

# CMPS 3480 Computer Graphics

## Catalog Description

### **CMPS 3480 Computer Graphics**

Introduction to computer graphics hardware, animation, two-dimensional transformations, basic concepts of computer graphics, theory and implementation. Use of graphics API's such as DirectX or OpenGL. Developing 2D graphics applications software. Each week lecture meets for 150 minutes and lab meets for 150 minutes. Prerequisite: CMPS 2020.

## Prerequisite by Topic

Programming in C  
Object Oriented Programming  
Data Structures

## Units and Contact Time

4 semester units. 3 units lecture (150 minutes), 1 unit lab (150 minutes).

## Type

Required for Students of Computer Information Systems Track.

## Required Textbook

Interactive Computer Graphics: A Top-Down Approach with Shader-Based OpenGL, 6/E, Edward Angel and Dave Shreiner, Addison-Wesley publication, ISBN-10: 0132545233 • ISBN-13: 9780132545235.

## Recommended Textbook and Other Supplementary Material

None

## Coordinator(s)

Arif Wani and Gordon Griesel.

## Student Learning Outcomes

This one-semester first course is aimed at providing a firm foundation in Computer Graphics to both specialist and non-specialists undergraduates.

This course covers student learning outcomes falling under the following ACM/IEEE Body of Knowledge topics:

GV/Fundamental Concepts  
GV/Basic Rendering  
GV/Computer Animation

## ABET Outcome Coverage

This course maps to the following performance indicators for Computer Science (CAC/ABET):

CAC 3b with PIb1:

3b. An ability to analyze a problem, and identify and define the computing requirements and specifications appropriate to its solution.

PIb1. Identify key components and algorithms necessary for a solution.

CAC 3d with PID2:

3d. An ability to function effectively on teams to accomplish a common goal.

PID2. Listen and communicate with other team members.

CAC 3i with PI1:

3i. An ability to use current techniques, skills, and tools necessary for computing practice.

PI1. Program in a suitable computer language.

### **Lecture Topics and Schedule**

Week 1	Introduction to Computer Graphics Graphics Programming Frameworks The Graphics Pipeline	Chapter 1
Week 2	API Programming XWindows, OpenGL	Chapter 2
Week 3	Graphics Programming Raster Images and Functions Color Models (RGB, HSL)	Chapter 2
Week 4	Line Drawing Algorithms Bresenham's, DDA, Wu	Chapter 6
Week 5	Bresenham's Circle Drawing Algorithms Parametric Shapes and Boundaries	Chapter 6
Week 6	Bresenham's Ellipse Drawing Algorithms Curves and Splines	Chapter 6
Week 7	Orthographic Projections Ray Casting Vectors and Intersections	Chapter 4
Week 8	Perspective Projections Ray Tracing Basics	Chapter 4
Week 9	Transformations Translation, Rotation, Scaling	Chapter 3
Week 10	Transformations The Rotation Matrix Kinematics	Chapter 3
Week 11	Clipping Algorithms Cohen-Sutherland CSG - Constructive Solid Geometry	Chapter 6
Week 12	Filling Algorithms Flood Fill Scanline Conversion	Chapter 6
Week 13	Hidden-Surface Removal Painter's Algorithm Z-Buffer Binary Space Partitioning	Chapter 6
Week 14	Lighting Point and Directional Lights Global Lighting, Photon Mapping Subsurface Scattering	Chapter 5
Week 15	Shading Surface Normals Gouraud, Phong, Blinn-Phong Reflection and Refraction	Chapter 5

**Design Content Description**

Not applicable to this course

**Prepared By**

Arif Wani

**Approval**

Approved by CEE/CS Department on [date]

Effective [term]