

## Addressing the current and Future skill needs for sustainability, digitalization and the bio-Economy in agriculture: European skills agenda and Strategy

<b>D3.2: curricula Design</b>	
<b>Document description</b>	This task outlines the approach taken in the design and development of the training curricular.
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## Table of Contents

<b>1</b>	<b>INTRODUCTION.....</b>	<b>4</b>
<b>2</b>	<b>CURRICULA DESIGN METHODOLOGY .....</b>	<b>5</b>
2.1	APPROACH	5
2.2	KEY CONSIDERATIONS IN CURRICULA DESIGN MODEL	5
2.2.1	<i>Curricula Adaptability</i>	5
2.2.2	<i>Duration</i>	6
2.2.3	<i>Training Content</i>	6
2.2.4	<i>Training Assessment</i>	6
2.2.5	<i>Learning Outcomes &amp; Content Mapping</i>	7
2.2.6	<i>Learning Outcomes</i>	7
2.2.7	<i>Content Mapping</i>	9
2.3	CURRICULA DESIGN MIND MAP	11
<b>3</b>	<b>OCCUPATIONAL PROFILES AND THE CURRICULAR .....</b>	<b>12</b>
3.1	CURRICULA IDENTIFICATION	12
3.2	SKILLS AND COMPETENCIES	12
<b>4</b>	<b>CURRICULA DESIGN REPORTS .....</b>	<b>13</b>
4.1	OPERATOR FOR BIOECONOMY IN AGRICULTURE AND FOOD-INDUSTRY AND FORESTRY	13
4.2	OPERATOR FOR SUSTAINABILITY IN AGRICULTURE AND FOOD-INDUSTRY AND FORESTRY	13
4.3	OPERATOR FOR DIGITALISATION IN AGRICULTURE AND FOOD-INDUSTRY AND FORESTRY	14
4.4	TECHNICIAN FOR FOOD INDUSTRY SUSTAINABILITY	14
4.5	TECHNICIAN FOR FOOD INDUSTRY DIGITALISATION	15
4.6	TECHNICIAN FOR AGRICULTURE DIGITALISATION	15

4.7	TECHNICIAN FOR AGRICULTURE SUSTAINABILITY	16
<b>5</b>	<b>CONCLUSION .....</b>	<b>16</b>
<b>6</b>	<b>REFERENCES.....</b>	<b>17</b>
<b>7</b>	<b>APPENDICES.....</b>	<b>18</b>
7.1	APPENDIX 1 – CURRICULA FOR THE “OPERATOR FOR BIOECONOMY IN AGRICULTURE AND FOOD-INDUSTRY AND FORESTRY” OCCUPATIONAL PROFILE. EQF 4	19
7.2	APPENDIX 2 – CURRICULA FOR THE “OPERATOR FOR SUSTAINABILITY IN AGRICULTURE AND FOOD-INDUSTRY AND FORESTRY” OCCUPATIONAL PROFILE.	28
7.3	APPENDIX 3 – CURRICULA FOR THE “OPERATOR FOR DIGITALISATION IN AGRICULTURE AND FOOD-INDUSTRY AND FORESTRY” OCCUPATIONAL PROFILE.	48
7.4	APPENDIX 4 – CURRICULA FOR THE “TECHNICIAN FOR FOOD INDUSTRY SUSTAINABILITY” OCCUPATIONAL PROFILE.	61
7.5	APPENDIX 5 – CURRICULA FOR THE “TECHNICIAN FOR FOOD INDUSTRY DIGITALISATION” OCCUPATIONAL PROFILE.	91
7.6	APPENDIX 6 – CURRICULA FOR THE “TECHNICIAN FOR AGRICULTURE DIGITALISATION” OCCUPATIONAL PROFILE.	99
7.7	APPENDIX 7 – CURRICULA FOR THE “TECHNICIAN FOR AGRICULTURE SUSTAINABILITY” OCCUPATIONAL PROFILE.	120
7.8	APPENDIX 8 – CURRICULA FOR THE “SOFT SKILLS MODULE” TO BE INCORPORATED ACROSS ALL 7/10 OCCUPATIONAL PROFILES.	161
7.9	APPENDIX 9 – OCCUPATIONAL PROFILE INFORMATION	169

# 1 Introduction

Curricula design is one of the critical aspects of the FIELDS Project, which links together the Future Skills and Competency requirements identified in Work Package 1 (Task 1.3 and 1.4), Future Trends (Task 1.5) as well as the Occupational Profiles and approaches to European Strategies on Skills Development in Work Package 2 (Task 2.1 and Task 2.3). Furthermore, it solidifies the project objectives, by setting out the foundation of the learning content, which will be developed in Work Package 3 (Tasks 3.3, 3.4 and Task 3.5).

Task 3.2 consists of designing the learning curricula, defining the pedagogical approach that will be used to develop the training programme in order to enhance the learning process.

It takes into account, 7/10 occupational profiles (at least one per country participating in the training) (EQF and ECVET based) corresponding to job profiles identified in Task 2.1 and Task 2.4, at least one per topic (sustainability, digitalisation, bioeconomy), for two levels: EQF level 4 (farmers, foresters and food producers, SMEs) and one for EQF level 5 (students) in line with the sector changing needs in the short to longer term.

In this task, the consortium applied a reverse design methodology whereby we started by considering the learning objectives (mainly represented by the ESCO skills and described in a similar manner), after which, we considered the behaviours needed (what the learner should be able to perform in order to be able to demonstrate their ability) and finally the knowledge base required to support their development.

The material developed for the curricula, will be used in two ways: by farmers, foresters and farm advisors, interested in the skill and not in the ECVET certification, and by students, wishing to later work in the sector.

The latest will get ECVET certification through a completion of the whole chosen curriculum. The first group, interested in the skills, can access a personalised pattern, following only the modules they need. Several methodologies will be considered: online learning, microlearning, gamification, flipped classroom, blended learning, peer learning, on-farm demonstration activities, action-based and participatory learning.

The principle adopted to schedule the training (online and in-class activities, work-based periods) will be defined in this task, to maximise the engagement of the learners, and to provide a modular training schedule.

## 2 curricula Design Methodology

In approaching the curricula design, we considered some fundamental elements that were aligned to the project scope, which included: the learner profiles, the way in which the curricula could be utilised, the number of learning hours to be achieved and the EQF Level requirements.

### 2.1 Approach

In approaching the curricula design, the consortium developed a standardised approach to curricula design, by developing a guidance document for the curricula design process. The guidance document highlighted the key considerations in terms of curricula and also mapped out this approach visually to ensure absolute clarity and coherence across the various curricula being designed. The guidance outlined the basic approach to the curricula, by identifying common skills and competencies across all curricula, Technical Skills Requirements, Basic ICT Skills Requirements and Soft Skills Requirements. These skills and competencies were directly aligned to the occupational profiles and the core areas of focus within the project scope, namely, Sustainability, Digitalisation, Bioeconomy, Management & Entrepreneurship and Soft Skills.

### 2.2 Key Considerations in curricula Design Model

The key considerations in the curricula design process took into account the project scope which was aligned with the chosen occupational profiles (7/10). The design process incorporated a standardised approach, ensuring that each curricula included the following:

- Soft Skills
- Technical Skills
- Basic ICT Skills

Additionally, it was felt that in the modern world, most (if not all) curricula could be linked to areas such as communications, health and safety, basic ICT as well as ensuring the alignment of the curricula to support Task 3.3 (Apprenticeships) and cohesion of work-experience (also known as Work-Based Learning) to be applicable across all training curricula. As such a Soft Skills and Entrepreneurship curriculum (Appendix 8) was developed, that could be utilised across all of the 7/10 occupational profiles and their respective curricular.

#### 2.2.1 Curricula Adaptability

Following this, essential to the curricula was to ensure the accessibility and applicability in all scenario's, based on the demographic profile of learners. As such it was important to ensure that the curricula could be used as a whole, but it was equally as important to be modular in approach, allowing for selective delivery, based on the audience/end user profile. This approach ensured the long-term sustainability of the overall programme and its use, post project.

### 2.2.2 Duration

In considering the design of the curricula, the duration of a full academic programme was considered, ensuring the following:

- 180-hours (in Class Learning)
- 360-hours of Work Based Learning (WBL)
- 120-hours Online Learning
- 20-hours of Assessment

### 2.2.3 Training Content

In order to ensure high quality training content and in the interest of efficiency, it was imperative that there was no duplication of work across the various training curricula. It was also important to ensure that the consortia took into account the content development which forms part of Work Package 3 (Tasks 3.3, 3.4 and Task 3.5). As such the initial approach was to check what content was already in existence among the partnership which in turn highlighted any potential gaps in training content (for development).

Knowing the potential content and mapping these to identified learning outcomes, influenced the curricula design process to ensure the enablement of success.

### 2.2.4 Training Assessment

Considering that the curricula would potentially lead to a formal qualification and recognition through the EQF and both levels 4 and levels 5, it was imperative to ensure the consortia considered the approach to assessment. Assessment techniques were identified and shared across the various curricula, once again ensuring a standardised approach in the assessment, thereby enabling the fair and consistent assessment of learners across all curricula.

A range of different assessment techniques were considered as follows:

- Portfolio / Collection of Work    xx%
- Skills Demonstration            xx%
- Assignment                            xx%
- Examination theory                xx%

## 2.2.5 Learning Outcomes & Content Mapping

As previously outlined, the design process reverse engineered the curricula design, starting with the desired outcomes of each curricular. As such, of vital importance was the identification of the learning outcomes (LO's).

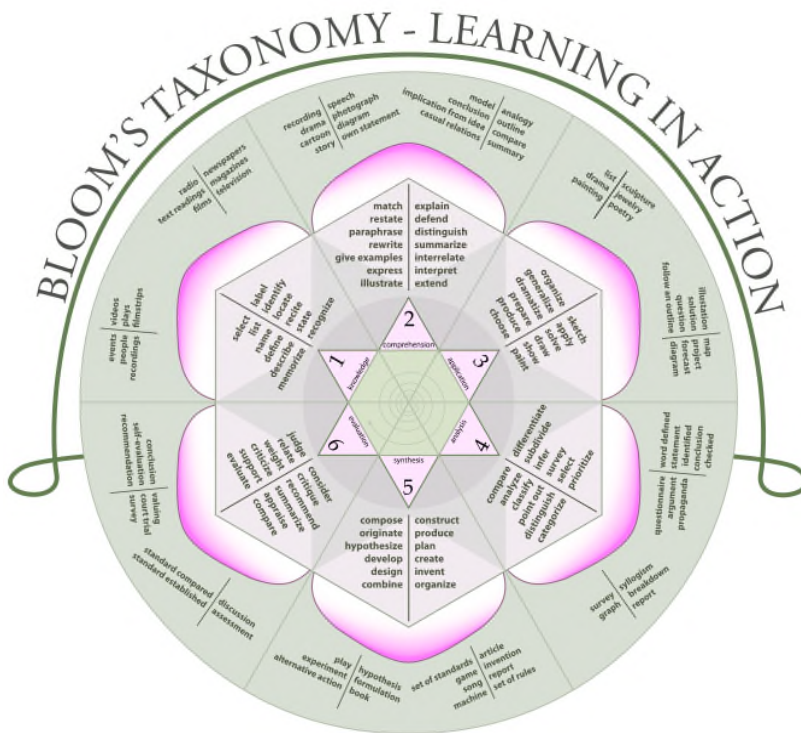
## 2.2.6 Learning Outcomes

In identifying such outcomes, it was imperative to map these against the occupational profiles identified in Work Package 2 (Task 2.1 and Task 2.3) and utilising the Essential Skills and Essential Knowledge criteria established to develop the ESCO Skills Profiles, enabled the development of the learning outcomes for each curricular.

In establishing the learning outcomes and identifying the learning outcome descriptors, the consortia made use of the six levels of cognitive learning of Bloom's Taxonomy. These are:

1. Remembering
2. Understanding
3. Applying
4. Analysing
5. Evaluating
6. Creating

The action verbs can be seen in the sample images below.





Action Words for Bloom's Taxonomy					
Knowledge	Understand	Apply	Analyze	Evaluate	Create
define	explain	solve	analyze	reframe	design
identify	describe	apply	compare	criticize	compose
describe	interpret	illustrate	classify	evaluate	create
label	paraphrase	modify	contrast	order	plan
list	summarize	use	distinguish	appraise	combine
name	classify	calculate	infer	judge	formulate
state	compare	change	separate	support	invent
match	differentiate	choose	explain	compare	hypothesize
recognize	discuss	demonstrate	select	decide	substitute
select	distinguish	discover	categorize	discriminate	write
examine	extend	experiment	connect	recommend	compile
locate	predict	relate	differentiate	summarize	construct
memorize	associate	show	discriminate	assess	develop
quote	contrast	sketch	divide	choose	generalize
recall	convert	complete	order	convince	integrate
reproduce	demonstrate	construct	point out	defend	modify
tabulate	estimate	dramatize	prioritize	estimate	organize
tell	express	interpret	subdivide	find errors	prepare
copy	identify	manipulate	survey	grade	produce
discover	indicate	paint	advertise	measure	rearrange
duplicate	infer	prepare	appraise	predict	rewrite
enumerate	relate	produce	break down	rank	role-play
listen	restate	report	calculate	score	adapt
observe	select	teach	conclude	select	anticipate
omit	translate	act	correlate	test	arrange
read	ask	administer	criticize	argue	assemble
recite	cite	articulate	deduce	conclude	choose
record	discover	chart	devise	consider	collaborate
repeat	generalize	collect	diagram	critique	collect
retell	give examples	compute	dissect	debate	devise
visualize	group	determine	estimate	distinguish	express
	illustrate	develop	evaluate	editorialize	facilitate
	judge	employ	experiment	justify	imagine
	observe	establish	focus	persuade	infer
	order	examine	illustrate	rate	intervene
	report	explain	organize	weigh	justify
	represent	interview	outline		make
	research	judge	plan		manage
	review	list	question		negotiate
	rewrite	operate	test		originate
	show	practice			propose
	trace	predict			reorganize
	transform	record			report
		schedule			revise
		simulate			schematize
		transfer			simulate
		write			solve
					speculate
					structure
					support
					test
					validate

### 2.2.7 Content Mapping

The consortia established yet another template (excel spreadsheet) to support the partnership in the design process. This was a three-tiered approach to ensure consistency across all curricula. Firstly, the learning outcomes were mapped against the essential skills and essential knowledge criteria of the occupational profiles.

						1st Draft Programme
3x Core elements: Focus on Missing bits	Soft Skills	ICT (Technologies)	Technical Areas			
<b>Soft</b>						<b>Introduction to sustainable bioeconomy</b> Understanding the bioeconomy Climate change, circularity and sustainability EU and national bioeconomy policies and strategies Benefits for stakeholders and consumers
Health & Safety Awareness	Safety Legislation, Regulations	Working with Machinery	Risk Assessments	Accident & Incident Investigation	Reporting	
Communications	Behaviours	Communication Styles	Types of Communications	Active Listening	Verbal vs Non Verbal Comms	
Team Working	Understanding Teams	Managing Teams	Team Dynamics & Comms	Stages of Team Development		
Conflict Resolution	Interpersonal Conflict	Managing Conflict	Threat & Risk Identification	Responses to Conflict	Conflict Management Styles	
<b>ICT</b>						<b>Biomass and Biofuels</b> Biotechnology – History and Applications Biomass production Biofuels, textiles and packaging Forestry based bioeconomy
Basic Computers	Biotechnology – History and Applications					
Data Entry	Basic Data Analytics	Recording & Tracking				
Basic Microsoft Office Applications	Word	Excel	Email			
<b>Technical Skills</b>						
<b>Essential Skills</b>						<b>Innovations in the Bioeconomy</b> Agri-tech and agricultural products Biobased plastics and products Biorefineries and value from food waste Anaerobic Digestion products
Management of natural resources,	Understanding the bioeconomy	Climate change, circularity and sustainability	EU and national bioeconomy policies and strategies	Benefits for stakeholders and consumers		
Biomass production and transformation	Biomass production	Biomass production and conversion	Biobased plastics and products			
Planning and coordinating production						
Traceability	Biorefineries and value from food waste					
Efficient use of resources and logistics	Biorefineries and value from food	Biobased plastics and products	Forestry based bioeconomy	Biofuels, textiles and packaging		
Production, management of renewable energy and its use,	Anaerobic Digestion products	Biorefineries and value from food	Operation of biorefineries			
By-products and co-products valorisation	Anaerobic Digestion products	Biomass production and conversion	Biomass production			
<b>Essential Knowledge</b>						<b>The changing workplace</b> Biomass production and conversion Agriculture and aquaculture work Operation of biorefineries Skills and development
Bio-economy and circular economy principles	Climate change, circularity and sustainability					
Biobased products and ecosystem services, re-use, recycling, nutrients circulation vs	Biobased plastics and products	Agriculture and aquaculture work				
Food waste reduction	Biorefineries and value from food	Agri-tech and agricultural products				
Energy efficient production methods	Biotechnology – History and App	Biofuels, textiles and packaging	Forestry based bioeconomy			
Knowledge about the forestry and agri-food production chain	Biorefineries and value from food	Agri-tech and agricultural products	Biotechnology – History and App	Biofuels, textiles and packaging	Forestry based bioeconomy	
<b>Work Experience</b>						

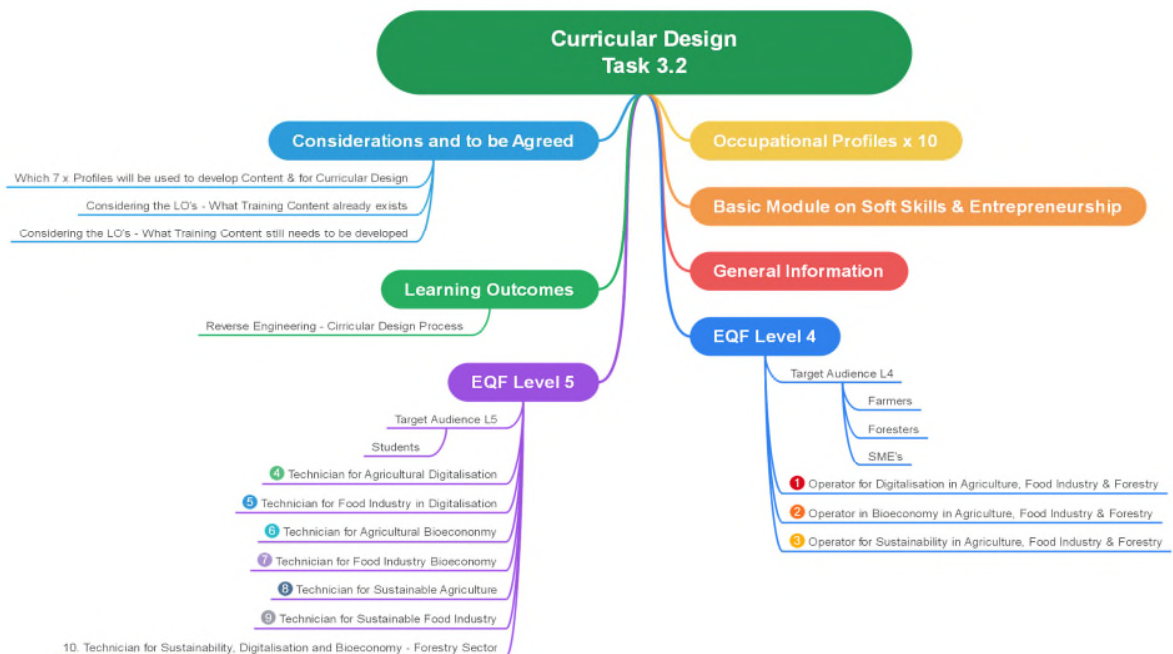
Secondly, was the establishment of learning modules/units and potential lessons, mapped against the learning outcomes.

Module	Lesson	Learning Outcomes
Introduction to the Sustainable Bioeconomy	Understanding the bioeconomy	<ul style="list-style-type: none"> <li>o Appreciate the Bioeconomy Concept and Rationale</li> </ul>
	Climate change, circularity and sustainability	<ul style="list-style-type: none"> <li>o Understand the impact of Climate Change on agricultural production</li> <li>o Understand the impact of global expansion on natural resources</li> </ul>
	EU and national bioeconomy policies and strategies	<ul style="list-style-type: none"> <li>o Appreciate the principles of circularity, Green and sustainability</li> <li>o Understand the development of EU and national bioeconomy policies and strategies</li> </ul>
	Benefits for stakeholders and consumers	<ul style="list-style-type: none"> <li>o Appreciate the benefits of implementing bioeconomy strategies</li> <li>o Climate mitigation and carbon neutrality</li> <li>o Ecosystem and biodiversity restoration</li> <li>o Food sustainability</li> <li>o Clean Energy</li> <li>o Job Creation</li> <li>o New Products and Business Models</li> </ul>
Biomass and Biofuels	Biotechnology – History and Applications	<ul style="list-style-type: none"> <li>o Understand the historical development of biotechnology</li> <li>o Appreciate the applications of biotechnology</li> <li>o Appreciate the biological/chemical processes involved</li> </ul>
	Biomass production	<ul style="list-style-type: none"> <li>o Understand the definition and types of biomass</li> <li>o Understand Bioenergy supply from biomass</li> <li>o Understand the impact on Carbon Emissions</li> </ul>
	Biofuels	<ul style="list-style-type: none"> <li>o Identify the different types of biofuels produced</li> <li>o Appreciate the development of Algae based biofuels</li> <li>o Consider the sustainability of biofuel production</li> </ul>
	Forestry based bioeconomy	<ul style="list-style-type: none"> <li>o The uses of forestry to the bioeconomy</li> <li>o CO2 Capture</li> <li>o Ecosystem Management</li> </ul>

Finally, the overall curricula design map was created whereby the modules, lessons, learning outcomes, assessments, learning methodologies and the duration of hours for each learning event was mapped together to validate the quality assurance of the process of curricula design.

Module	Lesson	Learning Outcomes	Assessment	Methodology (online, class-room, virtual)	No of Hours (consider to breakdown by lesson)	
Introduction to the Sustainable Bioeconomy	Understanding the bioeconomy	o Appreciate the Bioeconomy Concept and Rationale	<b>Examination Theory</b> Multiple Choice Exam with 20 questions. Each Question worth 2 marks Total 40 marks  <b>Assessment Value = 40%</b>	class room / virtual	12 in-class, 12 virtual	
	Climate change, circularity and sustainability	o Understand the impact of Climate Change on agricultural production o Understand the impact of global expansion on natural resources		class room / virtual	4 in-class, 8 virtual	
	EU and national bioeconomy policies and strategies	o Appreciate the principles of circularity, Green and sustainability o Understand the development of EU and national bioeconomy policies and strategies		class room / virtual	4 in-class, 8 virtual	
	Benefits for stakeholders and consumers	Appreciate the benefits of implementing bioeconomy strategies o Climate mitigation and carbon neutrality o Ecosystem and biodiversity restoration o Food sustainability o Clean Energy o Job Creation o New Products and Business Models		class room / virtual	4 in-class, 8 virtual	
Biomass and Biofuels	Biotechnology – History and Applications	o Understand the historical development of biotechnology o Appreciate the applications of biotechnology o Appreciate the biological/chemical processes involved	<b>Assignment</b> Suggest and assignment with a total value of 20 marks  <b>Assessment Value = 20%</b>	online / virtual	14 virtual	
	Biomass production	o Understand the definition and types of biomass o Understand Bioenergy supply from biomass o Understand the impact on Carbon Emissions		class room	10 in-class	
	Biofuels	o Identify the different types of biofuels produced o Appreciate the development of Algae based biofuels o Consider the sustainability of biofuel production o The uses of forestry to the bioeconomy		flipped classroom / class room	14 in-class	

## 2.3 curricula Design Mind Map



## 3 Occupational Profiles and the Curricular

### 3.1 curricula Identification

In the selection of the curricula and agreeing which curricula to design was the starting point of the design process. The first step in the process was to agree which of the 7/10 occupational profiles would form the basis of the programme to be delivered. Essential to this was knowing and understanding the requirements of the EQVET Recognition system and the breakdown of the occupational profiles based on the EQF Level 4 and EQF Level 5 positioning.

Whilst ten occupational profiles were developed. The curricula design only took into consideration seven of these profiles for curricula design. The occupation profiles had previously been prioritised in Work Package 2 (Task 2.2) already considering the EQF levels (L4 or L5). The selected 7/10 occupational profiles are as follows:

EQF Level 4:

1. Operator for bioeconomy in agriculture and food-industry and forestry
2. Operator for sustainability in agriculture and food-industry and forestry
3. Operator for digitalisation in agriculture and food-industry and forestry

EQF Level 5:

4. Technician for food industry sustainability
5. Technician for food industry digitalisation
6. Technician for Agriculture digitalisation
7. Technician for Agriculture sustainability

### 3.2 Skills and Competencies

Each occupational profile had identified a series of skills and competencies under the following categories:

- Essential Skills
- Essential Knowledge
- Optional Skills
- Optional Knowledge

When designing the curricula more focus was placed on the essential skills and essential knowledge. However, the design process also considered other elements of the overall project such as the Skills Gaps identified in both work packages 1 and 2 and the future trends. The overall purpose of this approach was to future proof industry through the development of skills and talent, being cognisant of both current and future skills requirements.

## 4 curricula Design Reports

### 4.1 Operator for bioeconomy in agriculture and food-industry and forestry

For this occupational profile and curricula design, the consortia (UHOH, CEPI, FJ-BLT, ICOS and AP) worked in harmony to design the learning outcomes, the modular approach and then the assessment criteria for each of the curricula. Following this, the delivery methodology was agreed, to ensure it encompassed all elements of the programme, to include, classroom based (in-person), online (eLearning and virtual), work-based learning and the assessment of learners.

Once the general structure was agreed, the consortia identified any existing materials among the partnership and also identified any gaps in training content. This allowed the partners to focus on the key requirements to fulfil the curricula as a whole, which in turn set the scene for Task 3.4 Training Content Creation.

The overall curriculum was agreed and proposed to the broader partnership for input and review and was subsequently finalised.

The curriculum for this Occupational profile is attached as Appendix 1.

### 4.2 Operator for sustainability in agriculture and food-industry and forestry

For this occupational profile and curricula design, the consortia (Aeres, AC3A and UCLM) worked collaboratively with partners from the Level 5 Sustainability Curriculars' to design a singular approach to the overall sustainability curricula (Technician for food industry sustainability and Technician for Agriculture sustainability). It was agreed that the level 4 curricula would focus on the practical skills associated with sustainability and that the level 5 curricula would focus more on management practices and orientations.

The collaborating partners agreed the learning outcomes, the modular approach and then the assessment criteria for each of the curricula. Following this, the delivery methodology was agreed, to ensure it encompassed all elements of the programme, to include, classroom based (in-person), online (eLearning and virtual), work-based learning and the assessment of learners.

Once the general structure was agreed, the consortia identified any existing materials among the partnership and also identified any gaps in training content. This allowed the partners to focus on the key requirements to fulfil the curricula as a whole, which in turn set the scene for Task 3.4 Training Content Creation.

The overall curriculum was agreed and proposed to the broader partnership for input and review and was subsequently finalised.

The curriculum for this Occupational profile is attached as Appendix 2.

### 4.3 Operator for digitalisation in agriculture and food-industry and forestry

For the occupational profile and curricula design for the operator for digitalisation in agriculture, food-industry and forestry, the consortia (AGRAR+, AERES, CEPI, CERTH, FJ-BLT and LVA) worked together with partners from the Level 5 Digitalisation Curriculars' to design a singular approach to the overall digitalisation curricula (Technician for food industry digitalisation and Technician for Agriculture digitalisation). The working group agreed that the level 4 curricula would focus on the practical skills associated with digitalisation and that the level 5 curricula would focus more on management practices and work preparation.

The partners defined the learning outcomes. They decided a modular approach for the digitalisation curricula and then the assessment criteria for each of the curricula. The teaching methods adopted were those set out in the programme, i.e. face-to-face teaching, online teaching (e-learning and virtual learning), work-based learning and learner assessment. According to the defined learning outcomes, search for existing material was done. For missing material responsible partners were identified. They had to prepare the material till a delivery date.

The entire curriculum was submitted to the partners for review and correction. The changes were collected and accepted in the document by the lead partner and thus finalised.

The curriculum for this Occupational profile is attached as Appendix 3.

### 4.4 Technician for food industry sustainability

For this occupational profile and curricula design, the consortia (UCLM, AC3A and Aeres) worked collaboratively with partners from the Level 4 Sustainability Curriculars' to design a singular approach to the overall sustainability curricula (Operator for sustainability in agriculture and food-industry and forestry; Technician for food industry sustainability and Technician for Agriculture sustainability). It was agreed that the level 4 curricula would focus on the practical skills associated with sustainability and that the level 5 curricula would focus more on management practices and orientations.

The collaborating partners agreed the learning outcomes, the modular approach and then the assessment criteria for each of the curricula. Following this, the delivery methodology was agreed, to ensure it encompassed all elements of the programme, to include, classroom based (in-person), online (eLearning and virtual), work-based learning and the assessment of learners.

Once the general structure was agreed, the consortia identified any existing materials among the partnership and also identified any gaps in training content. This allowed the partners to focus on the key requirements to fulfil the curricula as a whole, which in turn set the scene for Task 3.4 Training Content Creation.

The overall curriculum was agreed and proposed to the broader partnership for input and review and was subsequently finalised.

The curriculum for this Occupational profile is attached as Appendix 4.



## 4.5 Technician for food industry digitalisation

For the occupational profile and curricula design for the technician for food-industry digitalisation, the task was driven by the lead partner responsible INFOR in conjunction with UNITO. Partners from the Level 4 and 5 Digitalisation Curriculars' (CERTH, FJ-BLT, PA) also collaborated to design a singular approach to the overall digitalisation curricula (Technician for Agriculture digitalisation and Operator for digitalisation in agriculture and food-industry and forestry). It was agreed that the level 4 curricula would focus on the practical skills associated with digitalisation and that the level 5 curricula would focus more on management practices and orientations.

The partners agreed the units, the lessons and the learning outcomes, and then the assessment criteria for each of the units. Following this, the delivery methodology was agreed, to ensure it encompassed all elements of the programme, to include, classroom based (in-person), online (eLearning and virtual), work-based learning and the assessment of learners.

The overall curriculum was agreed and proposed to the broader partnership for input and review and was subsequently finalised.

The curriculum for this Occupational profile is attached as Appendix 5.

## 4.6 Technician for Agriculture digitalisation

For the occupational profile and curricula design for the technician for agriculture digitalisation, the task was predominantly driven by the lead partner responsible (PA), where they worked with their organisational stakeholders and advisors, to develop an initial proposal and proposed learning outcomes to others within the partnership. Thereafter, the consortia (PA, AP & CERTH) worked together to prioritise learning outcomes. The partners then tweaked and defined the learning outcomes further and were also cognisant of the level 4 "Operator for digitalisation in agriculture and food-industry and forestry" and how the level 5 profile was a step up in terms of learning outcomes versus the level 4 profile and subsequent curricula.

They decided a modular approach for the digitalisation curricula and then the assessment criteria for each of the curricula. The teaching methods adopted were those set out in the programme, i.e. face-to-face teaching, online teaching (e-learning and virtual learning), work-based learning and learner assessment. According to the defined learning outcomes, search for existing material was done. For missing material responsible partners were identified.

The curriculum for this Occupational profile is attached as Appendix 6.

The working group agreed that the level 4 curricula would focus on the practical skills associated with digitalisation and that the level 5 curricula would focus more on management practices and work preparation.

## 4.7 Technician for Agriculture sustainability

For this occupational profile and curricula design, the consortia (AC3A, AERES, WUR and UCLM) worked collaboratively with partners from the Level 5 Sustainability Curriculars' to design a singular approach to the overall sustainability curricula (Technician for food industry sustainability and Technician for Agriculture sustainability). It was agreed that the level 4 curricula would focus on the practical skills associated with sustainability and that the level 5 curricula would focus more on management practices and orientations.

Where curricula overlapped across both the level 4 and Level 5 profiles, it was agreed that the distinction would be based on the commitment of learners and an increase in intensity based on the learning objectives to be achieved, where the level 5 learning outcomes are more management orientated and the level 4 learning outcomes, were more technical orientated, in consideration of learner capabilities at each level.

The collaborating partners agreed the learning outcomes, the modular approach and then the assessment criteria for each of the curricula. Following this, the delivery methodology was agreed, to ensure it encompassed all elements of the programme, to include, classroom based (in-person), online (eLearning and virtual), work-based learning and the assessment of learners.

Once the general structure was agreed, the consortia identified any existing materials among the partnership and also identified any gaps in training content. This allowed the partners to focus on the key requirements to fulfil the curricula as a whole, which in turn set the scene for Task 3.4 Training Content Creation.

The overall curriculum was agreed and proposed to the broader partnership for input and review and was subsequently finalised.

The curriculum for this Occupational profile is attached as Appendix 7.

## 5 Conclusion

The curricula design process was confusing needless to say and the partnership struggled to come to grips with designing a curriculum that had so much potential content, that it made it difficult to remain focused on the overall requirements of the project.

There was a delay in completing the curricula design process, as partners lost sight of the design mechanism, and started focussing on the content creation process, which caused further confusion. It was only once the partnership physically got together that the design shape started making more sense. Whilst the processes were in place, there appeared to be a lack of clarity, which caused partners to go in several different directions.



Ultimately, once the focus was re-established, the partnership was able to move past this and were able to agree and complete the task at hand.

It should be noted that the curricula design process, whilst robust, also has some limitations, enhanced by the elaboration of training content creation, due to take place in task 3.4. Essentially the design process is but a mere plan for what the potential curricula would look like to help focus the development of content, aligned with the project objectives and deliverables. It is recognised that the curricula could change and also be adapted in line with the modular approach, which could and would ultimately be used across different jurisdictions across the partnership. In particular the pilot programmes will run as outlined in WP4 of the project.

## 6 References

Anderson, L.W., Krathwohl, D.R., Airasian, P.W., Cruikshank, K.A., Mayer, R.E., Pintrich, P.R., Raths, J., Wittrock, M.C. (2001). A Taxonomy for Learning, Teaching, and Assessing: A revision of Bloom's Taxonomy of Educational Objectives. New York: Pearson, Allyn & Bacon.

Krathwohl, D. R. (2002). A revision of bloom's taxonomy: An overview. *Theory into Practice* 41(4), 212-218

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## 7 Appendices

**Appendix 1** – Curriculum for the “Operator for bioeconomy in agriculture and food-industry and forestry” occupational profile, EQF 4.

**Appendix 2** – Curriculum for the “Operator for sustainability in agriculture and food-industry and forestry” occupational profile.

**Appendix 3** – Curriculum for the “Operator for digitalisation in agriculture and food-industry and forestry” occupational profile.

**Appendix 4** – Curriculum for the “Technician for food industry sustainability” occupational profile.

**Appendix 5** – Curriculum for the “Technician for food industry digitalisation” occupational profile.

**Appendix 6** – Curriculum for the “Technician for Agriculture digitalisation” occupational profile.

**Appendix 7** – Curriculum for the “Technician for Agriculture sustainability” occupational profile.

**Appendix 8** – Curriculum for the “Soft Skills Module” to be incorporated across all 7/10 occupational profiles.

**Appendix 9** – Occupational Profile Information

## 7.1 Appendix 1 – curricula for the “Operator for bioeconomy in agriculture and food-industry and forestry” occupational profile. EQF 4

### Component Details

<b>Title</b>	Operator in Bioeconomy in Agriculture, Food Industry and Forestry
<b>Level</b>	4
<b>Total Hours</b>	680
<b>Purpose</b>	<p>The purpose of this award is to equip the learner with the relevant knowledge, skill and competence to participate in the bioeconomy, across the agriculture, food and forestry sectors.</p> <p style="text-align: center;">OR</p> <p>The purpose of this award is to equip the learner with the knowledge of the challenges and opportunities presented to stakeholders and consumers as we transition to a bioeconomy.</p>
<b>Learning Outcomes</b>	<p>Learners will be able to:</p> <ol style="list-style-type: none"> <li>1 Understand the principles of a sustainable bioeconomy.</li> <li>2 Appreciate how EU and national policies are promoting this transition</li> <li>3 Understand the range of agricultural and bio-renewable product opportunities</li> <li>4 Appreciate the different technologies used in developing a bioeconomy</li> <li>5 Understand the roles and skills needed to take advantage of new work opportunities.</li> </ol>

**Assessment Techniques**  
standards of

In order to demonstrate that they have reached the knowledge, skill and competence identified in all the learning outcomes, learners are required to complete the assessment(s) below.

The assessor is responsible for devising assessment instruments (e.g., project and assignment briefs, examination papers), assessment criteria and mark sheets, consistent with the techniques identified below and EQF assessment requirements.

Programme validation will require providers to map each learning outcome to its associated assessment technique. All learning outcomes **must** be assessed and achieved in accordance with the **minimum intended module learning outcomes** set out in the validated programme.

Portfolio / Collection of Work	60 %
Skills Demonstration	40 %

## Description

### **Portfolio / Collection of Work**

*A portfolio or collection of work is a collection and/or selection of pieces of work produced by the learner over a period of time that demonstrates achievement of a range of learning outcomes. The collection may be self-generated or may be generated in response to a particular brief or tasks/activities devised by the assessor.*

### **Skills Demonstration**

*A skills demonstration is used to assess a wide range of practical based learning outcomes including practical skills and knowledge. A skills demonstration will require the learner to complete a task or series of tasks that demonstrate a range of skills.*

## Proposed Programme Outline

### Bioeconomy Awareness (Operator Level)

#### Course Aim:

The purpose of this course is to equip the learner with the knowledge of the challenges and opportunities presented to stakeholders and consumers as we transition to a bioeconomy

#### Course Objectives:

On completion of this training course, you will be able to:

- Understand the principles of a sustainable bioeconomy.
- Appreciate how EU and national policies are promoting this transition
- Understand the range of agricultural and bio-renewable product opportunities
- Appreciate the different technologies used in developing a bioeconomy
- Understand the roles and skills needed to take advantage of new work opportunities.

#### Course Delivery:

The course is delivered in blended learning format with learners having access to online eLearning materials supplemented by classroom workshops. Full course notes are provided.

#### Course Structure:

##### Module 1 Introduction to sustainable bioeconomy

- Understanding the bioeconomy
- Climate change, circularity and sustainability
- EU and national bioeconomy policies and strategies
- Benefits for stakeholders and consumers

##### Module 2 Biomass and Biofuels

- Biotechnology – History and Applications
- Biomass production
- Biofuels, textiles and packaging
- Forestry based bioeconomy

##### Module 3 Innovations in the Bioeconomy

- Agritech and agricultural products
- Biobased plastics and products
- Biorefineries and value from food waste
- Anaerobic Digestion products

##### Module 4 The changing workplace

- Biomass production and conversion
- Agriculture and aquaculture work
- Operation of biorefineries
- Skills and development

### Certification and Assessment:

On successful completion of this training the learner will receive a course completion certificate.

### From the Occupational Profile:

From the core curriculum (Module Soft-skills and Entrepreneurship) – Annex I ESSENTIAL SKILLS

- Management of natural resources,
- Biomass production and transformation
- Planning and coordinating production
- Traceability
- Efficient use of resources and logistics
- Production, management of renewable energy and its use,
- By-products and co-products valorisation

#### ESSENTIAL KNOWLEDGE

- Bio-economy and circular economy principles
- Biobased products and ecosystem services, re-use, recycling; nutrients circulation vs nutrients removal
- Food waste reduction
- Energy efficient production methods
- Knowledge about the forestry and agri-food production chain

### Duration

120 hours online learning  
 180 hours in-class learning  
 360 hours work-based learning  
 20 hours of Assessment

**Summary of Content**

Unit	Lesson	Learning Outcomes	Assessment	Methodology	No of Hours	
				(Online, class-room, virtual)	(Consider to breakdown by lesson)	
Introduction to the Sustainable Bioeconomy	Understanding the bioeconomy	Appreciate the Bioeconomy Concept and Rationale		Classroom / virtual	12 in-class, 12 virtual	
	Climate change, circularity and sustainability	Understand the impact of Climate Change on agricultural production		Classroom / virtual	4 in-class, 8 virtual	
		Understand the impact of global expansion on natural resources				
	EU and national bioeconomy policies and strategies	Appreciate the principles of circularity, Green and sustainability	<b>Examination Theory</b>	Classroom / virtual	4 in-class, 8 virtual	
		Understand the development of EU and national bioeconomy policies and strategies	Multiple Choice Exam with 20 questions.			
	Benefits for stakeholders and consumers		Appreciate the benefits of implementing bioeconomy strategies	Each Question worth 2 marks	Classroom / virtual	4 in-class, 8 virtual
			Climate mitigation and carbon neutrality	Total 40 marks		
			Ecosystem and biodiversity restoration			
			Food sustainability	<b>Assessment Value = 40%</b>		
			Clean Energy			
Job Creation						
Biomass and Biofuels	Biotechnology – History and Applications	Understand the historical development of biotechnology		online / virtual	14 virtual	
		Appreciate the applications of biotechnology				
		Appreciate the biological/chemical processes involved				
	Biomass production	Understand the definition and types of biomasses		Classroom	10 in-class	
		Understand Bioenergy supply from biomass				
		Understand the impact on Carbon Emissions	<b>Assignment</b>			



	Biofuels	Identify the different types of biofuels produced	Suggest and assignment with a total value of 20 marks	flipped classroom / classroom	14 in-class
		Appreciate the development of Algae based biofuels			
		Consider the sustainability of biofuel production			
	Forestry based bioeconomy	The uses of forestry to the bioeconomy	<b>Assessment Value = 20%</b>	online / field-trip	12 in-class, 10 virtual
		CO2 Capture			
		Ecosystem Management			
		Bioproducts from forestry			
Innovations in the Bioeconomy	Agri-tech and agricultural products	Use of digital technologies in agriculture		Classroom / field trip / online	9 in-class, 6 virtual
		Traceability of agricultural ingredients			
		Nutraceuticals and functional foods			
		Aquaculture products			
	Biorefineries and value from food waste	By-products, Coproducts and Valorisation	<b>Portfolio of Coursework</b>	Classroom / field trip / online	9 in-class, 6 virtual
		Biorefinery processes and Products	Suggest a portfolio of 3 pieces of coursework worth a total of 10 marks		
		Industrial Biorefineries	(1 – 4 marks, 2 – 4 marks and 3 – 2 marks)		
		Farm based biorefineries			
			<b>Assessment Value = 10%</b>		
	Anaerobic Digestion process	Understand how Anaerobic Digesters work		Classroom / virtual / online	12 in-class, 6 virtual
	Biobased plastics and products	Bio textiles		Classroom / online / field trip	6 in-class, 6 virtual
		Biobased plastics			
Biobased building products					

The Changing Workplace	Management of Natural Resources	Understand the potential new roles and work opportunities	<b>Portfolio of Coursework</b> Suggest a portfolio of 3 pieces of coursework worth a total of 10 marks (1 – 4 marks, 2 – 4 marks and 3 – 2 marks)	flipped classroom / online	3 in-class, 8 virtual
	Biomass production and conversion	Understand the future skill sets needed		Classroom / online	3 in-class, 8 virtual
	Agriculture and aquaculture work	Appreciate how bioeconomy strategies will impact agricultural production	<b>Assessment Value = 10%</b>	online / field trip	10 in-class, 4 virtual
	Operation of biorefineries	suggestion: Students will get a basic knowledge of how biorefineries operate		flipped classroom / field trip	20 in-class, virtual
Health & Safety Awareness	Safety legislation and Regulations	Analyse the duties of employers and employees as specified in current Safety, Health and Welfare at work legislation	First choice <b>Assignment</b> To conduct a safety risk assessment worth 20 marks  <b>Or</b>  Second choice <b>Skills Demonstration</b>	Classroom / online	
	Safety Statements	Examine the role of the Health and Safety Authority	To show how to use a fire extinguisher (video Evidenced)	Classroom / virtual	

	Risks and Controls	Explain the causes, prevention, emergency procedures, reporting and recording of accidents and dangerous occurrences	Worth 20 marks	Classroom / virtual	
	Accident Investigation and Reporting	Analyse the causes and prevention of fire related events to include identification of emergency procedures, the fire triangle and fire equipment		Online / Virtual	
	Fire Safety	Comment on specific hazards and risks when working with equipment to include mechanical and electrical equipment		Classroom / Online	
	Working with machinery	Investigate how personal protective equipment (PPE) is used in the workplace	<b>Assessment Value = 20%</b>	Online / Virtual	
			<b>Total Assessment Value = 100%</b>		

## 7.2 Appendix 2 – curricula for the “Operator for sustainability in agriculture and food-industry and forestry” occupational profile.

### Component Details

<b>Title</b>	Operator in Sustainability in Agriculture, Food Industry and Forestry
<b>Level</b>	4
<b>Total Hours</b>	680
<b>Purpose</b>	The purpose of this award is to equip the learner with the relevant knowledge, skills and competencies to participate practically in sustainability, across the agriculture, food and forestry sectors.
<b>Learning Objectives</b>	Learners will be able to:
	<ol style="list-style-type: none"> <li>1. Explain the underlying reasons why sustainability in agriculture, forestry and agri-food production is important and urgent.</li> <li>2. Explain the interactions between biodiversity, soil, water and air, and the importance of those to sustaining a healthy environment for human life and for agriculture, forestry and agri-food production</li> <li>3. Minimise damage to biodiversity, soil, water and air, during agriculture, forestry and agri-food production activities.</li> <li>4. Practically apply methods and techniques that enhance biodiversity, soil health, water quality and air quality, during agriculture, forestry and agri-food production activities.</li> <li>5. Prove awareness and knowledge of the main European policies and regulatory frameworks around sustainable production, including organic certification.</li> </ol>

**Assessment Techniques** In order to demonstrate that learners have reached the standards of knowledge, skill and competence identified in all the learning outcomes, learners are required to complete the assessment(s) below.

The assessor is responsible for devising assessment instruments and situations (e.g. project and assignment briefs, examination papers, locations and tools for practicals), assessment criteria and mark sheets, consistent with the techniques identified below and EQF assessment requirements.

Programme validation will require providers to map each learning outcome to its associated assessment technique. All learning outcomes **must** be assessed and achieved in accordance with the **minimum intended module learning outcomes** set out in the validated programme.

Portfolio / Collection of Work	40 %
Skills Demonstration	20 %
Assignment	10 %
Examination theory	30 %

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## Description

### Portfolio / Collection of Work

A portfolio or collection of work is a collection and/or selection of pieces of work produced by the learner over a period of time that demonstrates achievement of a range of learning outcomes. The collection may be self-generated or may be generated in response to a particular brief or tasks/activities devised by the assessor.

### Skills Demonstration

A skills demonstration is used to assess a wide range of practical based learning outcomes including practical skills and knowledge. A skills demonstration will require the learner to complete a task or series of tasks that demonstrate a range of skills.

### Assignment

An assignment is an exercise carried out in response to a brief with specific guidelines as to what should be included. An assignment is usually of short duration and may be carried out over a specified period of time.

### Examination - Theory

An examination provides a means of assessing a learner's ability to recall and apply knowledge, skills and understanding within a set period of time and under clearly specified conditions.

A theory-based examination assesses the ability to recall, apply and understand specific theory and knowledge.

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## Proposed Programme Outline

### Sustainability Awareness Course Description

### Operator for Sustainability in Agriculture, Food Industry and Forestry

#### Course Aim:

The purpose of this course is to equip the learner with the relevant knowledge, skills and competences to participate in sustainable production in agriculture and agri-food sectors.

#### Course Objectives:

1. Explain the underlying reasons why sustainability in agriculture, forestry and agri-food production is important and urgent.
2. Explain the interactions between biodiversity, soil, water and air, and the importance of those to sustaining a healthy environment for human life and for agriculture, forestry and agri-food production
3. Minimise damage to biodiversity, soil, water and air, during agriculture, forestry and agri-food production activities.
4. Practically apply methods and techniques that enhance biodiversity, soil health, water quality and air quality, during agriculture, forestry and agri-food production activities.
5. Prove awareness and knowledge of the main European policies and regulatory frameworks around sustainable production, including organic certification.
6. Show awareness of the importance of health and safety for the worker.

#### Course Delivery:

The course is delivered in blended learning format with learners having access to online eLearning materials supplemented by classroom workshops. Full course notes are provided.

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## Course Structure:

### Module 1 Introduction to sustainability

- Sustainability
- Climate change
- Adaptation and mitigation
- Management of resources
- System thinking/ Systemic approach
- Life cycle assessment (aspects)

### Module 2 Biodiversity

- What is biodiversity
- Introduction on biodiversity
- Impact on biodiversity in relation to human actions

### Module 3 Soil functioning and preservation

- Soil – General introduction
- Soil as a resource
- Soil impacted by Agri- and Food activities

### Module 4 Water Agriculture and in agri-food industry

- General introduction on Water
- Water quantity
- Water quality
- Wastewater as environmental emission
- Prevention of damage to water bodies
- Water for agri-food

### Module 5 Air and Atmosphere

- GHG emissions reduction
- Emissions from livestock
- Emissions from transport and logistics
- Climate change



## Module 6 Energy efficiency

- Energy sources
- What is renewable energy
- Link between energy and climate change
- Direct and indirect costs of energy
- Energy management
- Agri and food industry energy consumption
- Agri and food industry producing renewable energy
- By-products: sources for energy production

## Module 7 Good agricultural practices

- Crop rotation
- New Crop techniques
- Pest and disease management
- Agro-environmental practices
- Low emissions spreading spraying equipment and practices
- Integrated pest and disease management
- Crop diversification
- Conservation farming
- Grassland management
- Smart farming (Introduction)

## Module 8 Waste- and by-product management

- Characterization of waste
- Waste prevention and minimization I: general concepts
- Waste prevention and minimization II: stock management
- Waste prevention and minimization III: changes in manufacturing processes
- Waste prevention and minimization IV: recovery or resources

## Module 9 Social Sustainability

- Social sustainability for the worker

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## Module 10 Sustainability Policy and regulations: The Law

- Policy
- Regulatory frameworks
- Certification

### **Certification and Assessment:**

On successful completion of this training the learner will receive a course completion certificate.

### **Duration**

120 hours online learning

180 hours in-class learning

360 hours work-based learning

20 hours of Assessment

### Summary of Content

Unit/module	Lesson	Learning Outcomes	Assessment	Methodology	No of hrs
Introduction to Sustainability	Sustainability : introduction	Explain the 3 dimensions of sustainability and their interactions	Combination of: - Theory examination - Portfolio of coursework - Assignments	classroom / virtual / online	1
		Ecosystems - introduction Balances and in-balances		classroom / virtual / online	1
	Climate change	Explain how climate works (cycles etc). Proof of change and human causes - reasons causing climate change - impacts - Modern Tools		classroom / virtual / online	2
	Adaptation/mitigation	List 3 methods to reduce GHG (C,CH <sub>4</sub> etc) emission List 3 methods to bind GHG (C,CH <sub>4</sub> etc) emission List 3 methods how farmers can adapt to climate change. Provide examples of practices that farmers can implement		classroom / virtual / online	2

	Management of resources	Know essential resources Explain vital resources Explain Threats Explain ways to mitigate threats		classroom / virtual / online	3
	Systems approach - System Thinking	Explain that every aspect in an (agro)ecosystem interacts with other aspects		Introduction: classroom / virtual / online Followed by: Assignment	1
	Life Cycle Assessment (Aspects) Introduction to LCA concept: the impacts of the inputs and outputs	Explain what is the Life Cycle of a product. Examples of environmental problems from production processes Explain how the tool of environmental management can evaluate the environmental behavior of a product		Introduction: classroom / virtual / online Followed by: Assignment	1
		Draw and describe a lifecycles assessment of a certain resource/product, including economic and social aspects.		Introduction: classroom / virtual / online Followed by: Assignment	1

Soil Functioning and Preservation	Soil: general introduction, types and specification for uses	Be able to name 5 samples of different soil types and explain their characteristics	Combination of: - Portfolio of coursework - Skills demonstration	Practicals	2
		Be able to carry out sustainable and efficient soil management practices		Demo/ field visit	2
	Soil as a resource	Explain several Soil Nutrients and what effect they have on plants. Explain which factors contribute to soil fertility. Describe soil problems (corrosion, acidification, soil pollution with heavy metals, loss of organic matter etc.)		Practicals/ assignment/ field visit	2
		Soil impacted by Agri and Food activities			
				Describe at least 3 methods to improve soil fertility and actions to combat desertification	Practicals/ assignment/ field visit
	Water in Agriculture			Draw the water cycle (ocean, clouds, rain, rivers).	Combination of: - Theory

and in Agri-Food Industry	Water : general introduction. sources, availability, specification for uses	Write a short paper on a case where Sustainable and Efficient water use has been developed	examination - Portfolio of coursework - Skills demonstration	Practical	2
	Water - quantity	Explain about availability, demands, conflicts of use, regulations on water use.		Assignment	2
		Explain Sustainable Irrigation principles. Examples of rational irrigation technics that farmers can implement. Know techniques to identify water-sensitive stages of crop growth		Workbased	10
		Explain Ground Water Management (as a resource) in different situations.		Workbased	3
		Describe how to implement rainwater harvesting & soil water retention and be able to apply relevant techniques		Practical and Workbased	4
	Water quality (I). Treatment technologies for water conditioning	To predict water quality based on its origin. To Identify the unit operation to remove pollutants. To know the main types of disinfecting agents and their main characteristics.		classroom / virtual / online Incl. Field visit / demonstration	4

	Water quality (II). Uses and treatment technologies for water reclamation	To recognize the main uses of reclaimed water and related legislation. To identify the unit operations to be used depending on the use of reclaimed water.		Incl. Field visit	4
	Wastewater: Emission and treatment	To know wastewater characterization parameters and the values for discharge to the environment or sewage system. To be able to identify and describe the fundamentals of wastewater treatment technologies		classroom / virtual / online	10
	Prevention of damages to Water bodies	Be able to carry out good practices of Nutrient Management, Application Practices and Use of Pesticides		Extra practicals	6
		Be able to carry out good agricultural practices in the management of water, energy and other means of production		Extra practicals / demo's	10

	Water in Agrifood Industry	<p>To know water requirements for heat exchange, transformation processes and cleaning.</p> <p>To be able to identify and classify the different types of wastewaters</p> <p>To identify and know the main industrial water and wastewater treatment technologies.</p>		classroom / virtual / online Extra practicals / demo's	6
Air and atmosphere	GHG's Emissions reduction,	<p>Explain about Agri: emissions from machinery and fertilization</p> <p>Make a chart showing emissions from different machines.</p> <p>Describe which practices farmers should adapt in order to reduce the emissions</p>	<p>- Theory examination</p> <p>- Portfolio of coursework</p>	classroom / virtual / online	4
	Emissions from Livestock	<p>Agri: emission from livestock (animals, buildings, manure)</p> <p>Provide a chart showing emissions from livestock during the last years/ decades.</p> <p>Provide examples of practices that can reduce the emissions</p>		classroom / virtual / online Includes practicals	4
	Emission from Transport and logistics	<p>Impacts of importing inputs and exporting food.</p>		classroom / virtual / online Includes practicals	4



		Examples of alternative solutions for zero emissions in transport			
	Climate change	Describe a case where farmers and food industry are affected by climate change		Assignment	2
		Explain how Climate Change affects the general atmosphere, how air pollution is connected with climate change.		classroom / virtual / online Includes practicals	4
Biodiversity	What is biodiversity	Students are able to explain the principle of system thinking that relates to biodiversity Students can make a drawing (schematic) which illustrates the interactions between several organisms	Combination of: - Theory examination - Portfolio of coursework - Skills demonstration	Introducion: classroom / virtual / online Followed by: Assignment	1
		Students can name a number of biodiversity indicators and explain why these are used as indicators		Introducion: classroom / virtual / online Followed by: Assignment	1
		EQF 5: Students carry out a biodiversity assessment-quantification through the use of biodiversity indicators		Introducion: classroom / virtual / online	1

		Students can explain a systems to monitor changes in biodiversity.		Followed by: Assignment	
	Biodiversity as a resource	Explain what Ecosystem services are and give 5 examples (pollination, soil fertility etc.)		classroom / virtual / online	1
		Students write a case-study on the importance of biodiversity for agricultural production		Assignment	3
	Biodiversity impacted by practice	Describe agricultural practices influencing biodiversity in a positive way and which practices having a negative effect		Assignment	2
		Be able to carry out and explain a set number of sustainable practices towards biodiversity		Demonstration and practicals	4
Good Agricultural Practices	Crop Rotation	Explain the characteristics of crop rotations and their management in the field.	Portfolio of coursework and skills demonstration	classroom / virtual / online	2

(Crop husbandry )	New Crop Techniques	Examples of new farming techniques resistant to climate change	classroom / virtual / online Includes field visits	2
	Agro-Environmental Practices	Be able to carry out good environmental practices in agriculture.	classroom / virtual / online Includes field visits	2
	Low emissions Spreading/Spraying Equipment & Practices	Operate plant protection product application equipment correctly.	classroom / virtual / online Includes practicals	4
	Integrated Pest & Disease Management	To know the method of integrated pest management.	classroom / virtual / online Includes practicals and/or field visits	4
	Crop Diversification	Describe the different types of crop diversification.	classroom / virtual / online Includes field visits	2
	Conservation farming	Explain the general principles of conservation agriculture	classroom / virtual / online Includes field visits	2

	Grassland Management	Explain the general principles of conservation agriculture		classroom / virtual / online Includes field visits	2
	Smart Farming (Introductory Aspects)	Explaining the general principles and future of smart farming.		Classroom / virtual / online Includes practicals and field visits	2
Energy Efficiency	Energy sources	Carbon based & petrol based energy facts	- Theory examination - Portfolio of coursework	classroom / virtual / online	2
	What is renewable energy	What is renewable energy and how can we use it agriculture?		classroom / virtual / online incl assignment	2
	Link between energy and climate change	Advantages of Renewable Energy Sources that make them a solution for energy sufficiency and for the sustainability of the planet		classroom / virtual / online	2
	Direct and indirect costs of energy	Costs of energy (direct and indirect). Comparison of conventional energy production methods costs' to renewable ones		classroom / virtual / online	2

	Energy management	Energy storage and H2 technologies. Electricity transmission and distribution. Smart grid technologies		classroom / virtual / online Includes practicals and field visits	4
	Agri and food industry energy consumption	Energy Efficiency (main measures). Energy saving and efficiency techniques in agrifood industry		Includes practicals and field visits	4
	Agri and food industry producing renewable energy	Ways to produce renewable energy. Practices how to produce renewable energy		classroom / virtual / online Includes practicals and field visits	4
	By-products: sources for energy production	Utilization of By-products, Biomass, digesters, photovoltaic electricity, production of biogas through the use of biomass in order to cover energy needs etc. How can agrifood industries become producers of green energy?		classroom / virtual / online Includes practicals and field visits	4
Waste- and byproduct management	Characterisation of waste	Description of the main types of wastes produced in the agrifood industry. To describe the main treatment technologies. To describe the main ways	- Theory examination	In class/ assignments	4

		of characterization of wastes. (knowledge)	- Portfolio of coursework		
	Waste prevention and minimization I: general concepts	To describe the general types of procedures for waste minimization (knowledge). Exemplification of the procedures with situations of the daily life (understanding)		In class/ assignments	2
	Waste prevention and minimization II: stock management	To describe and to classify the different stock management techniques that can be applied to minimize resources consumed and waste produced in the agrifood industry		In class/ assignments	4
	Waste prevention and minimization III: changes in manufacturing processes	To describe and to classify how changes in manufacturing techniques can be applied to minimize resources consumed and waste produced in the agrifood industry		In class/ assignments	6
	Waste prevention and minimization IV: recovery or resources	To describe and to classify of the different treatment and recovery techniques can be applied to minimize		In class/ assignments	4

		resources consumed and waste produced in the agrifood industry			
Social sustainability	Social sustainability for the worker	Health & Safety (general Awareness), Mental Health Resilience	- Theory examination - Assignment	Classroom / virtual / online Includes assignment	3
Sustainability Policy & Regulations: The Law	Policy	Being able to explain the main European Policy Drivers	- Theory examination - Portfolio of coursework	Classroom / virtual / online Extra assignment	1
		Being able to state the main objectives of CAP		Classroom / virtual / online Extra assignment	1
	Regulatory frameworks	Understand where to source locally available funds for financing of sustainable practices		Classroom / virtual / online Includes practical etc.	4
	Certification	Understand the impact of Organic and "Protected Designation of Origin" - PDO		Classroom / virtual / online Extra assignment	2

### 7.3 Appendix 3 – curricula for the “Operator for digitalisation in agriculture and food-industry and forestry” occupational profile.

#### Component Details

<b>Title</b>	Operator for Digitalisation in Agriculture, Food Industry and Forestry
<b>Level</b>	4
<b>Total Hours</b>	680
<b>Purpose</b>	The purpose of this award is to equip the learner with the relevant knowledge, skill and competence to operate the applications of digitalisation for agriculture, food industry and forestry
<b>Learning Objectives</b>	Learners will be able to:
	<ol style="list-style-type: none"> <li>1 Know the basic principles in Smart Farming and handling principles of agricultural products and foods</li> <li>2 Know the legal framework and safety issues while using autonomous machinery</li> <li>3 Know the basic principles of system integrations and data transfer protocols.</li> <li>4 Plan in advance and organise the use of robots and smart farming applications for their purposes. The learner will be able to plan and understand the roles and skills needed to take advantage of new work opportunities.</li> <li>5 Operate in practice the most typical machines and robots in Smart Farming (e.g. Milking Robots) and solve problems during operation autonomously</li> </ol>



### Assessment Techniques

In order to demonstrate that they have reached the standards of knowledge, skill and competence identified in all the learning outcomes, learners are required to complete the assessment(s) below.

The assessor is responsible for devising assessment instruments (e.g. project and assignment briefs, examination papers), assessment criteria and mark sheets, consistent with the techniques identified below and EQF assessment requirements.

Programme validation will require providers to map each learning outcome to its associated assessment technique. All learning outcomes **must** be assessed and achieved in accordance with the **minimum intended module learning outcomes** set out in the validated programme.

Portfolio / Collection of Work	20%
Skills Demonstration	20%
Assignment	20%
Examination theory	40%

## Description

### **Portfolio / Collection of Work**

A portfolio or collection of work is a collection and/or selection of pieces of work produced by the learner over a period of time that demonstrates achievement of a range of learning outcomes. The collection may be self-generated or may be generated in response to a particular brief or tasks/activities devised by the assessor.

### **Skills Demonstration**

A skills demonstration is used to assess a wide range of practical based learning outcomes including practical skills and knowledge. A skills demonstration will require the learner to complete a task or series of tasks that demonstrate a range of skills.

### **Assignment**

An assignment is an exercise carried out in response to a brief with specific guidelines as to what should be included. An assignment is usually of short duration and may be carried out over a specified period of time.

### **Examination - Theory**

An examination provides a means of assessing a learner's ability to recall and apply knowledge, skills and understanding within a set period of time and under clearly specified conditions.

A theory-based examination assesses the ability to recall, apply and understand specific theory and knowledge.

## Proposed Programme Outline

### Digitalisation Awareness Course Description

### Operator in Digitalisation in Agriculture, Food Industry and Forestry

#### Course Aim:

The purpose of this course is to equip the learner with the knowledge to operate digital applications in Agriculture, Food Industry and Forestry

#### Course Objectives:

**On completion of this training course, you will be able to:**

- know the basic principles in Smart Farming
- know the legal framework and safety issues while using autonomous machinery
- know the basic principles of system integrations and data transfer protocols.
- plan in advance and organise the use of robots and smart farming applications for their purposes
- operate in practice indicative machines and robots in Smart Farming (e.g. Milking Robots) and solve problems during operation autonomously

#### Course Structure

D010A What is digitalisation

D040A Basic remote sensing

D050A Farm management information system

D070A Forestry and Agri-food production chain

D080A Introduction to digitalisation tools and machinery

D090A Control the environment storage

D100A Greenhouse control

D110A Use of robots and drones

D120 Operate digital hardware

D130 Digital sustainability

D180 Practical training with job-specific machinery

D190 Food processing technical skills

### Content Mapping

Unit	Lesson	Learning Outcomes
Introduction to smart farming / digitalisation in Agriculture, Food Industry and Forestry	What is Digitalisation	<ul style="list-style-type: none"> <li>○ Understand comprehensively from different perspectives what is meant by digitalisation</li> <li>○ Ability to describe what is meant by digital innovation</li> <li>○ Ability to describe what is the difference between smart farm and precision farm concepts</li> </ul>
	Basic remote sensing, GPS, and GIS knowledge in Forestry and agri-food production chains	<ul style="list-style-type: none"> <li>○ Ability to describe the main differences in the use of GPS, GIS and RS in agriculture</li> <li>○ Ability to use modern technologies and equipment with high precision positioning systems, geo-mapping and/or automated steering systems for agricultural activities.</li> </ul>
	Farm Management Information Systems (FMIS),  Digital learning/tools	<ul style="list-style-type: none"> <li>○ Ability to describe the concept of FMIS</li> <li>○ Ability to describe importance of management information systems and databases in planning, managing and</li> </ul>

		<p>operating agricultural enterprise and agricultural production.</p> <ul style="list-style-type: none"> <li>○ Ability to describe case examples of different kinds of FMIS in different farm sizes and production lines in agriculture</li> <li>○ Ability to run Farm Management Information Systems and understand outputs</li> <li>○ Ability to explain the main differences between precision animal health systems and traditional animal health systems</li> </ul>
	Forestry and agri-food production chains	<ul style="list-style-type: none"> <li>○ Ability to describe the forestry supply chain principles.</li> <li>○ Ability to summarise the main aspects in agri-food production supply chain management.</li> </ul>
	Introduction to digitalisation tools and machinery	<ul style="list-style-type: none"> <li>○ Ability to find and use mobile phone apps</li> <li>○ Ability to name the various technologies available linked to farming activities and to understand what can be achieved from using them</li> <li>○ Learners are confident in using different kinds of software and online applications.</li> </ul>
System integration and data transfer	Control the environment for storage	<ul style="list-style-type: none"> <li>○ Technician/Operator is able to maintain or ensure the maintenance of cleaning equipment, heating or air conditioning of storage facilities, sensors and the temperature of premises.</li> <li>○ Ability to estimate the benefits and challenges relating to programming DIY vs Outsourcing / Contractors</li> </ul>
	Greenhouse control for irrigation and protected environment conditions	<ul style="list-style-type: none"> <li>○ Ability to compare devices and sensors, schedule irrigation, to set up temperatures, extra-time and CO2 fertilisation</li> </ul>
	Use of robots/drones	<ul style="list-style-type: none"> <li>○ Use semi-autonomous or autonomous machines which automatically carry out complex actions while being guided by digital or electronic software, such as driverless cars, drones and other machines.</li> <li>○ Drones legislation</li> </ul>

	Operate digital hardware	<ul style="list-style-type: none"> <li>○ Understand Canbus/ Isobus principles to connect tractor and equipment</li> <li>○ Operate Canbus/Isobus for connecting tractor and equipment</li> </ul>
	Digital Sustainability	<ul style="list-style-type: none"> <li>○ operate machinery according to application plans and maps to optimise productivity and reduce ecological effects</li> <li>○ Ability to optimise productivity and reduce ecological effects by applying the elements of Digital Farming e.g.: Preparation of application maps and plans for the precise application of seeds, fertiliser and crop protection based on yield- and soil maps</li> </ul>
Operation of typical machines, robots and applications in Smart Farming	Practical training with job-specific machinery/equipment and their maintenance	<ul style="list-style-type: none"> <li>○ Operate motorised agricultural equipment including tractors, balers, sprayers, ploughs, mowers, combines, earthmoving equipment, trucks and irrigation equipment.</li> </ul>
Food processing technical skills	Food processing technical skills	<ul style="list-style-type: none"> <li>○ Ability to describe the fundamentals of food processing.</li> </ul>

### Certification and Assessment:

On successful completion of this training the learner will receive a course completion certificate.

**From the Occupational Profile:**

From the core curriculum (Module Soft-skills and Entrepreneurship) – Annex I

**ESSENTIAL SKILLS**

- Practical training with job-specific machinery/equipment and their maintenance
- Use of robots/drones
- Data handling and analysis, data exchange
- Traceability
- Weather forecast knowledge and tools

**ESSENTIAL KNOWLEDGE**

- Knowledge of technical principles for digital agriculture, industry and forestry, smart systems and technologies introductory aspects; - Basic remote sensing, GPS, GIS knowledge
- Knowledge of Management Information Systems
- Knowledge about the forestry and agri-food production chain - Legal framework when using autonomous machinery
- Industry 4.0
- Circular manufacturing and sustainability aspects

This ensures all essential skills and knowledge have been sufficiently mapped to create learning content and proposed programmes.

**Duration**

120 hours online learning

180 hours in-class learning

360 hours work-based learning

20 hours of Assessment

Total = 680h

Module skills digitalisation EQF4&5 (copy date 2023-01-19)

Unit	Lesson		Learning Outcomes	Content creator	common to operator	common to technician agriculture	common to technician food industry
Introduction to smart farming / digitalisation in agriculture, Food Industry and Forestry	What is Digitalisation	D010A what is digitalisation	Understand comprehensively from different perspectives what is meant by digitalisation	UHOH	2	2	2
		D011A digital innovation	Ability to describe what is meant by digital innovation	UHOH	2	2	2
		D012A SmartFarm vs Precision Agriculture	Ability to describe what is the difference between smart farm and precision farm concept	FJ-BLT	4	4	4
	Technologies by Agricultural Farming Sub-sectors	D020A Technologies by sub sectors	Understanding the availability of digital technologies in different production sectors	CERTH		8	
	Digitalisation & the Impact of Technology	D030A digitalisation and the impact of technology	Ability to summarize how digital technology has evolved in time and can name the future digitalisation trends ("Technological breakthroughs from the early days of farming to 2030 and beyond")	CERTH		4	4
	Basic remote sensing, GPS, and GIS knowledge	D040A Basic remote sensing	The tools involved in geographical mapping and positioning, such as GPS (global positioning systems), GIS (geographical information systems), and RS (remote sensing). LO-suggestion: Ability to describe the main differences in the use of GPS, GIS and RS in agriculture	FJ-BLT	4	4	
		D041A Telematics and Aerial Sensing	Ability to use modern technologies and equipment with high precision positioning systems, geo-mapping and/or automated steering systems for agricultural activities.	FJ-BLT	12	12	
				Ability to describe the concept of FMIS	FJ-BLT	2	2



	Farm Management Information Systems	D051A Farm management concept of FMIS	Ability to describe importance of management information systems and databases in planning, managing and operating agricultural enterprise and agricultural production.	FJ-BLT	2	2	
		D052A Farm management different kinds of FMIS	Ability to describe case examples of different kinds of FMIS in different size farms and production lines in agriculture	ProAgria	4	4	
		D053A Farm management hardware and software configuration	The learner will be able to perform hardware and software configuration to most typical machines and robots and FMIS in Smart Farming	CERTH	4	4	
		D054A Farm management understand outputs	able to run Farm Management Information Systems and understand outputs	UNITO	4	4	
		D055A Farm management precision animal health system	Ability to explain the main differences between precision animal health systems and traditional animal health systems.	AERES	2	2	
	Industry 4.0 circular manufacturing	D060A industry 4.0	Innovative circular manufacturing technologies enhanced with novel production mechanisms and digitalization aspects promoting energy efficient and low material consumption production processes, resulting in reduced greenhouse gas emissions and air pollutants.	ANIA			8
	Forestry and agri-food production chain	D071A Forestry supply chain principles and knowledge	Forestry supply chain principles and knowledge. LO-suggestion: Ability to describe the forestry supply chain principles.	CEPI	4		
		D072A Agri-food production supply chain management	agri-food production supply chain management. LO-suggestion: Ability to summarise the main aspects in agri-food production supply chain management.	UNITO	4		6

Digitalisation tools and machinery	Introduction to digitalisation tools and machinery	D080A Introduction to digitalisation tools and machinery	Ability to find and use of mobile phones apps	UHOH	2	2	2	
		D081A Introduction to digitalisation tools and machinery	Ability to name the various technologies available linked to farming activities and understands what can be achieved from using them	FJ-BLT	4	4	4	
		D082A Software and applications Useful for Farm System	Learner is confident in using different kinds of software and online applications.	FJ-BLT	2	2	2	
		Legal framework when using autonomous machinery	Ability to demonstrate appreciation to the national legal framework and safety issues while using autonomous machinery					
	Control the environment for storage	D091A control the environment storage operator abilities	Technician/Operator is able to maintain or ensure the maintenance of cleaning equipment, heating or air conditioning of storage facilities, sensors and the temperature of premises.	UNITO	8	10	10	
		D092A control the environment storage DIY vs outsourcing	Ability to estimate the benefits and challenges relating to programming DIY vs Outsourcing / Contractors	ProAgria		2	2	
	Greenhouse control for irrigation and protected environment conditions	D100A greenhouse control	Use semi-autonomous or autonomous machines which automatically carry out complex actions while being guided by digital or electronic software, such as driverless cars, drones and other machines. Drones legislation	UNITO	4	6		
	Use of robots/drones	D110A use of robots and drones		CERTH-ProAgria	8	12	12	
	system integration and data transfer	Operate digital hardware	D120 Operate digital hardware	Understand Canbus/ Isobus principles to connect tractor and equipment	FJ-BLT	2	4	
				Operate Canbus/Isobus connect tractor and equipment	FJ-BLT	4	4	

			operate machinery according to application plans and maps to optimize productivity and reduce ecological effects	FJ-BLT	2		
	Digital Sustainability	D130 Digital Sustainability	Ability to optimize productivity and reduce ecological effects by applying the elements of Digital Farming e.g.: Preparation of application maps and plans for the precise application of seeds, fertiliser and crop protection based on yield- and soil maps	FJ-BLT	4	8	
	Precision farming, weather forecast knowledge and tools	D140 Precision farming weather forecast knowledge and tools	Gather data from satellites, radars, remote sensors, and weather stations in order to obtain information about weather conditions and phenomena.	CERTH		4	
	transferring data from application - data exchange	D150 transferring data from application - data exchange	Entering information into a data storage and data retrieval system via processes such as scanning, manual keying or electronic data transfer in order to process large amounts of data. (Data handling and analysis, data exchange)	CERTH		8	8
	basic statistics	D160 Basic Statistics	Collecting data and statistics to test and evaluate in order to generate assertions and pattern predictions, with the aim of discovering useful information in a decision-making process. (Data handling and analysis, data exchange)	CERTH		8	8
	Ability to implement traceability systems in respect of different agriculture resource	D170 Ability to implement traceability systems	Traceability, quality signs and labels; LO - suggestion: ability to describe key aspects of traceability, knowledge about legal requirements from EU and references to private standards	LVA		4	4
			Livestock farming traceability	AERES		6	

Operation of typical machines, robots and applications in Smart Farming	Practical training with job-specific machinery/equipment and their maintenance	D180 Practical training with job-specific machinery	Operate motorised agricultural equipment including tractors, balers, sprayers, ploughs, mowers, combines, earthmoving equipment, trucks, and irrigation equipment.	FJ-BLT, ProAgria, CERTH	8	6	
	Logistics, warehousing, transportation		Ability to name important opportunities and challenges of Food Logistics 4.0.	UNITO			6
Food processing technical skills	Food processing technical skills	D190 Food processing technical skills	Ability to describe the fundamentals of food processing.	LVA	30		30
			Ability to describe what is food manufacturing in the circular economy and how it is different from the traditional economy.	LVA			4
			Ability to name HACCP principles, physical and chemical hazards.	LVA			8
	Food processing automation	D200 Food processing automation	Application of sensors and control processing, Being able to manage the elements of an IoT ecosystem, assembling hardware and configuring software (sensors programming, signal processing, real-time and local analytics, manage databases, cloud analytics)	INFOR + UNITO			16
	Food packaging	D210 Food packaging	Ability to describe the packaging role in the digitalisation of agri-food production	UNITO			6
					128	148	148

## 7.4 Appendix 4 – curricula for the “Technician for food industry sustainability” occupational profile.

### Component Details

<b>Title</b>	Technician for food industry sustainability
<b>Level</b>	5
<b>Total Hours</b>	680
<b>Purpose</b>	The purpose of this award is to equip the learner with the relevant knowledge, skill and competence to perform technical tasks to support the implementation and supervision of sustainability requirements in the production, management and business activities of a food company.
<b>Learning Objectives</b>	Learners will be able to:
	<ol style="list-style-type: none"> <li>1 purchase of sustainable raw materials,</li> <li>2 monitoring the efficient use of resources,</li> <li>3 implementation and monitoring of sustainable processing technologies,</li> <li>4 sustainable product development and packaging,</li> <li>5 waste management,</li> <li>6 implementation and monitoring of continuous improvement procedures,</li> <li>7 sustainable marketing chains,</li> <li>8 administrative tasks and supervision of activities carried out by others.</li> </ol>

### Assessment Techniques

In order to demonstrate that they have reached the standards of knowledge, skill and competence identified in all the learning outcomes, learners are required to complete the assessment(s) below.

The assessor is responsible for devising assessment instruments (e.g. project and assignment briefs, examination papers), assessment criteria and mark sheets, consistent with the techniques identified below and EQF assessment requirements.

Programme validation will require providers to map each learning outcome to its associated assessment technique. All learning outcomes **must** be assessed and achieved in accordance with the **minimum intended module learning outcomes** set out in the validated programme.

Portfolio / Collection of Work	20%
Skills Demonstration	20%
Assignment	20%
Examination theory	40%

## Description

### **Portfolio / Collection of Work**

A portfolio or collection of work is a collection and/or selection of pieces of work produced by the learner over a period of time that demonstrates achievement of a range of learning outcomes. The collection may be self-generated or may be generated in response to a particular brief or tasks/activities devised by the assessor.

### **Skills Demonstration**

A skills demonstration is used to assess a wide range of practical based learning outcomes including practical skills and knowledge. A skills demonstration will require the learner to complete a task or series of tasks that demonstrate a range of skills.

### **Assignment**

An assignment is an exercise carried out in response to a brief with specific guidelines as to what should be included. An assignment is usually of short duration and may be carried out over a specified period of time.

### **Examination - Theory**

An examination provides a means of assessing a learner's ability to recall and apply knowledge, skills and understanding within a set period of time and under clearly specified conditions.

A theory-based examination assesses the ability to recall, apply and understand specific theory and knowledge.

## **Proposed Programme Outline**

### **Sustainability Awareness Course Description**

## Technician for food industry sustainability

### Course Aim:

The purpose of this course is to equip the learner with the relevant knowledge, skill and competence to perform technical tasks to support the implementation and supervision of sustainability requirements in the production, management and business activities of a food company.

### Course Objectives:

#### **On completion of this training course, you will be able to:**

- know the basic principles in the sustainable food industry
- Know how to purchase of sustainable raw materials,
- Monitor the efficient use of resources,
- Implement and monitor sustainable processing technologies,
- Know about sustainable product development and packaging,
- Supervise waste management, processes
- Implement and monitor of continuous improvement procedures,
- Plan sustainable marketing chains,
- Make administrative tasks and supervision of activities carried out by others.

### Course Structure

1. Introduction to sustainability
2. Water Quality/Quantity/Availability
3. Water in agri-food industry Biodiversity
4. Soil Functioning and Preservation
5. Air and atmosphere
6. Energy Efficiency
7. Good Practices in Agro-Food Industry
8. Waste & By-Product Management
9. Economic and financial Sustainability
10. Social Sustainability
11. Sustainability Policy & Regulations: The Law



### Content Mapping

Module	Lesson	Learning Outcomes
Introduction to sustainability	Sustainability: introduction	Explain the 3 dimensions of sustainability and their interactions
		To understand: Ecosystems - introduction Balances and imbalances
	Climate change	To be able to explain -how climate works (cycles etc). Proof of change and human causes - reasons causing climate change - impacts - Modern Tools (Geographic Information Systems, Satellite Remote Sensing) to identify impacts
	adaptation/mitigation (as a general approach for all topics)	To be able to: List 3 methods to reduce GHG (C, CH <sub>4</sub> etc) emission List 3 methods to bind GHG (C, CH <sub>4</sub> etc) emission List 3 methods how farmers can adapt to climate change. Provide examples of practices that farmers can implement
	Management of resources	To obtain essential resources - What are vital resources - History recap leading to current model - Threats - How to manage? Mitigation, solutions
	Systematic approach - System Thinking - decision making for complex situations	System approach - Thinking of every angle for a topic/decision

	<p>Life Cycle Assessment (Aspects) Introduction to LCA concept: the impacts of the inputs and outputs</p>	<p>Explain what is the Life Cycle of a product. Examples of environmental problems generated during the production of products. Explain how this tool of environmental management can evaluate the environmental behaviour of a product</p>
		<p>Draw and describe a lifecycle assessment of a certain resource/product. Include economic and social aspects</p>
<p><b>Water Quality/Quantity/Availability</b></p>	<p>Water: general introduction. sources, availability, specification for uses</p>	<p>To draw the water cycle (ocean, clouds, rain, rivers). Write a short paper on a case where Sustainable and Efficient water use has been developed</p>
	<p>Water - quantity</p>	<p>Explain about availability, demands, conflicts of use, regulations on water use. Explain Sustainable Irrigation principles. Examples of rational irrigation techniques that farmers can implement. Techniques to identify water-sensitive stages of crop growth to maintain high production levels Explain Ground Water Management (as a resource) in different situations. Describe ways of rainwater harvesting &amp; soil water retention and be able to apply relevant techniques</p>
	<p>Water quality (I). Treatment technologies for water conditioning</p>	<p>To predict water quality based on its origin. To Identify the unit operation to be used to remove each type of pollutant. To know the main types of disinfecting agents and their main characteristics.</p>

	Water quality (II). Uses and treatment technologies for water reclamation	To recognise the main uses of reclaimed water and related legislation. To identify the unit operations to be used depending on the use of reclaimed water.
	Wastewater: emission and treatment	to know wastewater characterization parameters and the values that must be met for discharge to the environment or sewage system. To be able to identify and describe the fundamentals of wastewater treatment technologies
<b>Water in Agri-food industry</b>	Water for Agri-food industry	To know water requirements for heat exchange, transformation process and cleaning. To be able to identify and classify the different types of wastewaters generated in the agri-food industry. To identify and know the main industrial water and wastewater treatment technologies.
<b>Biodiversity</b>	What is biodiversity	Students are able to explain the principle of system thinking that relates to biodiversity They can make a drawing (schematic) which illustrates the interactions between several organisms
		Students can name a number of biodiversity indicators and explain why these are used as indicators
		Students carry out a biodiversity assessment-quantification through the use of biodiversity indicators Students can explain a system to monitor changes in biodiversity.
	Biodiversity as a resource	Explain what Ecosystem services are and give 5 examples (pollination, soil fertility etc)

		Students write a case study on the importance of biodiversity for agricultural production
	Biodiversity impacted by practices	Describe agricultural practices influencing biodiversity in a positive way and practices having a negative effect
		Be able to carry out X Sustainable practices towards biodiversity
<b>Soil Functioning and Preservation</b>	Soil: general introduction, types and specification for uses	Be able to name samples of different soil types and explain what makes them to be different
		Be able to carry out Sustainable and Efficient soil management practices
	Soil as a resource	Explain several Soil Nutrients and what effect they have on plants. Explain which factors contribute to soil fertility. Describe soil problems (corrosion, acidification, soil pollution with heavy metals, loss of organic matter etc.)
	Soil impacted by Agri and Food activities	Be able to carry out sustainable Soil Fertility Management practices and explain why these are sustainable
		Describe X methods to improve soil fertility and actions to combat desertification
	Soil impacted by industrial activities	What are the main industrial activities that pollute the soil? What can be done to deal with it?
		Ways to restore the chemical composition and quality of the soil in environments burdened by polluting activities
<b>Air and atmosphere</b>	Air: general introduction, atmosphere and emission from activities	Explain what the GHG effect is. What is CO <sub>2</sub> , CH <sub>4</sub> etc

	GHG's Emissions reduction,	<p>Explain about Agri: emissions from machinery and fertilization Make a chart showing emissions from different machines. Describe which practices farmers should adapt in order to reduce the emissions</p>
		<p>Provide a chart showing emissions from the food industry during the last years/ decades. Examples of good practices that can reduce the emissions</p>
		<p>Agri: emission from livestock (animals, buildings, manure) Provide a chart showing emissions from livestock during the last years/ decades. Provide examples of practices that can reduce the emissions</p>
		<p>Impacts of importing inputs and exporting food. Examples of alternative solutions for zero emissions in transport</p>
	Climate Change related to industry and farms	<p>Describe a case where farmers and food industry are affected by climate change</p> <p>Explain how Climate Change affects the general atmosphere, how air pollution is connected with climate change.</p>
<b>Energy Efficiency</b>	Energy sources	<p>To understand: Carbon based &amp; petrol-based energy facts What is renewable energy and how can we use it agriculture? Advantages of Renewable Energy Sources that make them a solution for energy sufficiency and for the sustainability of the planet Costs of energy (direct and indirect). Comparison of conventional energy production methods costs to renewable ones</p>
	Agri and food industry consumption of energy	<p>To understand: - Energy storage and H2 technologies. - Electricity transmission and distribution. - Smart grid technologies</p>

		Energy Efficiency (main measures). Energy saving and efficiency techniques in agri-food industry
	Agri and food industry producing energy	To understand renewable Energy
		To understand: Utilisation of By-products, Biomass, digesters, photovoltaic electricity, production of biogas through the use of biomass in order to cover energy needs etc. How can agri-food industries become producers of green energy?
<b>Good Practices in Agri-Food Industry</b>	BATs for Materials reception and preparation	To describe materials reception and preparation (knowledge) and comparison of the mechanisms of action of each of the most common techniques materials reception and preparation (understanding). To discover the mechanisms of action of each of the most common processing techniques (application) and to select the different techniques that can be applied to minimise resources consumed and waste produced (evaluation).
	BATs for Size reduction, mixing and forming	To describe size reduction, mixing and forming techniques (knowledge) and comparison of the mechanisms of action of each of the most common techniques of size reduction, mixing and forming (understanding). To discover the mechanisms of action of each of the most common processing techniques (application) and to select the different techniques that can be applied to minimise resources consumed and waste produced (evaluation).
	BATs for Separation techniques	To describe separation techniques (knowledge) and comparison of the mechanisms of action of each of the most common techniques (understanding). To discover the mechanisms of action of each of the most common processing techniques (application) and to select the different techniques that can be applied to minimise resources consumed and waste produced (evaluation).
	BATs for Product processing technology	To describe product processing techniques (knowledge) and comparison of the mechanisms of action of each of the most common techniques (understanding). To discover the mechanisms of action of each of the most common processing techniques (application) and to select the different techniques that can be applied to minimise resources consumed and waste produced (evaluation).

	BATs for Heat processing	<p>To describe heat processing techniques (knowledge) and comparison of the mechanisms of action of each of the most common techniques (understanding).</p> <p>To discover the mechanisms of action of each of the most common processing techniques (application) and to select the different techniques that can be applied to minimise resources consumed and waste produced (evaluation).</p>
	BATS for Concentration by heat	<p>To describe concentration by heat techniques (knowledge) and comparison of the mechanisms of action of each of the most common techniques of concentration by heat (understanding).</p> <p>To discover the mechanisms of action of each of the most common processing techniques (application) and to select the different techniques that can be applied to minimise resources consumed and waste produced (evaluation).</p>
	BATS for Processing by removal of heat	<p>To describe processing by removal of heat techniques (knowledge) and comparison of the mechanisms of action of each of the most common techniques of processing by removal of heat (understanding).</p> <p>To discover the mechanisms of action of each of the most common processing techniques (application) and to select the different techniques that can be applied to minimise resources consumed and waste produced (evaluation).</p>
	BATs for Post processing operations	<p>To describe post processing operations (knowledge) and comparison of the mechanisms of action of each of the most common techniques of post processing operation (understanding).</p> <p>To discover the mechanisms of action of each of the most common processing techniques (application) and to select the different techniques that can be applied to minimise resources consumed and waste produced (evaluation).</p>
	BATS for Utility processes	<p>To describe utility processes (knowledge) and comparison of the mechanisms of action of each of the most common techniques of utility processes (understanding). To discover the mechanisms of action of each of the most common processing techniques (application) and to select the different techniques that can be applied to minimise resources consumed and waste produced (evaluation).</p>
<b>Waste &amp; By-Product Management</b>	Characterisation of waste	<p>To describe the types of wastes. Description of the main types of wastes produced in the agri-food industry. To describe the main treatment technologies. To describe the main ways of characterization of wastes. (knowledge)</p> <p>To identify wastes (analysis)</p>

	Waste prevention and minimization I: general concepts	To describe the general types of procedures for waste minimization (knowledge). Exemplification of the procedures with situations of daily life (understanding). To describe the items of a waste minimization report (knowledge). To sketch a waste minimization report (application)
	Waste prevention and minimization II: stock management	To describe (knowledge) and to classify (understanding) of the different stock management techniques can be applied to minimise resources consumed and waste produced (evaluation) in the agri-food industry
	Waste prevention and minimization III: changes in manufacturing processes	To describe (knowledge) and to classify (understanding) how changes in manufacturing techniques can be applied to minimise resources consumed and waste produced (evaluation) in the agri-food industry
	Waste prevention and minimization IV: recovery or resources	To describe (knowledge) and to classify (understanding) of the different treatment and recovery techniques can be applied to minimise resources consumed and waste produced (evaluation) in the agri-food industry
	Waste prevention & management in the agri-food industry I: meat & poultry, fish & shellfish and fruit & vegetables	To select the different techniques can be applied to minimise resources consumed and waste produced (evaluation) in the meat & poultry, fish & shellfish and fruit & vegetables.
	Waste prevention & management in the agri-food industry II: vegetable oils & fats and dairy products	To describe the main processes involved in the vegetable oils & fats and dairy products (knowledge), and to compare and to discover of their mechanisms of action (application) Strategies and methods to reduce agri-food waste
	Waste prevention & management in the agri-food industry III: grain mill products, dry pasta, starch, animal feed, bread, confectionery, sugar, coffee	To describe the main processes involved in the grain mill products, dry pasta, starch, animal feed, bread, confectionery, sugar, coffee (knowledge), and to compare and to discover their mechanisms of action (application) To select the different techniques can be applied to minimise resources consumed and waste produced (evaluation) in the grain mill products, dry pasta, starch, animal feed, bread, confectionery, sugar, coffee.
	Waste prevention & management in the agri-food industry IV; yeast,	



	malting, brewery, distilling, wine, soft drinks and citric acid	To describe the main processes involved in the meat & poultry, fish & shellfish and fruit & vegetables (knowledge), and to compare and to discover their mechanisms of action (application) To select the different techniques can be applied to minimise resources consumed and waste produced (evaluation) in the meat & poultry, fish & shellfish and fruit & vegetables.
		Being able to evaluate Expenses
		To know basics on Costs of production -gross and net margin
		To understand key indicators for the sustainability of business
		S620 Short supply chain management (Farmer to consumer)
		To understand economic resilience Circular Economy
		Lean (an introduction)
Sustainable Marketing & communication	To understand short Supply chain	
	To understand cooperative approaches	
	To understand sustainable communication	
<b>Social Sustainability</b>	Social sustainability for the worker	Being able to apply techniques on Health & Safety (general Awareness), Mental Health and Resilience
<b>Sustainability Policy &amp; Regulations: The Law</b>	Policy	Being able to explain the main European Policy Drivers
		Being able to state the main objectives of CAP
		Understand where to source locally available funds for financing of sustainable practices

	Certification organic PDO	Understand the impact of Organic and "Protected Designation of Origin" - DPO
	Traceability and food safety in industry	Understand the requirements of Food Safety and Traceability
	Traceability and food safety in agriculture & forestry	Being able to summarise what is meant by traceability in both agricultural products and in Forestry

### Certification and Assessment:

On successful completion of this training the learner will receive a course completion certificate.

### From the Occupational Profile:

From the core curriculum (Module Soft-skills and Entrepreneurship) – Annex I

#### ESSENTIAL SKILLS

##### Efficient use of resources

- water treatment and reuse
- waste prevention and valorisation of by-products
- energy efficiency (generation, storage and use of renewable energies)

##### Sustainable Packaging

- sourcing and efficient use of materials
- reusability/recyclability
- eco-design
- life cycle

##### Manufacturing technologies

- energetic optimisation of production plants - optimisation of manufacturing processes
- industry 4.0
- lean manufacturing
- preventive maintenance
- Sustainable origin of raw material (sustainable sourcing / efficient use of resources)

## ESSENTIAL KNOWLEDGE

### Sustainability:

- Climate change
- GHGs
- water management

### Circular economy:

- Circular manufacturing / Industry 4.0 aspects
- Traceability & food Production, food waste reduction
- Improved agri-food production (energetic optimisation of production plants - optimisation of manufacturing processes), logistics, sustainable metrics (KPIs), labelling
- Consumer trends / demands
- General legal framework for industry, environmental Licensing

This ensures all essential skills and knowledge have been sufficiently mapped to create learning content and proposed programme.

### **Duration**

120 hours online learning

180 hours in-class learning

360 hours work-based learning

20 hours of Assessment

Total = 680h

Module skills sustainability EQF4&5 (copy date 2023-01-19)

Module	Lesson	Content creator	Approximate hrs	total		
			Operator	Techn Agr	Techn AFI	methodology
<b>Introduction to sustainability</b>	Sustainability: introduction	AC3A	1	12	12	
		AC3A	1			
	Climate change	AC3A	2			
	adaptation/mitigation (as a general approach for all topics)	AC3A	2			
	Management of resources	AC3A	3			

	Systematic approach - System Thinking - decision making for complex situations	AC3A	1			assignment
	Life Cycle Assessment (Aspects) Introduction to LCA concept: the impacts of the inputs and outputs	AC3A	1			assignment
		AC3A	1			assignment
<b>Water Quality/Quantity/Availability</b>	Water: general introduction. sources, availability, specification for uses	UCLM	2	1	1	
	Water sources availability specification for uses	UCLM-CREA	2			Pract
	Water – quantity	UCLM-CREA	2	2	2	Ass
		UCLM-CREA	10	12		L4 work-based L5 work-based

		UCLM-CREA	3	2	6	work-based
		UCLM	4		4	Practical & work-based
	Water quality (I). Treatment technologies for water conditioning	UCLM-DIQ	4	4	6	incl field visit/demonstration
	Water quality (II). Uses and treatment technologies for water reclamation	UCLM	4	4	4	incl field visit
	Wastewater: emission and treatment	UCLM-DIQ	10	4	4	
Water in agriculture	Prevention of damages to Water bodies	UCLM-CREA	8	6		Extra practicals
		UCLM-CREA	8	10		Extra practicals/demo

Water in agri-food industry		UCLM-DIQ	6		4	Extra practicals/demo
<b>Biodiversity</b>	What is biodiversity	Aeres	1	1	1	
		Aeres	1	1	1	
		Aeres	1	1	1	
	Biodiversity as a resource	Aeres	1	1	1	
		Aeres	3	3	3	incl practical
	Biodiversity impacted by practices	Aeres	2	2	2	



		aeres	4	4		
<b>Soil Functioning and Preservation</b>	Soil: general introduction, types and specification for uses	CEPI	2	2	2	
		cepi	2	2	2	demo/fieldvisit
	Soil as a resource	cepi	2	2		practical/ass/field visit etc
	Soil impacted by Agri and Food activities	cepi	4	4		practical/ass/field visit etc
		cepi	2	2		practical/ass/field visit etc
	Soil impacted by industrial activities	cepi		2	2	practical/ass/field visit etc

		cepi		2	2	practical/ass/field visit etc
<b>Air and atmosphere</b>	Air : general introduction, atmosphere and emission from activities	cepi				
	GHG's Emissions reduction,	UNITO	4	4		incl practicals
					4	incl practicals
		AERES	4	4		incl practicals
		eepe			4	incl practicals
		UNITO	4	4	4	incl practicals

	Climate Change (See also topic Climate change in UNit INtroduction to sustainability)	UNITO	2	2	2	incl practicals
		cepi	4	4	4	incl practicals
<b>Energy Efficiency</b>	Energy sources	unito	2	2	2	
		unito	2	2	2	
			2	2	2	
			2	3	3	
	Agri and food industry consumption of energy		4	3	3	incl practicals&Fieldvi sits
		unito	4	3	3	incl practicals&Fieldvi sits

	Agri and food industry producing energy	unito	4	3	3	incl practicals&Fieldvisits
		unito	4	3	3	incl practicals&Fieldvisits
<b>Good Agricultural Practices : Sustainable Crop Production</b>	Crop Rotation	UCLM-CREA	2			
	New Crop Techniques	UCLM-CREA	2			
	Agro-Environmental Practices	UCLM-CREA	2			
	Low emissions Spreading/Spraying Equipment & Practices	UCLM-CREA	4			
	Integrated Pest & Disease Management	UCLM-CREA	4			
	Crop Diversification	UCLM-CREA	2			
	Conservation farming	UCLM-CREA	2			
	Agro-Forestry	????				
	Crop Protection	???? This is not necessary				

	Grassland Management	UCLM-CREA	2			
	Smart Farming (Introductory Aspects)	UCLM-CREA	2			
<b>Good Agricultural Practices : Sustainable Animal Husbandry</b>	Sustainable Feed Sources Sustainable Sourcing	AERES		4		
	Animal Nutrition	AERES		2		
		AERES		2		
	Reducing Emissions	AERES		2		
	Animal Welfare	Aeres		2		

Good Agricultural Practices Animal Welfare		Aeres		2		
	Responsible Use of Antibiotics	Aeres		2		
Good Practices in Agro-Food Industry	S451 BATs Materials reception and preparation	UCLM-DIQ	2		4	on-line
	S452 BATs for Size reduction, mixing and forming	UCLM-DIQ	2		4	on-line
	S461-BATs for Separation techniques	UCLM-DIQ	2		2	
	S462 BATs for Product processing technology	UCLM-DIQ	2		2	

	S471 BATs for Heat processing	UCLM-DIQ	2		2	
	S472 BATS for Concentration by heat	UCLM-DIQ	2		2	
	S473 BATS for Processing by removal of heat	UCLM-DIQ	2		2	
	S481 BATs for Post processing operations	UCLM-DIQ	2		2	
	S482 BATS for Utility processes	UCLM-DIQ	2		2	
<b>Waste &amp; By-Product Management</b>	S490 Characterisation of waste	UCLM-DIQ	4		2	
	S501 Waste prevention and minimization I: general concepts	UCLM-DIQ	2	2	2	in class /assignments
	S502 Waste prevention and minimization II: stock management	UCLM-DIQ	4			in class /assignments
	S503 Waste prevention and minimization III: changes in manufacturing processes	UCLM-DIQ	6			in class /assignments

	S504 Waste prevention and minimization IV: recovery or resources	UCLM-DIQ	4			
	S511 Waste prevention & management in the agri-food industry I: meat & poultry, fish & shellfish and fruit & vegetables	UCLM-DIQ			4	on-line
	S512 Waste prevention & management in the agri-food industry II: vegetable oils & fats and dairy products	UCLM-DIQ			4	
	S513 Waste prevention & management in the agri-food industry III: grain mill products, dry pasta, starch, animal feed, bread, confectionery, sugar, coffee	UCLM-DIQ			4	
	S514 Waste prevention & management in the agri-food industry IV; yeast, malting, brewery, distilling, wine, soft drinks and citric acid	UCLM-DIQ			4	incl practicals/case study
<b>Economic and financial Sustainability</b>		aP		2	2	
		aP		2	2	



		aP		3	3		
		ap		2	2		
		ap					
		ap		4	4		
	Lean (an introduction)	ap		2	2		
		ap		2	2		
		ap		1	1		
		ap		1	1		
	Sustainable Marketing & communication	ap		1	1		
		ap		1	1		
		ap		1	1		
<b>Social Sustainability</b>	Social sustainability for the worker	ap	3	3	3		

		ap		1	1	extra assignment
		ap		1	1	extra assignment
		ap		1	1	extra assignment
<b>Sustainability Policy &amp; Regulations: The Law</b>	Policy	ICOS	1	1	1	extra assignment
		ICOS	1	1		extra assignment
	Regulatory frameworks	ICOS	4	4	4	include practical etc
		ICOS	2	2	2	extra assignment
		ICOS		2	2	extra assignment
	Traceability	ICOS		2	2	extra assignment or work based

## 7.5 Appendix 5 – curricula for the “Technician for food industry digitalisation” occupational profile.

### Component Specification EQ Level 5

<b>Title</b>	Technician for food industry in digitalisation
<b>Level</b>	EQF 5 <p>Knowledge: Comprehensive, specialised, factual and theoretical knowledge within a field of work or study and an awareness of the boundaries of that knowledge</p> <p>Skills: A comprehensive range of cognitive and practical skills required to develop creative solutions to abstract problems</p> <p>Responsibility and Autonomy: Exercise management and supervision in contexts of work or study activities where there is unpredictable change; review and develop performance of self and others.</p>
<b>Total Hours</b>	600
<b>Purpose</b>	The purpose of this award is to equip the learner with the relevant knowledge, skill and competence to perform technical tasks to support the implementation of digital technologies in the agri-food industry.
<b>Learning Objectives</b>	Learners will be able to: <ol style="list-style-type: none"> <li>1. Appreciate the principles of digitalization in the food industry.</li> <li>2. Appreciate how EU and national policies are promoting the digital transition</li> <li>3. Understand the range of digital tools, the system integration and data transfer, in food industry</li> <li>4. Appreciate the ability to implement traceability systems in respect of different resource.</li> <li>5. Appreciate the processing and packaging of food and beverages, the equipment and procedures used in the production and distribution of foods.</li> <li>6. Understand the requirements for safe working on production processes</li> </ol>

**Assessment Techniques** In order to demonstrate that they have reached the standards of knowledge, skill and competence identified in all the learning outcomes, learners are required to complete the assessment(s) below.

The assessor is responsible for devising assessment instruments (e.g. project and assignment briefs, examination papers), assessment criteria and mark sheets, consistent with the techniques identified below and EQF assessment requirements.

Programme validation will require providers to map each learning outcome to its associated assessment technique. All learning outcomes **must** be assessed and achieved in accordance with the **minimum intended module learning outcomes** set out in the validated programme.

Portfolio / Collection of Work	20%
Skills Demonstration	20%
Assignment	20%
Examination theory	40%

## Description

### **Portfolio / Collection of Work**

*A portfolio or collection of work is a collection and/or selection of pieces of work produced by the learner over a period of time that demonstrates achievement of a range of learning outcomes. The collection may be self-generated or may be generated in response to a particular brief or tasks/activities devised by the assessor.*

### **Skills Demonstration**

*A skills demonstration is used to assess a wide range of practical based learning outcomes including practical skills and knowledge. A skills demonstration will require the learner to complete a task or series of tasks that demonstrate a range of skills.*

### **Assignment**

An assignment is an exercise carried out in response to a brief with specific guidelines as to what should be included. An assignment is usually of short duration and may be carried out over a specified period of time.

### **Examination - Theory**

An examination provides a means of assessing a learner's ability to recall and apply knowledge, skills and understanding within a set period of time and under clearly specified conditions.

A theory-based examination assesses the ability to recall, apply and understand specific theory and knowledge.

## Proposed Programme Outline

### Sustainability Awareness Course Description

### Technician for food industry in digitalisation

#### Course Aim:

The purpose of this course is to equip the learner with the knowledge of the challenges and opportunities presented to stakeholders and consumers as we transition towards the digitalization of the agri-food industry.

#### Course Objectives:

**On completion of this training course, you will be able to:**

- Understand the principles of digitalization in the food industry.
- Appreciate how EU and national policies are promoting the digital transition
- Understand the range of digital opportunities and applications in food industry
- Appreciate the different digital technologies used in food industry
- Understand the roles and skills needed to take advantage of new work opportunities.
- Understand the requirements for safe working on production processes.

#### Course Structure

Unit 1: Soft skills & Entrepreneurship

Unit 2: Introduction to smart farming / digitalisation in food Industry

Unit 3: System integration and data transfer

Unit 4: Operation of typical machines, robots and applications in Smart Farming

Unit 5: Food processing technical skills

#### Content Mapping

Unit	Lesson	Learning Outcomes
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Soft skills & Entrepreneurship	Understanding the digitalization principles in food industry	Definition of soft skills & digital competencies
	Innovation management	Ability to innovate together with the decision makers different lucrative future visions for the farm. Ability to facilitate peer groups for innovative companies
	Business Modelling	Ability to substantially ideate, describe, evaluate and discuss a business model using the Business Model Canvas Basic of economic and financial issues Analysis of Agri-food business modelling
	Organization and Planning	Achieving better results through effective planning and clarifying goals using SMART objectives Applying a critical-path network system to estimate time and activities required for reaching objective, using planning tools such as Gantt Charts Keeping things in perspective, practising the principles of prioritising work effectively
	Team working, negotiation and conflict management	Managing issues in team constitution (team roles) Identifying the different stages of team development and how a leader can support the team at each stage Understanding the needs of different personality styles and how to work with them Discovering how to build deeper relationships through common understanding and improved communication Becoming effective at delegating lower priority items
	Health and safety in the workplace	Applying principles, policies and institutional regulations aimed at guaranteeing a safe workplace for all employees Analyse the duties of employers and employees as specified in current Safety, Health and Welfare at work legislation Examine the role of the Health and Safety Authority Explain the causes, prevention, emergency procedures, reporting and recording of accidents and dangerous occurrences Analyse the causes and prevention of fire related events to include identification of emergency procedures, the fire triangle and fire equipment Comment on specific hazards and risks when working with equipment to include mechanical and electrical equipment Investigate how personal protective equipment (PPE) is used in the workplace
	Legislation	Identifying government regulations required for the manufacture and safety of food products
Digital Marketing	From Traditional to Digital Food Marketing	Evaluating the marketing function and the role it plays in achieving organisational success both in commercial and non-commercial settings Implementing techniques and sales methods used in order to present a product or service to customers in a persuasive manner and to meet their expectations and needs. Knowing the principles of managing the relationship between consumers and products or services for the purpose of increasing sales and improving advertising techniques. Carrying a market analysis to understand customers behaviour Identifying how to develop a marketing mix: product, price, promotion and place. Being able to define business digital and social strategy Creating an effective Digital Promotion Plan by enhancing internet

		<p>business tools such as social media, PPC (Pay Per Click) advertising, SEO (Search Engine Optimization) and growing your contact list with DEM (Direct Email Marketing).</p> <p>Optimizing business stand out on internet search engine with correct use of keywords</p> <p>Creating and optimize advertising on social media (Facebook, Instagram)</p> <p>Learning how to use Facebook and Google campaigns to promote a brand online</p> <p>Doing analysis and online market research</p> <p>Using Google Ads and make PPC campaigns to bring traffic to your company site</p> <p>Using Google Analytics and analysing statistics related to business website</p> <p>Creating email marketing campaigns</p> <p>Cases of studies and best practices in digital food marketing</p>
<p>Introduction to smart farming / digitalisation in agriculture, Food Industry</p>	<p>Industry 4.0 in the food-industry sector</p>	<p>Understanding the importance of Industry 4.0 implementation in the agri-food sector for the management of production systems, the definition of maintenance policies and after sales monitoring. Knowing the main Industry 4.0 solutions in food productions, processing, and logistics</p> <p>Performing operations carried out in warehouses with automated machines and robots.</p> <p>Being able to operate with the farm/factory management information systems (ERP) to support real-time management of business processes and the compliance of management standards</p> <ul style="list-style-type: none"> <li>▪ Using relevant information systems and databases to plan, manage and operate agricultural enterprise and production. (Integration of information from FMIS)</li> <li>▪ Entering information into a data storage and data retrieval system via processes such as scanning, manual keying or electronic data transfer in order to process large amounts of data. (Data handling and analysis, data exchange)</li> <li>▪ Collecting data and statistics to test and evaluate in order to generate assertions and pattern predictions, with the aim of discovering useful information in a decision-making process. (Data handling and analysis, data exchange)</li> </ul> <p>Being able to manage the elements of an IoT ecosystem, assembling hardware and configuring software (sensors programming, signal processing, real-time and local analytics, manage databases, cloud analytics)</p> <p>Data mining and statistical identification of patterns in data necessary to leverage statistics and inform decisions.</p> <p>Testing and maintenance of individual automatic machines, intelligent plants and production lines</p> <p>Knowing robotic technology innovations enabling automated food processing applications</p> <p>Enhancing food traceability and safety using blockchain solutions: The different integrated infrastructures, each with their own characteristics, that allow the development of blockchain applications. Examples are multichain, ethereum, hyperledger, corda, ripple, openchain, etc.</p> <p>Knowing and dealing with cyber threats in the food Industry</p>



Food processing technical skills	Fundamentals of Food Processing	<p>Describing the source and variability of raw food material and their impact on food processing operations.</p> <p>Explaining the spoilage and deterioration mechanisms in foods and methods to control deterioration and spoilage.</p> <p>Describing the basic principles and practices of cleaning and sanitation in food processing operations. Knowing the principles that make a food product safe for consumption. Applying the principles of food science to control and assure the quality of food products. Maintaining and ensuring the maintenance of cleaning equipment, heating or air conditioning of storage facilities and the temperature of premises. Explaining the principles and current practices of processing techniques and the effects of processing parameters on product quality.</p> <p>Food manufacturing in the circular economy: Innovative circular manufacturing technologies enhanced with novel production mechanisms and digitalization aspects promoting energy efficient and low material consumption production processes, resulting in reduced greenhouse gas emissions and air pollutants</p>
	Logistics, warehousing, transportation	<p>Exploring the key aspects of food supply chains from a management and social perspective.</p> <p>Identifying and develop Food supply chains: production, manufacturing, and Food regulation, safety and quality.</p> <p>Creating a logistic framework for transporting goods to customers and for receiving returns, execute and follow up the logistics processes and guidelines.</p> <p>Knowing Traceability measures to respond to potential risks that can arise in food and feed, so as to ensure that all food products are safe for humans to eat.</p> <p>Opportunities and Challenges of Food Logistics 4.0</p>
	Food packaging	<p>Explaining the properties and uses of various packaging materials.</p> <p>Managing packaging machinery and line operations.</p> <p>The packaging role in the digitalisation of agri-food production</p>

### Certification and Assessment:

On successful completion of this training the learner will receive a course completion certificate.

### From the Occupational Profile:

From the core curriculum (Module Soft-skills and Entrepreneurship) – Annex I  
**ESSENTIAL SKILLS**

- Integration of information from FMIS
- Data handling and analysis, data exchange
- E-commerce and e-marketing
- Logistics, warehousing, transportation
- Decision Support Systems
- Sourcing of raw materials and agricultural products
- Circular manufacturing aspects / food Industry 4.0

### ESSENTIAL KNOWLEDGE

- Food processing; automated food processing
- Packaging, automated packaging
- Quality management
- Big data handling and processing
- Traceability/blockchain
- Automated warehousing/robots
- High-Tech logistics & transportation: robots, drones
- Controlled environment for storage, heat/cold management
- Digital entrepreneurship

This ensures all essential skills and knowledge have been sufficiently mapped to create learning content and proposed programme.

#### **Duration**

120 hours online learning

160 hours in-class learning

300 hours work-based learning

20 hours of Assessment

## 7.6 Appendix 6 – curricula for the “Technician for Agriculture digitalisation” occupational profile.

### Component Specification EQ

#### Level 5

#### Technician for digitalization in agriculture

#### Component Details

<b>Title</b>	Technician for digitalization in agriculture
<b>Level</b>	EQF 5 Knowledge: Comprehensive, specialised, factual and theoretical knowledge within a field of work or study and an awareness of the boundaries of that knowledge Skills: A comprehensive range of cognitive and practical skills required to develop creative solutions to abstract problems Responsibility and Autonomy: Exercise management and supervision in contexts of work or study activities where there is unpredictable change; review and develop performance of self and others.
<b>Total Hours</b>	680
<b>Purpose</b>	The purpose of this award is to equip the learner with the relevant knowledge, skill and competence to participate in digitalisation across the agriculture sector.
<b>Learning Objectives</b>	Learners will be able to:

	<ol style="list-style-type: none"><li>1 Understand the principles of a digital ecosystem within a farm.</li><li>2 Appreciate the national legal framework and safety issues while using autonomous machinery</li><li>3 Understand the range of smart farming and digital technologies opportunities</li><li>4 Evaluate these opportunities within the farm from a comprehensive business perspective</li><li>5 Understand the roles and skills needed to take advantage of new work opportunities.</li></ol>
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### Assessment Techniques

In order to demonstrate that they have reached the standards of knowledge, skill and competence identified in all the learning outcomes, learners are required to complete the assessment(s) below.

The assessor is responsible for devising assessment instruments (e.g. project and assignment briefs, examination papers), assessment criteria and mark sheets, consistent with the techniques identified below and EQF assessment requirements.

Programme validation will require providers to map each learning outcome to its associated assessment technique. All learning outcomes **must** be assessed and achieved in accordance with the **minimum intended module learning outcomes** set out in the validated programme.

Portfolio / Collection of Work	20 %
Skills Demonstration	20 %
Assignment	20 %
Examination theory	40 %

## Description

### **Portfolio / Collection of Work**

*A portfolio or collection of work is a collection and/or selection of pieces of work produced by the learner over a period of time that demonstrates achievement of a range of learning outcomes. The collection may be self-generated or may be generated in response to a particular brief or tasks/activities devised by the assessor*

### **Skills Demonstration**

*A skills demonstration is used to assess a wide range of practical based learning outcomes including practical skills and knowledge. A skills demonstration will require the learner to complete a task or series of tasks that demonstrate a range of skills.*

### **Assignment**

*An assignment is an exercise carried out in response to a brief with specific guidelines as to what should be included. An assignment is usually of short duration and may be carried out over a specified period of time.*

### **Examination - Theory**

*An examination provides a means of assessing a learner's ability to recall and apply knowledge, skills and understanding within a set period of time and under clearly specified conditions.*

*A theory-based examination assesses the ability to recall, apply and understand specific theory and knowledge.*

## Proposed Programme Outline

### Digital Agriculture Awareness Course Description

#### Technician for digitalization in agriculture

##### **Course Aim:**

The purpose of this course is to enable the learner to build their knowledge and skills-base to address the complexities of developing, deploying and managing technology in the agriculture sector, with specific focus on digital concepts, data management, analytics and intelligence and a range of technologies that support the enhancement of efficiencies, sustainability and reliability across the sector.

##### **Course Objectives:**

###### **On completion of this training course, you will be able to:**

- Understand the principles of a digital ecosystem within a farm.
- Appreciate the national legal framework and safety issues while using autonomous machinery
- Understand the range of smart farming and digital technologies opportunities
- Evaluate these opportunities within the farm from a comprehensive business perspective
- Understand the roles and skills needed to take advantage of new work opportunities.

##### **Course Structure**

Unit 1 Business intelligence and work life skills

Unit 2 Job safety

Unit 3 Introduction to smart farming / digitalisation in agriculture (including logistics and bioeconomy)

Unit 4 System integration and data transfer

Unit 5 Operation and use of agricultural machinery, equipment, digitalisation tools, applications, premises and facilities

##### **Certification and Assessment:**

On successful completion of this training the learner will receive a course completion certificate.

**From the Occupational Profile:**

<p><b><u>Essential skills</u></b></p>	<p>From the core curriculum (Module Soft-skills and Entrepreneurship) see Annex I</p> <p>Farming activities:</p> <ul style="list-style-type: none"> <li>- Communication tools: peer groups for innovative farmers</li> <li>- Logistics management</li> <li>- Traceability; quality signs and labels</li> <li>- Weather forecast knowledge and/or tools</li> <li>- Digital entrepreneurship</li> </ul> <p>Arable crops:</p> <ul style="list-style-type: none"> <li>- Precision farming: remote sensing, GPS, GIS, Automated farming,</li> <li>- pest control: Pest and diseases models and recognition from sensors, imagery, etc</li> <li>- Implementation of crop specific FMIS + Implementation of a data transfer system</li> <li>- Use of Field operation management systems</li> </ul> <p>Livestock</p> <ul style="list-style-type: none"> <li>- Implementation of livestock specific FMIS + Implementation of a data transfer system</li> <li>- Precision animal health system</li> </ul> <p>Mixed farming</p> <ul style="list-style-type: none"> <li>- agrotourism platforms, local product online markets</li> </ul>
<p><b><u>Essential knowledge</u></b></p>	<p>Knowledge about general agriculture principles (whole production chain)</p> <p>General technical principles and options for digital agriculture</p> <p>Legal framework for operating a farm</p> <p>Legal framework when using autonomous machinery</p> <p>Introduction to machinery with digitalisation tools; advantages and disadvantages of each available technology (assessment criteria)</p> <p>Basic knowledge on GPS and GIS</p> <p>Basic knowledge on FIS</p>



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This ensures all essential skills and knowledge have been sufficiently mapped to create learning content and proposed programme.

Duration

120 hours online learning

180 hours in-class learning

360 hours work-based learning (~apprenticeship)

20 hours of Assessment

TOTAL = 680h

**Content Mapping (=300h) [appr. 30h/week > 10 weeks)**

Responsible  
Partner

**ProAgria (PA)**  
AC3A, ACTIA,  
ANIA, CERTH,  
FJ-BLT

Collab - Partner

Technician for Agriculture digitalisation										
Skills/Knowledge as OP T2.1	Skills/Knowledge as ESCO T2.5	Content	Foreseen duration	Available material	Skills	LO Addressed	Online (total 120h)	In-class (total 180h)	Method Type	Assessment
Soft Skill	Soft Skill									
Soft skills and entrepreneurship for digitalisation/ Business intelligence and worklife skills	Digital entrepreneurship	<a href="#">entrepreneurialism</a>	K090 From Traditional to Digital Food Marketing	Soft skills and entrepreneurship module	Entrepreneurship	Knowing the principles of managing the relationship between consumers and products or services for the purpose of increasing sales and improving advertising techniques. Carrying a market analysis to understand customers behaviour. Understand the routes to market and the	13	10	Flipped classroom	Portfolio of Coursework Suggest a portfolio of 3 pieces of coursework worth a total of 10
		<a href="#">agricultural business management</a>								
	Sales	<a href="#">persuade others</a> <a href="#">sales argumentation</a>								
	marketing	<a href="#">implement marketing strategies</a>								
	E-commerce	<a href="#">marketing principles</a> <a href="#">e-commerce systems</a>								

						marketing approach. Identifying how to develop a marketing mix: product, price, promotion and place. Creating an effective Digital Promotion Plan by enhancing internet business tools such as social media, PPC (Pay Per Click) advertising, SEO (Search Engine Optimization) and growing your contact list with DEM (Direct Email Marketing). Doing analysis and online market research. Using Google Analytics and analysing statistics related to business website. Creating cases of studies and best practices in digital food marketing				marks (1 – 4 marks, 2 – 4 marks and 3 – 2 marks)  Assessment Value = 10%
	Farmhouse platforms, local product online markets									
	Basics of economic and financial issues	<a href="#">comprehend financial business terminology</a>								
	Business planning	<a href="#">develop business plans</a>	K050 Business Modelling	8	Soft skills and entrepreneurship module	Entrepreneurship	Ability to substantially ideate, describe, evaluate, and discuss a business model using the Business Model Canvas Ability to describe the current farm digital ecosystem Basic of economic and financial issues Analysis of Agri-food business modelling	4	4	

	Innovation management and its deployment	<a href="#">seek innovation in current practices</a>	K040 Innovation management	4	Soft skills and entrepreneurship module	Soft skills	Ability to innovate together with the decision makers different lucrative future visions for the farm. Ability to facilitate peer groups for innovative companies		4						
	Strategic thinking	<a href="#">apply strategic thinking</a>													
	Negotiation and conflicts	<a href="#">negotiate compromise/resolve conflict</a>	K070 Team working negotiation and conflict management	10	Soft skills and entrepreneurship module	Soft skills and English	Managing issues in team constitution (team roles) Identifying the different stages of team development and how a leader can support the team at each stage Understanding the needs of different personality styles and how to work with them Discovering how to build deeper relationships through common understanding and improved communication Becoming effective at delegating lower priority items		10						
		<a href="#">Work in teams</a>													
	Public speaking	<a href="#">speak in public</a>													
	Problem solving	<a href="#">Problem solving</a>													
	English reading/ understanding	<a href="#">understand spoken English</a>													
		<a href="#">understand written English</a>													
		<a href="#">interact verbally in English</a>													
	Organisation and planning	<a href="#">work in an organised manner</a>									K060 Organization and Planning	6	Soft skills and entrepreneurship module	Soft skills	Achieving better results through effective planning and clarifying goals using SMART objectives Applying a critical-path network system to estimate time and activities required for reaching objective, using
Project management	<a href="#">perform project management</a>														

	Time management	<a href="#">manage time</a>				planning tools such as Gantt Charts Keeping things in perspective, practicing the principles of prioritizing work effectively			
	Continuous learning	<a href="#">demonstrate willingness to learn</a>	K100 Lifelong learning and continuous learning	4	Soft skills and entrepreneurship module	Soft skills	Ability to describe and understand CPD (Continuous Professional Development) Conscious decision making	2	2
	Decision making	<a href="#">make decisions</a>							
	Analytical thinking	<a href="#">Think analytically</a>							
	critical thinking	<a href="#">address problems critically</a>							
	creative thinking	<a href="#">Think creatively</a>							
	Reporting and briefing	<a href="#">write work-related reports</a>							
	proactive	<a href="#">think proactively</a>							
	flexible	<a href="#">adapt to change</a>							
	Communication tools: peer groups for innovative farmers	<a href="#">liaising and networking</a>	K030 participation in peer groups	3	Soft skills and entrepreneurship module	Essential skills	The benefits of peer groups in online learning. Online communities and collaborative learning. Tools and technologies for collaborative learning	3	
	Digital learning/ tools	<a href="#">using digital tools for collaboration and productivity</a>							

	Digital tools	<a href="#">have computer literacy</a>	K020 Basic ICT skills	4	Soft skills and entrepreneurship module	ICT skills		4		
	Job safety	<a href="#">follow safety precautions in work practices</a>	K080 Health and safety in the workplace	14	Soft skills and entrepreneurship module	Soft skills	Applying principles, policies and institutional regulations aimed at guaranteeing a safe workplace for all employees Analyse the duties of employers and employees as specified in current Safety, Health and Welfare at work legislation Examine the role of the Health and Safety Authority Explain the causes, prevention, emergency procedures, reporting and recording of accidents and dangerous occurrences Analyze the causes and prevention of fire related events to include identification of emergency procedures, the fire triangle and fire equipment Comment on specific hazards and risks when working with equipment to include mechanical and electrical equipment Investigate how personal protective equipment (PPE) is used in the workplace	6	8	Two choices  First choice Assignment To conduct a safety risk assessment worth 20 marks or Second choice Skills Demonstration To show how to use a fire extinguisher (video Evidenced) Worth 20 marks Assesme



Introduction to smart farming / digitalisation in agriculture (including logistics and bioeconomy)	Knowledge about general agriculture principles (whole production chain)	<a href="#">agricultural production principles</a>	D010A what is digitalisation	8	Digitalisation module	Essential knowledge	Understand comprehensively from different perspectives what is meant by digitalisation Ability to describe what is meant by digital innovation Ability to describe what is the difference between smart farm and precision farm concept	8			Examination Theory Multiple Choice Exam with 20 questions. Each Question worth 2 marks Total 40 marks Assessment Value = 40%
	Introduction to machinery with digitalisation tools; advantages and disadvantages of each available technology (assessment criteria)	<a href="#">agricultural equipment</a>	D020A Technologies by sub sectors	8	Digitalisation module	Essential knowledge	Understanding the availability of digital technologies in different production sectors	4	4		
			D030A digitalisation and the impact of technology	4	Digitalisation module	Essential knowledge	Ability to summarize how digital technology has evolved in time and can name the future digitalisation trends ("Technological breakthroughs from the early days of farming to 2030 and beyond")	4			



Precision farming: remote sensing, GPS, GIS, Automated farming		D040A Basic remote sensing	4	Digitalisation module	Essential skills	The tools involved in geographical mapping and positioning, such as GPS (global positioning systems), GIS (geographical information systems), and RS (remote sensing). LO-suggestion: Ability to describe the main differences in the use of GPS, GIS and RS in agriculture	2	2	
	<a href="#">apply precision farming</a>		12		Essential skills	Ability to use modern technologies and equipment with high precision positioning systems, geo-mapping and/or automated steering systems for agricultural activities.	4	8	
	Basic knowledge of GPS, GIS and FIS	<a href="#">geographic information systems</a>							
Implementation of crop-specific FMIS + Use of Field operation management systems + Implementation	<a href="#">use agricultural information systems and databases</a>	D050A Farm management information system	18	Digitalisation module	Essential skills	Ability to describe the concept of FMIS	2		

	n of livestock-specific FMIS					Management information systems and databases to plan, manage and operate agricultural enterprise and production. LO-suggestion: Ability to describe importance of management information systems and databases in planning, managing and operating agricultural enterprise and agricultural production.	2			
	Use of Field operation management systems					Ability to describe case examples of different kinds of FMIS in different size farms and production lines in agriculture	4			
						The learner will be able to perform hardware and software configuration to most typical machines and robots and FMIS in Smart Farming		4		
						able to run Farm Management Information Systems and understand outputs (FarmB...)			4	
	Precision animal health system	<a href="#">regulate animal health standards</a>				Precision animal health system. LO-suggestion: Ability to explain the main differences between precision animal health system and traditional animal health system.			2	

	Legal framework for operating a farm	<a href="#">legislation in agriculture</a>			-	Essential knowledge				
	Bioeconomy	<a href="#">bioeconomy</a>	B010 Understanding the bioeconomy	12	Bioeconomy module	Essential knowledge	Appreciate the Bioeconomy Concept and Rationale	8	4	
	Logistics managements	<a href="#">Manage logistics</a>	Ability to name important opportunities and challenges of Food Logistict 4.0.	12	UNITO	Essential skills		6	6	
System integration and data transfer	Arable crops: practical training with specific machinery (weeding machine, combined harvester)	<a href="#">operate agricultural machinery</a>	D120 Operate digital hardware	8	Digitalisation module	Optional skills	Understand Canbus/ Isobus principles to connect tractor and equipment Operate Canbus/Isobus connect tractor and equipment	2	6	Assignment Suggest and assignment with a total value of 20 marks Assessment Value = 20%
			D130 Connect and troubleshoot equipment	8	Digitalisation module	Essential knowledge	Ability to perform electronic diagnosis, troubleshooting.	4	4	

	Weather forecast knowledge and/ or tools	<a href="#">Collect weather-related data</a>	D140 Precision farming weather forecast knowledge and tools	4	Digitalisation module	Essential skills	Gather data from satellites, radars, remote sensors, and weather stations in order to obtain information about weather conditions and phenomena.		4	
	Implementation of a data-transfer system	<a href="#">migrate existing data</a>	D150 transferring data from application - data exchange	8	Digitalisation module	Essential skills	Entering information into a data storage and data retrieval system via processes such as scanning, manual keying or electronic data transfer in order to process large amounts of data. (Data handling and analysis, data exchange)		8	
	Data analysis, data exchange	<a href="#">perform data analysis</a>	D160 Basic Statistics	8	Digitalisation module	Optional knowledge	Collecting data and statistics to test and evaluate in order to generate assertions and pattern predictions, with the aim of discovering useful information in a decision-making process. (Data handling and analysis, data exchange)	6	2	
	Tracability, quality signs and labels	Implement traceability systems in respect of different agriculture and forestry resources	D170 Ability to implement traceability systems	10	Digitalisation module	Essential skills	Ability to describe key aspects of traceability, knowledge about legal requirements from EU and references to private standards Livestock farming traceability	4	6	
	Traceability	<a href="#">monitor livestock</a>								

Operation and use of agricultural machinery, equipment, digitalisation tools, applications, premises and facilities	Arable crops: practical training with specific machinery (weeding machine, combined harvester)	<a href="#">operate agricultural machinery</a>	D180 Practical training with job-specific machinery	6	Digitalisation module	Optional skills	Operate motorised agricultural equipment including tractors, balers, sprayers, ploughs, mowers, combines, earthmoving equipment, trucks, and irrigation equipment. Skills needed	6	Portfolio of Coursework Suggest a portfolio of 3 pieces of coursework worth a total of 10 marks (1 – 4 marks, 2 – 4 marks and 3 – 2 marks)  Assessment Value = 10%
	Livestock farming: feeding optimisation, traceability, FMIS, specific machinery (e.g. milking robot, autonomous feeding machine)	<a href="#">carry out feeding operations</a>	D080A Introduction to digitalisation tools and machinery	8	Digitalisation module	Essential knowledge	Ability to find and use of mobile phones apps Learner is confident in using different kinds of software and online applications.	8	
	Pest control: Pest and disease models and recognition	<a href="#">perform pest control</a>	D090A control the environment storage	10	Digitalisation module	Essential skills	Technician/Operator is able to maintain or ensure the maintenance of cleaning equipment, heating or air conditioning of storage	10	

	from sensors, imagery, etc						facilities, sensors and the temperature of premises.			
		D100A greenhouse control	6	Digitalisation module	Essential skills		Able to compare devices and sensors, schedule irrigation, to set up temperatures, extra-time and CO2 fertilisation		6	
	Basic programming knowledge	<a href="#">computer programming</a>	D090A control the environment storage	2	Digitalisation module	Optional knowledge	Ability to estimate the benefits and challenges relating to programming DIY vs Outsourcing / Contractors	2		
	Use of robots and drones	<a href="#">make use of personal robots for practical support</a>	D110A use of robots and drones	12	Digitalisation module	Optional skills	Use semi-autonomous or autonomous machines which automatically carry out complex actions while being guided by digital or electronic software, such as driverless cars, drones and other machines. Drones legislation	6	6	
	Legal framework when using autonomous machinery	<a href="#">legislation in agriculture</a>			-	Essential knowledge				
	Use of LCA tools (examples of commercial software tools)		S030 Adaptation and Mitigation	2	Sustainability module	Optional knowledge	List 3 methods to reduce GHG (C, CH <sub>4</sub> etc) emission List 3 methods to bind GHG (C, CH <sub>4</sub> etc) emission List 3 methods how farmers can adapt to climate change. Provide examples of	2		

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							practices that farmers can implement			
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## 7.7 Appendix 7 – curricula for the “Technician for Agriculture sustainability” occupational profile.

### Component Details

<b>Title</b>	Technician for sustainability in agriculture
<b>Level</b>	5
<b>Total Hours</b>	680
<b>Purpose</b>	The purpose of this award is to equip the learner with the relevant knowledge, skills and competence to participate in a sustainable production in agriculture and agri-food sectors.
<b>Learning Objectives</b>	<p>Learners will be able to:</p> <ol style="list-style-type: none"> <li>1. Understand the principles of a sustainable production in agriculture and agri-food, taking into account the 3 pillars of sustainability.</li> <li>2. Get basic knowledge of the potential impacts of production to the compartments of the environments such as water, air, energy, soil</li> <li>3. Identify adaptation and mitigation practices to reduce such impact</li> <li>4. Identify and understand the main drivers for economical sustainability</li> <li>5. Identify and understand the main drivers for social sustainability</li> </ol>

### Assessment Techniques

In order to demonstrate that they have reached the standards of knowledge, skill and competence



identified in all the learning outcomes, learners are required to complete the assessment(s) below.

The assessor is responsible for devising assessment instruments (e.g. project and assignment briefs, examination papers), assessment criteria and mark sheets, consistent with the techniques identified below and EQF assessment requirements.

Programme validation will require providers to map each learning outcome to its associated assessment technique. All learning outcomes **must** be assessed and achieved in accordance with the **minimum intended module learning outcomes** set out in the validated programme.

Portfolio / Collection of Work	2%
Skills Demonstration	5%
Assignment	3%
Examination theory (Test)	90%

## Description

### Portfolio / Collection of Work

*A portfolio or collection of work is a collection and/or selection of pieces of work produced by the learner over a period of time that demonstrates achievement of a range of learning outcomes. The collection may be self-generated or may be generated in response to a particular brief or tasks/activities devised by the assessor.*

### Skills Demonstration

*A skills demonstration is used to assess a wide range of practical based learning outcomes including practical skills and knowledge. A skills demonstration will require the learner to complete a task or series of tasks that demonstrate a range of skills.*

### Assignment

An assignment is an exercise carried out in response to a brief with specific guidelines as to what should be included. An assignment is usually of short duration and may be carried out over a specified period of time.

## **Examination - Theory**

An examination provides a means of assessing a learner's ability to recall and apply knowledge, skills and understanding within a set period of time and under clearly specified conditions.

A theory-based examination assesses the ability to recall, apply and understand specific theory and knowledge.

## Proposed Programme Outline

### Sustainability Awareness Course Description

#### Technician for sustainability in agriculture

##### Course Aim:

The purpose of this award is to equip the learner with the relevant knowledge, skills and competence to participate in a sustainable production in agriculture and agri-food sectors.

##### Course Objectives:

##### **On completion of this training course, you will be able to:**

- Understand the principles of a sustainable production in agriculture and agri-food, taking into account the 3 pillars of sustainability.
- Get basic knowledge of the potential impacts of production to the compartments of the environments such as water, air, energy, soil
- Identify adaptation and mitigation practices to reduce such impact
- Identify and understand the main drivers for economical sustainability
- Identify and understand the main drivers for social sustainability

##### Course Structure

Module 1	Introduction to sustainability
Module 2	Water Quality/Quantity/Availability
Module 3	Biodiversity
Module 4	Soil Functioning and Preservation
Module 5	Air and atmosphere
Module 6	Energy Efficiency
Module 7	Good Agricultural Practices: Sustainable Crop Production
Module 8	Good Agricultural Practices: Sustainable Animal Husbandry
Module 9	Good Agricultural Practices: Animal Welfare
Module 10	Good Practices in Agri-Food Industry
Module 11	Waste & By-Product Management
Module 12	Economic and financial Sustainability
Module 13	Social Sustainability
Module 14	Sustainability Policy & Regulations: The Law

### Content Mapping

Module	Unit	Lesson	Learning Outcomes EQF4	Learning Outcomes EQF5	Level	Profile	Approximate hrs			Methodology
							Operator	Techn Agr	Techn AFI	
Introduction to sustainability	S010 Sustainability	Sustainability introduction	Explain the 3 dimensions of sustainability and their interactions		All levels (with adaptation by the teacher)	All profiles (with adaptation by the teacher)	1	12	12	
			Ecosystems - introduction Balances and imbalances				1			
	S020 Climate change	Climate change	Explain how climate works (cycles etc). Proof of change and human causes - reasons causing climate change - impacts - Modern Tools (Geographic Information Systems,				2			

			Satellite Remote Sensing) to identify impacts							
	S030 Adaptation and Mitigation	adaptation/mitigation (as a general approach for all topics)	<p>List 3 methods to reduce GHG (C, CH<sub>4</sub> etc) emission</p> <p>List 3 methods to bind GHG (C,CH<sub>4</sub> etc) emission</p> <p>List 3 methods how farmers can adapt to climate change. Provide examples of practices that farmers can implement</p>				2			
	S040 Management of resources	Management of resources	<p>Essential resources</p> <ul style="list-style-type: none"> <li>- What are vital resources</li> <li>- History recap leading to current model</li> <li>- Threats</li> <li>- How to manage? Mitigation, solutions</li> </ul>				3			

	S050 System Thinking	Systemic approach - System Thinking - decision making for complex situations	Systemic approach - Thinking of every angle for a topic/decision				1			assignment
	S070 Life Cycle Assessment (Aspects)	Life Cycle Assessment (Aspects) Introduction to LCA concept: the impacts of the inputs and outputs	Explain what is the Life Cycle of a product. Examples of environmental problems generated during the production of products. Explain how this tool of environmental management can evaluate the environmental behavior of a product				1			assignment
			Draw and describe a lifecycles assessment of a certain resource/product.				1			assignment

			Include economic and social aspects							
Soil Functioning and Preservation	S180 Soil general introduction	Soil: general introduction, types and specification for uses	Be able to name X samples of different soil types and explain what makes them to be different		All Levels	All profiles	2	2	2	
			Be able to carry out Sustainable and Efficient soil management practices		All Levels	All profiles	2	2	2	demo/field visit
	S190 Soil as a resource	Soil as a resource	Explain several Soil Nutrients and what effect they have on plants. Explain which factors contribute to soil fertility. Describe soil problems (corrosion, acidification, soil pollution with heavy metals, loss of organic matter etc.)		Level 4 : learning about good practices Level 5 : management practices and orientations	Agriculture, Forestry	2	2		practical/ass/field visit etc

	S200 Soil impacted by Agri and Food activities	Soil impacted by Agri and Food activities	Be able to carry out sustainable Soil Fertility Management practices and explain why these are sustainable		Level 4 : learning about good practices Level 5 : management practices and orientations	Agriculture, Forestry	4	4		practical/ ass/field visit etc
			Describe X methods to improve soil fertility and actions to combat desertification		Level 4 : learning about good practices Level 5 : management practices and orientations	Agriculture, Forestry	2	2		practical/ ass/field visit etc
	S210 Soil impacted by industrial activities	Soil impacted by industrial activities	What are the main industrial activities that pollute the soil? What can be done to deal with it?		Level 5 : management practices and orientations	All profiles		2	2	practical/ ass/field visit etc
			Ways to restore the chemical composition and quality of the soil in environments burdened by polluting activities		Level 5 Awareness of the responsibility -> Food Industry Remediation activity : Farm & forestry	All profiles		2	2	practical/ ass/field visit etc



Water Quality/Quantity/Availability	S080 Water general introduction	Water: general introduction. sources, availability, specification for uses	To draw the water cycle (ocean, clouds, rain, rivers).		All levels	All profile	2	1	1	
	S090 Water sources availability specification for uses		Write a short paper on a case where Sustainable and Efficient water use has been developed		Level 4: examples of good practices and use cases	Agriculture	2			Pract
	S101 Availability water	S100 Water quantity	Explain about availability, demands, conflicts of use, regulations on water use.		Level 4: learning about good practices Level 5: management practices and orientations	All profile	2	2	2	Ass
	S102 Sustainable Irrigation		To know the role of irrigation in sustainable development		Level 4: learning about good practices Level 5: management practices and orientations	Agriculture	2	2		workbased

	S103 Sprinkler Irrigation		To know the main characteristics of sprinkler irrigation		Level 4: learning about good practices Level 5: management practices and orientations	Agriculture	2	4		workbased
	S104 Drip Irrigation		To know the main characteristics of drip irrigation		Level 4: learning about good practices Level 5 : management practices and orientations	Agriculture	4	4		workbased
	S105 Surface Irrigation		To know the main characteristics of surface irrigation		Level 4: learning about good practices Level 5 : management practices and orientations	Agriculture	2	2		workbased
	S106 Groundwater management		Explain Ground Water Management (as a resource) in X different situations.		Level 4 : learning about good practices Level 5 :	All profile	3	2	6	workbased

					management practices and orientations					
	S107 Rainwater Harvesting		Describe X ways of rainwater harvesting & soil water retention and be able to apply relevant techniques		Level 4 : examples of good practices and use cases	All profile	4		4	Practical workbased
	S110 Water quality	S111 Treatment technologies for water conditioning	To predict water quality based on its origin. To Identify the unit operation to be used to remove each type of pollutant. To know the main types of disinfecting agents and their main characteristics.		Level 4 : learning about good practices Level 5 : management practices and orientations	All profile	4	4	6	incl field visit /demonstration
		S112 Uses and treatment technologies for water reclamation	To recognise the main uses of reclaimed water and related legislation. To identify the unit operations to be used depending on the use of reclaimed water.		Level 4 : learning about good practices Level 5 : management practices and orientations	All profile	4	4	4	incl field visit

	S120 waste water as environmental emission	Wastewater: emission and treatment	to know wastewater characterization parameters and the values that must be met for discharge to the environment or sewage system. To be able to identify the main wastewater treatment technologies	To be able to identify and describe the fundamentals of wastewater treatment technologies	Level 4 : learning about good practices Level 5 : management practices and orientations	All profile	4	8	8	
Water in agriculture	S131 Soil Fertility Management	S130 Prevention of damages to Water bodies	Be able to carry out good practices of Nutrient Management, Application Practices and Use of Pesticides		Level 4 : learning about good practices	Agriculture	2			Extra practical
	S132 Handling of plant protection spraying equipment				Level 4 : learning about good practices Level 5 : management practices and orientations	Agriculture	2	2		Extra practicals/ demo
	S133 Be able to carry out good agricultural practices in				Level 4 : learning about good practices Level 5 : management	Agriculture	2	4		Extra practicals/ demo

	the management of energy		energy and other means of production		practices and orientations					
	S134 Water management at farm level				Level 4 : learning about good practices Level 5 : management practices and orientations	Agriculture	2	2		Extra practicals
	S135 IAS SIARPR				Level 4 : learning about good practices Level 5 : management practices and orientations	Agriculture	2	2		Extra practicals/ demo
	S136 Sprinkler and drip irrigation system evaluation				Level 4 : learning about good practices	Agriculture	6			Extra practicals/ demo

	S137 Crop Planning				Level 4 : learning about good practices	Agriculture	1			Extra practicals/ demo
Water in agri-food industry	S140 Water for agri-food		To know water requirements for heat exchange, transformation process and cleaning and to be able to identify and classify the different types of wastewaters generated in agri-food industry.	To identify and know the main strategies for wastewater treatment in agri-food sector.	Level 4: Introduction and use cases Level 5 : Technology operation and requirements	Food Industry	4		6	Extra practicals/ demo
Air and atmosphere	S220 Air atmosphere and emissions from activities	Air: general introduction, atmosphere and emission from activities	Explain what is GHG effect ? What is CO2,CH4 etc		All levels	All profiles				
	S230 GHG emission reduction	GHG's Emissions reduction,	Explain about Agri: emissions from machinery and fertilisation Make a chart showing emissions from different machines.		Level 4 : learning about good practices Level 5 : management practices and orientations	Agriculture & forestry	4	4		incl practicals

			Describe which practises farmers should adapt in order to reduce the emissions							
	S232 emission from food industry		Provide a chart showing emissions from the food industry during the last years/ decades. Examples of good practices that can reduce the emissions		Level 4 : learning about good practices Level 5 : management practices and orientations	Food Industry			4	incl practicals
	S238 Emission from transport and logistics		Impacts of importing inputs and exporting food. Examples of alternative solutions for zero emissions in transport		Level 4 : learning about good practices Level 5 : management practices and orientations	All profiles	4	4	4	incl practicals
	S240 Climate change	Climate Change (See also topic Climate change in UNit	Describe a case where farmers and food industry are affected by climate change		All levels	All profiles	2	2	2	incl practicals

		INTroduction to sustainability)	Explain how Climate Change affects the general atmosphere, how air pollution is connected with climate change.		All levels	All profiles	4	4	4	incl practicals
Biodiversity	S150 What is Biodiversity	What is biodiversity	Students are able to explain the principle of system thinking that relates to biodiversity		All levels	All profiles	1	1	1	
			They can make a drawing (schematic) which illustrates the interactions between several organisms		All levels	All profiles	1	1	1	
			Students can name a number of biodiversity indicators and explain why these are used as indicators		All levels	All profiles	1	1	1	



			EQF 5: Students carry out a biodiversity assessment-quantification through the use of biodiversity indicators Students can explain a system to monitor changes in biodiversity.		All levels	All profiles	1	1	1	
	S160 Biodiversity as a resource	Biodiversity as a resource	Explain what Ecosystem services are and give 5 examples (pollination, soil fertility etc)		Level 5	Agriculture, Forestry	1	1	1	
			Students write a case study on the importance of biodiversity for agricultural production		Level 4 : learning about good practices Level 5 : management practices and orientations	Agriculture, Forestry	3	3	3	incl practical
	S170 Biodiversity	Biodiversity impacted by practices	Describe X agricultural practices influencing biodiversity in a positive way and X		Level 4	Agriculture, Forestry	2	2	2	

	impacted by practices		practices having a negative effect							
			Be able to carry out X Sustainable practices towards biodiversity		Level 4: learning about good practices Level 5: management practices and orientations	Agriculture, Forestry	4	4		
Good Agricultural Practices : Sustainable Crop Production	S290 crop rotation	Crop Rotation	Explain the characteristics of crop rotations and their management in the field.		Level 4	Agriculture	2			
	S300 new crop techniques	New Crop Techniques	examples of new farming techniques resistant to climate change		Level 4	Agriculture	2			
	S310 Agro-Environmental Practices	Agro-Environmental Practices	Be able to carry out good environmental practices in agriculture.			Agriculture	2			
	S320 Low emissions	Low emissions Spreading/Spray	Operate plant protection product		Level 4	Agriculture	4			

	Spreading Spraying Equipment & Practices	ing Equipment & Practices	application equipment correctly.							
	S330 Integrated Pest & Disease Management	Integrated Pest & Disease Management	To know the method of integrated pest management.			Agriculture	4			
	S340 Crop Diversification	Crop Diversification	Describe the different types of crop diversification.			Agriculture	2			
	S350 Conservation farming	Conservation farming	Explain the general principles of conservation agriculture			Agriculture	2			
	S380 Grassland Management	Grassland Management	Explain the general principles of conservation agriculture			Agriculture	2			
	S390 Smart Farming Introductory Aspects	Smart Farming (Introductory Aspects)	Explaining the general principles and future of smart farming.			Agriculture	2			

Good Agricultural Practices : Sustainable Animal Husbandry	S400 Sustainable Animal nutrition	Sustainable Feed Sources Sustainable Sourcing	1. The student is able to explain a number of alternative sources of protein that can be used in animal feed			Agriculture		4		
			2. The student is able to explain why it is important to look for alternative feed sources							
	S410 Sustainable feed sources	Animal Nutrition	1. Student is able to explain what nutritional requirements for different animal must be met		5	Agriculture		2		
			2. Student is able to explain what the biggest sustainability challenges are in the future		5	Agriculture		2		
	S420 Livestock Reducing Emissions	Reducing Emissions	1. The student can name the X most harmful emission gases released from		5	Agriculture		2		

			pig/poultry farming 2. The student is able to name X ways in which harmful emission gases can be reduced							
Good Agricultural Practices Animal Welfare	S430 Animal Welfare	Animal Welfare	1. The student is able to explain welfare practices for types of animals, how these improve animal welfare.		5	Agriculture		2		
			2. The student is able to describe the impact of practices on costs and benefits			Agriculture		2		
	S440 Responsible Use of Antibiotics	Responsible Use of Antibiotics	1. The student is able to explain the importance of antibiotic reduction. 2. The student is able to give examples of how antibiotic reduction can be achieved		5			2		

Good Practices in Agro-Food Industry	S450 Best available technologies not involving changes in composition	S450 BATs Materials reception and preparation	To describe materials reception and preparation (knowledge) and comparison of the mechanisms of action of each of the most common techniques materials reception and preparation (understanding),	To discover the mechanisms of action of each of the most common processing techniques (application) and to select the different techniques that can be applied to minimise resources consumed and waste produced (evaluation).		AF Industry	2		4	on-line
		S455 BATS for Size reduction, mixing and forming	To describe size reduction, mixing and forming techniques (knowledge) and comparison of the mechanisms of action of each of the most common techniques of size reduction, mixing and forming (understanding),	To discover the mechanisms of action of each of the most common processing techniques (application) and to select the different techniques that can be applied to minimise resources consumed and waste produced (evaluation).		AF Industry	2		4	on-line

	S460 Best available technologies for processes involving separation techniques or product processing	S461-BATS for Separation techniques	To describe separation techniques (knowledge) and comparison of the mechanisms of action of each of the most common techniques (understanding),	To discover the mechanisms of action of each of the most common processing techniques (application) and to select the different techniques that can be applied to minimise resources consumed and waste produced (evaluation).		AF Industry	2		2	
		S462 BATS for Product processing technology	To describe of product processing techniques (knowledge) and comparison of the mechanisms of action of each of the most common techniques (understanding),	To discover the mechanisms of action of each of the most common processing techniques (application) and to select the different techniques that can be applied to minimise resources consumed and waste produced (evaluation).		AF Industry	2		2	

	S470 Best available technologies involving heat processing	S471 BATs for Heat processing	To describe heat processing techniques (knowledge) and comparison of the mechanisms of action of each of the most common techniques (understanding),	To discover the mechanisms of action of each of the most common processing techniques (application) and to select the different techniques that can be applied to minimise resources consumed and waste produced (evaluation).		AF Industry	2		2	
		S472 BATS for Concentration by heat	To describe concentration by heat techniques (knowledge) and comparison of the mechanisms of action of each of the most common techniques of concentration by heat (understanding),	To discover the mechanisms of action of each of the most common processing techniques (application) and to select the different techniques that can be applied to minimise resources consumed and waste produced (evaluation).		AF Industry	2		2	



		S473 BATs for Processing by removal of heat	To describe processing by removal of heat techniques (knowledge) and comparison of the mechanisms of action of each of the most common techniques of processing by removal of heat (understanding),	To discover the mechanisms of action of each of the most common processing techniques (application) and to select the different techniques that can be applied to minimise resources consumed and waste produced (evaluation).		AF Industry	2		2	
	S480 Best available technologies for post processing operations and for utility processes	S481 BATs for Post processing operations	To describe post processing operations (knowledge) and comparison of the mechanisms of action of each of the most common techniques of post processing operation (understanding),	To discover the mechanisms of action of each of the most common processing techniques (application) and to select the different techniques that can be applied to minimise resources consumed and waste produced (evaluation).		AF Industry	2		2	

		S482 BATS for Utility processes	To describe utility processes (knowledge) and comparison of the mechanisms of action of each of the most common techniques of utility processes (understanding),	To discover the mechanisms of action of each of the most common processing techniques (application) and to select the different techniques that can be applied to minimise resources consumed and waste produced (evaluation).		AF Industry	2		2	
Energy Efficiency	S250 Energy sources	Energy sources	Carbon based & petrol based energy facts		All levels	All profiles	2	2	2	
	S252 What is renewable energy		What is renewable energy and how can we use it agriculture?		All levels	All profiles	2	2	2	
	S254 link between energy and climate change		Advantages of Renewable Energy Sources that make them a solution for energy sufficiency and		All levels	All profiles	2	2	2	

			for the sustainability of the planet							
	S256 direct and indirect costs of energy		Costs of energy (direct and indirect). Comparison of conventional energy production methods costs' to renewable ones		All levels	All profiles	2	3	3	
	S258 Energy management	Agri and food industry consumption of energy	- Energy storage and H2 technologies. - Electricity transmission and distribution. - Smart grid technologies		Level 4 : learning about good practices Level 5 : management practices and orientations	All profiles	4	3	3	incl practical & Field visits
	S260 agri and food industry energy consumption		Energy Efficiency (main measures). Energy saving and efficiency techniques in agri-food industry		Level 4 : learning about good practices Level 5 : management practices and orientations	All profiles	4	3	3	incl practical & Field visits

	S270 Agri and food industry producing renewable energy	Agri and food industry producing energy	Renewable Energy		Level 4 : learning about good practices Level 5 : management practices and orientations	All profiles	4	3	3	incl practical & Field visits
	S280 by products biomass digestors photovoltaic		Utilization of By-products, Biomass, digesters, photovoltaic electricity, production of biogas through the use of biomass in order to cover energy needs etc. How can agri-food industries become producers of green energy?		Level 4 : learning about good practices Level 5 : management practices and orientations	All profiles	4	3	3	incl practical & Field visits
Waste & By-Product Management	S490 Characterisation of wastes	S490 Characterisation of waste	To describe the types of wastes. Description of the main types of wastes produced in the agri-food industry. To describe the main treatment technologies. To describe the main ways	To identify wastes (analysis)		all profiles	4		2	

			of characterization of wastes. (knowledge)							
S-500 Waste prevention & minimization	S501 Waste prevention and minimization I: general concepts	To describe the general types of procedures for waste minimization (knowledge). Exemplification of the procedures with situations of the daily life (understanding)	To describe the items of a waste minimization report (knowledge). To sketch a waste minimization report (application)			all profiles	2	2	2	in class /assignments
	S502 Waste prevention and minimization II: stock management	To describe (knowledge) and to classify (understanding) of the different stock management techniques can be applied to minimise resources consumed and waste produced (evaluation) in the agri-food industry	not taught at level 5			all profiles	4			in class /assignments
	S503 Waste prevention and minimization III: changes in	To describe (knowledge) and to classify (understanding) how changes in manufacturing	not taught at level 5			all profiles	6			in class /assignments

		manufacturing processes	techniques can be applied to minimise resources consumed and waste produced (evaluation) in the agri-food industry							
		S504 Waste prevention and minimization IV: recovery or resources	To describe (knowledge) and to classify (understanding) of the different treatment and recovery techniques can be applied to minimise resources consumed and waste produced (evaluation) in the agri-food industry	not taught at level 5		all profiles	4			
	S510 Waste prevention & management in the agri-food industry	S511 Waste prevention & management in the agri-food industry I: meat & poultry, fish & shellfish and fruit & vegetables	To describe the main processes involved in the meat & poultry, fish & shellfish and fruit & vegetables (knowledge), and to compare and to discover their mechanisms of action (application) Strategies and methods in order	To select the different techniques can be applied to minimise resources consumed and waste produced (evaluation) in the meat & poultry, fish & shellfish and fruit & vegetables.		AF industry			4	on-line

			to reduce agri-food waste							
		S512 Waste prevention & management in the agri-food industry II: vegetable oils & fats and dairy products	To describe the main processes involved in the vegetable oils & fats and dairy products (knowledge), and to compare and to discover of their mechanisms of action (application) Strategies and methods in order to reduce agri-food waste	To select the different techniques can be applied to minimise resources consumed and waste produced (evaluation) in the meat & poultry, fish & shellfish and fruit & vegetables.		AF industry			4	
		S513 Waste prevention & management in the agri-food industry III: grain mill products, dry pasta, starch, animal feed, bread,	To describe the main processes involved in the grain mill products, dry pasta, starch, animal feed, bread, confectionery, sugar, coffee (knowledge), and to compare and to discover their mechanisms of action (application)	To select the different techniques can be applied to minimise resources consumed and waste produced (evaluation) in the grain mill products, dry pasta, starch, animal feed, bread,		AF industry			4	

		confectionery, sugar, coffee		confectionery, sugar, coffee.						
		S514 Waste prevention & management in the agri-food industry IV; yeast, malting, brewery, distilling, wine, soft drinks and citric acid	To describe the main processes involved in the meat & poultry, fish & shellfish and fruit & vegetables (knowledge), and to compare and to discover their mechanisms of action (application)	To select the different techniques can be applied to minimise resources consumed and waste produced (evaluation) in the meat & poultry, fish & shellfish and fruit & vegetables.		AF industry			4	incl practicals/ case study
Economic and financial Sustainability	S580 Budget & balance	Basic of economy at farm level	Not taught at level 4		Level 5	all profiles		2	2	
	S590 Expenses		Not taught at level 4		Level 5	all profiles		2	2	
	S600 Costs of production - gross and net margin		Not taught at level 4		Level 5	all profiles		3	3	



	S610 Key indicators for the sustainability of your business		Not taught at level 4		Level 5	all profiles		2	2	
	S620 Short supply chain management (Farmer to consumer)		Not taught at level 4		Level 5					
	S630 Economical resilience Circular Economy		Not taught at level 4		Level 5	all profiles		4	4	
	S640 Lean introduction	Lean (an introduction)	Not taught at level 4		level 5	all profiles		2	2	
			Not taught at level 4		level 5	agriculture & forestry		2	2	
			Not taught at level 4		level 5	all profiles		1	1	
			Not taught at level 4		Level 5	all profiles		1	1	

	S650 Short Supply chain	Sustainable Marketing & communication	Not taught at level 4		Level 5	all profiles		1	1	
	S660 Cooperative approaches		Not taught at level 4		Level 5	all profiles		1	1	
	S670 Sustainable communication		Not taught at level 4		Level 5	all profiles		1	1	
Social Sustainability	S680 Social sustainability for the worker	Social sustainability for the worker	Health & Safety (general Awareness), Mental Health Resilience		All levels	all profiles	3	3	3	
	S690 Social sustainability for the society	Social sustainability for the society	Not taught at level 4			all profiles		1	1	extra assignment
			Not taught at level 4			all profiles		1	1	extra assignment

			Not taught at level 4			all profiles		1	1	extra assignement
Sustainability Policy & Regulations: The Law	S700 Policy	Policy	Being able to explain the main European Policy Drivers		level 5	all profiles	1	1	1	extra assignement
			Being able to state the main objectives of CAP		level 5	Agriculture & Forestry	1	1		extra assignement
	S710 Regulatory frameworks	Regulatory frameworks	Same as level 5		Level 4 : examples of good practices and use cases Level 5 : management practices and orientations	all profiles	4	4	4	incl pratical etc
			Understand where to source locally available funds for financing of sustainable practices		Level 4 : examples of good practices and use cases Level 5 : management	all profiles	2	2	2	extra assignement

					practices and orientations					
			Not taught at level 4		level 5	all profiles		2	2	extra assignment
	S720 Certification organic PDO	Traceability	Understand the impact of Organic and "Protected Designation of Origin" - PDO		Level 5	all profiles		2	2	extra assignment or work based
	S730 Traceability and food safety in industry		Understand the requirements of Food Safety and Traceability		Level 5	industry			2	extra assignment
	S740 Traceability and food safety in agriculture & forestry		Being able to summarise what is meant by traceability in both agricultural products and in Forestry		Level 5	Agriculture & Forestry		2		extra assignment

### Certification and Assessment:

On successful completion of this training the learner will receive a course completion certificate.

**From the Occupational Profile:** Skills and Knowledge needs to assess against

### Technician for Sustainable Agriculture

<p><b>Essential skills</b></p>	<p>Core curriculum - Module Soft-skills and Entrepreneurship (see Annex 3)</p> <ul style="list-style-type: none"> <li>● Soil health management</li> <li>● Crop rotation and new crop techniques</li> <li>● Water/groundwater management</li> <li>● Adaptation and mitigation to climate change</li> <li>● Efficient use of resources, waste prevention and valorisation of by-products</li> <li>● Agro environmental practices</li> <li>● Low emission spreading/spraying equipment and practices</li> <li>● Integrated pest and disease management</li> <li>● Sustainable feed sources and animal nutrition (sustainable sourcing, reducing emissions)</li> <li>● Energy management: energy efficiency and renewable energy</li> </ul>
<p><b>Essential knowledge</b></p>	<ul style="list-style-type: none"> <li>● Good agricultural practices: crop diversification, conservation farming, agroforestry, biodiversity, crop protection, grassland management</li> <li>● Circular economy: Traceability and LCA aspects</li> <li>● Environmental management aspects, GHGs emission reduction; climate change</li> <li>● Legislation regarding the issue of water, protected areas, sustainable land, use measures and regulatory framework and environmental licensing</li> <li>● Smart farming introductory aspects</li> <li>● Soil nutrients and fertility</li> <li>● Work/life Balance</li> </ul>

<p><b>Optional skills</b></p>	<ul style="list-style-type: none"> <li>• Minerals and emission accounting</li> <li>• Zero waste management practices</li> <li>• Corporate social responsibility</li> <li>• Renewable energy production: generation, storage and use of renewable energies</li> <li>• Precision animal health</li> <li>• Slurry management and valorisation</li> <li>• Ecommerce and short supply chains</li> </ul>
<p><b>Optional knowledge</b></p>	<ul style="list-style-type: none"> <li>• Indoor vertical farming (horticulture)</li> <li>• Animal welfare, well-being and health</li> <li>• New grasslands such as mixed-species swards</li> <li>• Weather forecast knowledge and/or tools</li> <li>• Generational renewal</li> </ul>

## Technician for Sustainable Food Industry

<p><b>Essential skills</b></p>	<p>Core curriculum - Module Soft-skills and Entrepreneurship (see Annex 3)</p> <p><u>Efficient use of resources</u></p> <ul style="list-style-type: none"> <li>• water treatment and reuse</li> <li>• waste prevention and valorisation of by-products</li> <li>• energy efficiency (generation, storage and use of renewable energies)</li> </ul> <p><u>Sustainable Packaging</u></p> <ul style="list-style-type: none"> <li>• sourcing and efficient use of materials</li> <li>• reusability/recyclability</li> <li>• eco-design</li> <li>• life cycle</li> </ul> <p><u>Manufacturing technologies</u></p> <ul style="list-style-type: none"> <li>• energetic optimisation of production plants - optimisation of manufacturing processes</li> <li>• industry 4.0</li> <li>• lean manufacturing</li> <li>• preventive maintenance</li> <li>• Sustainable origin of raw material (sustainable sourcing / efficient use of resources)</li> </ul>
<p><b>Essential knowledge</b></p>	<p><u>Sustainability:</u></p> <ul style="list-style-type: none"> <li>• Climate change</li> <li>• GHGs</li> <li>• water management</li> </ul> <p><u>Circular economy:</u></p> <ul style="list-style-type: none"> <li>• Circular manufacturing / Industry 4.0 aspects</li> <li>• Traceability &amp; food Production, food waste reduction</li> <li>• Improved agri-food production (energetic optimisation of production plants - optimisation of manufacturing processes), logistics, sustainable metrics (KPIs), labelling</li> <li>• Consumer trends / demands</li> <li>• General legal framework for industry, environmental Licensing</li> </ul>
<p><b>Optional skills</b></p>	<ul style="list-style-type: none"> <li>• LCA digital tools</li> <li>• Environmental Management Systems</li> </ul>

<b>Optional knowledge</b>	<ul style="list-style-type: none"><li>• Corporate social responsibility</li><li>• Sustainable value chains</li></ul>
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This ensures all essential skills and knowledge have been sufficiently mapped to create learning content and proposed programme.

**Duration**

120 hours online learning

180 hours in-class learning

360 hours work-based learning

20 hours of Assessment



## 7.8 Appendix 8 – curricula for the “Soft Skills Module” to be incorporated across all 7/10 occupational profiles.

### Basic Module for each occupational profile.

Units	Learning outcomes	ESCO TSC framework correspondence
<b>Basic knowl edg e</b>	1. Definitions (soft skills, food industry, sustainability, bioeconomy)	1. ID6: Life Skills and competences <ul style="list-style-type: none"> <li>a. ID6.6 Applying general knowledge               <ul style="list-style-type: none"> <li>i. ID6.6.1 Apply Knowledge of Science Technology and Engineering</li> <li>ii. ID6.6.2 Apply knowledge of Social Science and Humanities</li> </ul> </li> </ul>
	2. Job safety	2. ID4: Social and communication skills and competences <ul style="list-style-type: none"> <li>a. ID4.5 Following ethical code of conduct               <ul style="list-style-type: none"> <li>i. ID4.5.1 Comply with regulations</li> </ul> </li> </ul> ID6: Life Skills and competences <ul style="list-style-type: none"> <li>b. ID6.1 Applying health related skills and competences               <ul style="list-style-type: none"> <li>i. ID 6.1.3 Maintain psychological wellbeing</li> <li>ii. ID 6.1.4 Demonstrate awareness of risks to health</li> <li>iii. ID 6.1.7 Protect the health of others</li> </ul> </li> </ul> ID5: Physical and manual skills and competences <ul style="list-style-type: none"> <li>c. ID5.1 Manipulating and controlling objects and equipment               <ul style="list-style-type: none"> <li>i. ID5.1.2 Use equipment, tools or technology with precision</li> </ul> </li> <li>d. ID5.2 Responding to physical changes or hazards               <ul style="list-style-type: none"> <li>i. ID5.2.1 Adjust to physical demands</li> <li>ii. ID5.2.2 Reach quickly to physical changes or hazards</li> </ul> </li> </ul>
	3. Digital learning/tools	3. ID1: Core skills and competences <ul style="list-style-type: none"> <li>a. ID1.3 Working with digital devices and applications               <ul style="list-style-type: none"> <li>i. ID1.3.1 Operate digital hardware</li> <li>ii. ID1.3.2 Conduct web searches</li> </ul> </li> </ul>

		<ul style="list-style-type: none"> <li>iii. ID1.3.3 Use communication and collaboration software</li> <li>iv. ID1.3.4 Create and edit digital content</li> <li>v. ID1.3.6 Manage digital identity</li> <li>vi. ID1.3.7 Apply digital security measures</li> </ul>
	4. Basic of economic and financial issues	4. ID6: Life Skills and competences <ul style="list-style-type: none"> <li>a. ID6.6 Applying general knowledge               <ul style="list-style-type: none"> <li>i. ID6.6.2 Apply knowledge of Social Science and Humanities</li> </ul> </li> </ul>
	5. English reading/understanding	5. ID1: Core skills and competences <ul style="list-style-type: none"> <li>a. ID1.1 Mastering languages</li> </ul>
	6. Business- /Entrepreneurship Skills in general	6. ID6: Life Skills and competences <ul style="list-style-type: none"> <li>a. ID6.5 Applying financial and entrepreneurial skills and competences               <ul style="list-style-type: none"> <li>i. ID6.5.1 Manage financial and material resources</li> <li>ii. ID6.5.2 Demonstrate entrepreneurship</li> </ul> </li> </ul> <p>ID3: Self-management skills and competences</p> <p>(These skills can also be valuable here)</p>
	7. Knowledge of agri-food communities	7. ID6: Life Skills and competences <ul style="list-style-type: none"> <li>a. ID6.6 Applying general knowledge               <ul style="list-style-type: none"> <li>i. ID6.6.1 Apply Knowledge of Science Technology and Engineering</li> </ul> </li> </ul>
<b>Business planning /model</b>	8. Innovation management and its deployment	8. ID2 Thinking skills and competences <ul style="list-style-type: none"> <li>a. ID2.4 Thinking creatively and innovatively               <ul style="list-style-type: none"> <li>i. ID2.4.2 Thinking innovatively</li> </ul> </li> </ul> <p>ID3 Self-management skills and competences and ID4 Social and communication skills and competences cluster can also be valuable here.</p>
	9. Project management	9. ID2 Thinking skills and competences <p>ID3 Self-management skills and competences</p> <p>ID4 Social and communication skills and competences</p>
	10. Decision making	10. ID3 Self-management skills and competences <ul style="list-style-type: none"> <li>a. ID3.2 Taking a proactive approach</li> </ul>

		i. ID3.2.4 Make decisions
	11. Time management	11. ID3 Self-management skills and competences a. ID3.1 Working efficiently i. ID3.1.2 Manage time
	12. Business planning	12. ID6: Life Skills and competences a. ID6.5 Applying financial and entrepreneurial skills and competences i. ID6.5.1 Manage financial and material resources ii. ID6.5.2 Demonstrate entrepreneurship  ID2: Thinking skills and competences a. ID2.2 Planning and organising i. ID2.2.1 Plan ii. ID2.2.2 Organise information, objects and resources
	13. Sales and Marketing	13. ID6: Life Skills and competences a. ID6.5 Applying financial and entrepreneurial skills and competences i. ID6.5.2 Demonstrate entrepreneurship
	14. Cooperatives	14. ID6: Life Skills and entrepreneurship a. ID6.6 Applying general knowledge i. ID6.6.1 Apply Knowledge of Science Technology and Engineering ii. ID6.6.2 Apply knowledge of Social Science and Humanities
	15. Agri-food law, quality, safety and certification	15. ID6: Life Skills and competences a. ID6.6 Applying general knowledge i. ID6.6.1 Apply Knowledge of Science Technology and Engineering ii. ID6.6.2 Apply knowledge of Social Science and Humanities  ID4: Social and communication skills and competences e. ID4.5 Following ethical code of conduct i. ID4.5.1 Comply with regulations
<b>Social &amp;</b>	16. Public speaking	16. ID4 Social and Communication skills and competences a. ID4.1 Communicating i. ID4.1.2 Address an audience

<b>Com muni catio n</b>	17. Negotiation and conflicts	17. ID4 Social and Communication skills and competences a. ID4.1 Communicating i. ID4.1.5 Negotiate ii. ID4.1.6 Resolve conflict
	18. Food chain cooperation	18. ID4 Social and Communication skills and competences a. ID4.1 Communicating i. ID4.1.3 Promote ideas, products or services ii. ID4.1.4 Moderate discussions b. ID4.2 Supporting others i. ID4.2.1 Show empathy ii. ID4.2.2 Ensure customer orientation iii. ID4.2.3 Advise others iv. ID4.2.4 Instruct others c. ID4.3 collaborating in teams and networks i. ID4.3.1 Work in teams ii. ID4.3.2 Build and maintain networks iii. ID4.3.3 Demonstrate intercultural competence
	19. Staff working/networking	19. ID4 Social and Communication skills and competences a. ID4.1 Communicating i. ID4.1.3 Promote ideas, products or services b. ID4.3 Collaborating in teams and networks i. ID4.3.1 Work in teams ii. ID4.3.2 Build and maintain networks iii. ID4.3.3 Demonstrate intercultural competence
	20. Reporting and briefing	20. ID4 Social and Communication skills and competences a. ID4.1 Communicating i. ID4.1.1 Report
<b>Thin king</b>	21. Organisation, planning, proactive and flexible	21. Organisation and planning  ID2 Thinking skills and competences a. ID2.2 Planning and organising i. ID2.2.1 Plan ii. ID2.2.2 Organise information, objects and resources  Proactive and flexible

		<p>ID3 Self-management skills and competences</p> <ul style="list-style-type: none"> <li>b. ID3.2 Taking a proactive approach <ul style="list-style-type: none"> <li>i. ID3.2.2 Show determination</li> <li>ii. ID3.2.3 Show initiative</li> <li>iii. ID3.2.4 Manage personal progression</li> </ul> </li> <li>c. ID3.4 Demonstrate willingness to learn <ul style="list-style-type: none"> <li>i. ID3.4.1 Keep an open mind</li> <li>ii. ID3.4.3 Adapt to change</li> </ul> </li> </ul>
	22. Problem solving	<p>22. ID2 Thinking skills and competences</p> <ul style="list-style-type: none"> <li>a. ID2.3 Dealing with problems <ul style="list-style-type: none"> <li>i. ID2.3.1 Identify problems</li> <li>ii. ID2.3.2 Solve problems</li> </ul> </li> </ul>
	23. Interdisciplinary knowledge	<p>23. ID2 Thinking skills and competences</p> <ul style="list-style-type: none"> <li>a. ID2.1 Processing information, ideas and concepts <ul style="list-style-type: none"> <li>i. ID2.1.3 Thinking holistically</li> </ul> </li> </ul> <p>ID6: Life Skills and competences</p> <ul style="list-style-type: none"> <li>b. ID6.6 Applying general knowledge <ul style="list-style-type: none"> <li>i. ID6.6.1 Apply Knowledge of Science Technology and Engineering</li> <li>ii. ID6.6.2 Apply knowledge of Social Science and Humanities</li> <li>iii. ID6.6.3 Apply knowledge of Philosophy, Ethics and Religion</li> </ul> </li> </ul>
	24. Learning Continuously	<p>24. ID3 Self-management skills and competences</p> <ul style="list-style-type: none"> <li>a. ID3.4 Demonstrating willingness to learn <ul style="list-style-type: none"> <li>i. ID3.4.5 Demonstrate willingness to learn</li> </ul> </li> </ul>

## Structure of the Basic module on Soft skills and Entrepreneurship

### Units, Lessons and Learning Outcomes

Units	Lessons	Learning Outcomes	Content creator	Level	Profile	Approx hours
K010 Understanding the role of soft skills and digital competences	K011 Soft Skills and Digital Competencies	Definition of soft skills & digital competencies	EFB	4 & 5	all	2
K020 Basic ICT skills	K021 Modern Technologies	Utilise computers, IT equipment, software and modern-day technology in an efficient way.	EFB	4 & 5	all	2
	K022 Cyber Security Risks	Ability to acknowledge cyber security risks for the FMIS ("Cyber threat risks the digital ecosystem on a farm include and how to avoid them")	EFB	4 & 5	all	2
K030 participation in peer groups	K031 Peer Groups in Online Learning	The benefits of peer groups in online learning	EFB	4 & 5	all	1
	K032 Online Communities and Collaborative Learning	Online communities and collaborative learning	EFB	4 & 5	all	1
	K033 Tools and Technologies for Collaborative Learning	Tools and technologies for collaborative learning	EFB	4 & 5	all	1
K040 Innovation management	K041 Innovation strategy	Ability to innovate together with the decision makers different lucrative future visions for the farm.	INFOR	4 & 5	all	2
		Ability to facilitate peer groups for innovative companies	INFOR	4 & 5	all	2
K050 Business Modelling	K051 Introduction to entrepreneurship	Applying financial and entrepreneurial skills and competences	INFOR			
	K052 The business model canvas	Ability to substantially ideate, describe, evaluate, and discuss a business model using the Business Model Canvas	INFOR	4 & 5	all	2
		Ability to describe the current farm digital ecosystem	AC3A - INFOR	4 & 5	all	2
	K054 Economic basic	Basic of economic and financial issues	INFOR	4 & 5	all	2
		Analysis of Agri-food business modelling	UNITO	4 & 5	all	2

K060 Organization and Planning	K061 Organization and Planning SMART objectives	Achieving better results through effective planning and clarifying goals using SMART objectives	LVA	4 & 5	all	2
	K062 Organization and Planning critical-path network system	Applying a critical-path network system to estimate time and activities required for reaching objective, using planning tools such as Gantt Charts	UNITO - INFOR	4 & 5	all	2
	K063 Organization and Planning prioritizing work effectively	Keeping things in perspective, practicing the principles of prioritizing work effectively	AC3A	4 & 5	all	2
K070 Team working negotiation and conflict management	K071 The value of the team	Managing issues in team constitution (team roles)	INFOR	4 & 5	all	2
	K072 Leadership e people management	Identifying the different stages of team development and how a leader can support the team at each stage	INFOR	4 & 5	all	2
	K073 Relationship building communication skills	Understanding the needs of different personality styles and how to work with them	INFOR	4 & 5	all	2
	K074 Team building	Discovering how to build deeper relationships through common understanding and improved communication	INFOR	4 & 5	all	2
	K075 Delegation	Becoming effective at delegating lower priority items	INFOR	4 & 5	all	2
K080 Health and safety in the workplace	K081_Principles, policies and institutional regulations	Applying principles, policies and institutional regulations aimed at guaranteeing a safe workplace for all employees	CONFAGRI	4 & 5	all	2
	K082_The duties of employers and employees	Analyze the duties of employers and employees as specified in current Safety, Health and Welfare at work legislation		4 & 5	all	2
	K083_Health and Safety Authority	Examine the role of the Health and Safety Authority		4 & 5	all	2
	K084_Risk analysis and behavior in a state of emergency	Explain the causes, prevention, emergency procedures, reporting and recording of accidents and dangerous occurrences		4 & 5	all	2
	K085_Fire risk and prevention	Analyze the causes and prevention of fire related events to include identification of emergency procedures, the fire triangle and fire equipment		4 & 5	all	2
	K086_The risk of mechanical and electrical equipment	Comment on specific hazards and risks when working with equipment to include mechanical and electrical equipment		4 & 5	all	2
	K087_Protective equipment (PPE) in the workplace	Investigate how personal protective equipment (PPE) is used in the workplace		4 & 5	all	2

K090 From Traditional to Digital Food Marketing	K091 Consumer Behavior and Engagement	Knowing the principles of managing the relationship between consumers and products or services for the purpose of increasing sales and improving advertising techniques.	EFB	4 & 5	all	2
	K092 Consumer Engagement	Carrying a market analysis to understand customers behaviour	EFB	4 & 5	all	2
	K093 Route to Market Strategy Plan	Understand the routes to market and the marketing approach	EFB	4 & 5	all	2
	K094 Digital Marketing Models	Identifying how to develop a marketing mix: product, price, promotion and place.	EFB	4 & 5	all	2
	K095 Organic Paid and Email Marketing	Creating an effective Digital Promotion Plan by enhancing internet business tools such as social media, PPC (Pay Per Click) advertising, SEO (Search Engine Optimization) and growing your contact list with DEM (Direct Email Marketing).	EFB	4 & 5	all	6
	K096 Keyword Research and Competitive Analysis	Doing analysis and online market research	EFB	4 & 5	all	3
	K097 Introduction to Google Analytics	Using Google Analytics and analysing statistics related to business website	EFB	4 & 5	all	4
	K098 Digital Food Marketing Case studies	Creating cases of studies and best practices in digital food marketing	EFB	4 & 5	all	2
K100 Lifelong learning and continuous learning	K101 Lifelong learning and continuous learning CPD	ability to describe and understand CPD (Continuous Professional Development)	LVA	4 & 5	all	2
	K102 Problem solving and decision making	Conscious decision making	INFOR	4 & 5	all	2



## 7.9 Appendix 9 – Occupational Profile Information

In task 2.1 the consortia developed seven occupational profiles which formed the basis of the curricula design.

Specific details of each occupational profile can be found within the [“FINAL REPORT”](#) relating to the occupational profile development.

Whilst ten occupational profiles were developed. The curricula design only took into consideration seven of these profiles for curricula design. The occupation profiles had previously been prioritised in Work Package 2 (Task 2.2) already considering the EQF levels (L4 or L5). The selected 7/10 occupational profiles are as follows:

EQF Level 4:

1. Operator for bioeconomy in agriculture and food-industry and forestry
2. Operator for sustainability in agriculture and food-industry and forestry
3. Operator for digitalisation in agriculture and food-industry and forestry

EQF Level 5:

4. Technician for food industry sustainability
5. Technician for food industry digitalisation
6. Technician for Agriculture digitalisation
7. Technician for Agriculture sustainability

Information pertaining to the remaining three profiles can also be found within the Final Report for the [Occupational Profiles](#).