

# Introduction to Computer Graphics - Video course

## Course objective

To introduce students to the basics of computer graphics.

**Prerequisites:** Basic programming, Data structures and Basics of linear algebra and matrices.

## Course contents

Graphics display devices, Input devices, Rendering pipeline, Raster Graphics: Line and Circle drawing algorithms, Windowing, Clipping: Cohen and Sutherland line clipping, Cyrus-beck clipping method, 2D and 3D Geometrical Transformations, Viewing Transformations: parallel and perspective projection, Curves and Surfaces: Cubic splines, Bezier curves, B-splines, Tensor product surfaces, Surface of revolution Sweep surfaces, Fractal curves and surfaces, Hidden line/surface removal methods, Illumination model, Polygon Shading: Gouraud, Phong, Introduction to Ray-tracing, Animation.  
Lecture **Outline with topics** (and no. of hours)

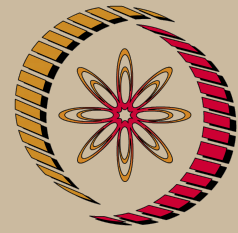
- |  |     |
|--|-----|
| 1. Graphics display devices, Input devices, Rendering pipeline | (3) |
| 2. Raster graphics, windowing and clipping                     | (6) |
| 3. Transformations   | (5) |
| 4. Curves and surfaces   | (7) |
| 5. Hidden surface elimination                                  | (6) |
| 6. Illumination and Shading Models                             | (4) |
| 7. Introduction to Ray-tracing                                 | (4) |
| 8. Animation   | (5) |

## Brief description of laboratory activities

1. Implementation of viewing/rendering pipeline
2. Hierarchical modeling using transformations
3. Basic ray tracing
4. Programming practices with standard graphics libraries like open GL.

## Suggested texts and reference materials

1. *Computer Graphics (Principles and Practice)* by Foley, van Dam, Feiner and Hughes, Addison Wesley (Indian Edition).
2. *Computer Graphics* by D Hearn and P M Baker, Prentice Hall of India (Indian Edition).
3. *Mathematical Elements for Computer Graphics* by D F Rogers, McGraw Hill (Indian Edition).
4. *Procedural Elements for Computer Graphics* by D F Rogers, McGraw Hill (Indian Edition).
5. *Interactive Computer Graphics, A top-down approach with OpenGL* by Edward Angele, Addison Wesley.
6. *Curves and Surfaces for Computer Aided Geometric Design* by G Farin, Academic Press.



NP-TEL

# NPTEL

<http://nptel.ac.in>

## Computer Science and Engineering

### Coordinators:

**Prof. Prem K Kalra**

Department of Computer  
Science and Engineering IIT  
Delhi