

Branch Name:	Mechanical Engineering (CAD/CAM)
Program Code:	ET201
Course Name:	Computer Aided Design
Course Code:	2ET2010101T
Pre-requisite Course:	Zeal to learn the subject

Course Objectives:

1. To understand fundamental concepts of computer graphics and its tools in a generic framework
2. To impart the parametric fundamentals to create and manipulate geometric models using curves, surfaces and solids
3. To provide clear understanding of CAD systems for 3D modeling and viewing.

Teaching and Examination Scheme:

Credit	Teaching Scheme Hours per week				Evaluation Scheme (Marks)								
					Theory (Marks)				Practical (Marks)				Total (Marks)
	L	T	P	Total	SEE		CCA		SEE		CCA		
					Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	
3	3	-	-	3	24	60	16	40	-	-	-	-	100

Subject Contents:

Sr. No	Topic	Total Hours	Weightage (%)
1	Introduction: Historical Development, Product Life Cycle and Role of CAD, Applications of CAD, Explicit and Implicit Equations, Intrinsic Equations, Parametric Equations, CAD Database	02	10
2	Principles of Computer Graphics: Introduction, graphic primitives, Plotting of analytical Curves, Coordinate systems, Half-Spaces and Homogeneous Coordinates, 2D (Translations, Rotation, Scaling and Shear) and 3D transformation (Translations, Rotation, Scaling, Shear, Orthographic and Perspective Projections), Windows to View port transformation, Clipping.	05	15
3	Curves: Fundamental of Curve Design, Parametric Space of a Curve, Reparametrization, Space Curves: Spline Curves, Bezier Curves, B-Spline Curve, Rational Polynomials, Rational curves, NURBS.	05	25

4	Surfaces: Fundamental of Surface Design, Parametric Space of a Surface, Reparametrization of a Surface patch, Sixteen point form, Four Curve Form, Plane, Cylindrical and Ruled Surfaces, Surfaces of Revolutions, Bezier Surface, B-Spline Surface.	04	20
5	Solids: Fundamental of Solid Design, Parametric Space of a Solids; Continuity and composite Solids, Surface and Curves in a Solid	03	10
6	Solid Modeling: Topology and Geometry, Set theory, Euler Operators, Regularized Boolean Operators, Construction Criteria, Graph Based Models, Instances and Parameterized Shapes, Cell-decomposition and Spatial Occupancy Enumeration, Sweep representation, CGS, B-Rep, Wireframe Analytical properties, Relational properties and Intersection.	06	20

Review Presentation:

The student is expected to spend minimum 2 hours per week (as mentioned in the teaching and evaluation scheme) to refer at least two peer reviewed journal papers related to this domain/subject. The student is expected to identify issues/challenges and emerging trends in the domain/subject. 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. Mastering CAD / CAM Ibrahim Zeid McGraw-Hill
2. Geometric Modelling M Mortenson Industrial Press.
3. CAD / CAM: Theory and Practice Ibrahim Zeid McGraw-Hill
4. Mathematical Elements of Computer Graphics David F Roger McGraw Hill
5. Computer Graphics: C Version Hearn and Baker Pretice Hall of India
6. Curves and Surfaces for CAGD: A Practical Guide 5/e, Gerald Farin Morgan Kaufmann
7. Computer Graphics and Geometric Modelling David Salomon Springer.
8. Computer Aided Engineering Design Anupam Saxena and Birendra Sahay Springer
9. Mechanical Assemblies: Their Design, Manufacture, and Role in Product Development D E Whitney Oxford Press

E-Resources:

1. nptel.ac.in/courses/112106175/

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

CLO	Description	Bloom's Taxonomy Level
CLO1	Understanding the product life cycle, role of CAD and various application of CAD tool	1 Remembering 2 Understanding
CLO2	Solve 2D and 3D transformations for the basic entities like line and circle.	5 Evaluating

CLO3	Formulate the basic mathematics fundamental to CAD system	4 Analyze
CLO4	Use the different geometric modeling techniques like feature based modeling, surface modeling and solid modeling.	3 Applying
CLO5	Create geometric models through animation and transform them into real world systems	6 Creating
CLO6	Simulate assembly of parts using Computer-Aided Design software.	4 Analyze

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	H												M	
CLO2		M	H										M	
CLO3			H										L	
CLO4				M	M									M
CLO5					M		M		H					M
CLO6										L	H			M

H: High, M: Medium, L: Low