A global snapshot of circular economy learning offerings in higher education
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Preface

The aim of this research has been to map and illuminate the current global landscape of circular economy learning offerings in higher education. To our knowledge, this is the first mapping exercise of its kind, which aims to provide learners and practitioners with a point-in-time snapshot of what is being taught where and how.

Our interactive map illustrates where these offerings can be found. We highlight key emergent themes, geographical hotspots, and tell some stories of curriculum and resource development from the field.

A note on the Ellen MacArthur Foundation

The Ellen MacArthur Foundation was formed in 2010 with the mission to accelerate the transition to a circular economy. We work in the fields of Learning, Business & Government, Insight & Analysis, Systemic Initiatives and Communications.

We have always supported work in higher education, partnering with institutions worldwide to develop, share, and scale circular economy learning, and enable research collaborations to inform the effective application of the circular economy framework across sectors.

Through academic partnerships, we have co-developed the world’s first circular economy learning offerings of their kind: University of Bradford’s MBA in Innovation, Enterprise and Circular Economy and TU Delft’s MOOC (Massive Open Online Course – Circular Economy: An Introduction) being two cases in point.

What did we research?

Our research focuses on bachelor’s and master’s degree level programmes, courses, and modules with credits exceeding 1.5 ECTS. MOOCs (Massive Open Online Courses) are also included. Only learning offerings that are visible online and feature circular economy in the course title or course description are included. The research encompasses learning offerings available between 2017-2019.

The languages selected are English, Finnish, and Dutch, as these proved to have the highest activity of circular economy learning offerings. Chinese has also been added as an exploratory case.

We recognise that this research boundary of learning offerings with circular economy in the course title or course description is a rather blunt instrument of measurement and does not take into account those learning offerings which speak about circular economy with more subtlety. It also does not touch on the myriad of other subject areas which contribute to the umbrella concept of a circular economy: biomimicry, industrial ecology, and cradle to cradle to name a few.
138 higher education institutions with circular economy learning offerings
- in English, Dutch, Finnish, and Chinese

Click on the highlighted countries on the map to learn more about their learning offerings. Please reach out to info@ellenmacarthurfoundation.org if you know of any learning offerings that fit the research criteria.
What are the key themes emerging from course descriptions?

Of the 138 higher education institutions, the analysis on the following three slides focuses on 51 learning offerings which explicitly mention circular economy in the title.

**Key themes in course descriptions globally**

- **Environmental aspects** • Most of the 39 mentions are general, and the examples given are largely confined to resource scarcity, whereas other examples of environmental impact are mostly left out, e.g. climate change, water and biodiversity, the derived impact on the social sphere and human health, and also the role of renewables.

- **Social aspects** • Of the 32 mentions of social aspects, seven are directed at behavioural change. The impact on equality and social cohesion is another angle that stands out. 11 of the course descriptions display an evaluative, questioning stance, whereas eight focus only on the positive impact the circular economy can have on social systems.

- **Policy levers** • While 28 course descriptions bring up policy, few go into any level of detail. Only seven highlight market-based instruments, while another lever – public procurement – is absent.

- **Digital technology** • Only 14 course descriptions bring up any connection to the role of digital technology, e.g. IoT, big data, 3D printing, automation, Industry 4.0, or blockchain.

- **Design** • Design features in 35 course descriptions, oftentimes in general terms. There were a few mentions of ecodesign, modular design, and six mentions of biomimicry. Moreover, LCA (life-cycle assessment) was often discussed in relation to design.

- **Servitisation** • Only 22 descriptions discuss product-service systems (PSS) and shifting from goods to services.

- **Circular business models** • 28 course descriptions address the role of circular business models – a few even seem to simply equate circular economy with circular business models.

- **Systems thinking** • Although it appears in 22 of the descriptions, there is a large degree of uncertainty around how systems thinking is understood. Some imply that systems thinking mainly consists of collaboration or LCA, both of which are highlighted in close to half the course descriptions.

Based on 51 global learning offerings with circular economy in the title.

**Academic level of the learning offerings**

Most of the learning offerings are found in the space of traditional sustainability-focused studies, engineering, and business. Design and innovation also deserve mention.
How did we create this?

We looked at 37 learning offerings of varying lengths with circular economy in the title, weighted them equally, and then selected the 30 most frequently used words overall. Compound words and word forms were not accounted for. The connections are illustrated in the social network diagram. The nodes closest to the centre represent the most frequently featured words, and the thicker lines denote stronger connections between the nodes.

- The focus on business and design is striking, as is the focus on question formulations around waste, resources, and materials.
- Besides the 30 words listed in the bar chart other words were found farther down, e.g. innovation (35), policy (39), services (73), and renewable (83).
What’s happening in Finland?

Realising that the circular economy requires cross-sectoral collaboration, new expertise, and ways of thinking, Sitra – the Finnish Innovation Fund – has played a pivotal role in advancing learning for a circular economy in Finland, across all levels of education. By funding, co-developing, and aligning learning offerings at 25 Finnish higher education institutions, Sitra, together with practitioners across the country, has enabled Finland to lead the world with higher education institutions that offer circular economy learnings. A total of 1,800 teachers and 73,500 students have been reached in efforts to date. The salient role of the Ministry of Education and Culture also deserves mention, as do a wide range of regional and local actors, in particular the joint efforts undertaken by the Finnish higher education institutions themselves.

Momentum in the Netherlands

The Netherlands is a global leader when it comes to the promotion of a circular economy, and our findings show that this also translates through to education. TU Delft is currently the higher education institution with the highest number of learning offerings related to circular economy in the world. Our findings indicate that the Dutch learning offerings have a strong focus on systems thinking and design. 25% of all learning offerings in this study are found at universities of applied sciences. These institutions are particularly common in Finland and the Netherlands, where they are respectively known as ammattikorkeakoulut (amk) and hogescholen. Their practice-oriented approach may hint at a broader trend of an applied learning vision for a circular economy.

A snapshot from China

The philosophy of a circular economy has been present in China for a long time. The country confirmed its position as a forerunner around circular economy legislation in 2006 when it included circular economy in the 11th Five-Year Plan for all levels of government, although not explicitly in the higher education section. The 20 learning offerings identified in this study only constitute a fraction of the educational activities in China, but they suggest that the focus in higher education is currently weighted in favour of technical perspectives in industry, whereas business models and system shifts are addressed to a much lower extent.

There is an emerging presence of circular economy centres at higher education institutions, which is visible also in China. The Institute of Circular Economy at Tongji University as an example, has a strong focus on systems thinking and on multi-disciplinary approaches.

Three geographical hotspots

Key themes in Finnish course descriptions

- Design
- Digital technology
- Policy levers
- Servitisation
- Systems thinking
- Environmental aspects
- Circular business models
- Social aspects

Based on 12 Finnish learning offerings with circular economy in the title.

Key themes in Dutch course descriptions

- Design
- Digital technology
- Policy levers
- Servitisation
- Systems thinking
- Environmental aspects
- Circular business models
- Social aspects

Based on 15 Dutch learning offerings with circular economy in the title.
Stories from the field: Developing curricula, resources and approaches

Developing a circular economy curriculum: Columbia University, USA

Stephanie Kersten-Johnston is the Director of Sustainable Business at Heineken USA, and Adjunct Professor at Columbia University. When she moved to the US three years ago, Kersten-Johnston was struck by the limited circular economy educational content available, and she embarked on a journey to develop a course on circular economy, targeted at sustainability professionals, as part of Columbia’s Master’s programme in Sustainability Management. By approaching the circular economy from several different entry points (e.g. through the lens of policy, business models, design and policy), the course is intended to introduce the students to the circular economy in a comprehensive way and inspire them to investigate the opportunities further.

Full syllabus details can be found here.

“I really appreciated the holistic approach of an embedded economy which factors in society – contrary to other approaches which only focus on material flows. The class was unusual in that it both had a practical and local relation (through up-to-date case studies and guest speakers), high-quality theory in processable bites, complemented with interactive group work.”
Josefine Koehler, Candidate M.Sc. JEMES - Cities & Sustainability – Student, 2017

“When an approach gathers momentum in the way that circular economy has, it can take time to catch on, and when it does it can easily become misconstrued or diluted. It requires a real shift in mindsets, and it is not enough to use incrementally less resources year by year; the system we have built has flaws that go much deeper than that.”
Stephanie Kersten-Johnston, Adjunct professor - Columbia University

Exploring complexity and the circular economy through a board game: International Institute for Industrial Environmental Economics, Lund University, Sweden

In order to understand the need for a circular economy, it is first key to grasp the nature of complex adaptive systems. While theory provides a common language to understand these systems, seeing complex chains of events play out in front of students’ own eyes, triggered by their own actions, can be useful for gaining a deeper understanding of what a complex adaptive system actually is. Katherine Whalen has developed a board game that shows it is neither predetermined or random.

For more information, please consider the full-length article.

“In a safe space, the students can explore complex adaptive systems, from the perspective of material production and consumption. You can opt for different business strategies, e.g. leasing or urban mining, each which might be preferable in a given scenario. However, gradually increasing resource scarcity, as well as certain unpredictable world events (e.g. an export disruption or new regulation) might offset the advantage. In other words, students learn to see production from various perspectives, such as social, cultural, trade, policy or ethical.”
Katherine Whalen, PhD Candidate – IIIEE, Lund University
Corporate Challenge: Exeter University, UK

The Corporate Challenge, as part of the Exeter MBA, was a five-day group exercise to tackle a real-life problem faced by a global multinational organisation – more specifically, a case-study with a circular economy context. The MBA cohort partnered with IKEA to help them shape a circular business model that challenged how the firm produces and interacts with it:
1. Looks at the products it makes and wastes
2. Interacts with customers and suppliers
3. Prioritises a more circular supply chain.

The challenge was assessed across the core MBA business subjects of Accounting and Finance, Economics, Marketing, Strategy, and Operations.

“The corporate challenge created a space in which we were able to immerse ourselves into the context of a real-world business, and be confronted with the various (and sometimes conflicting) needs of stakeholders – all the while trying to create a product or service grounded in circular economy principles. This unique learning experience established our recognition for the dire need for practitioners to think beyond the scope of the classical business system.”

Evelyn Hussain, Exeter MBA (2017-18)

A textbook approach: Fontys University of Applied Sciences, Netherlands

Considering the inherent complexity and evolving nature of the circular umbrella concept, capturing it in a textbook would seem to many like a daunting task. Yet, the authors of 4’33” – Time for a Circular Economy have done just that. Written to promote knowledge creation and a new critical way of thinking and viewing the world, the textbook also attempts to provide a common frame of reference for what a circular economy can be. The authors have chosen to focus on a number of aspects that are underexposed in the existing literature on the circular economy; namely circular economy as a social innovation, as a developmental perspective, the role of digital technology and the information revolution, the role of biomimicry, and the impact of circular economy on education.

“The shift to a circular economy is a systemic shift that affects all of society and our mental orientation... We first need to understand it as a whole in order to then take small steps.”

P.235, 4’33” – Time for a Circular Economy
The concept of circular economy is gaining traction across business, government, and academia. With regards to its uptake in higher education, this research illuminates a nascent momentum in the creation of circular economy learning offerings, resources and approaches, with certain geographies as front runners in this space.

Further research is needed to capture learning offerings available in other languages, that are not visible online, and are not explicitly labelled circular economy, but nonetheless focus on relevant building blocks and perspectives.

Our work in higher education to date shows circular economy to be an evolving and at times contested idea, which appeals to students, and which has benefitted from coming together of various schools of thought. However, attention to-date has focused on the circular aspect; it is more seldom discussed or taught in the context of an economy. To grasp the essence of the circular economy implies using a framework for thinking in line with the science of complex systems, seeing real world systems as much more than mechanisms. A greater common understanding and wider inclusion of this thinking would serve as an important step not just to help further understanding of the circular economy, but also in accelerating the transition to it.

Education plays a pivotal role in challenging the way in which we see and think about our current linear economy, and it should help inspire and provide tools for both imagining and creating a narrative for a future that is positive – not just less negative. The questions around how to teach about a circular economy are as important as what to teach. We hope these findings will inspire and prove useful when designing curricula that can help build this future.

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The higher education institutions have learning offerings with circular economy explicitly in the title.

- **Aalto University**: CHEM-E6215: Circular Economy Design Forum; Kemian-, bio- ja materiaaliteknikka, tekniikan kandidaatti ja diplomi-insinööri; WAT-E2170: Circular Economy in Environmental Engineering L
- **Centria University of Applied Sciences**: Bio- ja kiertotalouden muuntokoulutus; Bio- ja kiertotalouden tuotantoprosessien osaaminen
- **Haaga-Helia University of Applied Sciences**: ECO8HH101: New Business Models in the Circular Economy
- **Häme University of Applied Sciences (HAMK)**: Biomassavirrat ja tuotantoprosessit; IB00BR92: Innovative Service Management; Tieto- ja viestintätieteellisiä, biotalous; Ympäristösuunnittelija (AMK), kestävä kehitys
- **Kajaani University of Applied Sciences (KAMK)**: Bio- ja kiertotalouden muuntokoulutus
- **Karelia University of Applied Sciences**: BIA2018: Ruokaketjuun ravinnekierrot; Bio- ja kiertotalouden muuntokoulutus
- **Lahti University of Applied Sciences (LAMK)**: Energia- ja ympäristötieteellisiä, fysioterapeutti; Kestävä kaupunkiympäristö, insinööri; Konetekniikka; Mediamotion, visuaalinen viestintä; Muotoilija, teollinen ja brändimuotoilu; Puutekniikka; Sairaanhoitaja; Sosionomi; Tradenomi, liiketalous; Uudistava johtaminen
- **Lapland University of Applied Sciences (Lapin AMK)**: Bio- ja kiertotalouden muuntokoulutus; S01RL120: Rakennustekniikan kiertotalous; RSO1RL121: Rakentamisen kiertotalous -projekti
- **Lappeenranta University of Technology**: BJO2A1500: Current Issues in Enabling Technologies for Circular Economy; Master’s Programme in Biorefineries; Master’s Programme in Circular Economy
- **Laurea University of Applied Sciences**: R0424: Service Design for Circular Economy
- **Metropolia UAS**: Bio- ja kemiantekniikka - kestävän kehityksen edelläkävijä; Energia- ja ympäristötieteellisiä, TX00DHS2: Towards a Sustainable Consumer Society (Part of the 3 UAS Learning offering)
- **Novia University of Applied Sciences**: BE16GE: Grön ekonomi; Kiertotalous (University of Helsinki’s MOOC); Specialiseringsutbildning inom bioekonomi (Trilingual: Swedish-Finnish-English)
- **Oulu University**: Prosessitekniikka, Prosessi- ja ympäristötieteellinen tutkinto-ohjelma
- **Satakunta University of Applied Sciences (SAMK)**: YTY170005 Circular Economy Solutions
- **Savonia University of Applied Sciences**: Bio- ja kiertotalouden muuntokoulutus; Energiatekniikka; 4WUS8080/WU18SM: Energiatekniikan tutkinto-ohjelma; Ruokatuotteen tuotekehitys kiertotaloussessa; 4WUS8080: Kiertotalous
- **Seinäjoki University of Applied Sciences (SeAMK)**: Kiertotalouden liiketoimintamahdollisuudet ruokaketjussa; LT00B830: Circular economy: new business opportunities; XX00BU62: Digitalization in circular food economy; XX00BU64: Food product development in circular economy; XX00BU65: Modern consumer behavior in circular economy; XX00BU66: Energy Self-sufficiency in Food Chain
- **South-Eastern Finland University of Applied Sciences (Xamk – Kaakkolais-Uomen AMK)**: Asiakas digitaloudessa; biotuetekniikka; ympäristötieteen; Kiertotalous
- **Tampere University of Applied Sciences**: KATVA15S: Foundations of Ecological Economics
- **Tampere University of Applied Sciences (TAMK)**: MSc in Risk Management and Circular Economy; 5F00DI136: Roadmap for Risk Management and Circular Economy; 5F00DI137: Megatrends in Circular Economy; 5F00DI86: Recent Developments in Circular Economy; 5F00DI88: Leadership for Sustainable Change; 5F00DI48: Synergy using the Piñata Method
- **Turku University of Applied Sciences**: Circular economy minor subject; business and new technologies; RAK-2380: Kiertotalous infrarakentamisessa; RAK-33800: Kiertotalous talonrakentamisessa; TRT-25016: Contemporary Circular Economy Challenges and Solutions; TTA-65077: Turning Circular Economy Technologies into Business; Ympäristö- ja energiatekniikka
- **University of Helsinki**: AGFO601: Green, circular, bioeconomy: limits and synergies of three sustainability avenues; Kemian perusopintotutkinto- ja filosofian maisteri; Kemian kandiohjelma; luonnontieteiden kandidaatti ja maisteri; XX00BU63: Sustainable Change and Solutions; YTY170005 Circular Economy Solutions
- **University of Lapland**: Hallintotieteiden ja johtamisen tutkinto-ohjelma; Johtaminen (maisteri); Politiikatieteiden ja sosioligan tutkinto-ohjelma (kandidaatti ja maisteri)
- **University of Vaasa**: Moderni kuluttajakäytäntöytimeen
- **Vaasa University of Applied Sciences (VAMK)**: IEYX1004: Sustainable Development and Circular Economy
- **Åbo Akademi University**: 416511.0: Biorefinery - Application of Chemical Engineering Principles

**Finland 26 (18)**

**Take me back to the map!**
The real higher education institutions have learning offerings with circular economy explicitly in the title.

- **Aeres University of Applied Sciences**: Circulaire economie en nieuwe business modellen
- **Amsterdam University of Applied Sciences**: Entrepreneurship
- **Avans University of Applied Sciences**: BI-MINOR-SP-DHM: Duurzaam hergebruik van materialen; BI-MINOR-SP-VBI: Verduurzaming bestaande infrastructuur en bebouwing versie 2.0; Biobased Technology and Business Development
- **Delft University of Technology**: AESB3112: Geo-resources 2.0: towards the future; AE4AS2M19: Implementing Innovation; AR0074: Geo-design for a Circular Economy in Urban Regions; AR3AE015: Architectural Engineering Graduation Studio; AR3CP040: City of Innovations; AR3CS020: Seminar Cross Domain Stad van de Toekomst; CIE5122: Capita Selecta Steel and Aluminium Structures; Circular Economy: An Introduction; CME2200: Dynamic Control of Projects; ID4185: Strategic & Sustainable Design; IO3075: Towards Circular Product Design; LB2801 Bio-based Materials in a Circular Economy; MSc Metropolitan Analysis, Design and Engineering (MADE); MS43315: Recycling Engineering Materials; PDECE01x: Engineering Design for a Circular Economy; Waste Management and Critical Raw Materials; Sustainable Packaging in a Circular Economy
- **Eindhoven University of Technology**: 7XSUC0: Green Business Models
- **Erasmus University (Rotterdam)**: BMEM050: Circular Economy; BM01GBS: Sustainability Leadership and Planetary Boundaries; MINUC-003: Think Green: Ecological and Economic Perspectives for a Sustainable Environment; 60093: Supply chain management; 60456: Global Business and Sustainability; 60458: Management of Innovation
- **Fontys University of Applied Sciences**: 2247CIRECO: Minor Circulaire Economie; Circular Economy MOOC
- **HAN University of Applied Sciences**: M_BHR-DMVO: Duurzaam en maatschappelijk verantwoord ondernemen; M_B-M-LEHT: Low Ec High Tec; M_ECO-MCE: Circulaire economie, meervoudige waardecreatie; M_1ZD03: Leiderschap in duurzame zorg
- **HAS University of Applied Sciences**: MN3404: Biobased economy in the agrifood sector; MN4411: Future Food Systems
- **HU University of Applied Sciences Utrecht**: TIGO-MAM-16: Asset Management in de gebouwde omgeving; TIGO-MSSC-16: Smart Sustainable Cities
- **HZ University of Applied Sciences**: Circular Economy; Marine Bio-based Products - Research & Innovation; Supply Chain Innovation - Research & Innovation
- **Leiden University**: A Circular Economy of Metals: Towards a Sustainable Societal Metabolism (MOOC); MINLDE-02: LDE-Minor: Geo-resources for the Future; Urban Studies; 4413CLOSCY: Closed loop supply chains; 4609HCDECY: Duurzaamheid in een circulaire economie; 5241VMC: The Material City; 7600HCCI: Circular Economy: from Challenge to Opportunity
- **Maastricht University**: BBM013: Sustainability of Biobased Materials
- **NHL Stenden University of Applied Sciences**: MIGRO: Green Logistics 1 & 2; TE.NHL.VL.PP18.SS: Minor Sustainable Society
- **Radboud University**: MAN-MOC006: Social, Sustainable and Technological Innovation; Master’s specialisation in Corporate Sustainability; New Business Models – Working Together on Value Creation (MOOC); WEconomy – Exploring transitional trends in business and society; NWI-FMT020: Bio-economy
- **Rotterdam University of Applied Sciences**: MINIGOSBT18: Sustainable Building Technology; MINRBSCEC17: Circular Economy and Business Innovation; MINRBSCEC18: Fieldlab Circular Economy and Business Innovation; MINWDDKNEE01: New Earth
- **Saxion University of Applied Sciences**: Asset Management in de Gebouwde Omgeving/ Updating Built Environments; BDON: Business Models and Financial Technology; INBP: Industrieel en Duurzaam Bouwen
- **The Hague University**: Sustainable Business Minor
- **The Hague University of Applied Sciences**: B-HMVTT16-SAM: Strategisch Asset Management in de Gebouwde Omgeving; W-HMVTT17-SUE: Sustainable Urban Engineering
- **Tilburg University**: 325089: Sustainable Entrepreneurship
- **University of Amsterdam**: The Circular City: Towards a Sustainable Urban Ecosystem; 7S24B1291Y: Governing transitions for global sustainable development
- **University of Groningen**: Recht, ICT en de circulaire economie
- **Utrecht University**: Bio Inspired Innovation (MSc); GEO4-2521: ENSM-Bio-Based Economy; GEO4-2602: Environmental Assessment and Management Approaches; E19: Law and sustainability
- **Van Hall Larenstein University of Applied Sciences**: VTL4FFVN: Feeding Future Cities
- **Wageningen University & Research**: Circular Economy (MOOC); ETE-34306 Energy, Water and Nutrient Cycles in the Built Environment; MST-26806 Circular Economy; M-BHR-DMVO: Duurzaam en maatschappelijk verantwoord ondernemen; M_B-M-LEHT: Low Ec High Tec; M_ECO-MCE: Circulaire economie, meervoudige waardecreatie; M_1ZD03: Leiderschap in duurzame zorg
- **W Indies University of Applied Sciences**: MI.BTC1.m1V18: Circular Housing; MI.EDOM: Operational Management in Industry
- **Zuyd University of Applied Sciences**: H-FM-ZM021-17: Circulaire economie
The teal higher education institutions have learning offerings with circular economy explicitly in the title.

- Bath Spa University: MSc in Environmental Management
- Brunel University London: MSc Sustainability, Entrepreneurship and Design
- Cambridge University: EP08: Comparative Environmental Politics and Policy
- Cranfield University: Technology Innovation and Management for a Circular Economy MSc (including: Innovate Evaluate and Manage the Circular Economy & Understand and Analyse the Circular Economy)
- Imperial College London: CI4-463: Waste Management Engineering
- University College London (UCL) (Bartlett School of Environment, Energy & Resources): Sustainable Resources: Economics, Policy and Transitions MSc
- University of Chichester: BML 210: Sustainable Enterprise and the Circular Economy
- University of Dundee: MSc Design for Business
- University of Edinburgh: BA Product Design
- University of Exeter: ECMM160: Engineering Materials and the Environment; Tackling Global Challenges and Developing Resilience
- University of Greenwich: BUSI552: Sustainability in Business
- University of Leeds: CIVE5985M Circular Economy and Resource Recovery from Waste; Environmental Challenges: Scarcity and Conflict in the Natural Environment (MOOC)
- University of Manchester: MACE30262: Sustainable Waste Management; MCEL30022: Interdisciplinary Sustainable Development
- University of Reading: CEM322-Sustainable Urban Systems; MM320: Sustainable Organisations
- University of Southampton: ENVS3014: Sustainable Resource Management
- University of Strathclyde: CL988: Leading issues in Circular Economy (Title changed to CL994 Circular Economy & Transformations Towards Sustainability in 2018); MSc Environmental Entrepreneurship; Supply Chain & Sustainability Management MSc/PgDip
- University of Surrey: ENG058: Life Cycle Thinking and the Circular Economy
- University of Sussex: N1602: Enterprise in the Circular Economy
- University of Swansea: EG-M110: Circular Economy and Sustainable Engineering; EGTM79 Environmental Analysis and Legislation
The teal higher education institutions have learning offerings with circular economy explicitly in the title.

- **Beijing Normal University**: Circular Economy and Sustainable Development Enterprise (MOOC)
- **Beijing University of Technology**: Resource Environment and Circular Economy; Theory and Practice of Circular Economy (MOOC)
- **Dongguan University of Technology**: 循环经济与可持续发展 (Circular Economy and Sustainable Development)
- **Donghua University**: 环境科学专业 (Environmental Science Programme)
- **Huaziao University**: 环境与供应链创新管理 (Innovation management of logistics and supply chain)
- **Huazhong Agricultural University**: 生态与可持续发展 (Ecology and Sustainable Development (MOOC))
- **Huazhong University of Science and Technology**: 城市发展与城市管理专题 (Issues in Urban Development and Urban Management)
- **Nanjing Agricultural University**: 环境经济学与环境管理 (Environmental Economics and Management)
- **Peking University**: 清洁生产过程原理 (Principles of Clean Production Processes); 资源循环原理与技术 (Principles and Processes of Resource Recovery and Recycling)
- **Renmin University of China**: 产业生态学 (Industrial Ecology); 城市与区域循环经济可持续发展战略 (Urban and Regional Circular Economy and Sustainable Development Strategy)
- **Shandong University**: 清洁生产 (Cleaner Production)

- **Shanghai Jiaotong University**: 环境与可持续发展 (Environment and Sustainable Development); 能源经济学 (Energy Economics); 节能原理与技术 (Energy conservation and technology)
- **Tsinghua University**: 环境发展 (Environment and Development)
- **UNEP-Tongji Institute of Environment for Sustainable Development**: 环境管理与可持续发展国际硕士学位 (International Master of Environmental Management and Sustainable Development)
- **X’An University of Architecture and Technology**: 冶金环保及资源综合利用 (Environmental Protection Synthetic and Exploitation of Metallurgy Resources)
- **Zhejiang Gongshang University**: 资源与环境经济学 (Environmental and Resources Economics)

- **Bard College**: Focus on Circular Value Chain Management (Principles of Sustainable Management, Operations and Supply Chains, Circular Value Chain Management)
- **Columbia University**: SUMA K4130: Sustainable Cities; SUMA K4310: Practicum in Innovative Sustainability Leadership; SUMA K5025: Corporate Sustainability: Reporting and Strategy; SUMA K525 Consumerism & Sustainability; SUMA PS5470: Circular Economy for Sustainability Professionals
- **Harvard University**: ECON E-1625 Economic Strategy and Competitiveness; ENVR E-158B Introduction to the Circular Economy
- **New York University**: PADM-GP.4467: Managing for Environmental Sustainability
- **Ohio State University**: BA 3640.02: Introduction to Sustainability in Business - Principles & Practices
- **Portland State University**: MS in Global Supply Chain Management
- **Rutgers University**: Sustainability: Tackling Food Waste
- **Stanford University**: CEE 144: Design and Innovation for the Circular Economy
- **University of California, Santa Barbara**: ES118 Industrial Ecology; ES193 Circular Economy
- **Western Washington University**: MKTG 384/474: Marketing Strategies for Sustainability
Italy 7 (3)

The teal higher education institutions have learning offerings with circular economy explicitly in the title.

• **Bocconi University**: 20553: Finance for the Green Business and the Circular Economy
• **Free University of Bozen-Bolzano**: 47515: Planning and Simulation of Production and Logistics Systems
• **Rome Business School**: Master in Agribusiness Management
• **Università Cattolica del Sacro Cuore**: Master’s course in Environmental management and communication; Sustainability and Food Law
• **University of Bologna (DICAM)**: Earth Resources Engineering; 81644: laboratory on Renewable Raw Materials and Circular Economy
• **University of Milano-Bicocca (with the University of Bologna, University of Naples Federico II, and University of Turin)**: Master’s program in Bioeconomy in the Circular Economy (Biocirce) (Note: These universities are treated as one as sufficient information about the individual modules could not be obtained)
• **University of Rome Tor Vergata**: Corporate Social Responsibility

France 4 (2)

The teal higher education institutions have learning offerings with circular economy explicitly in the title.

• **ECAM Lyon**: IPL Summer School 2018 Science & Engineering program
• **École des mines d’Albi-Carmaux**: Master Advanced Pharmaceutical Engineering – ADPHARMING; Master Biomass and Waste for Energy and Materials (BiWEM)
• **ESCP Europe Business School IA10-A7**: Circular Economy: moving away from the linear model
• **MINES ParisTech**: MP20: Circular Economy and Eco-design: “Urban mine” case

Belgium 3 (2)

The teal higher education institutions have learning offerings with circular economy explicitly in the title.

• **Ghent University**: Introduction to the Circular Economy: Economics and Management of Natural Resources
• **Université libre de Bruxelles**: URBA-H9009 – Urban Sustainability and circular Economy
• **University of Liège**: GEOL0315-1: Solid Waste and by products processing
The teal higher education institutions have learning offerings with circular economy explicitly in the title.

**Sweden 4 (1)**
- Karlstad University: EMAD18: Bioeconomy, processes and products; KTAD01: Bioindustrial processes
- KTH Royal Institute of Technology: ME2722: Green Economics; Master in Sustainable Technology
- Linnaeus University: IMX509: Industrial Ecology
- Lund University (IIIEE): The Circular Economy: Managing Materials Sustainably; IMEN02: Conceptualisations of Sustainability; Greening the Economy: Lessons from Scandinavia

**Spain 2 (1)**
- Universitat Politècnica de Catalunya: Resources Recovery and Circular Economy
- GBSB Global Business School: FLM127: Sustainable Luxury and Design

**Denmark 2 (1)**
- Aalborg University: Sustainable Cities MSc in Engineering
- Copenhagen Business School (CBS): KAN-CMVV1726U: Circular Economic thinking in competitive businesses

**Poland 1 (1)**
- Tadeusz Kościuszko University of Technology: Circular economy in technology and waste utilization

**Austria 3 (1)**
- Johannes Kepler University Linz: Circular Economy 1: Innovation, Design and Quality Perspectives; Circular Economy 2: Interdisciplinary Project IQD Project “Smart, Circular and Servitzied Products”
- University of Applied Sciences BFI Vienna: MSc Sustainability & Responsible Manager
- Vienna University of Economics and Business: 6092 Elective - Environmental Economics I

**Luxembourg 1 (0)**
- University of Luxembourg: Sustainability in Logistics and Supply Chain Management

**Ireland 1 (0)**
- Trinity Business College: BU4621 Social Innovation and Social Impact

**Switzerland 2 (1)**
- ETH Zürich: 151-3208-00L Systemic Design for Sustainability II
- University of Geneva: 14E235 CR: Economie de l’environnement (Regards économiques et environnement)

**Canada 2 (0)**
- McGill University: MGPO-440: Strategies for Sustainability
- University of Alberta: SMO 686: Selected Topics in Behavioural Sciences: Design Thinking and Innovation

**Germany 2 (0)**
- Technical University of Berlin: RES17: Resource Efficiency Strategies in industrial value chains
- Trier University of Applied Sciences (Birkenfeld): Master of Science in International Material Flow Management (IMAT MSc)

**Multiple countries**
- CESIE (with University of Florence, University of Rostock, Mälardalen University, Tongji University, East China University of Science and Technology, Sichuan University): BBChina – Master Programme on Bio-Based Circular Economy: From Fields to Bioenergy, Biofuel and Bioproducts in China (Note: Treated as one higher education institution as information about the individual modules could not be obtained)
- EIT (Multiple higher education institutions): EMerald – Master in Georesources Engineering; EMC – European Mining Course (Note: Treated as one higher education institution as information about the individual modules could not be obtained)
- Institut Polytechnique de Grenoble (Together with Aalto University, Technische Universität Darmstadt, University of Bordeaux and University of Liege): AMIS, the Master’s Program in Advanced Materials for Innovation and Sustainability (Note: Treated as one higher education institution as information about the individual modules could not be obtained)