3  
**prerequisite** : 901167

**Pest control methods that can be used in agriculture, such as agricultural, mechanical and physical control, as well as approved pesticides, their characteristics, uses, mode of action and effectiveness. Methods of safe and optional application of approved pesticides and their compatibility with other control methods.**

**Course number** : 903441  
**Course title** : Post-harvest technology  
**Credit hours** : 3  
**prerequisite** : 903332

**This course focuses on food loss and waste, Post-harvest quality control, ripening and degradation processes in fresh horticultural products, measuring and evaluating product quality and losses, current technologies for storage, packaging and handling, and the use of artificial intelligence to minimize losses.**



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**Course number** : 903442  
**Course title** : Sustainable farming methods  
**Credit hours** : 3  
**prerequisite** : 901361

This course introduces the most important methods of sustainable agriculture, which is a system that includes activities related to the production of animals and the cultivation of plants together in a specific place that will continue in the long term. These activities include meeting basic human needs such as food, improving environmental conditions and natural resources that depend on the components of the agricultural economy to maximize the use of non-renewable and finite resources.

**Course number** : 903443  
**Course title** : Environment and sustainable production  
**Credit hours** : 3  
**prerequisite** : 903112

The Sustainable Agriculture and Environment course deals with the main principles of sustainable agriculture and sustainable agricultural production systems that aim to improve the quality of the environment and preserve natural resources in order to increase the economic value and profitability of the farm. This course will also provide the basics of the science behind alternative agricultural systems, including soil biology and sustainable pest management.

**Course number** : 903444  
**Course title** : Field training  
**Credit hours** : 3  
**prerequisite** : Exceeding 90 hours

Apply basic agricultural skills and sustainable farming methods and employ artificial intelligence and technology in smart modern agriculture.



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**Course number** : 903445  
**Course title** : Graduation project  
**Credit hours** : 3  
**prerequisite** : 90 hours

The course introduces scientific research, its importance, how to test the research issue, and training on data collection, in addition to developing the student's abilities to design research in the field of agricultural economics and draw research results by conducting field or office research.

**Course number** : 903446  
**Course title** : Soilless farming  
**Credit hours** : 3  
**prerequisite** : 901361

Soilless agriculture is one of the modern agricultural systems in which vegetables, fruits and ornamental plants are produced without the usual agricultural soil, using water and alternative soil environments such as peat moss, perlite, vermiculite and sponges, while supplying the plants with the necessary nutrients through the nutrient solution, and these systems can be used on the roofs and balconies of houses and lands that are not suitable for agriculture.

**Course number** : 903463  
**Course title** : The Internet of Things  
**Credit hours** : 3  
**prerequisite** : 311241

The Internet of Things (IoT) is a computing concept that expresses the idea of connecting various physical devices to the Internet and the ability of each device to identify itself to other devices. It is a virtual network that connects various objects categorized as electronics, software, sensors, and motors to each other via the Internet, allowing them to exchange data with each other.