



# MCAST

Malta College of Arts, Science & Technology

MQF Level 4

AG4-03-20

**Advanced Diploma in Horticulture**

**Course Specification**

## **Course Description**

This two-year full-time programme provides learners with an understanding of the horticultural industry including crop management of a wide range of crops; an introduction to garden design; floristry; pest and nutrient management, as well as studies in rural development and agricultural policies.

The course offers a wide perspective on the latest technologies used in the agricultural sector as well as its interconnectivity with entrepreneurship and business and the hospitality sector in relation to garden design and agri and ecotourism. Learners will be encouraged to relate theory to practice at all stages of learning through assignments, projects, practical work and work placements/apprenticeship schemes. Scheduled practical crop husbandry duties form an integral part of the curriculum.

## **Programme Learning Outcomes**

At the end of the programme the learner will be able to:

- 1. Understand a number of scientific and technical aspects in the subject-areas chosen;*
- 2. Understand the anatomy, physiology, behaviour and health issues related to plants;*
- 3. Undertake work-related experience and practical work in the land-based sector;*
- 4. Develop business ideas and carry out investigative projects in the land-based sector.*

## **Entry Requirements**

MCAST Diploma in Fish Husbandry

or

MCAST Diploma in Animal Care

or

MCAST Diploma in Horticulture

or

MCAST Diploma in Applied Science

or

4 SEC/O-Level passes/SSC&P (Level 3) passes

Preferred: Biology, Chemistry, Mathematics and English Language

## Current Approved Programme Structure

Unit Code	Unit Title	ECVET	Year
ASHRT-406-1504	Introduction to Fruiculture and Vegetable Production	6	I
CDKSK-406-2010	Information Technology	6	I
ASFDD-406-1501	Food Processing: Cottage Industry and Fermentation	6	I/II Year A
ASFDD-406-1502	Global Agriculture and Trade	6	I/II Year A
ASHRT-406-1501	Rural Sociology, topography and Structures	6	I/II Year A
ASHRT-406-1503	Integrated Nutrient Management	6	I/II Year A
ASHRT-406-1502	Garden Design Principles	6	I/II Year A
ASHRT-406-1508	Cut Flower Production and Flower Arrangement	6	I/II Year A
ASHRT-406-1509	Field Crop Planning and Production: Solanaceae, Cucurbits and Strawberries	6	I/II Year A
CDKSK-402-1914	Intrapersonal and Interpersonal Skills	2	I/II Year A
CDKSK-404-1915	Employability and Entrepreneurial Skills	4	I/II Year A
ASCHM-406-1603	Basic Chemistry	6	I/II Year B
ASH&S-406-1513	Health and Safety and First Aid	6	I/II Year B
ASASC-406-1602	Environmental Science	6	I/II Year B
ASPRJ-409-1803	Undertake An Extended Investigative Project In The Land- and Sea-Based Sectors	9	I/II Year B
ASHRT-409-1505	Pest and Diseases Management	9	I/II Year B
ASHRT-406-1506	Plant Biology and Genetics	6	I/II Year B
ASHRT-403-1507	Water Quality and Irrigation	3	I/II Year B
CDKSK-406-2001	English	6	I/II Year B
ASWBL-409-1801	Work Related Experience	9	II

ASHRT-400-1602	Practical*	0	II
<b>Total ECVET/ECTS</b>		<b>120</b>	<b>/</b>

\* Learners following this programme need to also follow a practical component which is not accredited. This is assessed on a pass/fail basis, and is shown also on the final transcript.

## **Unit: ASHRT-406-1504 Introduction to Fruitculture and Vegetable Production**

**Unit level (MQF):** 4  
**Credits:** 6

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### **Unit description**

The intensive production of fruit and vegetables on commercial horticulture units is an important part of reducing the reliance of imported produce. It offers career opportunities and employment in both the growing industry and ancillary suppliers. This introductory unit provides the foundation for students entering the industry as well as those who may wish to continue with further studies.

The unit aims to bring together the underlying principles of crop production, with the practical applications as seen through local enterprises and other resources which will enrich the learners understanding.

Investigations of factors to consider in relation to selection of an appropriate site for specific fruit or vegetable crops are undertaken, followed by identification of facilities and resources required for the enterprise to function.

The principles of raising plants from seed either directly drilled in the field or through transplanting of modules are discussed.

A wide range of growing systems for vegetables are examined and the choices of vegetable varieties are discussed and related to the needs of all year round production, seasonality, floating mulches, irrigation and nutrient requirements, weed, pest and disease control.

The unit then considers the production of both soft and top fruit. Examination of the benefits of using certified stock for planting and the importance of correct rootstock selection for top fruit are considered.

Orchard planting and training systems are evaluated as are relevant pruning techniques.

Finally, the unit explores the requirements for successful harvesting, preparation for storage, storage techniques, packaging and the preparation of produce for the market.

## Learning Outcomes

**On completion of this unit the learner will be able to:**

1. *Explain the importance of site selection and crop choices for successful crop cultivation;*
2. *Explain the principles of vegetable crop production;*
3. *Explain the principles of fruit crop production;*
4. *Identify the requirements for the harvesting, storage and preparation for market, of fruit and vegetables.*

## **Unit: ASFDD-406-1501 Food Processing: Cottage Industry and Fermentation**

**Unit level (MQF):** 4  
**Credits:** 6

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### **Unit description**

For decades before the medieval period, and for years later, people in different parts of the world used a selection of approaches to preserve foods for later consumption at a time when there was no electricity to refrigerate food.

This unit provides an understanding of the main Cottage Foods that learners can make in the kitchen of their home residences. Not all food prepared domestically can be vended as Cottage Foods. They must be safe and non-hazardous foods products that do not need temperature and/or time controls to remain safe for consumption. The unit is relevant to learners wishing to further their knowledge of traditional food preservation methods, principles and shelf-life control and stabilisation.

Drying, pickling, curing, salting, sugaring, canning and fermenting are all techniques that have been essential activities throughout history aiming at killing or inhibiting the growth of microorganisms prolonging the shelf-life of the product.

This unit will explore how each of these techniques work, benefits, and limitations of food safety and quality perspective. It will also provide to students a step-by-step guideline on how to process and produce the products themselves. The unit will also be introducing the learner to various bee products and the benefits of the amazing discovered by scientists.

Finally, students should have the underpinning knowledge and understanding to make food using all the main traditional preservation method.

## Learning Outcomes

On completion of this unit the learner will be able to:

1. *Discuss principals and importance of food preservation;*
2. *Evaluate the technical and practical skills in many aspects of the Cottage Industry and Prepare food in a hygienic way;*
3. *Evaluate the role of fermentation microorganisms in major food fermentations;*
4. *Discuss the different bee products and related benefits.*



## **Unit: ASFDD-406-1502 Global Agriculture and Trade**

**Unit level (MQF):** 4  
**Credits:** 6

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### **Unit description**

In an ever evolving world that has a challenging background of population growth; changing economic development, development of trading groups and global supply chains; increasing food demand and also building concerns over food security provides the backdrop for this unit of study. The unit will study real life examples that underpin the need to secure ‘more food from equal or less resources’ in a sustainable, long term manner. These examples are taken from around the world and incorporate both intensive and extensive agriculture systems and food production methods. The unit will focus initially on the factors influencing, and challenges for the effective delivery of food in a complex food supply and the “push-pull” mechanisms involved in food demand in a world context. Alongside this theme the global view of nutrition and malnutrition (both over and under-eating) will be addressed.

The unit will also cover the different agricultural systems used worldwide such as extensive, semi-intensive, intensive, pastoralism, slash-and-burn, etc. Commodity trading will be discussed including FAOSTAT data, major importers and exporters of agricultural commodities and an introduction to food trade (role of WTO, Doha Rounds, etc.) Furthermore, consideration and discussion of the most significant, current food chain issues, drivers for change and their impact on food business will be investigated. This will include identifying recent developments in science and technology in the agri-food sector including breeding and biotechnology adoption; protected agricultural systems and advancing post-harvest controls and storage opportunities. This unit will provide students with an understanding of how agriculture and trade work on a global scale. It will also provide them with: the skill to plan, draft and organise thoughts; an opportunity to present ideas to both small and large groups as well as the ability to reflect on ideas and develop arguments supported by evidence.

## Learning Outcomes

On completion of this unit the learner will be able to:

1. *Identify the main drivers for change in modern agri-food systems globally, and the need to consider greater intensification as the drive to produce more from less intensifies;*
2. *List the strengths and weaknesses of large scale and intensive farming systems and low input systems;*
3. *Explain the main trends and issues in food supply and demand on a global and local scale;*
4. *Identify the main drivers for change in modern agri-food systems globally, and the need to consider greater intensification.*

## **Unit: ASHRT-406-1501 Rural Sociology, Topography and Structures**

**Unit level (MQF):** 4  
**Credits:** 6

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### **Unit description**

This unit revolves around the ‘making of the landscape,’ and an exploration of the various influences which have led to many turning points in Maltese agricultural history. Agriculture is a large scale land use and over centuries has resulted in an array of rural transformations across Europe. Landscape is a broad term and can incorporate an assemblage of physical attributes including rural landforms and structures and is a result of the interaction between nature and culture. The Maltese rural environment remains largely dominated by agriculture, however in the present day, the contribution of agriculture to the local economy is modest. Nevertheless, agriculture contributes to the local rural character, and the geomorphology of the Maltese Islands has resulted in various topographic features that contribute to the diversity of the landscape. Various military structures, archaeological features and sites exist, as well as the prominence of traditional rubble walls surrounding agricultural fields. Each landscape is a result of the superposition of different layers of changes that have occurred at different points in time. The Maltese landscape is unique in its physical structure, reflecting the diverse settlement patterns and urban forms introduced over various centuries. The traditional function of rural settlements is agrarian, however this is changing with the reduction in the focus on agriculture in rural areas and the introduction of residential and industrial uses not related to agriculture.

This unit explores the relationship between rural structures and agrarian community settlements and practices. It begins by investigating the structure and characteristics of Maltese rural communities; gaining an overview of their current role and function in the rural economy, in addition to a focus on the contrast between rural and urban land cover and use across the Island. The content then moves on to an exploration of the main features and structures of the rural environment in Malta, including common archaeological heritage, the significance of old farmhouses and rural structures, and a focus on geological features, focusing specifically on quarrying activities. From this, students will be encouraged to make connections between existing rural structures and the past activities and characteristics of agrarian societies. This will include an investigation of the ongoing interaction between rural communities and the environment, and a look at current threats and subsequent policies that are in place to protect rural structures. The unit subsequently focuses on the specific role of agriculture in Malta’s history, and its trajectory in terms of its shifting position in the rural economy. Students will gain an overview of the history and development of

agrarian communities from earliest evidence (7<sup>th</sup> Century BC) to the present day. Alongside this, students will also learn about the main drivers of the agricultural trajectory in Malta, including the influence of policies, such as the CAP and the European Landscape Convention, and international demands. Finally, the unit will include an introduction into the construction of a rubble wall (or other specified rural structure); investigating various forms and styles of rural structures.

## Learning Outcomes

On completion of this unit the learner will be able to:

1. *Outline the history and development of agrarian communities in Malta, describing their current structure, characteristics and occupation;*
2. *Identify how the main structures of the Maltese rural environment reflect the underlying topography and past land uses and practices of agrarian societies;*
3. *Establish how agriculture has played a fluctuating role in Malta's history, and review the factors and events that have affected Malta's agricultural trajectory;*
4. *Build a rubble wall (or other specified rural structure) and undertake a risk assessment of the rubble wall building process.*

## Unit: ASHRT-406-1503 Integrated Nutrient Management

**Unit level (MQF):** 4  
**Credits:** 6

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### Unit description

This is a management skills based unit and will demonstrate the learner's abilities to analyse and evaluate plant nutrient needs in relation to soil fertility by developing an understanding of optimising of all sources of organic, inorganic and biological components in order to benefit higher productivity in a sustained, integrated management system.

The learner will demonstrate an understanding of key concepts, determinants and advantages of managing nutrients for maintenance of productivity sustainably. The unit is relevant to learners wanting to further enhance their knowledge of nutrient supply management as applied to horticultural practices. On completion of the unit learners will understand the need for and how future productivity must be managed and how resources should be utilised efficiently and effectively.

Learners will carry out soil testing and analysis for evaluation of nutrient assessment and be able to research effectively in order to plan for sustainable plant production. Learners will also gain skills in presenting and in feasibility and gain confidence in applying integrated management principles.

Learners will gain underpinning knowledge and understanding of the key issues and importance of sourcing and utilising variable plant nutrients and how these affect plant growth and development. The learners will also gain a broad knowledge of edible mushroom production.

### Learning Outcomes

**On completion of this unit the learner will be able to:**

- 1. Evaluate the use of Integrated Nutrient Management in maintenance and adjustment of soil fertility and plant nutrient supply for sustainable crop production;*
- 2. Plan effective and efficient management of plant nutrient supply in optimising plant productivity;*
- 3. Analyse diverse sources of plant nutrients to check nutrient maintain soil health and productivity;*
- 4. Explain edible Mushroom production and management.*

## Unit: ASHRT-406-1502 Garden Design Principles

**Unit level (MQF):** 4  
**Credits:** 6

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### Unit description

This unit aims to provide learners with an understanding of the procedures, processes and principles of garden design and how these are applied in practice.

This is achieved through learners undertaking real site based design projects and industrial based design activities. They will also be asked to reflect on the theory of their own developing design solutions (and those of others) through formative design critiques, tutorials and reviews. These design activities will allow learners to develop a clear understanding of the main stages of the design process and the applied use of creative principles required to develop competent garden designs.

This unit will give learners the knowledge and skills required to follow a design process; e.g. identify the requirements of the client brief, undertake site investigations identifying issues and potential solutions, develop design ideas and concepts, apply creative design principles via interim sketch designs including the application and choice of hard and soft landscape materials, produce final designs layouts and communicate ideas by producing plans and visualisations. In developing this knowledge and skills, learners will investigate and apply the elements and principles of creative design practice. These include:

- Embracing design elements such as line, shape, form, geometry, colour, texture;
- Utilising spatial design tools such as masses & voids, form & space, scale and proportion;
- Exploring composition principles such as Order/Balance/Proportion, Harmony/Unity, Movement/Flow, Rhythm/ Repetition/Transition;
- Developing real designs by converting creative theory and ideas into working solutions through the choice of hard and soft landscape materials.

While the unit focuses on developing the learners garden design abilities, it also intends to provide horticulturalists with the applied language tools that will enable them to confidently communicate about the design process and design issues with other professions within the landscape industries, e.g. contractors, nurseries, landscape designers. Having strong design communication skills is also becoming more important as the public become increasingly informed and aware about aspects of their green environment, quality landscapes and the need for good design.

On completion of this unit learners will be able to produce and present a range of simple plans and visualisations and communicate the process, ideas and designs.

## **Learning Outcomes**

**On completion of this unit the learner will be able to:**

- 1. Demonstrate the use of different stages of a design process as applied to garden design;*
- 2. Apply the elements and principles of design as they relate to garden design;*
- 3. Identify the requirements of a range of plants used in landscaping;*
- 4. Apply verbal and graphic techniques to communicate a garden design projects utilising design plans, images and visualisations.*

## **Unit: ASHRT-406-1508 Cut Flower Production and Flower Arrangement**

**Unit level (MQF):** 4  
**Credits:** 6

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### **Unit description**

The commercial production of flowers within Malta for use in the local floristry industry is an important part of reducing the reliance on imported material for flower arrangement.

The principles of cut flower production through to the post-harvest treatment of individual species provide essential knowledge for students who wish to have involvement in the floristry industry.

As well as this, the principles that underpin the development of flower arrangements are essential knowledge for students entering into the professional world of the flower designer.

Flower arrangement is influenced by the sources of inspiration and governed by the principles and elements of design. By having an appreciation of the sources of design inspiration; emotion, botany, culture, technique and economy and the application of the elements; form, space, colour, texture and line and principles of design; balance, scale and proportion, dominance, contrast, rhythm and harmony, will enable the individual to produce a wide range of flower arrangements for an extensive range of occasions, in one of three styles; form-linear, vegetative or decorative.

This unit aims to combine an introduction to flower production with an introduction to the use of the resulting cut flowers in arrangement and display.

The unit begins by investigating the range of flowers grown on the island and their contribution to self-sufficiency. Generic crop requirements are examined to include site selection, soil types, plant raising and establishment and crop management. The unit then extends into harvesting of the flower crop to ensure optimum vase life of a range of species. An evaluation of current practices used within the floriculture industry to include the use of preservatives and other techniques for extending the life of floral material.



The second part of the unit investigates the key sources of design inspiration (emotion, culture, botany, technique/craft and economy), for flower arrangements and how the sources of inspiration link together; however, one will have slightly more influence than the others.

The unit then moves onto distinctive design styles Form-linear makes use of space to emphasise the different plant forms selected, often limited in the amount of materials used; Vegetative designs make use of the natural growth habit of the plant materials selected, they must also be from the same season and growing region; Decorative designs may incorporate manipulated plant materials and accessories.

The unit will focus on the elements and principles of design, exploring each, and producing examples of each in isolation then discussing how they are used in conjunction to create cohesive flower arrangements for stated occasions.

Learners will have the opportunity to use the knowledge to analyse a range of flower arrangements for the application of the principles and elements of design, identify the hierarchy of the sources of inspiration for a selection of flower arrangements, identifying where improvements could be made.

## **Learning Outcomes**

**On completion of this unit the learner will be able to:**

- 1. Understand the principles of cut flower production;*
- 2. Identify the requirements for harvesting, grading, storage and preparation for market of cut flowers;*
- 3. Identify sources of design inspiration and the creative design process;*
- 4. Explain the application of the principles and elements of design.*

## **Unit: ASHRT-406-1509 Field Crop Planning and Production: Solanaceae, Cucurbits and Strawberries**

**Unit level (MQF):** 4  
**Credits:** 6

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### **Unit description**

Solanaceae, Cucurbits and Strawberries are identified as key crops of economic importance to the island of Malta and therefore offer career opportunities and employment within the production industry and ancillary suppliers.

This unit covers the planning and growing of these key crops starting with the principles of soil management and cultivation techniques. This is covered in particular as applied to the potato crop as it is a below-ground “root” crop and so soil preparation is crucial for the successful production of high quality, marketable potato tubers.

The potato crop itself will be covered from variety choice through to harvest and storage. It will include planting rates and dates, crop nutrition, crop protection, irrigation and preparation for harvest. Markets for potatoes grown in Malta will also be discussed briefly.

The second part of the unit covers the intensive market garden crops of tomatoes, peppers, aubergines, melons, courgettes, cucumbers and pumpkins.

Comparisons are made between these crops within the principles of production practices such plant establishment, continuity of supply, crop training and management, through to harvesting and grading.

The principles of post-harvest management will be outlined for students to further investigate these in relation local practices in harvesting and marketing of each crop.

Visits to local producers of the named crops are seen as essential to illustrate and expand the student’s understanding of the principles of crop cultivation.

## Learning Outcomes

On completion of this unit the learner will be able to:

1. *Know how to prepare suitable subsoil and seedbed conditions for successful production of Solanaceae, Cucurbit and strawberry crops;*
2. *Know how to grow crops to produce maximum marketable yields using sustainable, integrated crop management techniques;*
3. *Compare crop production methods for tomatoes, peppers, aubergines, melons, courgettes, cucumbers and pumpkin;*
4. *Identify the requirements for post-harvest and marketing of tomatoes, peppers, aubergines, melons, courgettes, cucumbers and pumpkin.*

## Unit: ASCHM-406-1603 Basic Chemistry

**Unit level (MQF):** 4  
**Credits:** 6

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### Unit description

The aim for this unit is to provide students with the basic principles of chemistry such that it underpins their understanding of the biological molecules within plant and animal tissues and how they interact with inert and active molecules within their environment. Although theoretical, the unit is complemented by a significant amount of practical work to allow students to investigate chemical pathways, interactions and laws, and to develop key laboratory skills that can be transferred to other scientific disciplines. Skills such as writing and interpreting chemical formulae, equations and calculations will be developed as well as quantitative and qualitative investigations of chemical principles.

The unit begins with an examination of the periodic table and the physical properties of elements that have led to its structure. This leads into the study of chemical bonding with the focus on the three strongest types of bonds (covalent, ionic and metallic) before broadening out to cover alternative bond types.

The unit then turns its attention to exploring the biologically important molecules and their properties in detail, including water, carbohydrates, structural and functional proteins, lipids.

### Learning Outcomes

**On completion of this unit the learner will be able to**

- 1. Describe atomic structure, properties of identified elements and principles of bonding;*
- 2. Describe and apply the principles of equilibrium;*
- 3. Discuss the chemistry of biologically important molecules;*
- 4. Demonstrate competence in a range of skills necessary in the study of chemistry.*

## **Unit: ASH&S-406-1513 Health and Safety and First Aid**

**Unit level (MQF):** 4

**Credits:** 6

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### **Unit description**

The Health and Safety element of this course is knowledge, skill and competency based unit which will allow learners to recognise, practice and display the necessary skills for competent analytical analysis of Health and Safety within an Agribusiness workplace setting.

Learners will develop an understanding of the hazards and risks which can face a worker in dealing with everyday issues while working in an Agribusiness setting including working with animals and machinery. They will be able to apply Health and Safety Legislation for controls in 'so far as is reasonably practicable' or employ best practise.

This unit is relevant to all employees and the skills developed can be demonstrated in an Agribusiness setting.

The Candidate will become familiar with the Risk Assessment core principles and practice, and the desirable actions and Controls needed to allow a 'suitable and sufficient' Assessment is carried out.

The unit will allow the candidate to develop a good understanding of the role of Health and Safety Legislation and the need to meet its requirements within an Agribusiness workplace.

Learners will have become competent in the execution of a Risk Assessment and will have a clear understanding of the Legal requirements needed to comply in completing and recording within an Agribusiness setting.

By meeting all criteria in this unit, learners will also obtain a first aid certificate, making them certified first aiders.

## Learning Outcomes

On completion of this unit the learner will be able to

1. *Understand common Health and Safety terminology and the information of the Health and Safety Legislation;*
2. *Identify common Health and Safety hazards within a farm setting;*
3. *Develop the skill in Assessing Risks to control and minimise Health and Safety risks;*
4. *Use first aid procedures to respond to emergency situations.*

## **Unit: ASASC-406-1602 Environmental Science**

**Unit level (MQF):** 4  
**Credits:** 6

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### **Unit description**

The aim of this Unit is to stimulate analytical thinking and develop skills for scientific inquiry that will provide the student with a good understanding of the environment. Learners will learn the importance of how the different environmental systems interact and the implications of the environment on human society. The Environmental Science Unit is to be approached with the student exercising problem solving and developing their investigation skills.

The Environmental Science Unit covers the main environmental topics of ecology, climate change, nutrient cycles and biodiversity. Learners are encouraged to research environmental issues and so develop their scientific literacy. Furthermore, learners need to practise communicating their research findings and thus develop their presentation skills.

Learners who complete the Environmental Science Unit will be able to utilise their understanding of the main principles of environmental science and apply the scientific skills learnt. In addition, learners will be able to draw on their environmental knowledge to develop and undertake practical investigations.

In this Unit, learners are to apply the environmental principles learnt to selected local contexts in order to complete the assessment tasks. In the Climate area of study, learners choose a particular greenhouse gas to research further and compile a mini presentation, narrating how their local climate is or could be affected. Likewise, with the Nutrient Cycle area, learners are to choose one cycle from which to research a particular aspect. Learners must demonstrate their knowledge of biodiversity threats by selecting a threatened animal in the region they live and present the underlying principles behind the threat and solutions to prevent the loss of this animal.

## Learning Outcomes

On completion of this unit the learner will be able to

1. *Explain general ecological principles in order to understand how organisms interact with their environment;*
2. *Show how climate change is affected by mankind for preventing further harm;*
3. *Explain how nutrient cycles function so as to be aware of their impact on the environment;*
4. *Appreciate the complexities of biodiversity for managing ecosystems.*



## **Unit: ASPRJ-409-1803 Undertake an Extended Investigative Project in The Land and Sea-Based Sectors**

**Unit level (MQF):** 4  
**Credits:** 9

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### **Unit description**

“Anyone who has ever worked on a project will agree that making a project succeed is no simple task. The difficulties manifest themselves in delays, budget over-runs, inadequate results, dissatisfied customers, high stress among the project team and other undesirable outcomes. What is the cause of all of these problems?”

Projects are characterised by four features: a group of people, a goal, limited time and money, and a certain level of uncertainty regarding whether the goals will be achieved. Project managers are involved with all of these aspects. Supervising and directing a project is thus anything but an easy task.”

The aim of this study unit is to train learners in all the processes involved in proposing and undertaking an extended investigative project in the land- or seabased sector. The learners should be able to conduct a literature review, compile a proposal, identify, plan, carry out an investigative project, and evaluate and present the results of the project.

The project will help the learners to develop project management and communication skills by investigating a topic of their choice.

It is suggested that the learners explore a topic area that interests them and is relevant to their field of study.

Learners will develop this skill of taking responsibility of their own learning by choosing independently their own research problem to be solved. They should produce a breakdown of resources and a project action plan including intermediate deadlines.

## Learning Outcomes

On completion of this unit the learner will be able to:

1. *Conduct a literature review related to the land- or sea-based sector;*
2. *Write a proposal for an investigative project in the land- or sea-based sector;*
3. *Design and produce a detailed plan for an investigative project in the land- or sea-based sector;*
4. *Construct an investigative project in the land- or sea-based sector and monitor all the phases involved;*
5. *Review and evaluate an investigative project in the land- or sea-based sector.*

## Unit: ASHRT-409-1505 Pest and Diseases Management

**Unit level (MQF):** 4  
**Credits:** 9

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### Unit description

Understanding the impact of pests in agriculture and horticulture, coupled with the knowledge for the legal obligations for the purchase and legal safe application of plant protection products is an extremely important skill to enable true yield potential and marketable crop quality without compromising the environment and consumer health.

In this unit learners will develop knowledge related to pests in the form of weeds, diseases and invertebrate pests, the effect on plant growth, development and quality. Learners will study the lifecycles of the main pests for each category for the major crops grown in Malta. Laboratory identification and fieldwork skills will be developed to allow identification and to help develop skills in pest and disease control.

Interactions of pests and diseases and their effects on plant species will be studied to gain an understanding on their population growth or decline and the influence of environment on growth.

Learners will also explore the pest and disease lifecycles and techniques that can be employed to help reduce economic damages. The impact on yield and quality will be considered to enable learners to evaluate the need for or justification for control.

This unit will also study the content of the pesticide course that the local farmers are legally obliged to sit in order for them to purchase, utilize and transport plant protection products.

## Learning Outcomes

On completion of this unit the learner will be able to:

1. *Identify and classify the key pests and diseases for a variety of crops in the Maltese archipelago;*
2. *Explain the need for appropriate management of pests to maintain optimum health, quality and functioning of cropping systems;*
3. *Recognise key risk factors for pest damage and learn how to avoid them where possible;*
4. *Develop an understanding of integrated pest management systems;*
5. *Evaluate current regulations and legislations related to the use of plant protection products.*

## Unit: ASHRT-406-1506 Plant Biology and Genetics

**Unit level (MQF):** 4  
**Credits:** 6

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### Unit description

The biological principles that operate in the growth and development of plants is an essential knowledge for students wishing to embark on a career in plant and crop production in horticulture.

By understanding the structure and activity of living processes in plants, an effective approach to critical production management decisions can be taken, thereby enhancing the prospect of commercial success.

This unit will provide the basis for an appreciation of the requirements for plant and crop production and the principles and practice of commercial plant and crop production and the application of genetics in crop improvement.

The unit will progress from an introduction to the plant cell, describing its principal structural characteristics and the organelles and other sub cellular components that undertake important life processes. Cellular reproduction by mitosis will be studied and the differentiation of new cells into tissues will be explored in relation to plant requirements for transport systems, support, water and nutrient uptake, photosynthesis and storage tissue.

Studies of plant organs will include the anatomy and morphology of the plant stem, the root, reproductive organs (both sexual and vegetative), and the leaf.

Physiological processes will be studied, in particular photosynthesis and water relations as well as phytohormone control of relevant processes such as ripening of harvestable plant parts.

The basic principles of genetics including selection and breeding techniques will be studied in relation to requirements for crop production, using examples of successful advances in a variety of appropriate crop types. Conventional and novel approaches to crop genetic management will be examined in their potential contribution to increased crop performance.

## Learning Outcomes

On completion of this unit the learner will be able to:

1. *Describe the structural and physiological basis of plant growth and development;*
2. *Appreciate the process of plant reproduction in relation to crop production;*
3. *Explain and utilize knowledge of plant physiology as the basis of input management of plants and crops;*
4. *Explain plant and crop improvement techniques, interpret varietal descriptions and appreciate the potential for future enhanced crop production from modern biotechnological techniques.*

## Unit: ASHRT-403-1507 Water Quality and Irrigation

**Unit level (MQF):** 4  
**Credits:** 3

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### Unit description

This is a theory and skills-based half unit which prepare learners to be able to sustainably source clean irrigation water, design a suitable irrigation and storage system, and to apply water to crops at the correct time and rate, in order to optimise production.

It explains the importance of providing unpolluted water to crops for quantity and quality improvement and allows learners to understand the effects of various water contaminants, and how they can be prevented from entering water sources, within the context of local legislation and practice to protect agricultural and horticultural water supplies.

It covers the variation in water quality (physical, chemical and biological parameters), how this is affected by the water source and how this affects it's use for irrigation.

It describes the importance of useable water to plants by discussing its function in crop structure, biochemistry and transport, as well as discussing its effect on quantity and quality of marketable production.

It then allows learners to practice the measurement or calculation of soil moisture deficit and explains the concept of “scheduling” so that water is used most effectively. Schedules for individual crops will then be dealt with in the field crop planning units.

Students will design and cost an irrigation supply system for a real farm, field or garden as part of the learning and assessment process. This exercise will include zoning, storage, delivery and application of irrigation water, as well as discussing routine maintenance and upkeep.

### Learning Outcomes

On completion of this unit the learner will be able to:

1. *Demonstrate how water behaves in the soil and in the plant;*
2. *Evaluate quality and sustainability of water resources;*
3. *Design and cost an irrigation system;*
4. *Formulate an irrigation schedule using deficit calculations.*

## Unit: ASWBL-409-1801 Work Related Experience

**Unit level (MQF):** 4  
**Credits:** 9

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### Unit description

This is a skills based unit that will allow learners to demonstrate that they have the necessary work-based learning skills to be able to understand the importance of sustainable approaches at the workplace, and to be able to plan, undertake and review work-based experience in the land- or sea-based sectors in relation to sustainability practices. Students will familiarise themselves with important aspects of sustainable approaches, such as their importance, impacts, the opportunities they provide and several popular techniques currently implemented.

The Unit is relevant to learners wishing to further develop their knowledge and understanding of how to prepare and operate within land- or sea-based employment sectors with a sustainable approach to organisations and businesses, as well as the ways in which they can access the various career opportunities this stream offers. On completion of the Unit, learners will have grasped the three step process to preparing for work-related experience: prepare, undertake and review. They will obtain insight into what steps are required in the application process, what skills are required in an interview, and how they can prepare to start work. Furthermore, learners will gain knowledge of various methods with which they can keep track of their progress, as well as methods of how they can review their performance for self-improvement. Learners will also be able to implement a Personal Development Plan for their work-related experience as well as how to work in a team and undertake leadership roles in work-based and sustainability-related activities.

Learners will carry out independent research and study to obtain important inductive insight into work-based experience in the land- or sea-based sectors with emphasis on related environmental sustainability aspects.

### Learning Outcomes

**On completion of this unit the learner will be able to:**

1. *Apply interpersonal and transferable skills in relation to effective communication related to issues of sustainability;*
2. *Prepare for a work-related experience in the land- or sea-based sector;*
3. *Undertake a work-related experience in the land- or sea-based sector;*
4. *Review work-related experience in the land- or sea-based sector.*