

INDIAN INSTITUTE OF INFORMATION TECHNOLOGY
DESIGN AND MANUFACTURING (IIITDM) KANCHEEPURAM

Course Title	Computer Aided Design and Manufacturing	Course Code				
Dept./ Specialization	Mechanical Engineering	Structure (LTPC)	3	1	0	4
To be offered for	UG/PG	Status	Core		Elective	<input type="checkbox"/>
Faculty Proposing the course	Dr. P. Pandithevan	Type	New		Modification	<input type="checkbox"/>
Recommendation from the DAC: Yes		Date of DAC	01-06-2021			
External Expert(s)	Prof. G. Saravana Kumar, IIT Madras					
Pre-requisite	Manufacturing Basics	Submitted for approval		46 th Senate		
Learning Objectives	<ul style="list-style-type: none"> The objective of this course is to provide the fundamental concepts of computer aided design and manufacturing through geometric modeling and their representations 					
Learning Outcomes	<p>At the end of the course, the students will be able to</p> <ul style="list-style-type: none"> model and represent three-dimensional surfaces and exchange data from one system to another understand 3D-solid representation techniques to develop CNC programs for machining complex geometries 					
Contents of the course <i>(With approximate break-up of hours for L/T/P)</i>	<p>Overview of CAD/CAM: Hardware and software requirements in CAD/CAM, Introduction to geometric representation- Implicit, explicit, parametric equations; Transformations in 2D and 3D, projections. (8L+1T)</p> <p>Parametric curves: Differential geometry of curves, Cubic Hermite curves - Algebraic and geometric form, Blending functions, subdivision, re-parameterization and composite Hermite curves, continuity aspects, Bezier curves - control polygons and Bernstein basis, de Casteljau algorithm, continuity aspects, rational Bezier curves, B-spline curves - periodic, open and non-uniform knot vectors and corresponding curves, rational B-splines, NURBS curve. (8L+3T)</p> <p>Parametric surfaces: Hermite surface - algebraic and geometric form, subdivision and reparameterization, continuity of surfaces, Bezier surface - control net representation, continuity aspects, rational Bezier surfaces, B-Spline surfaces - periodic, open and non-uniform knot vectors and corresponding surfaces, rational B-splines, NURBS surface. (8L+4T)</p> <p>Representation of solids: Topology of surfaces, Euler and modified form of equations, representations - Quadtree, Octree, Halfspace, Boundary Representation (B-Rep), Constructive Solid Geometry (CSG), Boolean operations in 2D - set membership classification, Union, Difference and Intersection. (8L+3T)</p> <p>Data exchange in CAD/CAM: CNC part programming for ordinary and complex geometry, CNC Program generation from CAD models, Concepts of native and neutral file formats for data exchange, Interfacing with manufacturing systems, Concepts of reverse engineering, Rapid prototyping, Computer aided process planning. (10L+3T)</p>					
Text Book	<ol style="list-style-type: none"> Zeid. I, CAD/CAM Theory and Practice, Tata McGraw Hill, 2006. Rogers. D.F and Adams, J.A, Mathematical Elements for Computer Graphics, McGraw Hill, 2002. Chee Kai Chua, Kah Fai Leong, Chu Sing Lim, Rapid prototyping, World Scientific, 2010. 					
Reference Books	<ol style="list-style-type: none"> Mortenson M.E, Geometric Modeling, John Wiley & Sons, 1985. Gerald E. Farin, Curves and Surfaces for CAGD, Morgan Kaufmann, 2002. 					