

| COURSE CODE | COURSE TITLE | L | T | P | C |
|-------------|-------------------|---|---|---|---|
| 1152IT129 | Computer Graphics | 3 | 0 | 0 | 3 |

Course Category:

~~Foundation (0) / Program Core (1) / Program Elective (2) / Allied Elective (3) / University Elective (4) / Value Education Elective (5) / Independent Learning (6) / Industry Higher Learning Institute Interaction (7).~~

a. Preamble:

This course is an introduction to computer graphics -- a field that is unique in its combination of science, art, and engineering. Its focus is the generation and manipulation of visual content and it provides the fundamental technology to an ever-increasing variety of media, including special effects and animation, interactive computer games and simulation, and graphical user interfaces. In this class we will discuss methods for synthesizing images in two and three dimensions, with an emphasis on "photorealistic rendering".

b. Prerequisite Courses:

- Engineering Mathematics – I
- Engineering Mathematics – II
- Problem Solving Using C

a. Related Courses:

- Multimedia Computing
- Digital Image Processing.

b. Course Educational Objectives:

Students undergoing this course are exposed to

- Identify and explain the core concepts of computer graphics.
- Apply graphics programming techniques to design, and create computer graphics scenes.
- To learn the basic principles of 3-dimensional computer graphics. Thus, the student will study the elementary mathematics techniques that allow them to position objects in three dimensional spaces.

c. Course Outcomes:

Upon the successful completion of the course, students will be able to:

| CO Nos. | Course Outcomes | Knowledge Level (Based on revised Bloom's Taxonomy) |
|----------------|--|--|
| CO1 | Design 2D and 3D models | K2,S3 |
| CO2 | Generate algorithms for ellipse, points and curves | K2,S3 |
| CO3 | Modeling of 3D objects | K2,S3 |
| CO4 | Knowledge on how to detect edges and surfaces | K2,S3 |
| CO5 | Design various color models | K2,S3 |

f. Correlation of COs with POs :

| Cos | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 |
|------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|-------------|-------------|-------------|
| CO1 | M | | M | | L | | | | | | | |
| CO2 | M | | M | | L | | | | | | | |
| CO3 | M | | M | | L | | | | | | | |
| CO4 | M | | M | | L | | | | | | | |
| CO5 | M | | M | | L | | | | | | | |

H- High; M-Medium; L-Low

g. Course Content:

UNIT I

L- 9

Introduction – Overview of Graphics system – Output primitives – Points and Lines – Line, Circle, Ellipse-Generating algorithms – Other Curves – Parallel curve algorithms – Curve functions – Pixel addressing – Filled area primitives – Fill area functions – Cell array – Character generation.

UNIT II**L- 9**

Attributes of output primitives – Line attributes – Curve attributes – Color and grayscale levels – Area fill attributes – Character attributes – Bundled attributes – Inquiry functions – Antialiasing – Two Dimensional geometric Transformation – Two Dimensional viewing – Two Dimensional viewing functions – Clipping.

UNIT III**L- 9**

Three Dimensional Concepts – Display methods – Three Dimensional Object representations – Three Dimensional geometric and modeling transformation – Three Dimensional Viewing – 3D and greater than 3D transformation.

UNIT IV**L- 9**

Visible surface Detection methods – Classification of algorithms – Backface detection – Depth-Buffer, Scan line, Depth-sorting, BSP-tree, Area-subdivision and other methods – Illumination models and surface – Rendering methods – Basic models – Displaying light intensities – Halftone patterns and dithering techniques – Polygon-rendering methods – Ray-Tracing – Radiosity lighting models – Environment mapping – Adding surface details.

UNIT V**L- 9**

Color Models and Color applications – Properties of Light – Standard primitives – Intuitive color concepts – RGB, YIQ, CMY, HSV Color Models – Conversion – HLS color model – Computer animation.

TOTAL: 45 periods**a. Learning Resources****i. Text Books :**

Donald Hearn and M. Pauline Baker, “Computer Graphics C Version”, Pearson Education, 2003.

ii. Reference:

- Foley, Vandam, Feiner, Huges, “Computer Graphics: Principles & Practice”, Pearson Education, second edition 2003.
- Digital Animation Bible – AVGERAKIF, Tata McGraw Hill.

iii. Online resources

1. www.graphics.cornell.edu/online/tutorial/
2. www.cs.wellesley.edu/~cs110/lectures/M01-color/graphics.pdf
3. <http://www.opengl.org/resources/libraries/glut/>
4. <http://www.xmission.com/~nate/glut.html>