

Branch Name:	Mechanical Engineering (CAD/CAM)
Program Code:	ET201
Course Name:	Product Design and Development
Course Code:	2ET2010302T
Pre-requisite Course:	UG level subjects on Design, Material and Industrial Engineering.

Course Objectives:

This course provides,

1. Competence with a set of tools and methods for product design and development.
2. Confidence in your own abilities to create a new product.
3. Confidence in selecting proper material and/or process.
4. Ability to design the product for fixed criteria(s) and making its models/prototypes accordingly.
5. Ability to coordinate multiple, interdisciplinary tasks in order to achieve a common objective.
6. Enhanced team working skills.

Teaching and Examination Scheme:

Credit	Teaching Scheme Hours per week				Evaluation Scheme (Marks)								Total (Marks)
					Theory (Marks)				Practical (Marks)				
	L	T	P	Total	SEE		CCA		SEE		CCA		
					Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	
03	03	-	-	03	24	60	16	40	-	-	-	-	100

Subject Contents:

Sr. No	Topic	Total Hours	Weightage (%)
1	Introduction: Characteristics of successful product development, Design and development of products, duration and cost of product development, the challenges of product development, product development cycle.	06	15
2	Development Processes: The front-end process, generic concept development process including Identifying Customer Needs, Concept Generation, Concept Selection, Concept Testing and Product Specifications.	08	25
3	Material selection: Importance, classification material performance characteristics, selection criteria, Ashby Material selection chart.	04	15
4	Process selection: Importance types of manufacturing process and their classification, Sources of information, selection criteria, Material and Process selection Methods, Expert systems. Computer Database Approach, performance indices decision matrix, AHP and fuzzy approach, introduction to material and process selection software.	08	25

5	Design for Manufacturing: Definition, estimation of manufacturing cost, reducing the cost of components, assembly, supporting production, impact of DFM on other factors. DFM, DFA, DFX, supplier involvement robust design, QFD and concurrent engineering.	08	10
6	Managing Projects: Understanding and representing task, baseline project planning, accelerating projects, project execution, postmortem project evaluation.	06	10

Review Presentation:

The student is expected to refer at least two peer reviewed journal papers related to this domain/subject so as to identify issues/challenges and emerging trends. Student is supposed to explore various video lectures (E.g. NPTEL) available in the domain/subject. Student is required to make a review-presentation on the work carried out for the same.

Recommended sites for journal papers are (1) asmedigitalcollection.asme.org (2) springer.com (3) sciencedirect.com (4) ieeexplore.ieee.org (5) scholar.google.co.in or others of similar repute.

List of Reference Books:

1. Ulrich, Karl, and Steven Eppinger, "Product Design and Development", New York, McGraw-Hill, 2003. ISBN: 9780072471465
2. Geoffrey Boothroyd, Peter Dewhurst, Winston A. Knight, "Product Design for Manufacture and Assembly", 3rd edition, CRC press.
3. A C Chitale and R C Gupta, "Product Design and Manufacturing", PHI, - 3rd Edition, 2003.
4. Tim Jones. Butterworth Heinemann, "New Product Development", -Oxford. UCI -1997
5. Dieter George E., "Mechanical Metallurgy", 3rd Edition, McGraw Hill.
6. O. Molloy, E.A. Warman, S. Tilley, "Design for Manufacturing and Assembly: Concepts, architectures and implementation", Springer Publications
7. William D. Callister, Jr., David G. Rethwisch, "Fundamentals of Material Science and Engineering", 4th Edition, John Wiley & Sons.

Course Learning Outcomes (CLO): On completion of this course, the students will be able to:

CLO	Description	Bloom's Taxonomy Level
CLO1	Describe an engineering design and development process.	2 Understanding
CLO2	Employ engineering, scientific, and mathematical principles to execute a design from concept to finished product.	3 Applying 4 Analyze
CLO3	Able to select proper material for respective application.	4 Analyze 5 Evaluating
CLO4	Fabricate an electromechanical assembly from engineering drawings.	3 Applying 6 Creating
CLO5	Work collaboratively on a team to successfully complete a design project.	4 Analyze 5 Evaluating
CLO6	Effectively communicate the results of projects and other assignments in a written and oral format.	2 Understanding 6 Creating

Mapping of CLOs with POs & PSOs:

Course Learning Outcomes	Program Outcomes (POs)												Program Specific Outcomes(PSOs)	
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CLO1	M		H		H				L				L	
CLO2		M	H	M	H						M		H	
CLO3	M					H	H	M				L		
CLO4	L		H		M		L			L				M
CLO5			M			H	M	H	H	H	H			H
CLO6				M	M	M	M	H	H	H	M		H	

H:High, M:Medium, L:Low