







Course Title: Computer Graphics

Course Code: 281CSS-3 & 414CCS-3

Program: Computer Science in Computer Science

Department: Computer Science

College: Computer Science and Information Systems

Institution: Najran University

Version: 2.0

Last Revision Date: August 2022







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A. General information about the course:

1. Course Identification

1. Credit hours: (3)

3 (2, 2, 1) [Theory, Lab, Tutorial]

2. Course type						
Α.	University	□College	🛛 Depa	rtment	□Track	□Others
В.	☑ Required □Elective					
3. Level/year at which this course is offered: (Level 8 / Year 4)						
4. C	ourse General D	escription:				

This course introduces the fundamental concepts of 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 which has combinations with C and C++ to create graphical images by writing frequent programs and solving problem sets. Topics to be covered in this course are 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 modelling, input devices and techniques, lighting and color, projections, hidden surface removal, and shading and rendering.

5. Pre-requirements for this course (if any):

111CSS-4

6. Pre-requirements for this course (if any):

342MATH-3

7. Course Main Objective(s):





- 1. Demonstrate knowledge of fundamental and contemporary computer graphics hardware.
- 2. Demonstrate basic knowledge of mathematical background (vector and matrix computation) and algorithms underlying the basic computer graphics primitives
- 3. Apply the main OpenGL attributes that control the display characteristics of graphics primitives
- 4. Implement basic geometrical transformations on simple 2D and 3D computer objects using OpenGL in C++
- 5. Create interactive and usable graphic applications in C++ using OpenGL programming interfaces
- 6. Illustrate a good level of debugging, documentation and structuring skills in computer graphics programs

2. Teaching mode (mark all that apply)

No	Mode of Instruction	Contact Hours	Percentage
1	Traditional classroom	75	100%
2	E-learning		
	Hybrid		
3	Traditional classroom		
	• E-learning		
4	Distance learning		

3. Contact Hours (based on the academic semester)

No	Activity	Contact Hours
1.	Lectures	30
2.	Laboratory/Studio	30
3.	Field	-
4.	Tutorial	15
5.	Others (specify)	-
Total		75

B. Course Learning Outcomes (CLOs), Teaching Strategies and Assessment Methods

Code	Course Learning Outcomes	Code of CLOs aligned with the program	Teaching Strategies	Assessment Methods
1.0	Knowledge and under	standing		



Code	Course Learning Outcomes	Code of CLOs aligned with the program	Teaching Strategies	Assessment Methods
1.1	Demonstrate knowledge of fundamental and contemporary computer graphics hardware	Κ1	TS:1-Interactive Lectures using PowerPoint slides with more examples TS:2- Engaging the students in problem- based learning through Tutorials	Locally Developed Exams such as Quiz, Mid Exam & Final Exam
1.2	Demonstrate basic knowledge of mathematical background (vector and matrix computation) and algorithms underlying the basic computer graphics primitives	K ₁ , K ₃	TS:1-Interactive Lectures using PowerPoint slides with more examples TS:2- Engaging the students in problem- based learning through Tutorials	Locally Developed Exams such as Quiz, Mid Exam & Final Exams embedded Questions with Scoring Rubrics
2.0	Skills			
2.1	Apply the main OpenGL attributes that control the display characteristics of graphics primitives	S ₁ , S ₂	TS:1-Interactive Lectures using PowerPoint slides with more examples TS:2- Engaging the students in problem- based learning through	
2.2	Implement basic geometrical transformations on simple 2D and 3D computer objects using OpenGL in C++	S_2	Tutorials TS:3- Lab Demonstrations TS: 4- Encouraging the students to use online links to know the concepts in detail. TS: 5 – Recall the topics	
2.3	Create interactive and usable graphic applications in C++ using OpenGL programming interfaces	S ₂ , S ₅	discussed in the last lecture by asking questions to the students. TS: 6 – Associating the topics in each chapter with the CLO.	
3.0	Values, autonomy, and	d responsibility		
3.1	Illustrate a good level of debugging,	\mathbf{V}_1	TS:1- Lab Demonstrations	Midterm Exam, Final Exam





Code	Course Learning Outcomes	Code of CLOs aligned with the program	Teaching Strategies	Assessment Methods
	documentation and structuring skills in computer graphics programs		TS: 2- Encouraging the students to use online links to know the concepts in detail.	

C. Course Content

No	List of Topics	Contact Hours
1.	Introduction to computer graphics	5
2.	Graphics display devices and input/output primitives	5
3.	Drawing basic graphics primitives, filling polygons	5
4.	Attributes of computer graphics primitives (state variables, colour, points, lines, filling regions, antialiasing)	10
5.	2D geometric affine transformations	10
6.	2D viewing pipeline, clipping, and coordinates	10
7.	Three-dimensional viewing and graphics rendering pipeline and 3D viewing and graphics rendering pipeline	10
8.	Representation and transformation of geometric objects (Polyhedra and Curved Surfaces)	10
9.	Introduction to interactive input methods and mouse and keyboard functions	5
10.	Visible surface detection	5
	Total	75

D. Students Assessment Activities

No	Assessment Activities *	Assessment timing (in week no)	Percentage of Total Assessment Score
1.	Quizzes	5, 9, 11	15%
2.	Assignments	5	5%
3.	Mid Lab Exam	10	10%
4.	Final Lab Exam	15	10%
5.	Midterm Examinations	7	20%
6.	Final Exam	17	40%

*Assessment Activities (i.e., Written test, oral test, oral presentation, group project, essay, etc.).





E. Learning Resources and Facilities

1. References and Learning Resources

Essential References	Computer Graphics with OpenGL®, Fourth Edition, Donald	
	Hearn, M. Pauline Baker, Warren R. Carithers.	
	1. Edward Angel, OpenGL: A Primer, Addison Wesley, Latest	
	Edition, 2007.	
Supportive References	2. Dave Shreiner, Mason Woo, Jackie Neider, and Tom Davis,	
	OpenGL Programming Guide: The Official Guide to Learning	
	OpenGL, Addison-Wesley, Latest Edition, 2009	
	http://freecomputerebooks.blogspot.com/2007/05/computer-	
	graphics-3d-graphics-vrml.html	
Other Learning Materials	Help Tutorial – Addison Wesley OpenGL Reference Manual	

2. Required Facilities and equipment

Items	Resources
facilities (Classrooms, laboratories, exhibition rooms, simulation rooms, etc.)	Classrooms to accommodate 30 students per classroom with desks and chairs, and labs to accommodate 30 students per lab with advanced computers.
Technology equipment (projector, smart board, software)	Data show, stationaries, smart board, suitable IDE (Netbeans and Eclipse)
Other equipment (depending on the nature of the specialty)	ACs for labs and classrooms, black curtains

F. Assessment of Course Quality

Assessment Areas/Issues	Assessor	Assessment Methods	
Collecting students' suggestions to facilitate more during the class.	Students	Verbal discussion	
Student's questionnaire once during the semester about course learning outcomes.	Students	Indirect Survey	
Achievement percentage of course learning outcomes, direct evaluation using CLO assessment sheet	Course Instructor	Direct evaluation using CLO achievement calculation	
Teaching strategies	Quality unit	Indirect	
Assessment methods	Quality unit	Indirect	
Instructor performance	Quality unit	Indirect	
Course content	Quality unit	Indirect	
Assessors (Students, Faculty, Program Leaders, Peer Reviewer, Others (specify)			

Assessment Methods (Direct, Indirect)





G. Specification Approval

COUNCIL /COMMITTEE	Computer Science Departmental Council
REFERENCE NO.	14440203-0185-00002
DATE	1st Sep, 2022

