

MODULE DESCRIPTOR 2019/20



CL994 Circular Economy and Transformations towards Sustainability

<p>Registrar: : Dr Elsa João, Senior Lecturer, Department of Civil and Environmental Engineering, level 5, James Weir Building, Tel.: 0141 548 4056; email: elsa.joao@strath.ac.uk.</p>	<p>Taught To (Programme): MSc in Sustainability & Environmental Studies MSc Environmental Engineering MSc in Hydrogeology MSc Civil Engineering MSc Environmental Entrepreneurship MSc Sustainable Engineering (Faculty degree) MEng 5th Year MRes Geo-Environmental Engineering MRes Integrated Pollution Prevention & Control (IPPC) MRes Climate Change Adaptation</p>	
<p>Other Lecturers Involved: Dr Girma Zawdie and Industrial guest speakers.</p>	<p>Credit Weighting: 10</p>	<p>Semester: 2</p>
<p>Assumed Pre-requisites: None</p>	<p>Compulsory/ optional/ elective class Compulsory to: MSc in Sustainability & Environmental Studies MRes Climate Change Adaptation Optional to: MSc Environmental Engineering MSc in Hydrogeology MSc Civil Engineering MSc Environmental Entrepreneurship MSc Sustainable Engineering (Faculty degree) MEng 5th Year MRes Geo-Environmental Engineering MRes Integrated Pollution Prevention & Control (IPPC)</p>	<p>Academic Level: 5</p>

Class Format and Delivery (hours):

Lecture	Tutorial	Laboratory	Coursework	Project	Private Study	Total
20				40	40	100

Class Aim(s)

The module introduces circular economy as a framework for the development and management of a sustainable 'waste-as-resource' economic system. The implications of the concept for transformations towards sustainability are explored in detail.

The module introduces circular economy as a systems-based concept in which production is designed to be restorative and resilient, while waste is designed out of the system. Circular economy is thus featured as a reaction to the conventional dispensation of the linear 'make-use-dispose' economy, and as a framework for the development and management of a sustainable, "waste-as-resource' economic system. The implications of the concept for research, policy and industrial practice are also explored as these relate to innovation and knowledge production; social trends and consumer behaviour; conservation and sustainable use of energy and material resources; climate change and environmental sustainability; and design of business models for green enterprise development and for sustainable growth and employment generation. Based on case studies relating to business practices and policy experiences, the module outlines the building blocks of circular economy and

discusses how in the circular economy context products, components and materials (technical and biological) can be used for as long as possible without losing value. Cases of product re-use through repair, remanufacturing and reconditioning are considered together with the business opportunities created for service providers. The case for recycling is also considered in connection with evolving market trends and implications for innovation and new product designs. The module also explores transition to circular economy in terms of regenerative agriculture; circular cities; and shifts from energy and material-intensive production activities to labour/skill-intensive and service-dominated activities. The social/cultural, economic, technological and environmental factors that impinge on the process of transition to circular economy as inhibiting and favourable 'system conditions' are also considered.

Learning Outcomes

On completion of the class the student is expected to be able to

- LO1:** Understand circular economy principles as effective heuristic to the understanding and analysis of issues relating sustainability and sustainable development and be able to identify and investigate key issues that arise and challenges that are envisaged in the transition to circular economy;
- LO2:** Challenge models of the economy based on linear thinking, and engage students in the exercise of systems thinking and be able to appreciate the broad and holistic view of business and policy models, and gain competence for problem solving as well as for problem appreciation and reframing;
- LO3:** Identify and critically evaluate the range of possibilities for using waste as economic good and as basis for commercially, socially and environmentally profitable business initiatives through the application of creative designs; as well as the range of business opportunities arising from repair, reconditioning and remanufacturing activities; and
- LO4:** Understand the role of individuals and communities in the making and operation of the circular economy.

(UK SPEC suggests no more than 4 learning outcomes per class. Statements must be broad and be syllabus free and link in with the intended learning outcomes on the course specifications.)

Syllabus

The class will be taught using a combination of lectures, group discussions, seminars, case studies and presentations by practitioners. The module is flexibly designed to accommodate a wide range of issues relating to the circular economy and variations in the expertise of guest speakers. The key topics covered by the module over a ten-week teaching period include the following:

- Week 1:** *Introduction* – What is the circular economy; why is it important; features of the circular economy and its building blocks
- Week 2:** The systems approach to circular economy analysis
- Week 3:** The sharing economy and the performance economy as aspects of the circular economy
- Week 4:** The built environment and the natural environment as aspects of the restorative and regenerative aspects of the circular economy – industrial application of the biological cycle
- Week 5:** Circular economy business systems
- Week 6:** Circular cities and transport systems
- Week 7:** Circular economy and energy systems
- Week 8:** Repair and remanufacturing and the circular economy
- Week 9:** Design and innovation in the context of circular economy – design trends mimicking nature
- Week 10:** Social networking, market relations and policy issues relating to the circular economy.

Assessment Criteria

Criteria

For each of the Class Learning Outcomes the following criteria will be used to make judgements on student learning:

[Note: Criteria break the LO down into 'teachable' elements but do not become syllabus orientated i.e. no mention of CAD package names, components etc.]

LO1

- C1 How students show their understanding of the concept of circular economy in relation to the concepts of sustainability and sustainable development (individual and group coursework, and participation in seminars and class discussion)
- C2 Students grasp of the dynamics of transition to circular economy in terms of the socio-cultural, economic, political and technological underpinnings of the economy and the environment individual and group coursework, and participation in seminars and class discussion)

LO2

- C1 Is there any evidence of analytical, critical and systemic thinking in students' discussion of circular economy issues (individual and group projects)

LO3

- C1 How capable are students in identifying and explaining the system conditions that facilitate and inhibit opportunities for viable business involving zero-waste activities; and in appraising the scope for sustainable business in repair, reconditioning and remanufacturing activities (individual and group projects)
- C2 How creative and innovative are students in identifying and evaluating business opportunities for generating value from waste (individual and group projects)

LO4

- C1 Students' engagement in case studies of how changes in the behavioural trend of individuals and communities as consumers and producers impact the economy-environment nexus, and how policy intervention could be designed to influence behaviour and create the socio-cultural circumstances conducive for transition to circular economy

The standards set for each criterion per Learning Outcome to achieve a pass grade are indicated on the assessment sheet for all assessments.

Principles of Assessment and Feedback (<https://www.strath.ac.uk/staff/policies/academic/>)

- Assignments are set to involve students in projects individually and as team participants.
- Students will have opportunities through interactions with class tutors to incorporate feedback on drafts of reports and improve their performance.
- Departmental policy: carry out mid-term class assessments and provide feedback to students.
- Establishment of MSc cohorts tend to foster the development of learning groups.
- It is the ethos of the MSc programme subscribing to this module that self-motivation and mutual respect in group projects are encouraged.

Recommended Reading

1. Webster, K. (2015), *The circular economy: a wealth of flows*. UK: EMF Publishing.
2. Webster, K., Blerot, J. and Johnson, C. (eds.) (2013), *A new dynamic: effective business in a circular economy*. UK: EMF Publishing.
3. Webster, K., Blerot, J. and Johnson, C. (eds.) (2016), *A new dynamic 2: effective systems in a circular economy*. UK: EMF Publishing.

4. Sundrarajan, A. (2016), *The sharing economy: the end of employment and the rise of crowd-based capitalism*. Cambridge, Mass.: MIT Press Ltd.
5. Stahel, W. (2010), *The performance economy*. Palgrave Macmillan.
6. Pauli, G. (2010), *The blue economy*. Paradigm Publications.
7. Lovins, A., Lovins, H. and Hawken, P. (1999), *Natural capitalism*. Earthscan.
8. Benyus, J. (2002), *Biomimicry: innovation inspired by nature*. William Morrow, 2nd edition.
9. Pawlyn, M. (2011), *Biomimicry in architecture*. RIBA Publishing

PLEASE NOTE:

Students need to gain a summative mark of 40% / 50% (please delete as appropriate) to pass the module. Students who fail the module at the first attempt will be re-examined during the August diet. This re-examination will consist entirely of exam / coursework / viva (please delete as appropriate).

Resit Arrangements

Assignment

Approved

Programme Director Signature:

Date of Last Modifications:

(Updated 9th August 2018)

Assessment and Feedback Schedule

Class Code	CL994	Class Title	Circular Economy and Transformations towards Sustainability
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Brief Description of Assessment

<p>Assignment 1 - Database of Most Interesting Papers linked to Circular Economy and Sustainability (worth 3% of the final mark)</p> <p>Assignment 2 - Group coursework – create a new circular model business (group report worth 47% of the final mark, 1,500 words long excluding references, tables, boxes, figures and appendices).</p> <p>Assignment 3 – Individual report evaluating self-transformation towards circularity (worth 50% of the final mark).</p>

Indicate in the tables below the Hand-Out (H), Submission (S) and Feedback (F) dates for each lab report/coursework/project and the timing of each Exam/Class Test (E), (T). Include duration of exam in brackets (e.g. E (2)).

Semester 1

Assessment type (& title)	LOs	Weight (%)	Individual / Group	WK1	WK2	WK3	WK4	WK5	WK6	WK7	WK8	WK9	WK10	WK11	Exam Period

Semester 2

Assessment type (& title)	LOs	Weight (%)	Individual / Group	WK1	WK2	WK3	WK4	WK5	WK6	WK7	WK8	WK9	WK10	WK11	Exam Period
1: DB most interesting paper	1,2,3,4	3	I	H		S			F						
Assignment 2 - create a new circular model business	1,2,3,4	47	G	H				S			F				

Assignment 3 – Individual report evaluating self-transformation towards circularity	1,2,3,4	50	I	H								S			F