GENERIC ELECTIVES (GE-EVS-05): CIRCULAR ECONOMY AND ENVIRONMENTAL SUSTAINABILITY

Credit distribution, Eligibility and Pre-requisites of the Course

Course title & Code	Credits	Credit distribution of the course			Eligibility criteria	Pre-requisite of the course
		Lecture	Tutorial	Practical/ Practice		
CIRCULAR ECONOMY AND ENVIRONMENTAL SUSTAINABILITY	4	2	0	2	Class XII pass	NA

Learning objectives

The Learning Objectives of this course are as follows:

- Critically evaluate five mega trends involving climate, development, ecology, economy, and technology and their linkages with energy and resources
- Inculcate principles and methods of circular economy and design resource-efficient, low carbon paradigm.
- Analyze business models/institutes/communities and associated processes and services and develop recommendations for integrating principles of circular economy
- Adopt routes of circular economy in personal, family, community, and institutional settings.

Learning outcomes

After the course, the students will be

- Equipped with tools and techniques of circular economy to develop a sustainable institute or community
- Acting as a consultant to industries and international organizations aiming for a circular economy
- Serving as a catalyst in evolving an ecoliterate society and industry and promoting sustainable polices

SYLLABUS OF GE-1

Theory (02 Credits: 30 lectures)

UNIT – I Circular economy (1½ Weeks) (03 lectures)

Concept and definitions; Closed loop ecosystems; Systems thinking; Benefits to environment, economy and society (03 lecture)

UNIT – II Principles of circular economy (2 Weeks) (04 lectures)
Sustainable procurement; Ecodesign; Industrial and territorial ecology; Economics of functionality; Responsible consumption; Extending the duration of use; Recycling (04 lecture)

UNIT – III Steps for transition towards a circular economy (3½ Weeks) (07 lectures)
Large-scale transition to non-polluting sources of energy; Durable products requiring less materials and energy; Incentivization of recycling, re-use, and repair; Replacement of hazardous materials with safer alternatives (07 lecture)

UNIT – IV Circular economy implementation (3½ Weeks) (07 lectures)
Micro-level: Firm-level engineering and managerial level; Meso-level: Industrial ecology, Industrial symbiosis, Eco-clusters, Eco-industrial parks; and Macro level: General policies, Plans, Green and sustainable entrepreneurship. (07 lecture)

UNIT –V Challenges in implementing circular economy (3½ Weeks) (07 lectures)
Achievability and desirability; Disrupting consumer's convenience; Local regulations versus the circular economy concept; Lack of infrastructure for waste treatment; Lack of recycling technology; Poor business model plan (07 lecture)

UNIT –VI Case studies from India and other parts of the world (1 Week) (02 lecture)

Teaching and learning interface for theoretical concepts

To achieve the course objectives and match with the contents, a wide range of teaching and learning tools will be employed, including (a) Formal lectures; (b) Interactive sessions using visual aid; (c) Case study analyses; (d) Hypothetical scenario building; (e) Group discussion on key topics; and (f) documentary screening and critical analyses.

Practicals/Hands-on Exercises – based on theory (02 Credits: 60 hours)

1. Evaluate the status of your institute with respect to efforts on circular economy using qualitative and quantitative surveys
2. Survey your institute and depict the journey of waste in your institute highlighting the factors/actors that are barrier to and facilitator of complete waste recycling
3. Collect spatial and temporal data on types of wastes being generated and identify the recycling hotspots and the gap in adopting circular economy principles
4. Based on activities 1 – 3, develop a consolidated waste recycling plan highlighting targets for Institute and each Department
5. Recycle and reuse the waste clothes produced at home and make a presentation in the class to increase their lifecycle and estimate its impact on ecological footprint of the family/institute

6. Coordinate with different groups working on waste recycling focusing on different types of wastes segregated at home/institute, for example, plastics/ glass/furniture/ metal/cans/paper waste and present as group activity
7. Visit an industrial area to analyse the status of circular economy concepts being practiced and give recommendations to improve the industrial sustainability (submit the report)
8. Conduction workshop in the Institute to educate students of other courses for converting wastes into useful products
9. Run a repair café where students and staff bring their broken stuff and get it repaired with the help of experts available at the Institute
10. Conduct a swap shop and swap party where people bring their old clothes for exchange
11. Estimate the impact of activities 8–10 reduction in ecological footprints
12. Conduct a drive to collect e-waste from the institute and the neighbourhood localities and donate it to the recycling facilities and estimate its impact on environment.
13. Based on the activities 1–12, plan and conduct awareness camps in the neighbourhood to educate and motivate people about importance of reuse and recycling and empower them with recycling methods

Teaching and learning interface for practical skills

To impart training on technical and analytical skills related to the course objectives, a wide range of learning methods will be used, including (a) laboratory practicals; (b) field-work exercises; (c) customized exercises based on available data; (d) survey analyses; and (e) developing case studies; (f) demonstration and critical analyses; and (h) experiential learning individually and collectively.

Essential/recommended readings

- Charter, M. ed., 2018. *Designing for the Circular Economy*. Routledge, London, UK.
- Hawken, P., Lovins, A.B. and Lovins, L.H., 2013. *Natural Capitalism: The Next Industrial Revolution*. Routledge.
- Lacy, P. and Rutqvist, J., 2015. *Waste to Wealth: The Circular Economy Advantage*. London: Palgrave Macmillan.
- Mavropoulos, A. and Nilsen, A.W., 2020. *Industry 4.0 and Circular Economy: Towards a Wasteless Future or A Wasteful Planet*? John Wiley & Sons.
- Stahel, W.R. and MacArthur, E., 2019. *The Circular Economy: A User's Guide*. Routledge, NY, USA.

Suggestive readings

- Crocker, R., Saint, C., Chen, G. and Tong, Y. eds., 2018. *Unmaking Waste in Production and Consumption: Towards the Circular Economy* (pp. 1-353). Bingley, UK: Emerald Publishing Limited.
- Delchet-Cochet, K. ed., 2020. Circular Economy: From Waste Reduction to Value Creation. John Wiley & Sons.
- Frodermann, L., 2018. *Exploratory Study on Circular Economy Approaches*. Springer, Fachmedien Wiesbaden.
- Ghosh, S.K., Samanta, S., Hirani, H. and da Silva, C.R.V. eds., 2022. *Effective Waste Management and Circular Economy: Legislative Framework and Strategies*. CRC Press.

Note: Examination scheme and mode shall be as prescribed by the Examination Branch, University of Delhi, from time to time.