Course Type	Course Code	Name of the Course	L	T	P	Credit
DE	OMED620	Fundamentals of Additive Manufacturing Technologies	3	0	0	3

Prerequisites
Master/PhD students having background in Mechanical Engineering/ Production Engineering/Manufacturing Technology.
Course Objective
1. To build a fundamental understanding of different additive manufacturing technologies—metallic and non-metallic—for product development. 2. To bridge digital computer interfaces with AM processes using commercially available software tools. 3. To benefit both academic learners and industry practitioners through a clear, demonstrated learning path.
Learning Outcome
1. To explain the principles and categories of multiple additive manufacturing processes. 2. Use CAD/CAM interfaces, slicing, STL file formats, and preprocess software for AM. 3. Compare and evaluate AM technologies (liquid, sheet, wire, powder) for applications. 4. Link computer-aided planning with layer-by-layer fabrication techniques and demonstrate prototype development using software tools.

Unit No	Topics to be covered	No of lecture videos	Video Time (Minutes)	Learning Outcomes
1	Introduction to Additive Manufacturing	2	113	Understood AM motivations, history, advantages, and classifications
2	Computer-Aided Process Planning (CAPP) – STL, Slicing, Support Structures	3	167	Learned STL file structure, slicing methods, support generation, preprocessing workflow
3	Liquid Additive Manufacturing (SLA, DLP, MJM)	3	189	Understood liquid-based AM processes, photopolymerization, equipment and material compatibility
4	Sheet Lamination and LOM Processes	3	187	Studied sheet AM technologies, bonding mechanisms, LOM hardware, pros and cons
5	Wire-based Additive Manufacturing – WAAM, EBAM, LMD	3	155	Explored wire-feed technologies, process parameters, deposition control, industrial applications

6	Powder Bed Fusion – SLS, DMLS, EBM	2	110	Learned powder feed, laser/e-beam melting, materials used, resolution and defects
7	Post-Processing in Additive Manufacturing	3	190	Studied post-processing methods such as support removal, surface finishing, and heat treatment
8	Design for Additive Manufacturing (DfAM)	3	165	Understood topology optimization, generative design, and DfAM principles
9	Applications of AM in Automotive, Aerospace, Medical	3	152	Explored real-world AM use cases in different sectors
10	Challenges: Accuracy, Repeatability, Process Monitoring	3	130	Understood limitations and quality control in AM systems
11	Sustainability and Economics of AM	2	92	Analyzed material waste, energy consumption, and cost comparison with conventional processes
12	Future Trends: 4D Printing, Bioprinting, AI in AM	3	124	Discussed emerging technologies and research frontiers in AM
Total		33	1774	(21 hours)

Text Books:

1. Venuvinod, Patri K., and Weiyin Ma. Rapid Prototyping: Laser-based and Other Technologies. Springer Science & Business Media, 2013.
2. Gibson, Ian, David Rosen, and Brent Stucker. Additive Manufacturing Technologies: Rapid Prototyping to Direct Digital Manufacturing. Springer, New York, NY, 2015.

Reference Books:

1. Kumar, L. Jyothish, Pulak M. Pandey, and David Ian Wimpenny, eds. 3D Printing and Additive Manufacturing Technologies. Springer, Singapore, 2019.
2. Jacobs, Paul F. "Fundamentals of Stereolithography." In 1992 International Solid Freeform Fabrication Symposium, 1992.