

SRM University
M.Tech Automotive Hybrid Systems Engineering
 (Collaborative program with NFTDC, Hyderabad)
 (Proposed syllabus from the academic year 2015-16)

Supportive courses

		L	T	P	C
AH 2192	COMPUTER AIDED DESIGN	3	0	0	3
	(Mandatory for non-mechanical engineering graduates)				
	Total Contact Hours-45				
	Prerequisites				
	Nil				
PURPOSE					
To incorporate basic skill sets in Computer aided design including synthetic curves, surfaces and rapid prototyping.					

Introduction to computer-aided design - Motivation, general design philosophies, CAD software, coordinate systems, sketches, orthographic and isometric views, exploded view, rendering

Principles of 3D geometrical modeling - Basic features of solid modeling, part drawing, standard dimensioning and tolerance, constraint relationships in solid modeling - Basic modeling tools in CAD (layers, colors, selection, transformation, offset, array, etc.) - Standard engineering drawing, standard machine elements (gear, shaft, springs, bearings)

Curve and surface fitting in an automated environment - Parametric and non-parametric representation of curves with example using ProE/Creo and Solid Works. - Synthetic, analytic, implicit and explicit methods of curves. - Surface representation in CAD, synthetic (splines and Bezier), and analytic (plane, ruled, revolution, tabulated), orthogonality, tangency. - Solid modeling, regularization, Boolean operation, half space operations, boundary representation (Brep), constructive solid geometry (CSG) - Writing scripts (programs) using MATLAB for curves, surfaces and solids.

Programming - Relation database, objects, class, inheritance, parametric modeling in: AutoCAD, ProE, and SolidWorks. - Macro and Application Programming Interface (API).

CAD/CAM simulation of manufacturing - Animation: basics, implementation in CAD software - Standard parts, fittings, bolts nuts, creating assembly and subassembly drawings - Product data exchange, file types (IEGS, STEP, ACIS, DXF, PARASOLID, STL, etc.)

Computer-aided solid model analysis and rapid prototyping - Simulation program for solving problems such as Solid Works Simulation - Basics of computational techniques, Finite Element Analysis (FEM) using CAD software (preprocessing, meshing, apply boundary condition, solve, post processing) - Geometric Tolerance: perpendicularity, parallelism, eccentricity, surface finish, angularity, flatness, position tolerance, clearance and interferences, using these features in CAD software - Basics of rapid prototyping, hardware and software, molding, design for manufacturing, reverse engineering and data capture techniques.

References:

1. Chris McMohan and Jimmi Browne, “*CAD/CAM Principles, Practice and Manufacturing Management*”, Pearson Education Asia,Ltd., 2000.
2. Donald Hearn and Pauline Baker M. “*Computer Graphics*”, Prentice Hall, Inc., 1992.
3. Ibrahim Zeid “*CAD/Cam Theory and Practice*”, McGraw Hill, International Edition, 1998.
4. Khandare S.S., “*Computer Aided Design*”, Charotar Publishing House, India, 2001.
5. Chua. C.K, “*Rapid Prototyping*”, Wiley, 1997.
6. Hilton. P.D. et all, “*Rapid Tooling*”, Marcel, Dekker 2000.
7. Beaman J.J et all, “*Solid freeform fabrication*”, Kluwer, 1997.
8. Jacobs P.F., “*Stereolithography and other Rapid Prototyping and Manufacturing Technologies*”, ASME, 1996.
9. Pham D.T. and Dimov S.S., “*Rapid Manufacturing; the technologies and application of RPT and Rapid tooling*”, Springer, London 2001.