

CircularX
SYLLABUS

Circular Economy

AN INTRODUCTION



Welcome!

We're honoured and excited to have you join us for Circular Economy: *an introduction*.

Whether you're here to gain insights into what a Circular Economy is all about, identify skills to make the transition to a Circular Economy happen, or connect with a global community of learners, we hope you find what you're looking for in this Circular Economy MOOC.

In this course you explore how businesses can create value by cycling products and materials, how designers come up with amazingly clever solutions, and how you can contribute to make the Circular Economy happen.

You will learn to re-think the economic system you experience every day; act upon it and become a leader in this major paradigm shift! You will shape a more circular future, together with our global network.

The course is led by TU Delft and co-created with the Ellen MacArthur Foundation and the Leiden-Delft-Erasmus Centre for Sustainability.



Universiteit Leiden



ERASMUS UNIVERSITY ROTTERDAM



ELLEN MACARTHUR FOUNDATION

COURSE OUTLINE

Circular Economy: *an introduction* is organised around a series of themes, based on the 'butterfly diagram' developed by the Ellen MacArthur Foundation. In each episode you learn about one of the circular loops in the diagram.

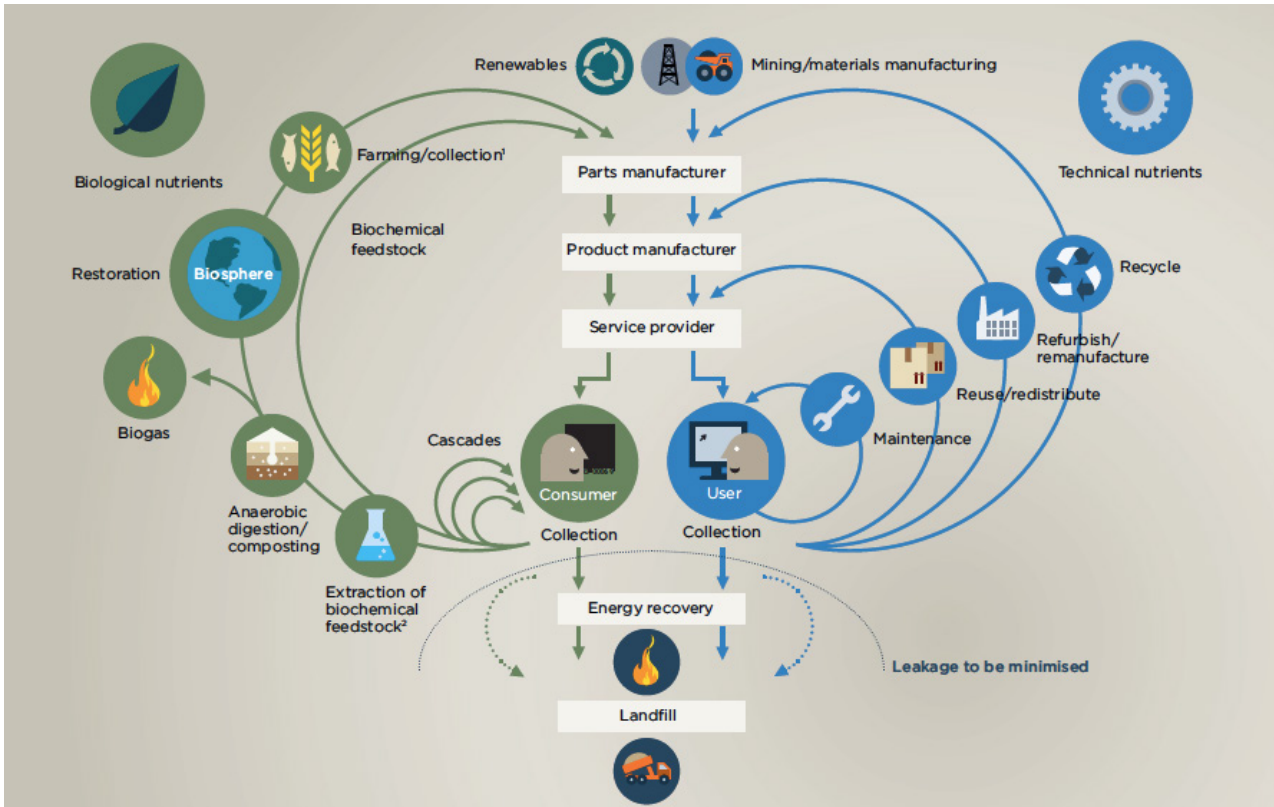


Figure 1: The 'butterfly diagram' of the circular economy. Courtesy Ellen MacArthur Foundation.

EPISODE 1: What is the Circular Economy?

What is wrong with our current Linear Economy? What benefits can a Circular Economy bring? You explore the roots of the Circular Economy together with experts in the fields of industrial ecology, cradle to cradle and biomimicry.

EPISODE 2: Business Value in a Circular Economy

Through closed loop supply chains and reverse logistics, new opportunities for business are created. This episode explores value creation and new business models in a Circular Economy.

EPISODE 3: Longer Lasting Products

The smaller the loop, the greater the profitability of the system. Learn how to look at product life extension through the eyes of designers and entrepreneurs. Join us in our repair café.

EPISODE 4: Remanufacturing

Remanufacturing enables companies to recapture value at a product or component level. It is currently being rediscovered as a promising business opportunity. You explore the topic together with researchers and entrepreneurs.

EPISODE 5: Waste Equals Food

This episode discusses how we can take inspiration from nature, when redesigning the way we deal with waste. We present a fascinating circular case study. Can you identify opportunities for change in your own area?

EPISODE 6: Thinking in Systems

The shift from linear to circular should not be underestimated. In this episode we discuss the extent and duration of the transition and we look at how sustainable the Circular Economy really is.

EPISODE 7: Full Circle

The course ends with a webinar. Your instructors will be available in a live session to answer your questions and discuss some of the thorniest issues. This is also the week when you take your final exam.



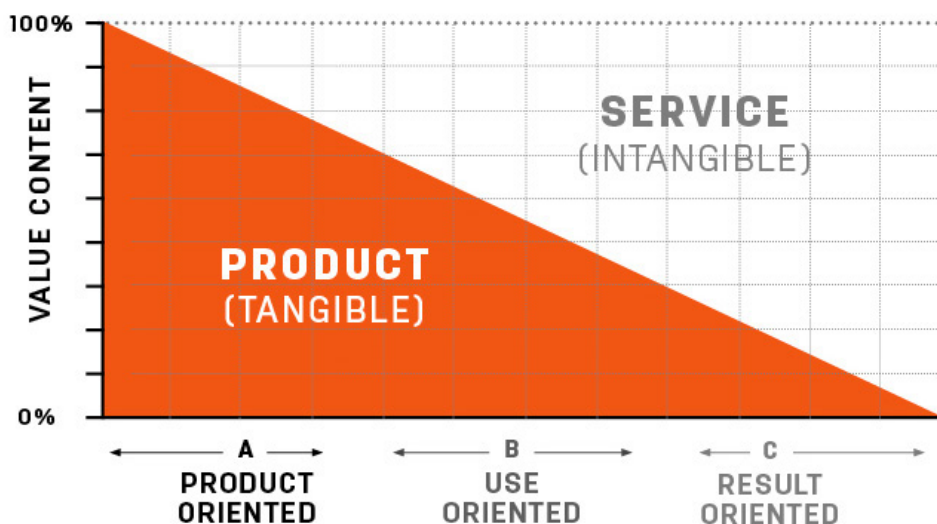
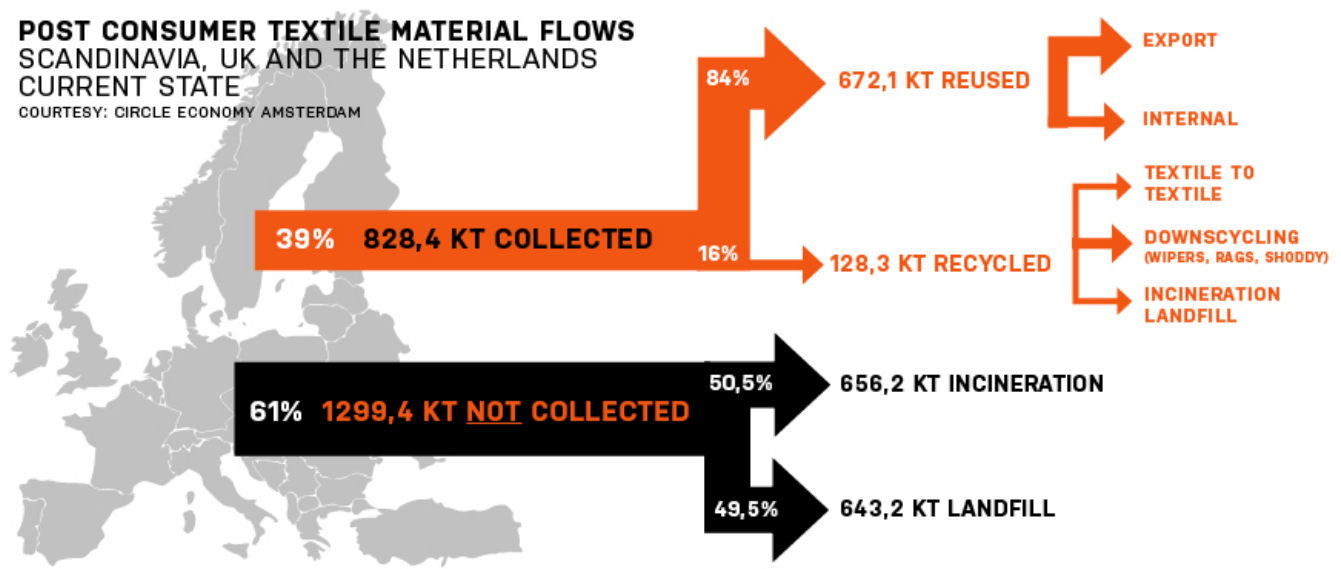
WHAT YOU'LL LEARN

In this course, you:

- Develop a general overview of the principles and ideas behind a Circular Economy.
- Explore business models that are conducive to a Circular Economy, and analyse the barriers and opportunities for transitioning to these circular business models.
- Investigate what it takes to create products that are easy to repair, remanufacture or recycle.
- Discover how natural systems can provide inspiring solutions to human problems.
- Develop a more solid understanding of the systemic effects of the transition to a Circular Economy.

Get the most out of this course!

One key lesson we've learned from previous learners: you get more out of the Circular Economy course if you work together on it with other people. Sign up with a friend, form a 'CircularX Team' or get your colleagues to take the course with you.



COURSE STRUCTURE AND MATERIALS

Each episode has a similar structure and grading policy (see figure 2). The non-graded contributions, such as your contributions to the discussion forum, are optional. Participation does, however, give you a great learning experience, as it allows you to share your ideas with the other course participants.

MAIN CONTENT	A section with video lectures and discussion topics ("Share Your Thoughts"). Any tests or activities provided in the Main Content are optional and non-graded. They do not contribute to the certificate.
ASSESSMENTS	Contains assignments, quizzes and a final exam . These assessments are graded and contribute to the certificate.
IN-DEPTH CONTENT	An optional "deep-dive" section where we take time to discuss more difficult or controversial topics. These activities are non-graded and do not contribute to the certificate.

Figure 2. Structure, course materials and grading policy per episode

Moreover, a list of 'further readings' has been added to the course info tab on the edX platform. This list has been compiled for those of you who would like to read beyond what is required for this course and its assignments.

GRADING AND CERTIFICATION

	Assignment	Quiz	'Narrative' assignment	Final exam	Total
Episode 1	5 points	5 points			10
Episode 2	5 points	5 points			10
Episode 3	15 points	5 points			20
Episode 4	5 points	5 points			10
Episode 5	5 points	5 points			10
Episode 6		5 points	10 points		15
Episode 7				25 points	25
Total	35 points	30 points	10 points	25 points	100 pts

Figure 3 Types of graded assessments and points

In total you can obtain 100 points. To pass you need an overall score of at least 60% of the total number of points that can be earned (60/100).

For the assignments we make use of self-assessment. Self assessment involves you assigning the grade you think your assignment deserves, based on the grading criteria and benchmark answers provided.

Your final grade in the course depends on whether you have uploaded and assessed assignments and how well you performed on the quizzes and final exam.

Certification

If you pass the course with a score of at least 60%, you are eligible for a certificate. A certificate allows you to verify your achievement and can be used to highlight skills on your resume. Check out <https://www.edx.org/verified-certificate> for more information about certification options.

DISCUSSION FORUM GUIDELINES

The discussion forum is an important tool on the edX platform for you to share and discuss your insights, assignments and reflections.

An important part of the learning happens on the discussion forum. The forum is all about sharing your ideas with peers and inviting them to give feedback. We stimulate a positive, constructive atmosphere. Please attend to the guidelines provided below to make this course a pleasant experience for everyone!

- Be respectful. Please, show respect to your fellow participants. We encourage debate and discussion but only when this is done in a polite and respectful manner. We do not tolerate rude behaviour, and condescending or abusive words. Instances will be reported and removed.
- Be constructive in your feedback. Learning in an online community is about interacting with each other. When commenting or providing feedback on work of others, be constructive and whenever possible provide suggestions for improvement.
- Be sensitive to your peers' background and culture. This is a global forum with participants from around the world. This means that your fellow participants may come from very diverse cultures and backgrounds. Please be sensitive to this when discussing your own work or results of others.
- Post appropriate content. Content that violates the Terms of Service is not permitted. You may not post inappropriate (eg. pornographic) or copyrighted content, advertise or promote outside products or organizations, or spam the forums with repeat content.

THE INSTRUCTORS

David Peck works for Delft University of Technology. He is a senior research fellow, manager and project director. He is a manager in the Leiden – Delft -Erasmus Centre for Sustainability. David is an Adjunct Professor at MIP, Politecnico di Milano, Graduate School of Business, where he runs the Circular Economy programme.

Dr. Conny Bakker is Associate Professor of Circular Product Design at the TU Delft, Faculty of Industrial Design Engineering. She specialises in design methodology; she explores strategies such as design for product life-extension, design for remanufacturing, and design for recycling, and the business models that enable these strategies. Conny coordinates and teaches dedicated courses in Sustainable Design and Circular Product Design.

Ken Webster Ken Webster is Head of Innovation at the Ellen MacArthur Foundation in the UK. He is the author of *The Circular Economy A Wealth of Flows* (EMF May 2015) and *Sense and Sustainability* (Terra Preta 2009). His background is in economics and business education and education for sustainability. He is Honorary Teaching Fellow at the University of Bradford's School of Management and a major contributor to their MBA Enterprise, Innovation and the Circular Economy. He joined the Foundation in 2010.

Dr. Erwin van der Laan is Associate Professor of Logistics and Operations Management at the Rotterdam School of Management, Erasmus University. His research focuses on value creation through closed loop supply chain management, in particular by designing and optimising operations management processes. Erwin is Scientific Director of the closed loop supply chain centre at RSM and teaches dedicated courses on closed loop supply chain management.

Dr. Ester van der Voet is Associate Professor at the Department of Industrial Ecology at the Institute of Environmental Sciences, Leiden University. She specialises in life-cycle assessment, material flow analysis, substance flow analysis, natural resource accounting, and indicator development. Her research areas include the bio-based economy and metals in the Circular Economy. She has extensive teaching experience, both online and on campus. She is a member of UNEP's International Resource Panel.

Emma Fromberg is a master student Strategic Product Design at Delft University of Technology and is currently working on her honours programme about remanufacturing and product design.

We are grateful for the contributions from (in order of appearance):

- Colin Webster (Education Programme Manager, Ellen MacArthur Foundation, UK)
- Dr. Marian Chertow (Associate Professor of Industrial Environmental Management and Director of the Industrial Environmental Management program at the Yale School of Forestry and Environmental Studies, USA)
- Nestor Coronado Palma (Circular Economy Program Director, Philips Healthcare)
- Prof. dr. Arnold Tukker (Professor of Industrial Ecology and Director of the Institute of Environmental Sciences at Leiden University, the Netherlands)
- James Ball (Green Housing Consultant at MaGrann Associates; Masters in Environmental Management Candidate at Yale University, USA)
- Miquel Ballester (Innovation Lead, Fairphone, Amsterdam)
- Olivier Hebert (Chief Technology Officer, Fairphone, Amsterdam)
- Marcel den Hollander (Industrial Designer and PhD researcher, TU Delft, the Netherlands)
- Ian Buxcey (Remanufacturing Manager Europe, Meritor)
- Dr. Nabil Nasr (Associate Provost and Director of the Golisano Institute for Sustainability, Rochester Institute of Technology, USA)
- Dr. Nancy Bocken (Associate Professor Sustainable Business Models and Circular Product Design, TU Delft, the Netherlands)
- Thijs Jasink (COO, ACtronics)
- Prof. Dr. Ing. Rolf Steinhilper (Professor of Manufacturing and Remanufacturing Technology, University of Bayreuth, Germany)
- Arjen Wittekoek (Director Coolrec)
- Gwen Cunningham (Project Developer, Circular Textiles Program, Circle Economy, Amsterdam)
- Michael Pawlyn (Architect, Exploration Architecture, UK)
- Interface: Geanne van Arkel (Head of Sustainable Development, Interface)

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