CS 312: COMPUTER GRAPHICS (3-0-2: 4)

Introduction
Graphic areas, Major Applications, Graphic APIs, 3D Geometric Models, Graphics Pipeline, Numerical Issues, Efficiency

Miscellaneous Math
Sets and Mappings, Solving Quadratic Equations, Trigonometry, Vectors, 2D Implicit and Parametric Curves, 3D Implicit and Parametric Curves, Linear Interpolation, Determinants and Matrices, Basic 2D and 3D transforms, Inverses of Transformation Matrices.

Raster Algorithms
Raster Displays, Monitor Intensities, RGB color, Line Drawing, Simple Anti-aliasing, Image Capture and Storage.Graph Algorithms.

Ray Tracing
The basic Ray Tracing Algorithm, Computing Viewing Rays, Ray-Object Intersection, A Ray Tracing Program, Shadows, Specular Reflection, Refraction, Instancing, Constructive Solid Geometry, Distribution Ray Tracing.

Data Structures for Graphics
Triangle Meshes, Winged Edge Data Structure, Scene Graphs, Scene Graphs, Tiling Multidimensional Arrays.

Sampling
Integration, Continuous Probability, Monte Carlo Integration, Choosing Random Points.

Reflection Models
Real World Materials, Implementing Reflection Models. Specular Reflection Material, Smooth Layered Model, Rough Layered Model.

Suggested list of Experiments:
01) Basic graphics function
02) Bresenham's algorithm for line drawing
03) Mid point algorithm, line drawing using DDA algorithm
04) Algorithms to draw circle, ellipse.
05) Rotating triangle about an origin.
06) Translation of a triangle.
07) Rotation of a point about a point.
08) Reflection of a triangle.
09) Filling a polygon.
10) Making a complex object using the previous exercises.

Text Books
1. J. D. Foley et al.: "Computer Graphics", Addison-Wesley.
2. Peter Shirley et al.: "Fundamental of Computer Graphics", A K Peters, Wellesley, Mass.

References
1. D. Hearn and P. M. Baker: "Computer Graphics", PHI.
2. F. S. Hill: "Computer Graphics", McMillan, New York.

3. W. K.Giloi: "Interactive Computer Graphics: Data Structure, Algorithms, Languages", Prentice Hall.