



SECOND SEMESTER 2023-2024
COURSE HANDOUT (PART-II)

Date: 09/01/2024

In addition to Part-I (General Handout for all courses appended to the timetable), this portion gives further specific details regarding the course.

Course Code : **MF F485**

Name of the Course : **Sustainable Manufacturing**

Instructor-In-Charge : **Ravi Shanker Vidyarthi**

I. Scope and Objective of the Course

Growing awareness and concerns about climate change, energy security and natural resource scarcity led by the rapid expansion of economic activity in the last two decades have put government and business under immense pressure to optimize the natural resources, to increase use of renewable energy and recycled material and to reduce the environmental effects involved in the production and consumption of goods and services. The primary objective of this course is to provide environmental, economical and social perspective of manufacturing processes, systems and tooling including material, energy and toxicity analysis during the various phases of product life cycle. A multidisciplinary approach will be undertaken. Collection and analysis of real world data from industry will be encouraged.

II. Textbook

1. D. Dornfeld (ed.), *Green Manufacturing: Fundamentals and Applications*, Springer, New York, 2013.
2. Anthony Johnson, *Sustainability in Engineering Design*, Elsevier publication, 2014.
3. Gunther Seliger (ed.) *Sustainability in Manufacturing*, Springer, 2007.

III. Reference books

1. Wen LI(ed), *Efficiency of manufacturing process: Energy and Ecological perspective*, Springer, Australia, 2015.
2. David T Allen & David R Shonnard, *Sustainable engineering*, Pearson, India, 2015.
3. J Paulo Davim, *Sustainable Manufacturing*, Wiley, UK, 2010
4. Rob Thompson, *Sustainable Materials, process and production*, Thames & Hudson, 2013.

IV. Contents

Topic	Learning Objective	Number of Lectures
1. Introduction	Sustainability importance, Sustainability challenges, Triple bottom line of sustainability and drawback, 4Rs of sustainability, Sustainable engineering to Sustainable	2





	manufacturing,	
2. Sustainable manufacturing implementation factors	Driver and barriers to sustainable manufacturing, SM stakeholders	5
3. Life cycle management and assessment	Strategic and operational evaluation of technologies using life cycle concept, MET analysis, environmental impact assessment, various impact assessment models, life cycle costing	5
4. Sustainable manufacturing design	Eco-innovation, design for environment, design for disposal, design for energy efficiency, design for material efficiency, sustainable materials, sustainable energy	5
5. Sustainable practices and matrices	Recycling, remanufacturing, reuse, resource efficiency, energy efficiency in machine tools and process chains	5
6. End of life (EOL) strategies	End-of-life strategies and product definition, reverse logistics, recycle, reuse and remanufacture	5
7. Sustainability framework	Elements and relationship	3
8. Sustainable business models	Integrated product policy, sustainable product service systems, green factories	4
9 Waste minimizations	Lean and green, waste categorization, waste reduction	5
Case studies and practice		3
	Total	42

V. Evaluation scheme and schedule

EC NO	Component	Duration	Weightage (%)	Date, time	Nature
1	Mid Exam	90min	30	11/03 - 4.00 - 5.30PM	CB
2	Seminar//Case study (Each chapter-1component during class hour)		20		OB
3	Project		10		OB
4	Comprehensive Exam	3hr	40	07/05 AN	CB





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V. Chamber consultation hour: To be announced in the class

VI. Notices concerning the course: All notices concerning the course will be displayed on CMS notice board only

VII. Makeup Policy: Makeup will be permitted only in genuine medical cases with prior permission.

***Academic Honesty and Integrity Policy:** Academic honesty and integrity are to be maintained by all the students throughout the semester and no type of academic dishonesty is acceptable.*

Instructor-In Charge

MF F485

