



circular economy  
design training  
in the textile and  
footwear industries

# Design4Circle Student's Guide



Co-funded by the  
Erasmus+ Programme  
of the European Union

**Design4Circle has been funded with support from the European Commission (2018-1-LV01-KA202-046977).**  
The views expressed in this document are those of the author only, the Commission cannot be held responsible for any use which may be made of the information contained therein.



Co-funded by the  
Erasmus+ Programme  
of the European Union

Grant Agreement N°: 2018-1-LV01-KA202-046977  
Innovative design practices for achieving a new textile  
circular sector

# Contents

<b>I. General details .....</b>	<b>3</b>
<b>II. Course details.....</b>	<b>5</b>
<b>III. Modules information .....</b>	<b>9</b>
<b>IV. E-learning Platform.....</b>	<b>16</b>

# I. General details

## Why?

“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”.<sup>1</sup>

The Circular Economy 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 espoused by the education and training systems.”

## So...

To get new competencies, knowledge and skills in the field of eco-design and eco-innovation to thrive in a circular economy we advise you to enrol to the “**ECO-DESIGN FOR CIRCULAR ECONOMY IN THE TEXTILE AND FASHION INDUSTRIES**” course.<sup>2</sup>

Even if the course is focused on eco-design and eco-innovation for textile and fashion industries, it will also be a benefit for other sectors, as the modules regarding basic principles of the circular economy, circular businesses models, or eco-design could cover knowledge gaps of other sectors. 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.

## Keypoints

- ✓ This course is harmonised to the European Qualification Framework and facilitates the validation of the training in all EU countries;
- ✓ You can get knowledge, necessary competencies and skills to implement new practices on eco-design in the textile and fashion industry;

---

<sup>1 2</sup><https://design4circle.eu/objectives/>

- ✓ You acquire knowledge about the new type of business, the circular one, and how to create new textile design companies.
- ✓ You will get specific, basic and transversal competencies and skills, management, entrepreneurship, leadership, digital and creative skills, and language competence in the field of VET.
- ✓ You can cooperate and exchange experiences among entities from different fields and perspectives (Universities, sector experts, textile and fashion area, business associations, etc.), and among people with different profiles (VET trainers, managers and other categories of employee, entrepreneurs, teachers), and even different countries;
- ✓ You will have access to the training material developed on specific subjects related to circular economy principals for the textile and fashion industry (e-learning platform): a design for a circular model in the fashion and textile sector, entrepreneurship and transversal eco-innovation training.

## Who can attend?

At this course, can enrol:

- An employee from the textile and fashion industry (who is working either in the design or manufacturing sector);
- Managers of textiles and fashion companies
- Students who attend courses in the field of Textile and Design Apparel Goods;

## II. Course details

### Summary

<b>Course title</b>	<b>"Eco-design for circular economy in the textile and fashion industries."</b>
<b>Credits</b>	28
<b>The total number of learning hours</b>	70
<b>The total number of self-study hours</b>	70
<b>For whom is planned</b>	Designers, managers, employees and students of the textile and fashion field
<b>Instructor information</b>	Email addresses
<b>Learning outcome</b>	The student/ learner will acquire the necessary skills on eco-design and eco-innovation to thrive in a circular economy.
<b>Teaching methods for achieving learning outcomes</b>	This course 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.
<b>Assessment</b>	Quizzes assess the level of knowledge acquired by the student/ learner. Quiz answers can take different forms, from short response to true/false and multiple choice. Digitally designed quizzes, question order and options can be randomised, so each student's quiz is unique.
<b>Learning resources</b>	PowerPoint presentations for each specific subject (uploaded on the platform); examples of best practices/ online video presentations, a list with references and a list with additional resources.



# Course modules and units

The course is comprised of 7 modules that can be used separately for a personalised learning journey:



## M1. Introduction to circular economy

- 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



## M2. Sustainability challenges in the textile and fashion industry

- 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



## M3. Materials for a circular economy

- 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 Re-use of already wore 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

## M4. Design for a circular economy



### 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

## M5. Manufacture for a circular economy



### 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

## M6. Recycling technologies for a circular economy of textile and fashion industry



### 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

## M7. Business management in a circular economy



- 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



## III. Modules information

### M1. Introduction to circular economy



#### Short Description

This module introduces the general body of knowledge related to circular economy thinking, starting with limitations of the current linear system. The module introduces definitions, principles and strategies of the circular economy. It presents the concept and its associated vocabulary. It also frames a Circular economy within EU legislation and national action plans.

<b>Learning hours</b>	6
<b>Self-study hours</b>	6
<b>ECVET points</b>	2

#### Learning Outcomes:

- 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.
- Have a clear understanding of the concept of CE, its historical development, its definitions, its principles.
- Know key examples of CE in practice.
- Understand the general EU framework related to the implementation of Circular Economy.
- Being able to position CE within the sustainable development concept.

#### Assessment criteria:

- Explain the challenges related to our current economic system.
- Describe the general principles related to CE.
- Explain the benefits of CE.
- Explain current barriers are preventing the implementation of CE.
- 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.
- Identify documents and regulations related to the implementation of CE.
- Describe the place and role of CE within Sustainability discourse.



## M2. Sustainability challenges in the textile and fashion industry

### Short Description

The module 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 hours** 10

**Self-study  
hours** 10

**ECVET points** 4

### 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 minimisation 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.

-Identify and manage issues about dust in the work environment

-Understand the impact of CE on people health and safety

-Identify and manage issues about the 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 the waste that can be recovered.

-Describe organisational 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 the 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

-Optimising the use of resources by circulating products

-Analyse the economy of water and energy resources in the case of circular products.

### M3. Materials for a circular economy



#### Short Description

This module describes idea of sustainable textile materials, their processing and finishing, analyses the influence of the production processes of fibres, yarns, fabrics to the environment, determine the types of textiles that can be recycled, and analyses the properties of recycled fibres and their products. It explains the necessary skills needed to implement this circular thinking into the various stages of textile production and consumption: material and resources selection

<b>Learning hours</b>	8
<b>Self-study hours</b>	8
<b>ECVET points</b>	3

#### Learning Outcomes:

#### Assessment criteria:

-Take decisions on the applicability of certain materials based on their ecological impact	-Explain the difference between 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 the 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 re-use of recyclable materials.	-Understand the influence of new fiber production process on the environment -Understand the textile apparel recycling process
-Analyse recoverable materials	-Identify textile materials that can be recoverable -Understand the difference between new and recovered fibre properties -Understand and improve the textile recycling system and its perspectives
-Design, plan and develop materials that can be later re-used.	-Understand mechanical and physical durability of fabrics and the possibility to use the second time -Determine what kind of textiles can be recycled and complexity of the process
-Manufacture products from recoverable materials	-Characterised main types of pf recoverable materials yarn and non-wovens -Assortment analyses of yarn from recovered

### Learning Outcomes:

### Assessment criteria:

	fibers for the production
-Formulate recycling and manufacturing habits of reusable material products.	-Understand lyse use of non-wovens for garments and technical textiles
-Form models on extending the lifecycle of products and keeping materials within the economy as much as possible.	-Assortment analyses of typical textiles that are manufactured from reusable material
-Conduct creative processes for textile confections made of recyclable materials	-Understand the properties of textiles and their influence on the durability
	-Characterised the impact of different outer factors on life length of fiber materials
-Re-use raw materials that are currently disposed of as waste	-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
	-Understand different types of waste in the production process
	-Describe waste grading processes
	-Understand cases were disposed of waste is collected and used as raw material

## M4. Design for a circular economy



### Short Description

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. Re-use, 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.

The module pays attention to 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, modernised, reassembled, with a high value).

<b>Learning hours</b>	14
<b>Self-study hours</b>	14
<b>ECVET points</b>	6

### Learning Outcomes:

### Assessment criteria:

-Understand the product life cycle, eco-design fundamentals and principles of	-Note the product life cycle, describe the principles of the life cycle.
---	--

### Learning Outcomes:

### Assessment criteria:

circular fashion.	-Define the eco-design fundamentals and explain it. -Identify the 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; analyse 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, modernised, 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.

## M5. Manufacture for a circular economy



### Short Description

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.

<b>Learning hours</b>	8
<b>Self-study hours</b>	8
<b>ECVET points</b>	3

### 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 a long life.	-Answer questions on how to source and produce more locally, without toxicity, and efficient.

### Learning Outcomes:

-Be able to source and produce avoiding making waste

-Know services to support a long life.

### Assessment criteria:

-Answer questions on the feasibility of achieving a minimum amount of waste in the company.

-Describe ways to support the longevity of a particular product.

## M6. Recycling technologies for a circular economy of textile and fashion industry



### Short Description

The module will focus on understanding the existing situation and challenges in textile recycling, provides knowledge of clean technologies for fashion design and recycling technologies. The module gives a general view about textile waste collection, sorting, about different ways of recycling technologies and re-use of recycled fibres.

**Learning hours** 10

**Self-study** 10

**hours**

**ECVET points** 4

### Learning Outcomes:

-Understand the existing situation and challenges in textile recycling

-Know textile recycling's technology

### Assessment criteria:

-Describe the issues in textile recycling

-Explain the purpose of textiles recycling

-Explain the benefits of textiles recycling

-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

## M7. Business management in a circular economy



### Short Description

The last module- circular business management - provides skills related to circular business model innovation and circular marketing while providing a system 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 emphasises the importance of thinking in systems and engages in cross-sector collaborations to implement full circular systems.

**Learning hours** 14

**Self-study** 14



**hours**  
**ECVET points** 6

**Learning Outcomes:**

**Assessment criteria:**

-Understand what a business model and know-how sustainable and circular business model is can be defined and implemented

-Understand the fundamentals of launching a circular economy business venture

-Have a basic understanding of system thinking and its use in circular economy transition

-Understand how networks and collaboration can create additional value

-Describe organisational 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

-Create a step by step plan to launch a circular startup

-Use system thinking tools to develop full circular fashion systems

-Develop meaningful partnership to create shared value in circular fashion systems

## IV. E-learning platform

### Training interface and navigation

On the left side of the screen, a global structure of the training is displayed with the list of online lessons. For each of them, the time spent for online lessons and the score or status obtained is displayed.

The main part of the screen contains the course description. At the right of the course main page, a "Continue" button allows to start the course beginning with its first lesson.

Then it's possible to carry out the complete training by clicking on the "Next" buttons. After a lesson is completed, a button "To next lesson" is displayed and it allows to go to the next lesson.

### Main menu

The main menu of the e-learning platform has the following entries:

- Home: the home page of the 'Design4Circle' course shows the description of the course and all the lessons included.
- My courses: this section gives the user an overview of all courses the student has access to.
- My achievements: this section gives the student an overview of relevant activities, and to download his certificates if he/she passed the test with the minimum score defined in the course settings.

### Training modules

The course is the base entity containing many tools and allowing to spread knowledge and to assess students' learning.

Each module consists of different theoretic lessons and assessments. This advance content will permit to improve the knowledge of those students that want to take a high-level training course.

## Course lessons

The Design4Circle e-learning platform offer many tools proposing different ways to facilitate the knowledge transmission. These tools will appear on the home page of the course.

Each course contains different lessons with the theoretical content and quizzed to assess students' knowledge.

A lesson can be:

- Purely theoretical: it means it will be composed of slides.
- Purely quiz: only questions of different types.

Lessons can be reached by clicking on the following button once you are inside a course:



## Links

In order to consult any of the links and videos contained within the lessons, you have right-click on them to open a menu that allows a variety of options. Your choices include opening the link in a new tab, opening it in a new window altogether and opening it in an "incognito window," where it largely won't be linked to your other browsing, and your history won't be saved for privacy's sake.

This will allow you to have websites open in multiple tabs while you're using the Design4Circle e-learning platform, so that you can read multiple websites, compare information, or attend to an urgent matter in one tab, then come back to your work in another one.

## Course evaluation

At the end of each module it is necessary to pass a test with an 80% score to be able to get the Design4Circle training certificate. You will have three attempts to pass each test.

Please, remember that tests will only be available to registered users.



Co-funded by the  
Erasmus+ Programme  
of the European Union

Grant Agreement N°: 2018-1-LV01-KA202-046977  
Innovative design practices for achieving a new textile  
circular sector

## **Student achievements**

Section "My achievements" allows you, as a student, to consult all your own results, and download the certificate for the Design4Circle course.

When a student passes all the lessons of the Design4Circle training with the required score, it will be possible to get a certificate. The student will be able to download the PDF certificate file from the section "My achievements", by clicking on the link "Download certificate".

A button will also make possible to download the certificate from the home page of the related course.