Course Specification

— (Bachelor)

Course Title: COMPUTER GRAPHICS	
Course Code: COMP 461	
Program: Bachelor of Computer Science	
Department: COMPUTER SCIENCE	
College: College of Engineering & Computer Science	
Institution: Jazan University	
Version: V2	
LastRevision Date:: 07 January 2023	

Table of Contents

A. General information about the course:

1. Course Identification

1. Credit hours: (03)

2. Course type

A.	☐University	☐College	☒Department	☐Track	☐Others
B.	☒Required			☐Elective	

3. Level/year at which this course is offered: (……….)

4. Course general Description:

In this Course Computer Graphics theory and applications will be covered. Topics taught are classified as Fundamentals of computer graphics programming, Graphics hardware and software standards, 2D geometric primitives and raster images, 3D object representations. Data structures, algorithms, and the graphics pipeline. Graphical user interfaces. Underlying concepts in computer graphics systems including games, animation, modelling, rendering and paint systems.

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

Nil

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

Nil

7. Course Main Objective(s):

- Explain the basic objectives, scope and applications of computer graphics.
- Illustrate the basic structures of 2D and 3D graphics systems.
- Determine 2D coordinate systems and equations of graphs and construct custom shapes.
- Demonstrate 2D transformations including translation, rotation, scaling, shearing, and reflection.
- Demonstrate 3D transformations including translation, rotation, scaling, shearing, and reflection.
- Discuss parallel and perspective projections and specify the viewing and projection matrices.

2. Teaching mode (mark all that apply)

No	Mode of Instruction	Contact Hours	Percentage
1	Traditional classroom	60	100%
2	E-learning		
3	Hybrid • Traditional classroom		

No	Mode of Instruction	Contact Hours	Percentage
	● E-learning		
4	Distancelearning		

3. Contact Hours(based on the academic semester)

No	Activity	Contact Hours
1.	**Lectures**	28
2.	**Laboratory/Studio**	28
3.	**Field**	
4.	**Tutorial**	
5.	**Others (specify)**	04
Total		60

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

Code	Course Learning Outcomes	Code of CLOs aligned with program	Teaching Strategies	Assessment Methods
1.0	**Knowledge and understanding**			
1.1	**Describe** the fundamentals of vector graphics and raster graphics.	K1	● Lectures/Present ations Media Lectures	● Mid-Term Exam ● Assignment-1 Final Theory Exam
1.2	**Relate** recent developments in the field of computer graphics.	K2	● Lectures/Present ations Media Lectures	● Mid-Term Exam ● Assignment-2 Final Theory Exam
...				
2.0	**Skills**			
2.1	**Evaluate** mapping of two-dimensional objects from the window to viewport.	S2	● Lectures /Presentations ● Media Lectures Tutorials	● Assignment -1 ● Assignment –2 Final Theory Exam
2.2	**Analyze** and	S1	● Lectures	● Assignment -

Code	Course Learning Outcomes	Code of CLOs aligned with program	Teaching Strategies	Assessment Methods
	implement two-dimensional and three-dimensional transformations such as translation, scaling and rotation.		/Presentations • Media Lectures Tutorials	1 • Assignment – 2 Final Theory Exam
2.3	**Explain** the concept of viewing pyramid and projection methods such as perspective projection and parallel projection.	S2	• Lectures /Presentations • Media Lectures Tutorials	• Assignment - 1 Final Theory Exam
2.4	**Design** two dimensional and three dimensional geometric objects.	S3	• Lectures /Presentations • Lab Demonstration • Media Lectures • Group discussion	• Assignment - 2 • Lab Exam • Final Theory Exam
2.5	**Present** design and development of graphics application effectively.	S5	• Lectures /Presentations • Lab Demonstration • Media Lectures • Group discussion	• Assignment - 2 • Lab Exam • Final Theory Exam
3.0	**Values, autonomy, and responsibility**			
3.1	**Demonstrate** ability to work in a team to design a graphics application program using OpenGL.	V2	• Group Discussion	• Assignment – 2 (Group Assignment)
3.2				
…				

C. Course Content

No	List of Topics	Contact Hours
1.	Fundamental of computer graphics Applications of Computer graphics Input device Client-Servers Display lists Cathode ray tube	4T+4P

	Raster Scan System	
2.	Introduction of Line drawing DDA algorithm Bresenham's line algorithm Midpoint circle algorithm Midpoint Circle algorithm	6T+6P
3.	Introduction to 2D Transformations Translation, Rotation and Scaling Homogeneous Coordinates Inverse Transformation Composite Transformation Reflection Shear	6T+6P
4.	2D Viewing Window to Viewport coordinate transformation Mapping Clipping Window to Normalized Viewport Introduction to clipping Cohen Sutherland Algorithm for clipping Sutherland-Hodgman Polygon Clipping Algorithm	6T+6P
5.	3D Transformations(Translate, rotate, scale) 3D Reflection & Shear Affine Transformations Overview of 3D viewing concepts 3D Viewing pipeline Projection Transformations Orthogonal Projections Oblique Parallel Projections Perspective Projections	6T+6P
---	Revision and doubt clearance	**2T+2T**
Total		**30T+30T**

D. Students Assessment Activities

No	Assessment Activities *	Assessment timing (in week no)	Percentage of Total Assessment Score
1.	Midterm Exam	5th-6th week	15%
2.	Assignment I	7th week	10%
3.	Assignment II (Case Study/ Group assignment)	9th week	15%
4.	Lab Exam	11th Week	20%
5.	Final Theory Exam	12th Week	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	Donald Hearn , M. Pauline *Baker, "Computer Graphics with OpenGL"*, *Pearson* Education Inc., *Fourth Edition*, 2014, ISBN-13: 978-0136053583
Supportive References	Peter Shirley, *Fundamentals of Computer Graphics, Third Edition*, 2009, A K Peters/CRC Press , ISBN 9781568814698 - CAT# K00408
Electronic Materials	http://www.opengl.org/wiki/Code_Resources
Other Learning Materials	

2. Required Facilities and equipment

Items	Resources
facilities (Classrooms, laboratories, exhibition rooms, simulation rooms, etc.)	• Classroom equipped with projector, whiteboard, and sufficient seating arrangements. • Lab with software installed and an individual computer terminal for each student.
Technology equipment (projector, smart board, software)	• Whiteboards and projectors for classroom and labs • Following software for lab work: • OpenGL
Other equipment (depending on the nature of the specialty)	• None

F. Assessment of Course Quality

Assessment Areas/Issues	Assessor	Assessment Methods
Effectiveness of teaching		
Effectiveness of Studentsassessment	CRC / QAU / HOD	Direct (Course reports / result analysis)
Quality of learning resources	Track leaders / CRC	Indirect (Review, meetingsand star rating withsuggestions for furthermodification and improvements)
The extent to which CLOs have been achieved	CRC / QAU	Direct (CLO assessment template further verified

Assessment Areas/Issues	Assessor	Assessment Methods
		atcourse coordinator, Trackleader and QAU level)
Other		

Assessors (Students, Faculty, Program Leaders, Peer Reviewer, Others (specify)

Assessment Methods(Direct, Indirect)

G. Specification Approval

COUNCIL /COMMITTEE	DEPARTMENT COUNCIL
REFERENCE NO.	ENGCSCS2406
DATE	19-09-2024