CURRICULUM ON ECO-DESIGN FOR CIRCULAR ECONOMY IN THE TEXTILE AND FASHION INDUSTRIES

DESIGN4CIRCLE

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CURRICULUM ON ECO-DESIGN FOR CIRCULAR ECONOMY IN THE TEXTILE AND FASHION INDUSTRIES

Project Title   Innovative design practices for achieving a new textile circular sector

Project Acronym   Design4Circle

Reference Number   2018-1-LV01-KA202-046977

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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)

"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].

The Design4Circle project aims to capture the opportunity to improve designers' knowledge, coming from the textile and fashion sector, regarding eco-innovation and circular economy. It will support professional designers and students through vocational education following industrial design education and/or during their active working life within the fashion and textile sectors. By improving or updating their knowledge and/or skills on eco-design and circular economy principles, the goal is to facilitate their personal and professional development.

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

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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".

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One of the outputs of the Design4Circle project is a Joint Curriculum on eco-design and circular businesses models for the textile and fashion industries.

The 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].

The Curriculum is designed in terms of the important 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 entrepreneurship and the development of innovative SMEs in the area of textile eco-design. To correctly identify needs and gaps the European Skills/Competences, qualifications and Occupations European Database (ESCO) has been used as a support tool to match related occupations with the necessary skills, knowledge and competences[6].

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The Curriculum has been drafted with a clear definition of the necessary Learning Outcomes and their related Knowledge, Skills and Competences[7]. The textile industry and designer needs and knowledge gaps identified in the previous key-study are connected with the identified learning outcome to cover them[8].

The main target groups are **professional designers** and **design students** in the textile and fashion industries.

The Curriculum contains seven modules (Table 1). The total duration of the course is 140 hours (70 learning hours and 70 self-study hours).

Table 1: Modules of the Joint Curriculum in eco-design in textile and fashion sectors towards a circular textile industry

Module	Title of the Module	Learning hours	Self-study hours
MODULE 1	Introduction to circular economy	6	6
MODULE 2	Sustainability challenges in the textile and fashion industry	10	10
MODULE 3	Materials for a circular economy	8	8
MODULE 4	Design for a circular economy	14	14
MODULE 5	Manufacture for a circular economy	8	8
MODULE 6	Recycling technologies in a textile and fashion industry	10	10
MODULE 7	Business management in a circular economy	14	14
	TOTAL	**70**	**70**

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7 Report "Defining, writing and applying learning outcomes. A European Handbook" developed by CEDEFOP
8 Report CIRCULAR ECONOMY IN THE TEXTILE AND FOOTWEAR INDUSTRY: NEW SKILLS AND COMPETENCES FOR A SECTOR RENEWAL
https://design4circle.eu

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Table 2 shows reference qualification, EQF level, learning outcomes and course assessments.

Table 2. Reference qualification, EQF level, learning outcomes and course assessment

Reference Qualifications	Expert in an eco-design for circular economy in the textile and fashion industries
EQF Level	5
Learning Outcomes	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. The course is designed to inform about ethical challenges arising in business and help the learners to identify and manage difficult ethical dilemmas they are likely to encounter in their career.
Course 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.

Every module in Curriculum is described in a form of short introduction. Modules contain learning outcomes and assessment criteria and are divided into 3 to 5 units. Each unit description contains knowledge, skills and acquired competencies. Every unit has a suggested reading, real case samples (industry and projects) and self-evaluation quiz.

JOINT CURRICULUM STRUCTURE AND RELATED LEARNING OUTCOMES

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 implementation of Circular Economy. Being able to position CE within the sustainable development concept.	Identify documents and regulations related to the implementation of CE. Describe the place and role of CE within Sustainability discourse.

RELATED LEARNING UNITS

Unit 1.1.	Introduction to Circular Economy
Unit 1.2.	Concepts and principles of Circular Economy
Unit 1.3.	Current state of policies addressing Circular Economy

CONTENT AND ACTIVITIES

Unit 1.1.	Introduction to Circular economy	
Knowledge	*Skills*	*Competencies*
means the body of facts, principles, theories and practices that is related to a field of work or study. It is described as theoretical and/or factual knowledge	*means the ability to apply knowledge and use know-how to complete tasks and solve problems. They are described as cognitive (logical, intuitive and creative thinking) or practical (involving manual dexterity and the use of methods, materials, tools and instruments)*	*means the proven ability to use knowledge, skills and personal, social and methodological abilities in work or study situations and in professional and personal development. It is described in terms of responsibility and autonomy*
At the end of this unit the designer will:	*At the end of this unit the designer will be able to:*	*At the end of this unit, the designer will have acquired the responsibility and autonomy to:*
Have a general understanding of limits associated to our current economic model Have a clear comprehension of the rationale behind circular economy Be able to describe benefits of implementing CE Be able to describe barriers to the implementation of CE.	Have a practical understanding on how CE can be implemented in own organization/industry Be able to analyse information, inform and communicate about CE to others.	Be able to verbally present ideas of CE and describe it to others. Be able to communicate with appreciation with members/reference person groups involved in the CE process.
Unit 1.2.	Concepts and principles of CE	
Knowledge	*Skills*	*Competencies*
Being able to know definitions, principles and main	Be able to analyse information related to CE and present	Be able to discuss CE principles and

strategies to implement CE.	it as a basis for decisions.	strategies with others.
Be able to describe method of applying CE.		Be able to reflect upon his/her own actions related to CE.
Be able to identify and describe the principles of circular fashion.		
Be able to identify CE related vocabulary and specific terms.		
Be able to differentiate between CE related and non-related information.		
Unit 1.3.	*Current state of policies addressing circular economy*	
Knowledge	*Skills*	*Competencies*
Be able to identify policy documents associated with the implementation of CE.	Be able to apply legislation rules for implementation of CE, analyse and use information to develop a CE plan within EU policies of sustainable development.	Be able to apply CE strategies considering EU politics of sustainable development.
Be able to describe the place and role of regulations for applying CE.		Be able to express and receive situation-based criticism.

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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.

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	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.

RELATED LEARNING 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

CONTENT AND ACTIVITIES

Unit 2.1.	*Alarming trends in textile and leather industry in terms of waste and environmental issues and social impact*	
Knowledge	Skills	Competencies
Be able to understand the existing situation in textile and leather industry. Be able to identify and understand	Be able to identify risks and use principles, methods and techniques to minimizes waste and environmental impact.	Are competent to prevent risks, understand methods and techniques for minimizing them.

alarming trends in textile industry.		
Unit 2.2.	*People health and safety*	
Knowledge	*Skills*	*Competencies*
Be able to describe impact of CE to people health and safety. Be able to describe characteristics which are responsible for the people health and safety. Be able to explain regulations concerning the handling of hazardous substances.	Be able to receive orders and plan own procedural steps for gaining people health and safety. Be able to identify and manage issues about dust in work environment. Be able to identify and manage issues about level of noise inside and outside the factory. Be able to identify and manage issues about hazardous substances in contact with people.	Be able to calculate proaction, action and service costs and analyse necessary plans to ensure people health and safety. Be able to 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*	*Competencies*
Be able to describe organizational procedures for maintaining a clean environment. Be able to describe environment friendly packaging solutions. Be able to assign the necessary documents for the mandatory environmental	Be able to identify and analyse the waste that can be recovered. Be able to select, adopt and implement the environment friendly packaging solutions. Be able to control the compliance with the mandatory environmental	Be able to supervise the environmental practices of the company in order to comply with the national and EU regulations. Be able to demonstrate capacity and responsibility for selecting,

legislation about: hazardous substances in contact with environment, water restrictions, waste legislations.	legislation about: hazardous substances in contact with environment, water restrictions, waste legislations.	adopting and implementing the environment friendly packaging solutions. Be able to develop strategies for compliance with the mandatory environmental legislation.
Unit 2.4.	*Ethical production*	
Knowledge	*Skills*	*Competencies*
Be able to recognize and implement the principles of ethical production throughout the supply chain.	Be able to apply principles of ethical production. Be able 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. Be able to use principles of ethical production in order to develop a long lasting and low impact products.

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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

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	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

RELATED LEARNING 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

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	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

CONTENT AND ACTIVITIES

Unit 3.1.	*Sustainable textile and non-textile materials*	
Knowledge	*Skills*	*Competencies*
Be able to describe sustainable fiber production processes. Be able to explain sustainable chemical technologies in textile production. Be able to explain non-textile material usages in production.	Be able to identify differences between sustainable and non – sustainable fibers. Be able to select sustainable chemical technologies for production. Be able to select non-textile materials for production.	Be able to analyse quality and textile specifications. Be able to apply sustainable chemical technologies for product development. Be able to use different non-textile material technologies for product development.
Unit 3.2.	*Textile waste as raw material for upcycling*	

Knowledge	Skills	Competencies
Be able to describe types of wastes in garment production. Be able to analyse possibilities in already used garment fabric application. Be able to describe durability of different textiles.	Be able to analyse waste types and sorting principles of them in garment production. Be able to analyse the best practices of waste fabric usage. Be able to identify suitability of waste material for different product design.	Be able to evaluate waste material application. Be able to select waste material for product designing. Be able to demonstrate benefits of waste material usage.
Unit 3.3.	**Recycled textiles**	
Knowledge	Skills	Competencies
Be able to describe tendencies and difficulties in textile recycling. Be able to explain difference between original and recycled fiber technical characteristics. Be able to mention types of fibers and products that more often are recycled in textile than other ones, describe reasons.	Be able to analyse the recycled fiber, yarn or fabric characteristics and suitability for application. Be able to find recycled fiber, yarn and fabric producers. Be able to analyse the best practices of recycled textile usage.	Be able to choose between recycled fiber and original fiber usage for product production, be able to mention advantages and disadvantages for both cases. To be able to collaborate with textile recycling companies and analyse product technical specifications. Be able to label fiber content it textiles according to

Be able to use correct forms of recycled fiber labelling.		European Regulations.

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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.

RELATED LEARNING 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

CONTENT AND ACTIVITIES

Unit 4.1.	Products life cycle, eco-design fundamentals and principles of circular fashion	
Knowledge	Skills	Competencies
Be able to understand the product life cycle, eco-design fundamentals and principles of circular fashion.

Promote an "environment friendly" view toward the entire lifecycle of the product. | Be able to note and describe the principles of the fashion product life cycle.

Be able to define the eco-design fundamentals and explain it.

Be able to identify risks and use principles, methods and techniques to minimizes waste and environmental impact.

Be able to explain the "environment friendly" view toward the entire lifecycle of the product; analyze the entire life cycle of the product. | Be able to develop and to implement a fashion product life cycle and circular fashion in everyday activities.

Be able to communicate with appreciation with community, employees, suppliers and clients about eco-design implementation and explain it for everyone.

Be able to express and receive situation-based criticism.

Are competent to prevent risks, understand methods and techniques for minimizing them.

Be able to demonstrate "environment friendly" purpose life cycle design. |
| Unit 4.2. | Eco-design principles in fashion | |

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Knowledge	Skills	Competencies
Be able to understand and apply the eco-design principles in fashion design. Be able to improve the design of circular products so that it is easier to repair materials. Understand the principles of zero waste design.	Be able to design the guidelines (model) for creation durable and long-lasting products, based on the principles of eco-design. Be able to explain how higher added value will be achieved. Be able to answer questions on the feasibility of achieving a minimum amount of waste in the company.	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 to explain how higher added value will be achieved in this business. Be able to redesign an existing product more environmentally friendly according to the eco-design criteria given.

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.

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RELATED LEARNING 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.

CONTENT AND ACTIVITIES

Unit 5.1.	*Manufacture processes for a circular economy in fabric production*	
Knowledge	*Skills*	*Competencies*
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 to choose environmentally friendly yarn and fabric manufacturing and finishing technologies

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Unit 5.2.	Manufacture processes for a circular economy in garment production	
Knowledge	Skills	Competencies
Be able to manufacture durable and long-lasting products (the creation of products that can be repaired, modernized, reassembled, with a high value). Understands how manufacturing processes impact the environment.	Be able to design the guidelines (model) for creation 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 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 to 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	Competencies
Understand how to source and produce more locally, without	Be able to create ethical and environmentally friendly products by using clean technologies, low impact materials	Be able to make a new product environmentally friendly according to the eco-design criteria given.

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toxicity, efficient. Understands how to source and produce with renewables. Understands how to avoid waste and surplus.	and provide services to support long life. Be able to minimize or avoid waste.	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**	**Competencies**
Understands what clean technologies production is. 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**	**Competencies**
Knows the ways and instruments needed to redesign a product.	Be able to evaluate services that support product longativity.	Be competent to redesign an existing product through disassembly or by using manufacture surpluses.

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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

RELATED LEARNING UNITS

Unit 6.1.	The basics of textile recycling
Unit 6.2.	Textile waste collection, sorting and preparation for recycling
	6.1.1 Waste types in textile production (fibers, yarns, pieces of fabrics, used or unused garments)

	6.1.2 Waste sorting principles according to their type, fiber content, colour and other characteristics) 6.1.3 Separation of non-textile parts of recyclable garments
Unit 6.3.	Technology for textile recycling 6.2.1 Textile waste material recycling into fiber 6.2.2 Yarn production from recycled fibers 6.2.3. Non-woven fabric production from recycled fibers

CONTENT AND ACTIVITIES

Unit 6.1.	*The basics of textile recycling*	
Knowledge	*Skills*	*Competencies*
-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*	*Competencies*
Be able to describe textile waste types in different textile production processes.	Be able to explain requirement and principles of textile waste collection, sorting and preparation for recycling.	Be able to manage textile waste collection process in textile factories. Be able to work in cooperation with the textile recycling

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Be able to understand the restrictions in textile and apparel recycling process. Be able to understand waste collection, sorting and preparation principles for recycling. Be able to describe necessary of non-textile part separation before recycling process.	Be able to develop or promote textile waste collection from population.	factories so that textile waste from textile factories can be utilized in friendly ways for nature. Be able to organize textile waste collection from population so that they are separated from other wastes.
Unit 6.3.	*Technology for textile recycling*	
Knowledge	*Skills*	*Competencies*
Be able to classify sources of textiles for recycling.	Be able to describe the manufacturing technologies to recyclable materials and give examples of manufacturing products from	Be able to understand typical textile recycling's technology methods. Be able to plan textile recycling

Be able to identify the textile recycling stages.	recoverable materials.	into fibers, yarn and non-woven fabrics.
Be able to determine the manufacturing technology, depending on the recyclable materials.	Be able to explain difference between recycled fiber yarn and original fiber yarn.	
Be able to describe yarn production processes from recycled fibers.	Be able to explain usage of recycled fibers for the production of technical non-woven fabrics.	
Be able to understand non-woven fabric production from recycled fibers.		

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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	Develop meaningful partnership to create shared value in circular fashion systems

create additional value	

RELATED LEARNING UNITS

Unit 7.1.	Entrepreneurship and new business models for circular economy
Unit 7.2.	Marketing and user centered 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

CONTENT AND ACTIVITIES

Unit 7.1.	*Entrepreneurship and new business models for circular economy*	
Knowledge	*Skills*	*Competencies*
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.	Launch a new circular economy business unit within existing organization. Be able to identify opportunities to turn textile waste into a profit.	Be able to design new business models fitting circular economy.
Unit 7.2.	*Marketing and user centered approaches*	

Knowledge	Skills	Competencies
Understand successful marketing strategies to market circular products and services.	Be able to communicate circularity to customers'/end users. Apply concretion techniques to develop user-centered solutions.	Engage customers in taking part of a circular fashion system
Unit 7.3.	*Systems thinking and networking*	
Knowledge	Skills	Competencies
Understand the relevance of systems thinking in designing circular economy projects and products. Know good examples of cross sectors collaborations in the fashion industry.	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.

Unit 7.4.	*Corporate social responsibility (CSR, also called corporate sustainability)*	
Knowledge	*Skills*	*Competencies*
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 the environment issues.	Be able to understand and use for implementation a CSR plan. Be able to plan procedural CSR steps to community, employees, suppliers and clients. Be able to identify and describe responsibility on the environment issues.	Be able to develop and to implement a 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*	*Competencies*
Know sustainability performance indicators (SPIs) and what are they used for.	Be able to understand and use sustainability performance indicators in	Be able to evaluate a company based on SPIs. Be able to make a report using reporting

Know sustainability reporting guidelines. Know economic, environmental and social aspects of sustainability.	measuring company's performance. Be able to use reporting principles and standards.	principles and standards.