College of Computer Science and Information Systems | **Department of Computer Science**

Course Code : 281CSS-3 | **Computer Graphics**

Contact Hour : 3(0) | **Prerequisite : 111CSS-4**

Coordinator -

2. Course Description

This course is dedicated to introduce the fundamental concepts in creating computer graphical images. Computer graphics is a multidisciplinary field which uses different ideas from art, mathematics, and computer science to create images. In this course the students study OpenGL that has combinations with C and C++ to create graphical images by writing frequent programs and solve problem sets. Topics to be covered in this course as: Introduction to graphics concepts, basic graphics programming and OpenGL (or 3D Max), basic raster graphics algorithms and primitives, scan conversion, graphics hardware, 2D geometrical transformations, 3D geometry and viewing, hierarchical modeling, input devices and techniques, lighting and color, projections, hidden surface removal, and shading and rendering.

3. Course Learning Outcomes

SL	By the end of this course, students should be able to:	Linkages to POs
1.	Demonstrate knowledge of fundamental and contemporary computer graphics hardware and software	a(S)
2.	Demonstrate basic knowledge of mathematical background (vector and matrix computation) and algorithms underlying the basic computer graphics primitives	a(S),j(S)
3.	Apply the main OpenGL attributes that control the display characteristics of graphics primitives	c(W),i(W)
4.	Implement basic geometrical transformations on simple 2D and 3D computer objects using OpenGL in C++	a(S),i(W),j(W)
5.	Create interactive and usable graphic applications in C++ using OpenGL programming interfaces	c(S),i(S)
6.	Apply basic physics of light and its interaction in simple objects using OpenGL in C++	j(W)
7.	Illustrate good level of debugging, documentation and structuring skills in computer graphics programs	a(W),j(W)

4. Learning Resources

Text	Baker Hearn, Computer Graphics With OpenGL, Updated Edition, Third Edition, 006.6 HDC
Reference	Dave Shreiner, Mason Woo, Jackie Neider, and Tom Davis, OpenGL Programming Guide: The Official Guide to Learning OpenGL, Addison-Wesley, Latest Edition.
Reference	Francis S Hill Jr. and Stephen M Kelley, Computer Graphics Using OpenGL, Prentice Hall, Latest Edition.
Reference	Edward Angel, OpenGL: A Primer, Addison Wesley, Latest Edition.

5. Course Content : The list below provides a summary of the material that will be covered during the course

Week	Topics	References Book / Others Source	Special Event	Tutorial Activities	Lab Activities
1.	Introduction to computer graphics	Chap 1			
2.	Graphics display devices and input/output primitives	Chap 2			Lab 1
3.	Drawing basic graphics primitives, filling polygons	Chap 3 + Lecturer Handout	Assignment 1		Lab 2

4.	Attributes of computer graphics primitives (state variables, color, points, lines, filling regions, antialiasing)	Chap 4 + Lecturer Handout	Assignment 2		Lab 3
5.	Attributes of computer graphics primitives (state variables, color, points, lines, filling regions, antialiasing)	Chap 4 + Lecturer Handout	Quiz 1		Lab4
6.	2D geometric affine transformations	Chap 6 + Chap 5 + Lecturer Handout			Lab 5
7.	2D viewing pipeline, clipping, and coordinates	Chap 6 + Chap 5 + Lecturer Handout	Midterm 1		Lab 6
8.	2D viewing pipeline, clipping, and coordinates	Chap 6 + Lecturer Handout	Quiz 2, Assignment 3		Lab 7
9.	Three dimensional viewing and graphics rendering pipeline and 3D viewing and graphics rendering pipeline	Chap 7 + Lecturer Handout	Quiz 3		Lab 8
10.	Three dimensional viewing and graphics rendering pipeline and 3D viewing and graphics rendering pipeline	Chap 7 + Lecturer Handout	Midterm 2		Lab 8
11.	Representation and transformation of geometric objects (Polyhedra and Curved Surfaces)	Chap 8 + Lecturer Handout	Assignment 4		Lab 9
12.	Representation and transformation of geometric objects (Polyhedra and Curved Surfaces)	Chap 8 + Lecturer Handout	Quiz 4		Lab 10
13.	Introduction to interactive input methods and mouse and keyboard functions	Chap 11 + Lecturer Handout	Quiz 5		Lab 11
14.	Visible surface detection	Lecturer Handout	Quiz 6		Lab 12

6. Evaluation Scheme: The following list is the contribution of course components to the final grade for the course.

Component	Weight (%)
Assignment 1	2
Assignment 2	2
Assignment 3	2
Assignment 4	2
Assignment 5	2
First Midterm Exam	15
Second Midterm Exam	15
Lab Performance	10
Final Lab Exam	10
Final Exam	40
Total	100


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