COMP 3490 – Computer Graphics 1

Calendar Description: An introductory course in computer graphics including topics such as raster graphics, two and three dimensional transforms, and simple rendering.
Prerequisite: COMP 2140 and either COMP 2190 or both MATH 1300 and MATH 1500 (or equivalent).
This course is a prerequisite for: COMP 4490.

Outline

1) Rasterization (1 week)
    Introduction to the viewing pipeline; viewports; polygon rasterization.
2) Primitives (2 weeks)
    Rendering primitives in 2D; the properties of primitives; colour and alpha; basic rendering algorithms such as Bresenham's line and flood fill; scan-line conversion; barycentric coordinates.
3) Transformations in 2D (2 weeks)
    Affine transformations and inverse transformations; matrix representations of transformations; coordinate systems; transformations as a change of basis; orthographic projection.
4) Interactivity and animation in 2D (1 1/2 weeks)
    Input processing; interacting with graphical objects; animation techniques; interpolation; advanced animation and object specification techniques such as hierarchical modeling.
5) Transformations and viewing in 3D (2 weeks)
    Affine transformations in 3D; techniques for specifying 3D rotations such as Euler angles and quaternions; view volumes; perspective and other projections.
6) Visibility in 3D (2 weeks)
    Clipping; object and surface culling; visible surface determination techniques including z-buffering and painter's algorithm; depth cueing.
7) Surface details (1 1/2 weeks)
    Texture mapping; other surface detailing techniques such as bump and displacement mapping.
8) Additional topics (1 week, time permitting)
    Advanced topics such as computational typography or image processing.

Text: Hearn, Baker, Carithers. *Computer Graphics with OpenGL*, fourth edition, Prentice Hall, 2011.