ICT441  COMPUTER GRAPHICS
3-0-2-4

1. **Introduction**: Definition; applications; overview of computer system and display sub-system; role of GPUs; problem definition; mathematical preliminaries; layers of graphics software; concept and realization of rendering pipeline.

2. **Graphics primitives**: Points; lines; circles and ellipses; scan conversion algorithms for primitives; fill area primitives; scan-line polygon filling; inside-outside test; boundary and flood-fill; character generation; line attributes; area-fill attributes; character attributes.

3. **2D transformations and viewing**: Translation, rotation, scaling; matrix representation; homogeneous coordinates; composite transformations; reflection and shearing; affine transformations; viewing pipeline and coordinate system; window-to-viewport transformation; clipping; basic line clipping algorithms.

4. **3D transformations and viewing**: 3D scaling, rotation and translation; composite transformation; viewing pipeline and coordinates; parallel and perspective projection.

5. **3D object representation**: Surface modelling; polygon mesh representation; curves and surfaces; quadric surfaces; spline representation; cubic spline; interpolation methods; Bezier curves and surfaces; B-spline curves and surfaces.

6. **Further topics** (TBD based on time available): Visible surface detection concepts; back-face detection; depth buffer method; Illumination and shading; multi-core graphics processors

**Laboratory work**: Based on the above key concepts of computer generated graphics.

**Grading**: In-semester quiz+test(s): 40%; final exam: 30%; lab-work: 30%.

**References**:
2. Foley and van Dam, “Computer Graphics”, Person Education