Course Type	Course Code	Name of Course	L	T	P	Credit
DE	NMED538	Computer Aided Design	3	0	0	3

Course Objective

- To impart knowledge dealing with computation aspects of transformations, projections, and engineering drawing.
- To impart the computation aspects of modeling of curves, surfaces and solids and computer graphics.

Learning Outcomes

Upon successful completion of this course, students will:

- Get basic knowledge of different transformations which will be very useful in robotic and mechatronics
- Get mathematic details of the projections used in mechanical engineering for visualization
- Learn the concepts of parametric curves and surface and their properties
- Fundamental of subdivided surfaces
- Learn the basic techniques of representation of solids, Euler's operators

Unit No.	Topics	Lecture Hours	Learning Outcome
1.	Overview of computer aided design: Introduction to computer aided design and computer graphics.	4	Students will know the use of computer-aided design in engineering and other applications.
2.	Transformations: 2-D and 3D transformations in Cartesian and homogeneous coordinate systems.	6	Basic knowledge of transformed geometry in 2D and 3D domains.
3.	Projections: Orthographic and axonometric projections, techniques for generating perspective views, vanishing points, stereographic projection.	5	Effects of different projections on models and their mathematical details
4.	Curves: Introduction to geometrical modeling, representation of parametric curves, composite curves, rational curves, interpolation, intersection of curves, subdivision of curves.	9	Basic knowledge of parametric curves can be used in Path/ trajectory planning for road, rail and well-paths after completion of this module
5.	Surfaces: Sweep surfaces, quadratic surfaces, bilinear surface, ruled and developable surfaces, Coons patches, Bezier and B-spline surfaces, Gaussian curvature and surface fairness, subdivision of surfaces, intersection of surfaces and their properties.	8	At end of this module students will be able to model different parametric surfaces and their properties
6.	Solid Modelling: Introduction to solid modeling, representation schemes of solids, feature based design, Euler operator	7	At end of this module students will able to model different objects use in mechanical engineering.
7.	Introduction of object oriented programming, and introduction to OpenGL.	3	At end of this module students will able to know the basic concepts of computer graphics and object-oriented programming
	Total	42	

Text Books:

1. Mathematical Elements of Computer Graphics, D. F. Roger and J. A. Adam, McGraw Hill Pub. 2017

Reference Books:

1. Geometric Modelling, M. E. Mortenson, Industrial Press In., New York. 2017