

|                       |                                                              |
|-----------------------|--------------------------------------------------------------|
| <b>Branch Name:</b>   | Information and Communication Technology                     |
| <b>Semester/Year:</b> | Semester VI / Third Year                                     |
| <b>Subject Title:</b> | Computer Graphics(Elective-I)                                |
| <b>Subject Code:</b>  | 1ET1070609                                                   |
| <b>Pre-requisite:</b> | Basic Skill on C Programming, Fundamental of Linear Algebra. |

**Course Objective:**

Each faculty of engineering & technology is profoundly computational. Simulations, designing, animation technique, data analysis & processing are a significance part of most of the engineering streams. This course is intended to gain knowledge about graphics hardware devices and software used. This course shall also put a foundation stone for understand the two and three dimensional graphics and their transformations. Appreciate illumination and color models. Be familiar with understand clipping techniques. Students will gain experience using a computer graphics application programming by completing several programming projects.

| Teaching Scheme (Hours per week) |          |           |        | Evaluation Scheme (Marks) |                       |                       |                       |       |
|----------------------------------|----------|-----------|--------|---------------------------|-----------------------|-----------------------|-----------------------|-------|
| Lecture                          | Tutorial | Practical | Credit | Theory                    |                       | Practical             |                       | Total |
|                                  |          |           |        | University Assessment     | Continuous Assessment | University Assessment | Continuous Assessment |       |
| 3                                | -        | 2         | 4      | 70                        | 30                    | 30                    | 20                    | 150   |

| Subject Contents |                                                                                                                                                                                                                                                                                                                                                                                                         |             |            |
|------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------|------------|
| Sr. No           | Topic                                                                                                                                                                                                                                                                                                                                                                                                   | Total Hours | Weight (%) |
| 1                | <b>Fundamental of Computer Graphics:</b> Basic of Computer Graphics, Applications of computer graphics, Video Display devices, Random and Raster scan systems, Graphics Software.                                                                                                                                                                                                                       | 04          | 15         |
| 2                | <b>Graphics Primitives:</b> Points, lines, circles and ellipses, Filled-area primitives, Cell array, Character generation, Line attributes, Area-fill attributes, Character attributers, Antialiasing.                                                                                                                                                                                                  | 07          | 20         |
| 3                | <b>2D transformation:</b> Basic Transformations techniques, Matrix representation, Homogeneous coordinates, Composite transformations, Reflection and Shearing                                                                                                                                                                                                                                          | 06          | 15         |
| 4                | <b>2D viewing:</b> The viewing pipeline and coordinates system, Window-to-viewport transformation, Clipping including point clipping, <b>Line clipping</b> - Cohen-Sutherland, Liang- Bersky, Nicholl-Lee-Nicholl, <b>Polygon clipping</b> - Sutherland-Hodgeman polygon clipping, Weiler-Atherton polygon clipping, text clipping, exterior clipping                                                   | 06          | 20         |
| 5                | <b>3D Modeling &amp; Projection:</b> 3D display methods, 3D scaling, rotation and translation, reflection & shears, parallel projection, perspective projection. <b>Curve &amp; Surface:</b> Polygon surfaces, curved lies and surfaces, quadric surfaces, spline representation, cubic spline interpolation methods, overview of Bazier curves and surfaces.                                           | 07          | 15         |
| 6                | <b>Fundamental of visible surface detection:</b> back-face detection, depth buffer method, A-buffer method, scan-line method, depth-sorting method, BSP-Tree method illumination, light sources, basic illumination model, <b>Color models</b> - properties of light, XYZ, RGB, YIQ and CMY color models. <b>Current Trend Computer Graphics</b> - Animations & Realism, Augmented reality, Case Study. | 04          | 15         |

**Course Outcome:**

At the end of this course, the student would be able

- To understand basic concepts of computer graphics.
- To understand the methods of problem solving in the domain of computer graphics.
- Understand basic concepts related to 2D and 3D graphics algorithms in developing various applications.
- Understand various aspects of computer visualization and color model.
- After completion of this course student will be able to Design animation sequences.

**List of References:**

- Computer Graphics, D.Hearn And P.Baker - Pearson Education - C Version
- Computer Graphics, Foley and van Dam - Person Education
- Computer Graphics, with OpenGL Hearn and Baker, - Pearson

**E-Resource:**

- <http://nptel.ac.in>
- <http://www.sciencedirect.com>
- <http://link.springer.com>
- <http://kesen.realtimerendering.com/>
- <http://www.graphics.cornell.edu/resources.html>
- <http://graphics.stanford.edu/>

**List of Experiments:**

**Note:** The experiment list provided beneath is for reference only. The course teacher may change/formulate it as per his/her methodology and requirement.

| Sr.No | Practical List                                                                       |
|-------|--------------------------------------------------------------------------------------|
| 1.    | Develop the DDA Line drawing algorithm.                                              |
| 2.    | Develop the Bresenham's Line drawing algorithm.                                      |
| 3.    | Develop the Bresenham's Circle drawing algorithm.                                    |
| 4     | Develop the program for to display different types of lines                          |
| 5     | Perform the following 2D Transformation operation Translation , Rotation and Scaling |
| 6.    | Perform the Line Clipping Algorithm                                                  |
| 7.    | Perform the Polygon clipping algorithm                                               |
| 8.    | Develop the program for bouncing ball graphics animation                             |
| 9.    | Develop the program to make a digital clock using graphics                           |
| 10.   | Develop the program for blinking stars in sky.                                       |