Semester	5			
Course Code:	MA5510			
Course Name:	Circular Economy for Engineering			
Credit Value	3 (Notional hours: 150)			
Pre-requisites	None			
Core /Optional	Optional			
Hourly Breakdown	Lecture (hrs)	Small-Group Discussions (hrs)	Assignments (hrs)	Independent Learning (hrs)
	12	28	10	100

Aim(s): To introduce the concept of circular economy and discuss the necessary involvement of Engineering Managers for the effectiveness of its application in engineering processes.

Intended Learning Outcomes:

On completion of the course, students should be able to:

- **explain** the differences between a circular economy and a linear economy.
- **explain** the basic concepts of a circular economy.
- **create** circular economic business models for different processes.
- **analyze** material recovery indicators for a circular economy.

Course content:

- **Introduction to Circular Economy:** Linear economy and waste of resources, green economies, regenerative economies, the Circular Economy.
- **Basic Principles of a Circular Economy:** The concepts of design out, regeneration, zero waste, 3R: reduce, reuse, and recycle; 6 R, 10R and evolution of R principles.
- **Models of Circular Economy:** Circular supply chain**,** engineering inputs at different levels of a circular economy
- **Indicators of material recovery:** Developing indicators for a circular process in engineering activities.
- **Challenge Project:** Building a circular economic model for any engineering activity and presenting the model.

Teaching/Learning Methods:

Lectures
Student Based Activities

Assessment Strategy

Continuous Assessments 50%	**Final Assessment** 50%		
Small Group Activities 30%	**Theory**	**Practical**	**Other**

Challenge Project 20%		50%	-	-

Recommended Reading:

- De Angelis, R. (2018). *Business Models in the Circular Economy_ Concepts, Examples and Theory.* Palgrave Macmillan ISBN 978-3-319-75126-9
- Machado, C. and Davim, J. P. (2020). *Circular Economy and Engineering.* Springer, Switzerland. ISBN 978-3-030-43043-6
- Mao, J., Li, C., Pei, Y., Xu, L. (2018). *Circular Economy and Sustainable Development Enterprises.* Springer, Singapore. ISBN 978-981-10-8524-6
- Scott, J. T. (2015). *The Sustainable Business*, 2nd Edition. Greenleaf Publishing, UK. ISBN-13: 978- 1-907643-52-1