JOINT CURRICULUM GUIDE IN ECO-DESIGN IN TEXTILE AND FASHION ECTORS TOWARDS A CIRCULAR TEXTILE INDUSTRY

DESIGN4CIRCLE
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circular economy design training in the textile and footwear industries

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Project Partners

P1 RIGA TECHNICAL UNIVERSITY - RTU (Latvia)
P2 TECHNICAL UNIVERSITY OF IASI – TUIASI (Romania)
P3 ECORES SPRL - ECORES (Belgium)
P4 AGRUPACION EMPRESARIAL INNOVADORA DE FABRICANTES DE MUEBLES Y AFINES DE LA REGION DE MURCIA- AMUEBLA (Spain)
P5 CENTRO TECNOLOGICO DE CALCADO DE PORTUGAL – CTCP (Portugal)
P6 TEXTILE TRADE ASSOCIATION - TEXTILE CLUSTER - TTA-TC (Macedonia)

Content

DEFINITION OF LEARNING OUTCOMES

"A new textiles economy" highlights design as strategic action towards a circular textile sector, taking into account that "designing and producing clothes of higher quality and providing access to them via new business models would help shift the perception of clothing from being a disposable item to being a durable product". [1] The Circular Economy (CE) points that "the transition to a circular economy will also require a qualified workforce with specific and sometimes new skills. If the right skills at all levels are to be developed, they will have to be adopted by the education and training systems." [2]

One of the outputs of Design4Circle project is aimed to develop a Joint Curriculum on eco-design for the textile sector and circular businesses model.

Curriculum has been established taking into consideration all requirements needed in the Qualification Frameworks of the countries involved as well as the European Credit System for Vocational Education and Training (ECVET) in line with the recommendation of the European Parliament and the Council of the EU, as well as European Qualifications Framework (EQF) recommendations to ensure students and workers mobility and training course transferability [3] [4] .

To correctly identify needs and gaps the European Skills/Competences, qualifications and Occupations European Database (ESCO) has been used as support tool to match related occupations with the necessary skills, knowledge and competences [5] .

Joint Curriculum is designed in terms of the necessary areas of knowledge and the pedagogical methodologies optimized to fit the variety of job profiles and the target industries, by identifying the learning outcomes that the proposed training content requires, as well as the training units to address the specific needs of certain job profiles. It also includes principles of circular business models to foster the entrepreneurship of innovative SMEs in the area of textile eco-design.

[1] Ellen MacArthur Foundation (2017), A new textiles economy: Redesigning fashion's future
[2] COM (2015) 614 final "Closing the loop - An EU action plan for the Circular Economy".
[3] Recommendation of the European Parliament and of the Council of 18 June 2009 on the establishment of a European Credit System for Vocational Education and Training (ECVET) (2009/C155/02)
[4] European Qualifications Framework recommendations http://www.ehea.info
[5] European Skills/Competences, qualifications and Occupations European Database https://ec.europa.eu/esco

Curriculum has been drafted with a clear definition of the necessary Learning Outcomes and their related Knowledge, Skills and Competences [6] .

Textile industry and designer needs and knowledge gaps identified in the previous key-study are connected with the identified learning outcome to cover them [7] .

Learning outcomes state what a learner is expected to know, be able to do and understand at the end of a learning process or sequence. The way such outcomes are defined and written orients teaching and learning and influences the quality and relevance of education and training. The way learning outcomes are defined and written matters to individual learners, the labour market and society in general [8].

Therefore, it is initially planned to transfer a general body of knowledge related to circular economy thinking (Module 1) and to clarify how this new paradigm responds to the sustainability challenges in the sector (Module 2). Then, based on a life-cycle approach, the skills needed to implement this circular thinking at different stages of textile production and consumption are addressed: material and resource selection (Module 3), design and manufacturing (Module 4), life-cycle technologies in manufacturing and recycling (Module 5). Finally, circular business management (Module 6) provides skills related to circular business model innovation and circular, while providing a systemic thinking perspective.

In the course of the work, module 4 was divided into two separate modules: one on design, the other on production.

So Curriculum in eco-design in textile and fashion sectors towards a circular textile industry contains of seven modules.

1. Introduction to circular economy;
2. Sustainability challenges in the textile and fashion industry;
3. Materials for a circular economy;
4. Design for a circular economy;
5. Manufacture for a circular economy;

[6] Report "Defining, writing and applying learning outcomes. A European Handbook" developed by CEDEFOP https://www.cedefop.europa.eu
[7] Report CIRCULAR ECONOMY IN THE TEXTILE AND FOOTWEAR INDUSTRY: NEW SKILLS AND COMPETENCES FOR A SECTOR RENEWAL https://design4circle.eu
[8] Cedefop (2017). Defining, writing and applying learning outcomes: a European handbook. Luxembourg: Publications Office. http://dx.doi.org/10.2801/566770

6. Recycling technologies Recycling technologies for a circular economy of textile and fashion industry;
7. Business management in a circular economy.

Table 1 shows modules description, learning outcomes, assessment criteria of each module. Learning units und subunits, and related Knowledge, Skills and Competences of each unit see in section JOINT CURRICULUM IN ECO-DESIGN IN TEXTILE AND FASHION SECTORS TOWARDS A CIRCULAR TEXTILE INDUSTRY.

Table 1. Joint Curriculum Modules, related Learning Outcomes and Assessment criteria

MODULE 1	
Introduction to circular economy	
Module 1 introduces the general body of knowledge related to circular economy thinking, starting with limitations of the current linear system. The modules introduce definitions, principles and strategies of circular economy. It presents the concept and its associated vocabulary. It also frames Circular economy within EU legislations and national action plans.	
Learning Outcomes: ***The learner will:***	**Assessment criteria:** ***The learner can:***
Understand the limits of the current linear economy. Understand the purpose of CE, and the rationale for applying the principles of Circular Economy Understand the benefits of CE. Understand the current barriers associated with CE.	Explain the challenges related to our current economic system. Describe the general principles associated with CE. Explain the benefits of CE. Explain current barriers preventing the implementation of CE.
Have a clear understanding of the concept of CE, its historic development, its definitions, its principles. Know key examples of CE in practice.	Define the concept of Circular economy and provide relevant examples. Identify relevant supporting concepts related to CE. Verbally present ideas of CE and describe it to others.
Understand the general EU framework related to the	Identify documents and regulations related to the implementation of CE.

implementation of Circular Economy. Being able to position CE within the sustainable development concept.	Describe the place and role of CE within Sustainability discourse.
MODULE 2	
Sustainability challenges in the textile and fashion industry	
Module 2 clarifies how the CE paradigm is answering sustainability challenges in the textile and leather industry. It introduces tools and methods to monitor and manage the environmental and social impacts of companies active in the sector.	
Learning Outcomes:	**Assessment criteria:**
Existing situation and challenges in textile industry EU and worldwide	Describe the issues outlined by different kinds of sustainable challenges in the textile industry
Understand the natural and technical cycles of matter and energy	Describe the issues outlined by different kinds of waste and its minimization techniques
	Explain the adverse effects on the environment of non-use of recyclable materials
	Identify professional competences based on reducing the environmental impact of pollution.
Understand impact of CE to people health and safety	Identify and manage issues about dust in work environment
	Identify and manage issues about level of noise inside and outside the factory
	Identify and manage issues about hazardous substances in contact with people
Supervise the environmental practices of the company in order to comply with the national and EU regulations	Identify of the waste that can be recovered.
	Describe organizational procedures for maintaining a clean environment.
	Demonstrate capacity and responsibility for selecting, adopting and implementing the environment friendly packaging solutions.
	Control the compliance with the mandatory environmental legislation

	about: hazardous substances in contact with environment, water restrictions, waste legislations.
Apply critical success actions and best practices in CSR on key topics	Develop and to implement a CSR plan.
	Describe involvement in communities, relations with employees
	Identify and describe responsibility on the environment issues
	Identify and describe relations with suppliers and clients
Optimizing the use of resources by circulating products	Analyze the economy of water and energy resources in the case of circular products.
MODULE 3	
Materials for a circular economy	
Life cycle approach to address the necessary skills needed to implement this circular thinking into the various stages of textile production and consumption: material and resources selection. *Module 3 describes idea of sustainable textile materials, their processing and finishing, analyses the influence of the production processes of fibres, yarns, fabrics to environment, determine the types of textiles that can be recycled, and analyses the properties of recycled fibres and their products.*	
Learning Outcomes:	**Assessment criteria:**
Take decisions on the applicability of certain materials based on their ecological impact	Explain difference of sustainable and non – sustainable materials
	Describe the influence of fiber material, processing and finishing on the sustainability of textiles
Select suppliers of materials and components with ecological characteristics	Explain influence of textile material production on their ecological characteristics
	Understand the use of recycled and waste textiles as raw material
	Understand different textile raw material suppliers and their products
Demonstrate the spirit of creative reuse of recyclable materials.	Understand influence of new fiber production process on environment
	Understand textile apparel recycling process
Analyze recoverable materials	Identify textile materials that can be recoverable

	Understand the difference between new and recovered fibre properties
	Understand and improve textile recycling system and its perspectives
Design, plan and develop materials that can be later reused.	Understand mechanical and physical durability of fabrics and possibility to use them second time
	Determine what kind of textiles can be recycled and complexity of process
Manufacture products from recoverable materials	Characterized main types pf recoverable materials yarn and non-wovens
	Assortment analyse of yarn from recivered fibers for production
	Understand lyse use of non-wovens for garments and technical textiles
Formulate recycling and manufacturing habits of reusable material products.	Assortment analyse of typical textiles that are manufactured from reusable material
Form models on extending the lifecycle of products and keeping materials within the economy as much as possible.	Understand properties of textiles and their influence on the durability
	Characterized the influence of different outer factors on life length of fiber materials
Conduct creative processes for textile confections made of recyclable materials	Understand how different fabric properties, for example, different shrinkage of fabrics during washing, bad colour resistance or other characteristics, influence good look of the garment
Reuse raw materials that are currently disposed of as waste	Understand different types of waste in production process
	Describe waste grading processes
	Understand cases where disposed of waste is collected and used as raw material
MODULE 4	
Design for a circular economy	
Designing goods in a smarter manner, covering their suitable lives and changing the role of such products within the system will be vital to the success of a circular economy. Reuse, redistribution, re-manufacture, repair, and refurbishment have so far established less care for designers and producers than	

waste-related issues, and linked strategies are less mature. However, they potentially offer important environmental and economic benefits by inspiring, for example, innovations in the design of less environmentally unsafe products. *Module 4 pays attention on understanding the product life cycle, eco-design fundamentals and principles of circular fashion. Learners will be able to create durable and long-lasting products (the creation of products that can be repaired, modernized, reassembled, with a high value).*	
Learning Outcomes:	**Assessment criteria:**
Understand the product life cycle, eco-design fundamentals and principles of circular fashion.	Note the product life cycle, describe the principles of the life cycle.
	Define the eco-design fundamentals and explain it.
	Identify principles of circular fashion / textile and describe the principles of circular fashion / textile.
Promote an "environment friendly" view toward the entire lifecycle of the product.	Explain the "environment friendly" view toward the entire lifecycle of the product; analyze the entire life cycle of the product. Demonstrate "environment friendly" purpose life cycle design.
Understand the principles of zero waste design.	Create a design that respects the principle of zero-waste.
Be able to create the products using principles of the eco-design and circularity. Be able to create durable and long-lasting products (the creation of products that can be repaired, modernized, reassembled, with a high value).	Redesign an existing product more environmentally friendly according to the criteria given. Redesign an existing product through disassembly or by using manufacture surpluses. Use techniques to improve the design of circular products so that it is easier to repair materials.
MODULE 5	
Manufacture for a circular economy	
Course pays attention to all the manufacturing sides of textile and fashion, starting from fibre pretreatment, yarn and fabric production and finishing, individual processes in garment production,	

like cutting, sewing and packaging to environmentally friendly and clean technologies production. Module shows the ways to make production processes more environmentally friendly by reducing dust, water and energy consumption or by using more friendly chemicals.	
Learning Outcomes:	**Assessment criteria:**
Understand the manufacture processes for a circular economy.	Describe the production processes of a particular product following CE principles.
Be able to create ethical and environmentally friendly products by using clean technologies, low impact materials and provide services to support long life.	Answer questions how to source and produce more locally, without toxicity, and efficient.
Be able to source and produce avoiding making waste	Answer questions on the feasibility of achieving a minimum amount of waste in the company.
Know services to support long life.	Describe ways to support the longevity of a particular product.
MODULE 6	
Recycling technologies for a circular economy of textile and fashion industry	
Module will focus on understanding existing situation and challenges in textile recycling, provides knowledge of clean technologies for fashion design and recycling technologies. Module 5 gives theoretical view about textile waste collection, sorting, about different ways of recycling technologies and reusage of recycled fibres.	
Learning Outcomes:	**Assessment criteria:**
Understand existing situation and challenges in textile recycling	Describe the issues in the textile recycling
	Explain the purpose of textiles recycling
	Explain the benefits of textiles recycling
Know textile recycling's technology	Classify sources of textiles for recycling
	Describe the textile recycling process
	Describe the manufacturing technologies to recyclable materials
	Give examples of manufacturing products from recoverable materials
MODULE 7	
Business management in a circular economy	

The last module- circular business management - provides skills related to circular business model innovation and circular marketing while providing a systems thinking perspective. It provides knowledge on business models and sustainable innovation, introduces tools to design a successful circular business model, looks at innovative marketing strategies to engage customers and end-users through practical examples. It emphasizes the importance of thinking in systems and engage in cross sector collaborations to implement full circular systems.	
Learning Outcomes:	**Assessment criteria:**
Understand what is a business model and know how sustainable and circular business model can be defined and implemented	Describe organizational procedures for CE management
	Describe a circular business model based on a specific typology
	Use tools to describe their own business model and design new business models
Understand the fundamentals of launching a circular economy business venture	Create a step by step plan to launch a circular start up
Have a basic understanding of system thinking and its use in circular economy transition	Use system thinking tools to develop full circular fashion systems
Understand how networks and collaboration can create additional value	Develop meaningful partnership to create shared value in circular fashion systems

HARMONIZATION OF EUROPEAN QUALIFICATION FRAMEWORK

The European Qualifications Framework for lifelong learning (EQF) aims to improve the transparency, comparability and portability of people's qualifications. The EQF was set up in 2008 as a common reference framework of qualifications, expressed as learning outcomes at increasing levels of proficiency. The framework serves as a translation device between different qualifications systems and their levels. It is intended to benefit learners, workers, job-seekers, employers, trade unions, education and training providers, qualification recognition bodies, government authorities and international organisations.[9]

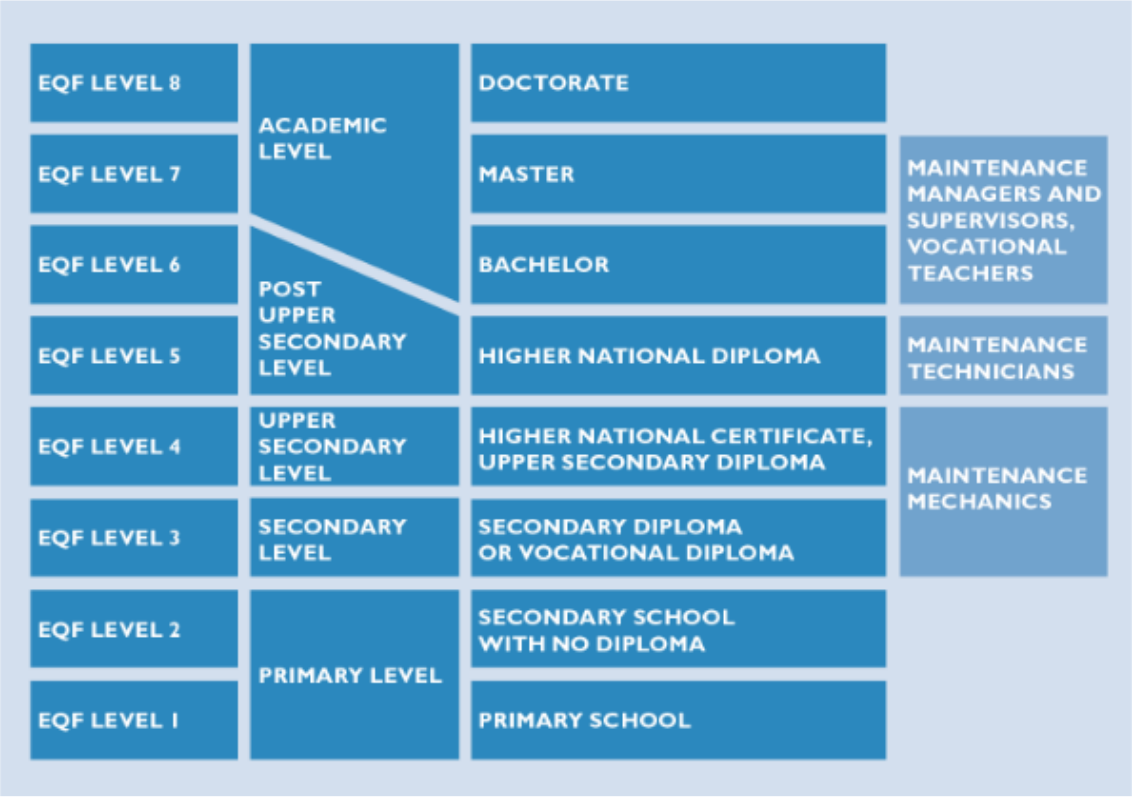

Figure 1. EQF levels and achieved education and maintenance personnel positions[10]

EQF levels between 3 and 8 are generally expected for personnel in the field of physical asset management and maintenance (Figure 1). EQF Levels 3 and 4 are sufficient for basic mechanics, usually the professionals on the lowest level in the maintenance organisation structure. Maintenance technicians and specialists are professionals with significant experience and flexibility to be

[9] http://www.ehea.info/Upload/TPG_A_QF_RO_MK_1_EQF_Brochure.pdf
[10] https://www.maintworld.com/R-D/Application-of-European-Qualification-Framework-EQF-in-Maintenance

able to perform various advanced tasks in the field of maintenance. For maintenance technicians, EQF level 5 is considered adequate.

Maintenance Managers and supervisors then typically recruit from professionals on EQF levels 6, 7 or 8, with suitable academic training combined with sufficient experience with maintenance processes.

Besides managerial functions, EQF level 6 also includes teachers at vocational schools educating maintenance technicians and mechanics.

The current situation in European labour markets is characterised by a shortage of maintenance professionals qualified on EQF levels 3 to 6: mechanics, technicians, supervisors and also vocational teachers capable of educating young maintenance professionals. Figure 2. explains the learning outcomes of EQF levels 4, 5 and 6.

	EQF 4	EQF 5	EQF 6
Knowledge	Factual and theoretical knowledge in broad contexts within a field of work study	Comprehensive, specialised, factual and theoretical knowledge within a field of work or study and an awareness of the boundaries of that knowledge.	Advanced knowledge of a field of work or study, involving a critical understanding of theories and principles.
Skills	A range of cognitive and practical skills required to generate solutions to specific problems in a field of work or study	A comprehensive range of cognitive and practical skills required to develop creative solutions to abstract problems.	Advanced skills, demonstrating mastery and innovation, required to solve complex and unpredictable problems in a specialised field of work or study
Competence	Exercise self-management within the guidelines of work or study contexts that are usually predictable, but are subject to change. Supervise the routine work of others, taking some responsibility for the evaluation and improvement of work or study activities.	Exercise management and supervision in contexts of work or study activities where there is unpredictable change. Review and develop performance of self and others.	Manage complex technical or professional activities or projects, taking responsibility for decision making in unpredictable work or study contexts. Take responsibility for managing professional development of individuals and group. Review and develop performance of self and others. Organize a maintenance management system
Maintenance Qualifications	Maintenance mechanic, Foreman, Electrician, Welder etc.	Maintenance technician, Maintenance specialist, Maintenance engineer	Maintenance supervisor, Maintenance manager, Advanced maintenance engineer, Vocational teacher in the field of maintenance

Figure 2 Learning outcomes, level 4,5 and 6[11]

[11]Developments of EQF level 5: Stakeholder approach https://www.efvet.org/wp-content/uploads/2019/01/Erasmus-project-Development-of-Sectoral-Qualification-Descriptors-for-EQF-level-51.pdf

"National qualifications frameworks (NQFs) classify qualifications by level, based on learning outcomes. This classification reflects the content and profile of qualifications - that is, what the holder of a certificate or diploma is expected to know, understand, and be able to do. The learning outcomes approach also ensures that education and training sub-systems are open to one another. Thus, it allows people to move more easily between education and training institutions and sectors"[12].

All countries committed to the European qualifications framework are developing or implementing national frameworks mostly covering all levels and types of qualifications[13].

The development of national qualifications frameworks in Europe also reflects the Bologna process and the agreement to implement qualifications frameworks in the European higher education area (QF-EHEA). All countries implementing the EQF are participating in this process. [14]

Big progress in cooperation and linking NQF to the EQF was done in 2019-2020[15]:

- 39 countries are cooperating on the European qualifications framework implementation.
- 36 countries have formally linked ('referenced') their national qualification systems or frameworks to the EQF: Austria, Belgium (Flanders and Wallonia), Bulgaria, Croatia, Cyprus, Czechia, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Kosovo, Latvia, Lichtenstein, Lithuania, Luxembourg, Malta, Montenegro, the Netherlands, North Macedonia, Norway, Poland, Portugal, Romania, Serbia, Slovakia, Slovenia, Sweden, Switzerland, Turkey and the United Kingdom.
- 33 countries have started tagging their certificates and diplomas as well as qualifications in their databases with NQF and/or EQF levels. Progress has been more visible in VET than in general education.
- 38 countries have officially established or formally adopted their national qualifications frameworks (NQFs);
- 36 countries are working towards comprehensive NQFs covering all types and levels of qualification from formal

[12] National qualifications frameworks (NQFs) https://www.cedefop.europa.eu/en/events-and-projects/projects/national-qualifications-framework-nqf
[13] National qualifications frameworks (NQFs) https://www.cedefop.europa.eu/en/events-and-projects/projects/national-qualifications-framework-nqf
[14] National qualifications frameworks (NQFs) https://www.cedefop.europa.eu/en/events-and-projects/projects/national-qualifications-framework-nqf
[15] National qualifications frameworks (NQFs) https://www.cedefop.europa.eu/en/events-and-projects/projects/national-qualifications-framework-nqf

education and training (VET, HE, general education); and increasingly opening towards non-regulated/private qualifications.

Comparing the NQF in the partner countries, it can be concluded that most of the partners' scope of the framework, numbers of levels, and level descriptors are same, and NQF is linked to EQF.

The success of the NQFs regarding being able to increase access and promote progression in education and training depends on their ability to support and promote other instruments: validation of non-formal and informal learning, credit transfer arrangements and renewal of curriculum and assessment methodologies (Cedefop, 2012).

The adaptation to a very dynamic labour market should be rapid. The non-formal and informal learning should refer to skills or capabilities which generally are not taken into account, skills which have to be well defined.

The policy objectives of the NQF are the following: "aiding comparability of national qualifications in Europe; improving the transparency, quality and relevance of qualifications; enabling more progression and mobility: between different subsystems and through the validation and recognition of non-formal and informal learning and between different working areas through transparency of competences; better linking IVET and CVET and developing new pathways" (Cedefop, 2012).

DEFINITION OF TRAINING PATH AND METHODOLOGIES

Design4Circle project proposes as main objective to develop an innovative learning curriculum in line with the needs of designers of the textile and fashion industry towards a circular business model. Thus, the project will have as a final aim to improve and foster Vocational Education and Training, updating skills and knowledge of textile and fashion designers.

In this way the project objective is in line with the following horizontal and VET priorities:

- Development of relevant and high quality skills and competences,
- Further strengthen key competences in initial and continuing VET,
- Transparency and recognition of skills and qualifications.

Design4Circle project aims to capture the opportunity to improve designers' knowledge, coming from the textile sector, regarding eco-innovation and circular economy. It will support **working designers and students through the continuing vocational education and training (CVET) after industrial design education and/or during their working life in the fashion sector** by improving or updating their knowledge and/or skills on eco-design and circular economy principles and continuing their personal or professional development.

Although Design4Circle is focused on the textile industry, it will also be benefit for other sectors, as the modules regarding basic principles of circular economy, circular businesses models, or eco-design could cover knowledge gaps of other sectors. Thus, final beneficiaries of Design4Circle project will be a great number of SMEs all around Europe, with a great impact in the European economy.

One of the outputs of Design4Circle project is to develop a Joint Curriculum on eco-design for the textile sector and circular businesses model (IO2). This curriculum is developed in order to facilitate the recognition of skills and qualifications of the current and future workers. Thus, a specific activity will be carry out in order to implement the European Credit System for Vocational Education and Training (ECVET) in line with the recommendation of

the European Parliament and the Council of the EU.

The Curriculum contains the following modules:

Module	Title of the module
Module 1	Introduction to circular economy
Module 2	Sustainability challenges in the textile and fashion industry
Module 3	Materials for a circular economy
Module 4	Design for a circular economy
Module 5	Manufacture for a circular economy
Module 6	Recycling technologies for a circular economy of textile and fashion industry
Module 7	Business management in a circular economy

There are different training paths (Figure 3) in accordance to the target groups. If the student is a manager the selected modules/units will be for manager, accordingly a designer will only learn modules/units for designers. Students that are neither will learn all the modules. Self-estimation quiz is in accordance to the chosen path as well. Table 2 shows suitability of modules for different categories or groups of learners.

Table 2. Suitability of modules for different categories or groups of learners

Target group	Suitable modules	Titles of the modules
A trainee from the Fashion Sector/Students from Design, Textile and Fashion Study Program	M1	Introduction to circular economy
	M2	Sustainability challenges in the textile and fashion industry
	M3	Materials for a circular economy
	M4	Design for a circular economy
	M5	Manufacture for a circular economy
	M6	Recycling technologies for a circular economy of textiles and fashion industry
	M7- advisable	Business management in a circular economy
A trainee from the manufacturing sector	M1	Introduction to circular economy
	M2	Sustainability challenges in the textile and fashion industry (without unit 2.2)
	M5	Manufacture for a circular economy
	M6	Recycling technologies for a circular economy of textiles and fashion industry
	M7	Business management in a circular economy
Manager	M1	Introduction to circular economy
	M2	Sustainability challenges in the

		textile and fashion industry
	M3- optional	Materials for a circular economy
	M4- optional	Design for a circular economy
	M5	Manufacture for a circular economy
	M6	Recycling technologies for a circular economy of textiles and fashion industry
	M7	Business management in a circular economy

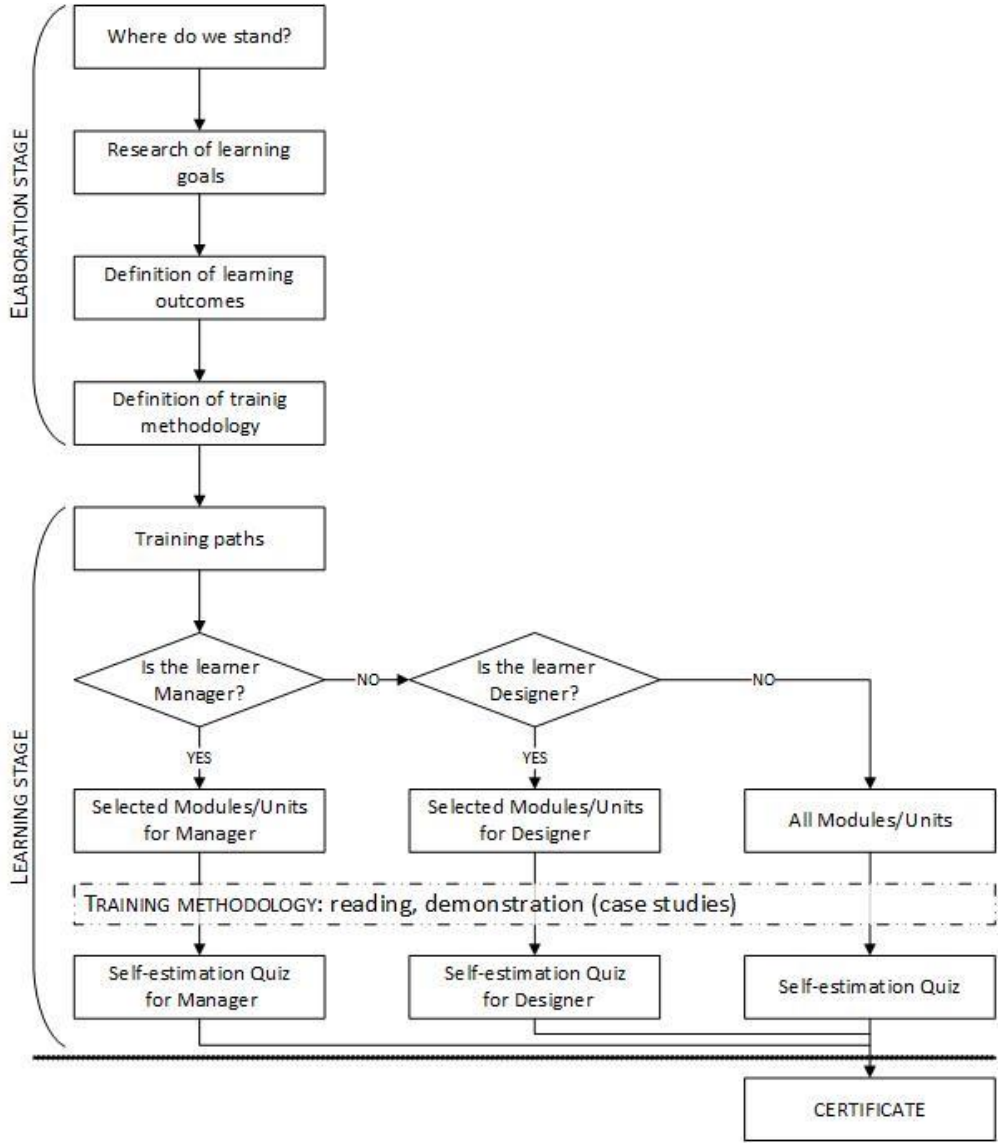

Figure 3. Learning paths

By the end of this course, the learners will acquire the necessary skills on eco-design and eco-innovation to thrive in a circular economy. It is designed for EQF level 5.

The learning course is designed to inform about ethical challenges arising in business and to help the learners to identify and manage difficult ethical dilemmas they are likely to encounter in their career.

CEDEFOP study on EQF level 5 developments have demonstrated, that qualifications in this level operate across VET, higher and even general education, with a varied range of qualifications awarded by a wide range of VET and higher education institutions. Different types of institutions have been authorized to award level 5 qualifications [16]:

- Higher education institutions;
- Centres for adult education;
- A VET college;
- A college for further education;
- Schools for post-secondary vocational education;
- Other providers, including private providers;
- Mixt type.

Due to the academic freedom, wider possibilities to implement study programmes (with or without qualifications), the higher education sector has advanced developments concerning EQF level 5 developments. But on the other side, vocational education and training (VET) can play a central role in preparing young people for work, developing the skills of adults and responding to the labour-market needs of the economy. VET adapts to the labour market instead of immediate employment of their graduates. At the same time, HE role should focus instead on long term employability which means both cooperation with and shaping of the world of work. Despite this role, VET has been oddly neglected and marginalised in policy discussions, often overshadowed by the increasing emphasis on general academic education and the role of schools in preparing students for university education [17].

This variety, however, is not fully present in many European countries and the higher education sector has advanced developments concerning EQF level 5 developments. At the moment, HE operates within the Bologna process and tools (degree system, ECTS), VET operates within the Copenhagen process and own instrument (EQAVET, Europass, ECVET). Both systems offer education

16 https://www.efvet.org/wp-content/uploads/2019/01/Erasmus-project-Development-of-Sectoral-Qualification-Descriptors-for-EQF-level-51.pdf
17 https://www.cedefop.europa.eu/en/events-and-projects/projects/validation-non-formal-and-informal-learning

programmes at EQF level 5, but their providers operate in quite different European contexts. HE providers have more institutional autonomy, academic freedom and accountability, on the other hand, in VET the educational process and its outcome are strongly driven by social partners. [18] [19] [20] [21] [22].

At level 5, a trainee will gain:

- Comprehensive, specialised, factual and theoretical knowledge within a field of work or study and an awareness of the boundaries of that knowledge.
- A comprehensive range of cognitive and practical skills required to develop creative solutions to abstract problems.
- Exercise management and supervision in the contexts of work or study activities were there is unpredictable change review and develop the performance of self and others.

Areas of competence/skills Level of proficiency	*Knowledge/ information*	*Good skills (ability to perform)*	*Mastery (high level of professional skills)*
Construction tools, equipment	√		
Construction materials	√		
Rules, regulations, documentation	√		
Work organisation procedures	√	√	
Using principles of fundamental construction work processes			√
Understanding and using new construction technologies and related skills (such as reading read working drawings for construction projects in 2D, 3D format)			
Overlapping/interrelated technologies			√
Team work/ Organisation of work flow		√	
Communicate with client and construction engineers/project managers		√	
Planning work of oneself and the others			√
Training of lower qualification workers		√	
Ability to train apprentices			√
Ensure safety and health at work	√	√	

Figure 4. Areas of competences at level 5 [23]

18 https://www.ecvet-secretariat.eu/en/faq-page#t1n967
19 http://www.ecvet-toolkit.eu
20 https://ec.europa.eu/education/resources-and-tools/european-credit-transfer-and-accumulation-system-ects_en
21 https://europa.eu/europass/en/compare-qualifications
22 https://www.cedefop.europa.eu/en/events-and-projects/projects/validation-non-formal-and-informal-learning
23 https://www.efvet.org/wp-content/uploads/2019/01/Erasmus-project-Development-of-Sectoral-Qualification-Descriptors-for-EQF-level-51.pdf

JOINT CURRICULUM GUIDE IN ECO-DESIGN IN TEXTILE AND FASHION SECTORS TOWARDS A CIRCULAR TEXTILE INDUSTRY

Every module in JOINT CURRICULUM IN ECO-DESIGN IN TEXTILE AND FASHION SECTORS TOWARDS A CIRCULAR TEXTILE INDUSTRY contains a general information, description of learning outcomes, teaching methods, assessment, learning and self-study hours, ECVET points. Learning outcomes and assessment criteria and are divided into 3 to 5 units. Each unit description contains knowledge, skills and autonomy and responsibility.

Every unit has a learning resources - PowerPoint presentation, suggested reading, real case samples/ online video presentations (industry and projects), a list with references and a list with additional resources (added in Training Materials).

At the end of each module it is necessary to pass self-evaluation quiz/test to be able to get the Design4Circle training certificate.

Curriculum in eco-design in textile and fashion sectors towards a circular textile industry contains of seven modules. The duration of the course is 140 hours (70 learning hours and 70 self-study hours), number of ECVET points – 28 (Table 3).

Table 3: Correspondence of the learning and self-study hours and ECVET points to the curriculum modules

No of Module	Title of the Learning Module	Learning hours	Self-study hours	ECVET points
MODULE 1	Introduction to circular economy	6	6	2
MODULE 2	Sustainability challenges in the textile and fashion industry	10	10	4
MODULE 3	Materials for a circular economy	10	10	4
MODULE 4	Design for a circular economy	14	14	6
MODULE	Manufacture for a circular economy	6	6	2
MODULE	Recycling technologies in a textile and fashion industry	10	10	4
MODULE 7	Business management in a circular economy	14	14	6
	TOTAL	70	70	28

Specifications of the training modules and units and learning outcomes of the JOINT CURRICULUM IN ECO-DESIGN IN TEXTILE AND FASHION SECTORS TOWARDS A CIRCULAR TEXTILE INDUSTRY are listed below.

MODULE 1

INTRODUCTION TO CIRCULAR ECOMOMY

Module 1	Introduction to circular economy
General information	Introduces the general body of knowledge related to circular economy thinking, starting with limitations of the current linear system. The modules introduce definitions, principles and strategies of circular economy. It presents the concept and its associated vocabulary. It also frames Circular economy within EU legislations and national action plans.
Learning outcome	By the end of this course, the learners will understand the purpose of CE, how to apply the principles of Circular Economy management; the limits of the current linear economy; the benefits of CE; the concept of CE (its historic development, its definitions, its principles); the current barriers associated with CE; the requisites for the implementation of Circular Economy; the position of CE within the sustainable development concept.
Teaching Methods	This unit is delivered as a non-formal training. The students/ learners have to study the e-courses (available on the Digital Platform) regarding the principles, concept, benefits of Circular Economy, its current barriers, which are the requisites for the implementation of Circular Economy; the position of CE within the sustainable development concept.
Assesment	Quizzes assess the level of knowledge acquired by the student/ learner. Quiz answers can take different forms, from short answer to true/false and multiple choice. Digitally designed quizzes, question order and options can be randomized, so each student's quiz is unique. The training materials available on https://training.design4circle.eu/
Learning hours	6
Self-study hours	6
ECVET	2

Units	Titles of the units
Unit 1.1	General knowledge around CE

Unit 1.2	Vocabulary and specific terms of CE	
Unit 1.3	Requisites for the implementation of CE	
Unit 1.1	**General knowledge around CE**	
Knowledge	**Skills**	**Autonomy and responsibility**
-Describe the barriers of implementation process of CE. -Define principles and main strategies to implement CE. -Define the principles of circular fashion.	-Develop a gradual plan for the CE involvement -Develop ability to analyse information, inform and educate others	-Apply the principles and strategies of CE; -Design an action plan to reflect upon his/ her own action; fundamentals of CSR in the organisation; -Design an action plan to improve the stakeholder's relationship to business -Communicate appreciation with members/reference person groups involved in the CE process.
Unit 1.2	**Vocabulary and specific terms of CE**	
Knowledge	**Skills**	**Autonomy and responsibility**
-Describe related vocabulary and specific terms. -Be able to make the difference between related and non- related information about CE.	-Analyse information and wordings and present it as a basis for decisions. -Explain how to use information and communication technologies.	-Present ideas and principles of CE to others.
Unit 1.3	**Requisites for the implementation of CE**	
Knowledge	**Skills**	**Autonomy and responsibility**
-Identify the needed documents for the implementation of CE. -Describe the place and the role of regulations for applying CE	-Develop an elementary ability to identify to apply legislation rules for implementation of CE, -Develop a CE plan within EU policies for a sustainable development.	-Apply the CE strategies considering EU politics of sustainable development; -Express and receive situation-based criticism

MODULE 2

SUSTAINABILITY CHALLENGES IN THE TEXTILE INDUSTRY

Module 2	Sustainability challenges in the textile industry
General information	Clarifies how the CE paradigm is answering sustainability challenges in the textile and leather industry. It introduces tools and methods to monitor and manage the environmental and social impacts of companies active in the sector.
Learning outcome	By the end of this course, the learners will understand the existing situation and challenges in textile industry EU and worldwide; the natural and technical cycles of matter and energy; the impact of CE to people health and safety; how to supervise the environmental practices of the company in order to comply with the national and EU regulations ; how to apply critical success actions and best practices in CSR on key topics and how to optimize the use of resources by circulating products.
Teaching Methods	Teaching methods: This unit is delivered as a non-formal training. The students/ learners have to study the e-courses (available on the Digital Platform) regarding the challenges in textile industry EU and worldwide; the natural and technical cycles of matter and energy; the impact of CE to people health and safety; how to supervise the environmental practices of the company in order to comply with the national and EU regulations ; how to apply critical success actions and best practices in CSR on key topics and how to optimize the use of resources by circulating products.
Assesment	Assessment: Quizzes assess the level of knowledge acquired by the student/ learner. Quiz answers can take different forms, from short answer to true/false and multiple choice. Digitally designed quizzes, question order and options can be randomized, so each student's quiz is unique. The training materials available on https://training.design4circle.eu/
Learning hours	10
Self-study hours	10
ECVET	4

Units	Titles of the units
Unit 2.1.	Alarming trends in textile and leather industry in terms of waste and environmental issues and social impact
Unit 2.2	People health and safety
Unit 2.3.	Waste, package and environment according to the national and EU regulations
Unit 2.4	Ethical production

Unit 2.1	**Alarming trends in textile and leather industry in terms of waste and environmental issues and social impact**	
Knowledge	**Skills**	**Autonomy and responsibility**
-Describe, identify and understand alarming trends in textile industry	-Identify and analyse the risks and select and apply proper principles, methods and techniques to minimizes waste and environmental impact.	-Present ideas or design plans to prevent risks, understand methods and techniques for minimizing them.
Unit 2.2.	**People health and safety**	
Knowledge	**Skills**	**Autonomy and responsibility**
-Describe the impact of CE to people health and safety. -Describe characteristics which are responsible for the people health and safety. -Explain regulations concerning the handling of hazardous substances.	-Develop a gradual plan for gaining people health and safety. -Ability to identify and manage issues about dust in work environment; -Ability to identify and manage issues about level of noise inside and outside the factory; -Ability to identify and manage issues about hazardous substances in contact with people.	-Calculate proaction, action and service costs and analyse necessary plans to ensure people health and safety; -Elaborate and apply problem solving strategies and reflect upon his/her own action.
Unit 2.3	**Waste, package and environment according to the national and EU regulations**	
Knowledge	**Skills**	**Autonomy and responsibility**
-Describe organizational procedures for maintaining a clean environment. -Describe environment friendly packaging solutions.	-Analyse the waste that can be recovered. -Select ,adopt and implement proper environment friendly packaging solutions. -Ability to control the compliance with the	-Design a plan to supervise the environmental practices of the company in order to comply with the national and EU regulations

-Be able to assign the necessary documents for the mandatory environmental legislation about: hazardous substances in contact with environment, water restrictions, waste legislations.	mandatory environmental legislation about: hazardous substances in contact with environment, water restrictions, waste legislations.	-Select , adopt and implement the environment friendly packaging solutions. -Design strategies for compliance with the mandatory environmental legislation.
Unit 2.4.	**Ethical production**	
Knowledge	**Skills**	**Autonomy and responsibility**
-Recognize and implement the principles of ethical production throughout the supply chain. -Define principles of eco-design and circularity to create textile products.	-Develop a plan to apply principles of ethical production. -Develop a plan to create ethical and environmentally friendly products by using clean technologies, low impact materials and provide services to support long life.	-Perform professional deeds according to ethical production; -Use the principles of ethical production in order to develop a long lasting and low impact products;

MODULE 3

MATERIALS FOR CIRCULAR ECONOMY

Module 3	Materials for a circular economy
General information	Life cycle approach to address the necessary skills needed to implement this circular thinking into the various stages of textile production and consumption: material and resources selection. Module 3 describes idea of sustainable textile materials, their processing and finishing, analyses the influence of the production processes of fibres, yarns, fabrics to environment, determine the types of textiles that can be recycled, and analyses the properties of recycled fibres and their products.
Learning outcome	By the end of this course, the learners will be able to take decisions on the applicability of certain materials based on their ecological; select suppliers of materials and components with ecological characteristics; demonstrate the spirit of creative reuse of recyclable materials; how to analyse recoverable materials; to design, plan and develop materials that can be later reused; how to manufacture products from recoverable materials; how to formulate recycling and manufacturing habits of reusable material products; how to form models on extending the lifecycle of products and keeping materials within the economy as much as possible; how to conduct creative processes for textile confections made of recyclable materials; how to reuse raw materials that are currently disposed of as waste.
Teaching methods	This unit is delivered as a non-formal training. The students/ learners have to study the e-courses (available on the Digital Platform) to be able to take decisions on the applicability of certain materials based on their ecological; to select suppliers of materials and components with ecological characteristics; to demonstrate the spirit of creative reuse of recyclable materials; to analyse recoverable materials; to design, plan and develop materials that can be later reused; to manufacture products from recoverable materials; to formulate recycling and manufacturing habits of reusable material products; to form models on extending the lifecycle of products and keeping materials within

	the economy as much as possible; to conduct creative processes for textile confections made of recyclable materials; to reuse raw materials that are currently disposed of as waste.
Assessment	Quizzes assess the level of knowledge acquired by the student/ learner. Quiz answers can take different forms, from short answer to true/false and multiple choice. Digitally designed quizzes, question order and options can be randomized, so each student's quiz is unique. The training materials available on https://training.design4circle.eu/
Learning hours	10
Self-study hours	10
ECVET	4

Units	Titles of the units
Unit 3.1.	Sustainable textile and non-textile materials 3.1.1 Sustainable natural (cotton, bast, wool, silk) fiber production 3.1.2 Sustainable production of regenerated cellulosic fibres 3.1.3 Sustainable synthetic fiber production 3.1.4.Sustainable chemical technologies for textile 3.1.5.Low impact materials non textile materials (for example leather, Seacell, Chitosan or Chitin, Corkshell, Milk protein, etc.)
Unit 3.2.	Textile waste as raw material for upcycling 3.2.1 Garment production waste materials 3.2.2 Reuse of already weared garment materials
Unit 3.3.	Recycled textiles 3.3.1 Recycled fibre 3.3.2.Recycled fiber yarn, woven and knitted fabrics 3.3.3.Recycled non-woven fabrics 3.3.4.Recycled fiber application in technical textiles

Unit 3.1.	**Sustainable textile and non-textile materials**	
Knowledge	**Skills**	**Autonomy and responsibility**
-Describe sustainable fiber production processes. -Explain sustainable chemical technologies in textile production; -Explain non-textile material usages in production.	-Ability to identify differences between sustainable and non – sustainable fibers. -Ability to select sustainable chemical technologies for production. -Ability to select non-textile materials for production.	-Analyse quality and textile specifications; -Apply sustainable chemical technologies for product development; -Use different non-textile material technologies for product development.
Unit 3.2.	**Textile waste as raw material for upcycling**	
Knowledge	**Skills**	**Autonomy and responsibility**

-Describe types of wastes in garment production. -Analyse possibilities in already used garment fabric application. -Describe durability of different textiles.	-Analyse waste types and sorting principles of them in garment production. -Analyse the best practices of waste fabric usage. -Identify suitability of waste material for different product design.	-Evaluate waste material application; -Select waste material for product designing. -Demonstrate the benefits of waste material usage.
Unit 3.3.	**Recycled textiles**	
Knowledge	**Skills**	**Autonomy and responsibility**
-Describe tendencies and difficulties in textile recycling. -Explain difference between original and recycled fiber technical characteristics. -Describe types of fibers and products that more often are recycled in textile than other ones, describe reasons; -Define the correct forms of recycled fiber labelling.	-Analyse the recycled fiber, yarn or fabric characteristics and suitability for application. -Find recycled fiber, yarn and fabric producers. -Analyse the best practices of recycled textile usage.	-Choose between recycled fiber and original fiber usage for product production, be able to mention advantages and disadvantages for both cases. -Collaborate with textile recycling companies and analyse product technical specifications. -Label fiber content it textiles according to European Regulations.

MODULE 4
DESIGN FOR A CIRCULAR ECONOMY

Module 4	Design for a circular economy
General information	Designing goods in a smarter manner, covering their suitable lives and changing the role of such products within the system will be vital to the success of a circular economy. Reuse, redistribution, re-manufacture, repair, and refurbishment have so far established less care for designers and producers than waste-related issues, and linked strategies are less mature. However, they potentially offer important environmental and economic benefits by inspiring, for example, innovations in the design of less environmentally unsafe products. This module pays attention on understanding the product life cycle, eco-design fundamentals and principles of circular fashion. Learners will be able to create durable and long-lasting products (the creation of products that can be repaired, modernized, reassembled, with a high value).
Learning outcome	By the end of this course, the learners will be able to understand the product life cycle, eco-design fundamentals and principles of circular fashion; to promote an "environment friendly" view toward the entire lifecycle of the product; to create durable and long-lasting products (the creation of products that can be repaired, modernized, reassembled, with a high value); to improve the design of circular products so that it is easier to repair materials; to understand the principles of zero waste design and to create the products using principles of the eco-design and circularity.
Teaching methods	This unit is delivered as a non-formal training. The students/ learners have to study the e-courses (available on the Digital Platform) to be able to understand the product life cycle, eco-design fundamentals and principles of circular fashion; to promote an "environment friendly" view toward the entire lifecycle of the product; to create durable and long-lasting products (the creation of products that can be repaired, modernized, reassembled, with a high value); to improve the design of circular products so that it is easier to repair materials; to understand

	the principles of zero waste design and to create the products using principles of the eco-design and circularity.
Assessment	Quizzes assess the level of knowledge acquired by the student/ learner. Quiz answers can take different forms, from short answer to true/false and multiple choice. Digitally designed quizzes, question order and options can be randomized, so each student's quiz is unique. The training materials available on https://training.design4circle.eu/
Learning hours	14
Self-study hours	14
ECVET	6

Units	Titles of the units
Unit 4.1.	Products life cycle, eco-design fundamentals and principles of circular fashion 4.1.1. Eco-design fundamentals 4.1.2. Products life cycle 4.1.3. Principles of circular fashion
Unit 4.2.	Eco-design principles in fashion and textile industry 4.2.1. Durable and long lasting design 4.2.2. Design for rebirth and circularity 4.2.3. Zero waste design 4.2.4. Design to reduce the need for rapid consumption

Unit 4.1.	**Products life cycle, eco-design fundamentals and principles of circular fashion**	
Knowledge	**Skills**	**Autonomy and responsibility**
-Understand the product life cycle, eco-design fundamentals and principles of circular fashion. -Define and promote an "environment friendly" view toward the entire lifecycle of the product	-Summaries the principles of the fashion product life cycle. -Define the eco-design fundamentals and explain it. -Identify risks and use principles, methods and techniques to minimizes waste and environmental impact ;	-Develop and implement a fashion product life cycle and circular fashion in everyday activities. -Communicate with appreciation with community, employees, suppliers and clients about eco-design implementation and explain it for everyone; -Express and receive situation-based criticism;

	-Explain the "environment friendly" view toward the entire lifecycle of the product; analyze the entire life cycle of the product.	-Design a plan to prevent risks, to understand methods and techniques for minimizing them; -Demonstrate "environment friendly" purpose life cycle design.
Unit 4.2.	**Eco-design principles in fashion and textile industry**	
Knowledge	**Skills**	**Autonomy and responsibility**
-Describe the eco-design principles in fashion design. -Describe design process of circular products so that they can be easy repair (materials) ; -Describe the principles of zero waste design.	-Explain how higher added value will be achieved; -Answer questions on the feasibility of achieving a minimum amount of waste in the company.	-Perform to design the guidelines (model) for creation durable and long-lasting products, based on the principles of eco-design. -Apply the eco-design principles in fashion design. -Design a plan which explains how higher added value will be achieved in this business; -Re-design an existing product more environmentally friendly according to the eco-design criteria given.

MODULE 5

MANUFACTURE FOR A CIRCULAR ECONOMY

Module 5	Manufacture for a circular economy
General information	The course pays attention to all the manufacturing sides of textile and fashion, starting from fibre pre-treatment, yarn and fabric production and finishing, individual processes in garment production, like cutting, sewing and packaging to environmentally friendly and clean technologies production. The module shows the ways to make production processes more environmentally friendly by reducing dust, water and energy consumption or by using more friendly chemicals.
Learning outcomes	The learners will be able to: understand the manufacture processes for a circular economy; create ethical and environmentally friendly products by using clean technologies, low impact materials and provide services to support long life; source and produce avoiding making waste; know services to support a long life.
Teaching methods	This content is delivered as a non-formal training. The students/ learners find the content on the Digital Platforms of the project.
Assessment	Quizzes assess the level of knowledge acquired by the student/ learner. Quiz answers can take different forms, select true/false or multiple choices. The training materials available on https://training.design4circle.eu/
Learning hours	6
Self-study hours	6
ECVET	2

Units	Titles of units
Unit 5.1.	Manufacture processes for a circular economy in fabric production
Unit 5.2.	Manufacture processes for a circular economy in garment production
Unit 5.3.	Environmentally-friendly production
Unit 5.4.	Clean technologies production
Unit 5.5.	Services to support long life

Unit 5.1.	**Manufacture processes for a circular economy in fabric production**	
Knowledge	**Skills**	**Autonomy and responsibility**
-To be able to understand main fiber treatment, yarn and fabric production and finishing processes. -To be able to understand how manufacturing and treatment processes impact on the environment.	-To be able to select the most environmentally friendly technologies for the production and finishing of yarn and fabrics -To be able to identify environmental pollution factors in different technological processes of yarn and fabric production and finishing	-To be able to supervise the use of environmentally friendly technologies in yarn and fabric production -To be able to be capable of choosing environmentally friendly yarn and fabric manufacturing and finishing technologies
Unit 5.2.	**Manufacture processes for a circular economy in garment production**	
Knowledge	**Skills**	**Autonomy and responsibility**
-Be able to manufacture durable and long-lasting products (the creation of products that can be repaired, modernised, reassembled, with a high value). -Understands how manufacturing processes impact the environment.	-Be able to design the guidelines (model) for the creation of durable and long-lasting products. -Be able to explain how higher added value will be achieved. -Be able to choose the best manufacturing processes for the circular economy. -Be able to choose the most appropriate packaging materials.	-Competent to perform to design the guidelines (model) for creation durable and long-lasting products, based on the principles of eco-design. -Taking into account the acquired knowledge and skills can explain how higher added value will be achieved in this business. -Competent to evaluate manufacturing processes by the amount of waste they make.
Unit 5.3.	**Environmentally-friendly production**	
Knowledge	**Skills**	**Autonomy and responsibility**

-Understand how to source and produce more locally, without toxicity, efficient. -Understands how to source and produce with renewables. -Understands how to avoid waste and surplus.	-Be able to create ethical and environmentally friendly products by using clean technologies, low impact materials and provide services to support a long life. -Be able to minimise or avoid waste.	-Be able to make a new product environmentally friendly according to the eco-design criteria given. -Be able to redesign an existing product more environmentally friendly according to the eco-design criteria given.
Unit 5.4.	**Clean technologies production**	
Knowledge	**Skills**	**Autonomy and responsibility**
-Understands what clean technologies production are. -Knows the newest trends of textile and garment manufacturing	-Be able to use different kind of clean technologies in production.	-Competent to implement clean technologies in manufacturing. -Competent to evaluate the impact of clean technologies.
Unit 5.5.	**Services to support long life**	
Knowledge	**Skills**	**Autonomy and responsibility**
-Knows the ways and instruments needed to redesign a product.	-Be able to evaluate services that support product longevity.	-Be competent to redesign an existing product through disassembly or by using manufacture surpluses.

MODULE 6
RECYCLING TECHNOLOGIES FOR A CIRCULAR ECONOMY OF TEXTILES

Module 6	Recycling technologies for a circular economy of textiles
General information	Module will focus on understanding existing situation and challenges in textile recycling, provides knowledge of clean technologies for fashion design and recycling technologies. It gives theoretical view about textile waste collection, sorting, about different ways of recycling technologies and reusage of recycled fibres
Learning outcome	By the end of this course, the learners will be able to understand the existing situation and challenges in textile recycling and to know textile recycling's technology.
Teaching methods	This unit is delivered as a non-formal training. The students/ learners have to study the e-courses (available on the Digital Platform) to be able to understand the existing situation and challenges in textile recycling and to know textile recycling's technology.
Assessment	Quizzes assess the level of knowledge acquired by the student/ learner. Quiz answers can take different forms, from short answer to true/false and multiple choice. Digitally designed quizzes, question order and options can be randomized, so each student's quiz is unique. The training materials available on https://training.design4circle.eu/
Learning hours	10
Self-study hours	10
ECVET	4

Units	Titles of the units
Unit 6.1.	The basics of textile recycling
Unit 6.2	Textile waste collection, sorting and preparation for recycling 6.2.1.Waste types in textile production (fibers, yarns, pieces of fabrics, used or unused garments) 6.2.2.Waste sorting principles according to their type, fiber content, colour and other characteristics) 6.2.3.Separation of non-textile parts of recyclable garments
Unit 6.3.	Technology for textile recycling

	6.3.1. Textile waste material recycling into fiber 6.3.2. Yarn production from recycled fibers 6.3.3. Non-woven fabric production from recycled fibers

Unit 6.1.	**The basics of textile recycling**	
Knowledge	**Skills**	**Autonomy and responsibility**
-Describe the impact of textile recycling to environmental; -Describe benefits of textile recycling.	-Develop the ability to explain an existing and challenges in the textile recycling.	-Apply the principles of textiles recycling technology to produce other products
Unit 6.2	**Textile waste collection, sorting and preparation for recycling**	
Knowledge	**Skills**	**Autonomy and responsibility**
-Describe textile waste types in different textile production processes; -Discuss understand the restrictions in textile and apparel recycling process; -Discuss waste collection, sorting and preparation principles for recycling; -Describe necessary of non-textile part separation before recycling process.	-Develop the ability to explain requirement and principles of textile waste collection, sorting and preparation for recycling; -Develop the ability to promote textile waste collection from population.	-Manage textile waste collection process in textile factories; -Design a plan to work in cooperation with the textile recycling factories so that textile waste from textile factories can be utilized in friendly ways for nature; -Organize textile waste collection from population so that they are separated from other wastes.
Unit 6.3.	**Technology for textile recycling**	
Knowledge	**Skills**	**Autonomy and responsibility**
-Classify sources of textiles for recycling; -Identify the textile recycling stages; -Describe the manufacturing technology, in relation (dependence) with recyclable materials;	-Develop the ability to describe the manufacturing technologies to recyclable materials and give examples of manufacturing products from recoverable materials; -Explain difference between recycled fiber	-Apply typical textile recycling's technology methods. -Plan textile recycling into fibers, yarn and non-woven fabrics.

-Describe yarn production processes from recycled fibers; -Discuss non-woven fabric production from recycled fibers.	yarn and original fiber yarn. -Explain usage of recycled fibers for the production of technical non-woven fabrics.	

MODULE 7

BUSINESS MANAGEMENT IN A CIRCULAR ECONOMY

Module 7	Business management in a circular economy
General information	This module- circular business management - provides skills related to circular business model innovation and circular marketing while providing a systems thinking perspective. It provides knowledge on business models and sustainable innovation, introduces tools to design a successful circular business model, looks at innovative marketing strategies to engage customers and end-users through practical examples. It emphasizes the importance of thinking in systems and engage in cross sector collaborations to implement full circular systems.
Learning outcome	By the end of this course, the learners will be able to understand what is a business model and know how sustainable and circular business model can be defined and implemented; to understand the fundamentals of launching a circular economy business venture; to acquire knowledge of system thinking and its use in circular economy transition and to understand networks and collaboration can create additional value .
Teaching methods	This unit is delivered as a non-formal training. The students/ learners have to study the e-courses (available on the Digital Platform) to acquire knowledge on business models and sustainable innovation, introduces tools to design a successful circular business model, looks at innovative marketing strategies to engage customers and end-users through practical examples.
Assessment	Quizzes assess the level of knowledge acquired by the student/ learner. Quiz answers can take different forms, from short answer to true/false and multiple choice. Digitally designed quizzes, question order and options can be randomized, so each student's quiz is unique. The training materials available on https://training.design4circle.eu/
Learning hours	14
Self-study hours	14
ECVET	6

Units	Titles of the units
Unit 7.1.	Entrepreneurship and new business models for circular economy
Unit 7.2.	Marketing and user centred approaches
Unit 7.3.	Systems thinking and networking
Unit 7.4.	Corporate social responsibility (CSR, also called corporate sustainability)
Unit 7.5.	Sustainability performance indicators and guidelines

Unit 7.1.	**Entrepreneurship and new business models for circular economy**	
Knowledge	**Skills**	**Autonomy and responsibility**
-Understand the importance of innovating with business models. -Know the different options for circular business models. -Understand the fundamentals of creating a circular economy business venture.	-Develop the ability to explain an existing and challenges in the textile recycling. -Develop the ability to launch a new circular economy business unit within existing organization; -Identify opportunities to turn textile waste into a profit.	-Design new business models fitting circular economy;
Unit 7.2.	**Marketing and user centered approaches**	
Knowledge	**Skills**	**Autonomy and responsibility**
-Understand successful marketing strategies to market circular products and services.	-Develop the ability to communicate circularity to customers/end users; -Develop co-creation techniques to design user-centered solutions.	-Engage customers in taking part of a circular fashion system; -Apply co-creation techniques to develop user-centered solutions.
Unit 7.3.	**Systems thinking and networking**	
Knowledge	**Skills**	**Autonomy and responsibility**
-Understand the relevance of systems thinking in designing circular economy projects and products. -Knows the good examples of cross sectors collaborations in	-Use systems thinking as a framework to develop new solutions. Identify relevant partnerships to develop circular economy solutions. -Realise stakeholders mapping assessment.	-Work in interdisciplinary teams; -Communicate with different professions.

the fashion industry.		
Unit 7.4.	**Corporate social responsibility (CSR, also called corporate sustainability)**	
Knowledge	**Skills**	**Autonomy and responsibility**
-Know the industry initiatives related to CSR. -Know tools and methods to set up CSR policies, such as GRI. -Be able to describe involvement in communities, relations with employees, suppliers and clients. -Be able to describe responsibility on environmental issues.	-Be able to understand and use for the implementation of a CSR plan. -Be able to plan procedural CSR steps to community, employees, suppliers and clients. -Be able to identify and describe responsibility for environmental issues.	-Be able to develop and to implement CSR politics and procedures. -Be able to communicate with appreciation with community, employees, suppliers and clients about CSR plan implementation. -Be able to express and receive situation-based criticism.
Unit 7.5.	**Sustainability performance indicators and guidelines**	
Knowledge	**Skills**	**Autonomy and responsibility**
-Know sustainability performance indicators (SPIs) and what are they used for. -Know sustainability reporting guidelines. -Know economic, environmental and social aspects of sustainability.	-Be able to understand and use sustainability performance indicators in measuring the company's performance. -Be able to use reporting principles and standards.	-Be able to evaluate a company based on SPIs. -Be able to make a report using reporting principles and standards.