

SU DEPARTMENT OF MATHEMATICS AND COMPUTER SCIENCE
 SYLLABUS (*Tentative*)
COSC/MATH 482/582 *Computer Graphics*

Description: This course focuses on generating and manipulating graphic information using computers. Emphasis will be on the mathematical analysis of the fundamental problems associated with those activities and on the structured design of solutions. **Note: Credit may not be received for more than one: COSC/MATH 482.**

Objectives: At the conclusion of the course, the student will have demonstrated (a) ability to design, and implement on a computer, algorithms to display and manipulate elementary two- and three-dimensional graphics figures and (b) understanding of the mathematics underlying those activities.

Prerequisites: COSC 120 and MATH 306.

Textbooks: "Open GL Programming Guide: The Official Guide To Learning Open GL, Version 3.0 and 3.1 by The Kronos OpenGL ARB Working Group, Dave Shreiner, Pearson Education, 7th edition, 2010.

	<i>Weeks</i>
<i>Introduction</i>	1
Conceptual framework for graphics. The graphics pipeline and ray tracing systems Introduction to the Open GL API, GLU, GLEE, GLUT and an introduction to POV-Ray.	
<i>Graphics Primitives and Techniques</i>	2
Color, basic modeling, single vs. double buffering, hidden surface removal, clipping, and event driven programming, OpenGL, GLU & GLUT and POV-Ray graphics primitives	
<i>Lighting, Illumination, and Shading</i>	2
Lighting models, materials, shading vs. shadowing, OpenGL and POV-Ray materials	
<i>Geometrical Transformations and Viewing</i>	3
Coordinate-free geometry, vector and affine spaces, homogeneous coordinates, change in frames, translations, scaling, rotations, shear, concatenation of transformations, and an introduction to animation. Open GL matrix stacks, modelview and projection matrices and basic shadowing. POV-Ray commands for geometric transformations.	
<i>Texture Mapping</i>	2
Texture mapping, bump mapping, environment mapping. OpenGL texture coordinates, texture coordinate generation and texture matrix. POV-Ray texture modes and bump mapping.	
<i>Advanced Techniques of Three-Dimensional Graphics</i>	3
Bezier curves, B-splines, advanced modeling, intersection and collision testing, radiosity. OpenGL vertex arrays, stencil and accumulation buffers, reflection and shadowing	
<i>Tests and Optional Topics</i>	<u>1</u>
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EVALUATION

Quizzes and Tests	20%-40%
Programs and Projects	40%-60%
Final Exam and/or Project	15%-30%