

الخطة الدراسية لبرنامج الماجستير في الزراعة الربحية
M.Sc. In Sustainable Agribusiness
2018

تشمل الخطة الدراسية للحصول على درجة الماجستير في الزراعة الربحية (36 ساعة معتمدة) موزعة كما يلي:

أولاً: المتطلبات الإلزامية :

المساقات الإلزامية (21 ساعة معتمدة): يدرس الطالب المساقات التالية :

ساعة معتمدة	Course Name	اسم المساق	رقم المساق
3	Principals and applications Agribusiness	مبادئ و تطبيقات الزراعة الربحية	58710
3	Farm production and management	ادارة المزرعة ومنتجاتها	58711
3	Agricultural finance	التمويل الزراعي	58712
3	Agribusiness marketing	تسويق الاعمال الزراعية	58713
3	Experimental design and analysis	تصميم و تحليل التجارب	58714
6	Thesis	الاطروحة	58799
21	المجموع		

ثانياً: متطلبات التخصص الاختيارية حسب المسار المطلوب (15 ساعة معتمدة):

Track (1) Agribusiness / Management and Marketing

المسار الأول: الادارة والتسويق

ساعة معتمدة	Course Name	اسم المساق	رقم المساق
3	World trade organization regulations for food	تشريعات منظمة التجارة العالمية الخاصة بالاغذية	58715
3	Total quality management	ادارة الجودة الشاملة	58716
3	Gap analysis	تحليل الفجوة	58717
3	Management strategies in Agribusiness firms	استراتيجيات ادارة المشاريع الزراعية	58721
3	Project planning and management in Agribusiness	تخطيط وادارة المشروعات الزراعية	58722
3	Special problems in Agribusiness	معيقات خاصة في الزراعة الربحية	58723
3	Farming systems	نظم الزراعة	58724
3	Agricultural marketing	التسويق الزراعي	58728
3	Agribusiness finance and risk management	تمويل الاعمال الزراعية وادارة المخاطر	58729
3	Agribusiness policy analysis	تحليل السياسات الزراعية	58730
3	Supply chain management	إدارة خطوط الانتاج	58731
3	Monitoring and evaluation of Agribusiness projects	متابعة وتقييم مشاريع الاعمال الزراعية	58732
3	Agricultural marketing and price analysis	التسويق الزراعي و تحليل الاسعار	58733
3	International market and agricultural trade	السوق العالمي و التجارة الزراعية	58734
3	Special topics in management and marketing	موضوعات خاصة في الادارة و التسويق	58735

Track (2) Agribusiness / Food Processing

المسار الثاني:

التصنيع الغذائي

ساعة معتمدة	Course Name	اسم المساق	رقم المساق
3	World trade organization regulations for food	تشريعات منظمة التجارة العالمية الخاصة بالاغذية	58715
3	Total quality management	ادارة الجودة الشامله	58716
3	Gap analysis	تحليل الفجوة	58717
3	Total quality management and food safety	ادارة الجودة الشاملة وسلامة الاغذية	58740
3	Advanced meat processing	تصنيع اللحوم متقدم	58741
3	Advanced dairy processing	تصنيع الالبان متقدم	58742
3	Extrusion and complementary technology	البثق والتكنولوجيا التكميلية	58743
3	Food chemistry	كيمياء الاغذية	58744
3	Food additives and legislation	المضافات الغذائية والتشريعات	58745
3	Food packaging technology and shelf-life examination	تكنولوجيا تغليف الاغذية وتقييم الصلاحية	58746
3	Innovation and food product development	الابتكار وتطوير المنتجات الغذائية	58747
3	Advanced food microbiology	أحياء دقيقة في الاغذية متقدم	58748
3	Raw material alternatives	بدائل المواد الخام	58749
3	Functional foods	الاغذية الوظيفية	58750
3	Special topics in food processing	مواضيع مختاره في التصنيع الغذائي	58751

Track (3) Agribusiness / Organic Agriculture

المسار الثالث: الزراعة العضوية

ساعة معتمدة	Course Name	اسم المساق	رقم المساق
3	World trade organization regulations for food	تشريعات منظمة التجارة العالمية الخاصة بالاغذية	58715
3	Total quality management	ادارة الجودة الشامله	58716
3	Gap analysis	تحليل الفجوة	58717
3	Principles of organic agriculture, biodiversity and agro-ecology	مبادئ الزراعة العضوية والتنوع الحيوي و البيئية الزراعية	58760
3	Soil fertility management in organic farming	ادارة خصوبة التربة في الزراعة العضوية	58761
3	Plant pests management under organic production	إدارة آفات النباتات في الزراعة العضوية	58762
3	Plant disease management under organic production	ادارة امراض النباتات في الزراعة العضوية	58763
3	Organic standards and legislation	معايير و تشريعات الزراعة العضوية	58764
3	Quality, safety and post-harvest handling of organic crops	الجودة والسلامة ومعاملات ما بعد الحصاد للمحاصيل العضوية	58765
3	Global markets and marketing for organic agro-food products	الأسواق الدولية وتسويق منتجات الزراعة العضوية الغذائية	58766
3	Organic Mediterranean commodities production	المنتجات الزراعية العضوية في منطقة حوض المتوسط	58767
3	Organic fruit production	انتاج الفاكهة العضوية	58768
3	Organic vegetable production	انتاج الخضروات العضوية	58769

3	Organic dairy production	انتاج الالبان العضوية	58770
3	Organic poultry production	انتاج الدواجن العضوية	58771
3	Active ingredients in medicinal and aromatic plants	المواد الفعالة في النباتات الطبية والعطرية	58772
3	Assessing policy and socio-economic impacts of organic farming	تقييم السياسات والاثار الاجتماعية والاقتصادية للزراعة العضوية	58773
3	Farm economics and management	ادارة و اقتصاديات المزرعة	58774
3	Special topics in organic agriculture	موضوعات خاصة في الزراعة العضوية	58775

Track (4) Agribusiness / Greenhouse Management

المسار الرابع: ادارة الزراعة المحمية

ساعة معتمدة	Course Name	اسم المساق	رقم المساق
3	World trade organization regulations for food	تشريعات منظمة التجارة العالمية الخاصة بالاغذية	58715
3	Total quality management	ادارة الجودة الشاملة	58716
3	Gap analysis	تحليل الفجوة	58717
3	Plant pests management under greenhouse production	ادارة الافات الزراعية في الدفيئات	58762
3	Plant disease management under greenhouse production	ادارة امراض النبات في الدفيئات	58763
3	Greenhouse and protected crop production	الدفيئات والزراعة المحمية	58780
3	Good agricultural practices in greenhouses	الممارسات الزراعية السليمة في الدفيئات	58781
3	Vegetable production in protected agriculture	انتاج الخضروات في الزراعة المحمية	58782
3	Fruit and flower production in protected agriculture	انتاج الفاكهة والزهور في الزراعة المحمية	58783
3	Postharvest technology	تكنولوجيا ما بعد الحصاد	58784
3	Applications in vegetable breeding	تطبيقات في تحسين الخضروات	58785
3	Soilless cultivation systems	نظم الزراعة بدون تربة	58786
3	Special topics in greenhouse management	موضوعات خاصة في ادارة الدفيئات	58797

Courses description

1.	<p>Principles of organic agriculture, biodiversity and agro-ecology (3 CH).</p> <p><u>Course description</u></p> <p>This course encompasses biological, social, and economic components of organic and sustainable farming systems. It emphasizes principles, concepts, and techniques of organic and sustainable production of crops, including agroecology, sustainability, biodiversity, soil quality, nutrient and water management, crop rotation, cover cropping and other cultural practices, pest control, postharvest handling, food quality and safety, marketing of organic products, and organic agriculture policy and regulation.</p> <p><u>Learning outcomes</u></p> <p>By the end of the course, the learner should be able to:</p> <ul style="list-style-type: none">• Analyze how a farm functions as an agroecosystem and evaluate the sustainability of farming operations including organic production.• Describe history of organic agriculture development nationally and globally and explain the growth of organic industry and consumer trend.• Demonstrate a working knowledge of the regulatory procedures and requirements of certified organic production.• Develop soil and nutrient management plans for organic and sustainable crop production that optimize nutrient cycling and minimize environmental degradation.• Develop pest management plans that emphasize proactive systems approach and minimize curative control measures.• Integrate various cultural practices such crop rotation and cover cropping into organic and sustainable farming systems.• Evaluate critically opportunities and challenges for organic farming.• Develop teamwork skills by designing and conducting field research project with peers.
2	<p>Soil fertility management in organic farming (3 CH).</p>

	<p><u>Course description</u></p> <p>Soil, abiotic and biotic components; organic matter evolution and balance; the main chemical parameters for soil fertility estimation; field sampling and practical laboratory; composting and biomass recycling; impact of fertilization and crop rotation on soil properties and crop growth;. Research methodology in organic agriculture.</p> <p><u>Learning outcomes</u></p> <p>Students should become knowledgeable of the techniques to manage the soil by maintaining its fertility and advising strategies for the fertilisation using the farm by-products. Students will learn how to manage the soil organic matter through the basilar principles of organic agriculture and how to develop research activities.</p>
3	<p>Plant pests management under organic production (3 CH).</p> <p><u>Course goals</u></p> <ul style="list-style-type: none"> • Understand crops, pests, and natural enemies as parts of larger ecosystems. • Implement proactive (preventive) measures. • Monitor pests and their natural enemies (beneficial organisms). • Use least-disruptive reactive (control) tactics as needed. <p><u>Course Description</u></p> <p>This course includes an overview of various alternative measures to traditional pest management, utilizing the biological control approaches as well as biotechnology. Alternative control measures comprised Pathogenic microorganisms, semiochemicals, including pheromones, botanical Insecticides, and insect growth regulators. In addition, the course discusses physiological and genetic approaches including genetic control of insect pests and plant resistance to insects.</p>

	<p><u>Learning Outcomes</u></p> <p>By the end of the course, the learner should be able to:</p> <ul style="list-style-type: none"> • Describe the steps in using Integrated Pest Management (IPM) under organic agriculture • Distinguish positive and negative impacts of pesticide use. • Understand problems resulting from misuse, overuse, and abuse of chemical pesticides. • Explain the different options in managing pests • Write an outline of an IPM plan under organic agriculture (which can be built over time and with experience. • Understand society's role in IPM decisions.
4	<p>Plant disease management under organic production (3 CH).</p> <p><u>Course description</u></p> <p>The course should include major plant diseases that are expected to threaten organic crops including airborne, soilborne and vector-borne diseases. It should cover major management strategies in organic farming including crop rotation, water management, biodiversity enhancement, plant resistance and breeding, seed health and direct management options. Major crops grown under organic production will be tackled and safe and acceptable disease management options will be introduced.</p> <p><u>Learning outcomes</u></p> <p>Students will be exposed to major organic plant pathogens in terms of identification and epidemiology. They will gain knowledge and training in available management options and best practices under organic farming system. Students will learn how to enhance biodiversity under organic system including soil suppressiveness to soilborne diseases through cultural, biological and acceptable chemical practices.</p>
5.	<p>Organic standards and legislation (3 CH).</p>

	<p><u>Course description</u></p> <p>Legislation in the world, International standards and guidelines: IFOAM basic standards, organic regulation in Northern countries (EU, USA); organic regulation in developing countries (Palestine); Certification and accreditation schemes; mandatory and voluntary regulatory systems; procedures of organic product importation in the EU. Auditing in organic inspection: audit planning and conduct.</p> <p><u>Learning outcomes</u></p> <p>Students should understand how the Principles of Organic Agriculture are translated into regulatory frameworks. Students will become knowledgeable of the 3-tiered system of oversight in current use within the organic trade. Students gain a direct understanding of the knowledge and skills needed to work in an organic certification agency. Students will be familiar with the Mediterranean Organic Agriculture 6 European regulation on organic standards and how to implement it for certifying organic products or production processes and they will learn also the importing rules. They will know the landscape of European private Standards applied to natural and organic cosmetics. They will learn also how to breed aquaculture organically and under which conditions and standards to be certified.</p>
6.	<p>Quality, safety and post-harvest handling of organic crops (3 CH).</p> <p><u>Course description</u></p> <p>International quality award systems, cost-effective quality management, quality improvement, ISO 9000, environmental management system, food safety and Hazard Analysis Critical Control Points (HACCP). Technologies applied to organic products in the post-harvest phases: storage, processing, cold storage, transportation and packaging. Re-use of organic by- products.</p> <p><u>Learning outcomes</u></p>

	<p>Students should become knowledgeable of the implementation of food quality control systems ISO 9001: 2000 and food safety issues HACCP.</p>
7.	<p>Global markets and marketing for organic agro-food products (3 CH).</p> <p><u>Course description</u></p> <p>Principles of agro-enterprise; linking organic farmers to global market; marketing of agro-food products and organic products; emerging social economic issues in organic agriculture trade.</p> <p><u>Learning outcomes</u></p> <p>Students should become familiar with the marketing concepts and instruments which could enhance a better positioning of organic products in the market.</p>
8.	<p>Organic Mediterranean commodities production (3 CH).</p> <p><u>Course description</u></p> <p>Main Mediterranean crops: olive groves, vegetable crops, fruits trees, viticulture in terms of production, management, protection and processing.</p> <p><u>Learning outcomes</u></p> <p>Students should become knowledgeable of the practices and techniques used in organic agriculture in both production and management of the main Mediterranean commodities.</p>

9.	<p>Organic fruit production (3 CH).</p> <p><u>Course description</u></p> <p>Legislation related to organic agriculture applied in Palestine and world-wide, nature pick (harvest from wild), application of basic principles in diversified and simple (monoculture) fruit orchards, alternative techniques that can be used to increase diversity, factors related to the ecosystem and market that must be evaluated prior to orchard establishment, selection of rootstocks, species and cultivars, cultural practices, consumer attitudes and other quality systems valid in domestic and foreign markets.</p> <p><u>Learning outcomes</u></p> <ul style="list-style-type: none"> • To plan organic farms including its surroundings according to the basic principles of organic farming, • To identify and implement technical alternatives in perennial fruit farms in respect to organic production • And to assess quality systems and consumer demand preferences for organic products • To evaluate legislation valid in the World and in Palestine related to organic fruit growing and harvesting from nature.
10.	<p>Organic vegetable production (3 CH).</p> <p><u>Purpose</u></p> <p>The purpose and intent of organic vegetable production course is to acquaint students with the principles and practices of sustainable and organic production of crops and the issues that affect such producers.</p> <p><u>Course description</u></p> <p>This course will provide an overview of Principles, concepts, and techniques of organic and sustainable production of crops; and will cover cultural practices</p>

	<p>for vegetables, social, and economic components of organic and sustainable farming systems, organic agriculture policy and regulation, organic certification, natural enemies in organic farming systems, post-harvest handling for organic crops, approved chemicals for use in organic post-harvest systems and marketing of organic vegetables.</p> <p><u>Learning outcomes</u></p> <p>By the end of this course, students will understand that successful organic vegetable production relies on more than producing vegetables; it requires managing money, people, and natural resources effectively. The learner should be able to:</p> <ul style="list-style-type: none"> • Define sustainable agriculture and agroecosystem and describe how these systems function. • Analyze the effects and future impact of current agricultural practices on the environment, local economy and physical/social well-being of society. • Evaluate how governmental policies and new technologies have influenced agricultural practices. • Evaluate the sustainability of organic production and recommend policy changes and new technologies to improve sustainability. • Demonstrate a working knowledge of the regulatory procedures and requirements of certified organic production. • Develop a soil management plan for an organic system that optimizes plant nutrition and minimizes environmental degradation; develop a pest management plan for an organic system that minimizes curative control measures. • Design a rotation for a small diversified organic farm to satisfy market demand. • Develop an entrepreneurship plan for getting the organic product from field to table. • Evaluate critically the practices and paradigms in contemporary organic agricultural systems; analyze opportunities and challenges faced by organic growers. • Enhance oral and written communication skills, including facilitation of in-class discussion and peer evaluation of written work.
11	<p>Natural medicinal and aromatic plants (3 CH).</p>

	<p><u>Purpose</u></p> <p>This Course provides introductory information in the production, processing, and marketing of medicinal and aromatic plants on the prairies. It also provides foundational information in the development of an herb enterprise.</p> <p><u>Course description</u></p> <p>The primary objective of this course is providing the basic knowledge on medicinal plants and their drugs. The course includes information on the taxonomical, botanical, eco-physiological and biochemical characteristics of the most important species utilized as drugs, addressing the diversity and characteristics of their active ingredients.</p> <p><u>Learning outcomes</u></p> <p>By the end of the course, the learner should be able to:</p> <ul style="list-style-type: none"> • Identify medicinal and aromatic plants that are suitable for commercial and non-commercial cultivation on the prairies. • Outline steps in planning and developing a field production operation for selected medicinal and aromatic plants • Determine the basic herb processing alternatives and uses of herbal products. • Investigate marketing strategies for medicinal and aromatic crops and determine buyers' requirements.
12.	<p>Special topics in organic agriculture (3 CH).</p> <p><u>Purpose</u></p> <p>To help develop an understanding of the historical, biological and ecological basis for organic farming, and learn the basic principles of organic matter management to feed the soil through the use of cover crops, compost and other organic and mineral amendments.</p> <p><u>Course description</u></p>

	<p>This course introduces students to the theories, practices, and policies of organic agriculture through the perspective of contemporary practitioners. Organic agriculture is a large and varied field; this discussion-based course intended for a broad audience will explore topics including the history and development of organic agriculture, fundamental organic farming practices from small to large-scale production, public perception of organics, the National Organic Program, and economic and marketing considerations for organic products.</p> <p><u>Learning outcomes</u></p> <p>By the end of the course, the learner should be able to:</p> <ul style="list-style-type: none"> • Learn the basic principles of managing biodiversity, crop rotations, non-crop competitors (weeds) and plant health for productive cropping systems with minimal off-farm resources. • Understand the foundation of organic animal husbandry and the integration of crops and animals on the organic farm.
13.	<p>Organic dairy production (3CH).</p> <p><u>Course Description</u></p> <p>This course deals with international regulations of organic dairy farming, basics of husbandry, breeding, nutrition, management and health in organic dairy farming. The course is also introduces economics, certification and marketing of dairy products, biological controls, hormones, gene modification and nutrient quality of organic milk.</p> <p><u>Learning outcomes</u></p> <p>By the end of the course, the learner should be able to:</p> <ul style="list-style-type: none"> • Describe the growth, food regulation, basic characteristics and marketing of the organic milk and milk products. • Describe nutrition of the organic dairy herd. • Explain management of the organic dairy herd. • Implement herd health on organic dairy farms. • Explain land use and organic crops that are approved for organic use. • Describe the impact of biological controls, hormones, gene

	<p>modification, antibiotics, and pesticides in organic milk on consumer attitude.</p> <ul style="list-style-type: none"> • Have a good basis for a profession in marketing, consulting, certification, and extension services for organic dairy farming.
14.	<p>Organic poultry production (3 CH).</p> <p><u>Course description</u></p> <p>This course introduces students to the international regulations of organic poultry (broilers and layers) production systems, husbandry, housing, health, genetics, nutrition, processing (poultry meat and egg products) and marketing.</p> <p><u>Learning outcomes</u></p> <p>By the end of the course, the learner should be able to:</p> <ul style="list-style-type: none"> • Describe the growth, food regulation, basic characteristics and marketing of the organic poultry meat and egg products. • Describe nutrition of the organic broiler and layers flocks. • Explain management of the organic poultry meat and egg products. • Implement flock health on organic poultry farms. • Explain land use and organic crops that are approved for organic use. • Describe the impact of biological controls, hormones, gene modification, antibiotics, and pesticides in organic poultry meat and egg products on consumer attitude. • Have a good basis for a profession in marketing, consulting, certification, and extension services for organic poultry production.
15.	<p>SPS and TBT for food safety (WTO) (3 CH).</p> <p>Description found after the descriptions of the core courses.</p>
16.	

	<p>Total quality management (3 CH).</p> <p>Description found after the descriptions of the core courses.</p>
17.	<p>Gap analysis (3 CH).</p> <p>Description found after the descriptions of the core courses.</p>

Track (4) Agribusiness / Greenhouse Management

1.	<p>Greenhouse and protected crop production (3 CH).</p> <p><u>Course description</u></p> <p>This course will present an overview of the world and local greenhouse vegetable industry, greenhouse structures and plant growing systems, irrigation and fertilization management using containers and soilless media, pests and diseases management, production of selected greenhouse-grown vegetable crops, and economics, marketing, and global competition.</p> <p><u>Learning outcomes</u></p> <p>By the end of the course, the learner should be able to:</p> <ul style="list-style-type: none"> • Demonstrate a comprehensive understanding of the greenhouse and protected agriculture industry at local, national, and global levels. • Compare and evaluate different protected structures used for high-value crop production. • Discuss key components and practices of greenhouse and protected production and management systems. • Develop management plans for a successful protected production operation that will address environmental and economic sustainability.
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	<ul style="list-style-type: none"> • Improve communication and team working skills through class presentations and collaborations with peers in class projects.
2.	<p>Good agricultural practices in greenhouse (3 CH).</p> <p><u>Course description</u></p> <p>Definitions (Conventional Agriculture, sustainable agriculture, ICM, IFS, IPP, etc), Comparative samples from EU countries, Good Agricultural Practices (EurepGAP/GlobalGAP), Why GAP in greenhouses?, GAP in greenhouses, Risk analyses, Preparation of instructions & recording forms, Matters need nota bene, Production Guidelines according to GAP, Selection of planting material, Cultural practices, Technology, Integrated Pest & Disease Management, Labelling (i.g. protocols), Farmer’s trainings, IPP cards, training at farm (farm field schools) etc.</p> <p><u>Learning outcomes</u></p> <p>By the end of the course, the learner should be able to:</p> <ul style="list-style-type: none"> • Do risk analysis. • Evaluate problems in greenhouse vegetable production. • Improve teaching material for the farmer training. • Solve problems that would be met in growing season. • Plan, control and manage the greenhouse vegetable production according to GAP. • Prepare related forms, procedures and instructions. • Use GAP in greenhouse vegetable production. • Be open to innovations, to reach information, and to produce solution.
3.	<p>Vegetable production in protected agriculture (3 CH).</p> <p><u>Course description</u></p> <p>The course includes the importance of vegetable production, methods of controlling the environmental factors inside the protectedhouses for best</p>

	<p>vegetable growing. Moreover, the different cultural practices and the newly developed techniques and their effects in increasing the vegetable productivity and quality. Finally, the cultural practices under protected conditions for the most important crops (tomato, cucumber, and others) will be included.</p> <p><u>Learning outcomes</u></p> <ul style="list-style-type: none"> • Knowledge and understanding: <ul style="list-style-type: none"> a. Development of knowledge about facilities used in protecting vegetables b. Understanding the employment of these facilities in production of protected crops. • Intellectual skills: <ul style="list-style-type: none"> a. Improve the use of protective techniques in producing good vegetable quality products. b. Effectuating the use of protective techniques to produce crops efficiently during the off season period and to prolong the production period. • Subject specific skills: <ul style="list-style-type: none"> a. Utilization of input factors effectively as much as possible. b. Introduction of new valuable crops under protective structure. • Transferable Skills: <ul style="list-style-type: none"> a. Well management of production under protective structures. b. Successful dealing with new technology involved in protective structures such as computers, thermo-regulators, heating, cooling and others.
4.	<p>Fruit and flower production in protected agriculture (3 CH).</p> <p><u>Course description</u></p> <p>The course includes the importance of fruit and flower production, methods of</p>

	<p>controlling the environmental factors inside the protectedhouses for best fruit and flower growing. Moreover, the different cultural practices and the newly developed techniques and their effects in increasingfruit and flower productivity and quality. Finally, the cultural practices under protected conditions for the most important fruit crops (strawberries) and flowers (roses, carnation, gerbera, etc) will be included.</p> <p><u>Learning outcomes</u></p> <ul style="list-style-type: none"> • Knowledge and understanding: <ul style="list-style-type: none"> a. Development of knowledge about facilities used in protecting fruit crops and flowers. b. Understanding the employment of these facilities in production of fruit crops and flowers. • Intellectual Skills: <ul style="list-style-type: none"> a. Improve the use of protective techniques in producing good fruit and flower quality products. b. Effectuating the use of protective techniques to produce crops efficiently duringthe off season period and to prolong the production period. • Subject Specific Skills: <ul style="list-style-type: none"> a. Utilization of input factors effectively as much as possible. b. Introduction of new valuable crops under protective structures. • Transferable Skills: <ul style="list-style-type: none"> a. Well management of production under protective structures. b. Successful dealing with new technology involved in protective structures such as computers, thermo-regulators, heating, cooling and others.
5.	<p>Plant pests management under greenhouse production (3 CH).</p> <p><u>Purpose</u></p>

- To investigate the principles, concepts and philosophy relative to integrated Pest management (IPM).
- To examine the factors responsible for development of IPM, and to ensure the student understands the potential good and bad results from pesticide use and how the misuse, abuse and overuse of pesticides can affect ecological systems, while making pest management extremely difficult.
- Students will learn IPM tactics and how these tactics blend into effective IPM programs that are ecologically sound, economically justifiable, and socially acceptable.

Course Description

This course includes: The Plant Integrated Pest Management, Pest management Concept; Ecological Aspects of Pest management; Biological Control; Resistant in Pest control; Parasitoids and Predators in Pest Management; Insect pathogens as biological Control agents; Insecticides in Pest Management; Attractants; Repellants and Genetic Control in Pest Management; The Quantitative Basis of Pest Management; and IPM Programs.

Learning Outcomes

By the end of the course, the learner should be able to:

- Define IPM.
- Describe the economic, ecological and sociological benefits of IBM.
- Distinguish between positive and negative impacts of pesticide use.
- Understand problems resulting from misuse, overuse and abuse of chemical pesticides.
- Define and describe pesticide resistance and how it develops.
- Identify ecological and biological characteristics important in development of pest population.
- Identify 10 tactics commonly used in IPM and be able to distinguish them.
- Understand society's role in IPM decisions.
- Describe different groups of pests and compare them to weeds and plant pathogens.
- Analyze and compare management tactics to determine the best approach to reducing pest population.
- Locate appropriate, scientifically valid sources of information on specific tactics to manage insects' pests.
- Learn how to develop an IPM program.

6.	<p>Plant disease management under greenhouse production (3 CH).</p> <p><u>Course description</u></p> <p>The course should include characteristic of protected cultivation and tools for sustainable plant protection. Major plant diseases that are expected to threaten greenhouse crops including airborne, soilborne and vector-borne diseases will be introduced in addition to management options including integrated control.</p> <p><u>Learning outcomes</u></p> <p>Students and trainees will be exposed to major greenhouse plant pathogens in terms of identification and epidemiology. They will be trained on available management options including cultural, biological, physical, chemical, and integrated tools.</p>
7.	<p>Postharvest technology (3 CH).</p> <p><u>Course description</u></p> <p>This course will give a deep understanding of many aspects of pre- and post-harvest technology and biology, including internal and external factors determining quality and post-harvest performance. It will discuss several technological and biological topics focusing on proper handling and reduction of postharvest losses. Important concepts such as maturity, harvesting, packing and packaging, cooling, storage, grading and transport will be addressed in some details to comprehend the nature of fresh produce for understanding of their proper handling conditions. Advanced and updated techniques in this area, e.g. sensors, will be explained.</p>
8.	

	<p>Applications in vegetable breeding (3 CH).</p> <p><u>Course description:</u></p> <p>Students who take the course are expected to increase their skills and knowledge and achieve an upper level in vegetable breeding. They will be able to create a breeding program and apply all types of breeding techniques to their work.</p> <p><u>Learning outcomes</u></p> <ul style="list-style-type: none"> • The student is expected to be able to apply advanced statistical methods in vegetable breeding. • The student is expected too have understood the techniques applied in vegetable breeding. • The student is expected to evaluate the breeding lines by morphologic, as well as molecular techniques. • The student will have learned which field layout to use in developing vegetable varieties.
9.	<p>Soilless cultivation systems (3 CH).</p> <p><u>Purpose</u></p> <p>To acquaint the student with the latest techniques of plant cultivation under cover. Student gets the knowledge about physical and chemical properties of growing medium for proper selection of plant cultivation techniques. Student acquires the ability to prepare nutrient solution and adjust its composition to a stage of growth of plant.</p> <p><u>Course description</u></p> <p>Overview of soilless cultivation methods. Types and selection of growing medium. The chemical properties of water intended for fertigation. Collecting of samples of water and nutrient solution for chemical analysis. Methods for chemical analysis of water and nutrient solutions. Water treatment methods. Cleaning of the irrigation system. Fertilizers used on crops with fertigation.</p>

	<p>Preparation of nutrient solution. Preparation of glasshouse for cultivation in rockwool. Methods of nutrient solutions disinfecting.</p> <p><u>Learning outcomes</u></p> <ul style="list-style-type: none"> • Knowledge and understanding: Student describes various techniques of soilless cultivation, indicates their usefulness. Differentiates between growing medium and assigns them specific properties. Demonstrates general knowledge about irrigation systems. Demonstrates knowledge of cultivation, fertilization and fertigation of selected plant species. • Application: Student is able to collect nutrient solutions' sample for analysis and is able to determine their chemical composition. Student can choose optimal nutrient solution for selected plant species. Student knows the rules for determining the composition of the nutrient solution and the rules of selection of fertilizers. • Reflection: Students understand the need to formulate the views on achievements in advanced technologies in horticulture and their influence on the environment. • Transferable skills – not tied to just one subject: Teamwork, ability to present and defend personal opinions, responsibility for team realized projects.
10.	<p>Special topics in greenhouse management (3 CH).</p> <p><u>Purpose</u></p> <p>The importance of using greenhouses for production of plants or their food products. The establishment and administration of greenhouses. Study the control of the environment of greenhouses.</p>

	<p><u>Course description</u></p> <p>This course focuses on the various ways that greenhouse growers control the environment and growing conditions for plants (both ornamental and crop). Students will develop a solid understanding of the delicate greenhouse environment and the many factors that go into ensuring success in growing plants. Topics covered, include: greenhouse environment, water and irrigation, structures, fertility, insect control, diseases, heat loss, computer controls, greenhouse automation, and post-harvest horticulture.</p> <p><u>Learning outcomes</u></p> <p>By the end of the course, the learner should be able to:</p> <ul style="list-style-type: none"> • Comprehend how plants in a closed environment respond to and use the environmental elements of light, temperature, carbon dioxide, water and humidity. • Comprehend how plants in a closed environment respond to and use the environmental elements of light, temperature, carbon dioxide, water and humidity. • Calculate and analyze energy losses in a greenhouse and be able to describe remediation solutions.
11.	<p>SPS and TBT for food safety (WTO) (3 CH).</p> <p>Description found after the descriptions of the core courses.</p>
12.	<p>Total quality management (3 CH).</p> <p>Description found after the descriptions of the core courses.</p>
13.	<p>Gap analysis (3 CH).</p>

	Description found after the descriptions of the core courses.
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