Course Specifications

Course Title:	Computer Graphics
Course Code:	**ICS-322**
Program:	Information Technology
Department:	Computer Science & Information
College:	Science at AL-Zulfi
Institution:	Majmaah University

Table of Contents

A. Course Identification

1. Credit hours:
2. Course type **a.** University ☐ College ☐ Department ■ Others ☐ **b.** Required ■ Elective ☐
3. Level/year at which this course is offered: **6th Level**
4. Pre-requisites for this course (if any)**:** Linear Algebra (MATH 210) Object Oriented Programming ICS 211
5. Co-requisites for this course (if any)**:** **Nil**

6. Mode of Instruction (mark all that apply)

No	Mode of Instruction	Contact Hours	Percentage
1	**Traditional classroom**	48	80%
2	**Blended**	6	10%
3	**E-learning**	6	10%
4	**Correspondence**	-	-
5	**Other**	-	-

7. Actual Learning Hours (based on academic semester)

No	Activity	Learning Hours
Contact Hours		
1	**Lecture**	30
2	**Laboratory/Studio**	30
3	**Tutorial**	
4	**Others** (specify)	
	Total	60
Other Learning Hours*		
1	**Study**	30
2	**Assignments**	30
3	**Library**	
4	**Projects/Research Essays/Theses**	10
5	**Others** (specify)	30
	Total	100

* The length of time that a learner takes to complete learning activities that lead to achievement of course learning outcomes, such as study time, homework assignments, projects, preparing presentations, library times

B. Course Objectives and Learning Outcomes

1. Course Description

The course covered the general concepts of computer graphics and its applications. It starts with an overview of interactive computer graphics, two dimensional system and mapping, then it presents the most important drawing algorithm, two-dimensional transformation; Clipping, filling and an introduction to 3D graphics.
The purpose of this course is to:

1. Introduce the students with the concepts and principles of computer graphics.
2. Give a thorough description of computer graphics hardware and software systems.
3. Understand the theory and application of Transformation and projection.
4. Understand the graphics pipeline: Modeling, texture mapping, illumination and ray tracing.
5. Design and implement a simple project using OpenGL.

2. Course Main Objective

1. A Survey of Computer Graphics Applications i. e. Engineering, Medical Imaging, Geography, Animations, Movies, 2D/3D, visualization etc.

2.Overview of Computer Graphics & Systems Graphics: Primitives and Packages, The Graphical Pipeline, CRT, Raster-Scan and Random-Scan displays, Color CRT Monitors, Flat-Panel Displays, Video Controller, Display Processor, CLUT … etc.

3.Colours and Grayscales: Beam-Penetration method Shadow-mask method.

4.Output Primitives and Attributes: Points, Lines, Circles, Ellipses. Examples - Open GL.

5. 2D and 3D Modeling, Types of Modeling, Types of Geometric Models
6. 2D Transformations and Viewing:
Translation, Scaling, Rotation, Shearing, Examples – Open GL.
7. 3D Transformation and Viewing:
3D Representation, Translation, Scaling, Rotation, Examples- OpenGL
8. 2D Viewing and 3D Viewing: Windows and Viewports, Window-To Viewport Coordinate Transformation, Point clipping, line clipping,
Cohen-Sutherland Line Clipping, Liang Barsky Line Clipping, 3d Rendering Pipeline, Examples-Open GL.
9. Projection :Parallel and Perspective Projection, Orthographic Parallel Projection, Oblique Parallel Projection, Oblique Projection, Cavalier Projections, Cabinet Projections, Examples - Open GL.

3. Course Learning Outcomes

CLOs		Aligned PLOs
1	**Knowledge:**	
1.1	Understand the 2D graphics and algorithms including line drawing, polygon filling, clipping, and transformations. They will be able to implement these concepts	a1
1.2	Understand the concepts and techniques used in 3D computer graphics, including viewing transformations, hierarchical modelling, colour, lighting and texture mapping.	a1
1.3	Acquire knowledge of the history and evolution of Course Teaching	a1

CLOs		Aligned PLOs
	Strategies computer graphics both hardware and software.	
1...		
2	**Skills :**	
2.1	Apply the 2D transformations and 3D transformations, and Explain how simple line and polygon clipping algorithms work.	b3
2.2	Function effectively on teams to accomplish a common goal, and communicate with the teacher, ask questions, solve problems, and use computers	b2
2.3	Implement simple animations using OpenGL.	b3
2...		
3	**Competence:**	
3.1	Learn how to search for information through library and internet, and Present a short report in a written form and orally using appropriate scientific language	C1
3.2	Use matrix algebra in computer graphics application and draw the basic primitives (e.g., point, line, polygons) using OpenGL.	C1
3.3		
3...		

C. Course Content

No	List of Topics	Contact Hours
1	Introduction to Computer Graphics and Its application	3
2	Coordinate Systems and Transformation (2D/3D)	6
3	Line, Circle and Ellipse Drawing	6
4	Lines Clipping (Cohan Sutherland and Liang Barsky Algorithm)	3
5	Projections	3
6	Bezier Curve (Inserting Points)	3
7	Polygon coloring	3
8	Illumination and ray tracing	6
9	Texture mapping	3
.10 ..	Animations and Movies	6
Total		

D. Teaching and Assessment

1. Alignment of Course Learning Outcomes with Teaching Strategies and Assessment Methods

Code	Course Learning Outcomes	Teaching Strategies	Assessment Methods
1.0	**Knowledge**		
1.1	Acquire knowledge of the history and evolution of computer graphics, both hardware and software.	Lectures Lab demonstrations Case studies Individual presentations Brainstorming.	Written Exam Homework assignments Lab assignments Class Activities Quizzes
1.2	Understand the 2D graphics and algorithms including: line drawing, polygon filling, clipping, and		

Code	Course Learning Outcomes	Teaching Strategies	Assessment Methods
	transformations. They will be able to implement these concepts.		
…	Understand the concepts and techniques used in 3D computer graphics, including viewing transformations, hierarchical modeling, color, lighting and texture mapping.		
2.0	**Skills**		
2.1	Use matrix algebra in computer graphics application and draw the basic primitives (e.g., point, line, polygons) using OpenGL.	Lectures Lab demonstrations Case studies Individual presentations Brainstorming.	Written Exam Homework assignments Lab assignments Class Activities Quizzes
2.2	Apply the 2D transformations and 3D transformations, and Explain how simple line and polygon clipping algorithms work.		
…	Implement simple animations using OpenGL.		
3.0	**Competence**		
3.1	Learn how to search for information through library and internet, and Present a short report in a written form and orally using appropriate scientific language.	Small group discussion Whole group discussion Brainstorming Presentation Brainstorming.	Written Exam Homework assignments Lab assignments Class Activities Quizzes
3.2			
…			

2. Assessment Tasks for Students

#	Assessment task*	Week Due	Percentage of Total Assessment Score
1	First written mid-term exam	6	15%
2	Second written mid-term exam	12	15%
3	Presentation, class activities, and group discussion	Every week	10%
4	Homework assignments	After each chapter	10%
5	Implementation of presented protocols	Every two weeks	10%
6	Final written exam	16	40%
7	Total		100%
8			

***Assessment task** (i.e., written test, oral test, oral presentation, group project, essay, etc.)

E. Student Academic Counseling and Support

Arrangements for availability of faculty and teaching staff for individual student consultations and academic advice :

Office hours: Sun: 8-10, Mon. 10-12
Email: m.badawi@mu.edu.sa

F. Learning Resources and Facilities

1.Learning Resources

Required Textbooks	Computer Graphics with Open GL (4th Edition) , Donald D. Hearn, M. Pauline Baker , Prentice Hall 2013 , ISBN-13: 9780136053583
Essential References Materials	
Electronic Materials	
Other Learning Materials	

2. Facilities Required

Item	Resources
Accommodation (Classrooms, laboratories, demonstration rooms/labs, etc.)	Classroom and Labs as that available at college of science at AzZulfi are enough.
Technology Resources (AV, data show, Smart Board, software, etc.)	Smart Board
Other Resources (Specify, e.g. if specific laboratory equipment is required, list requirements or attach a list)	N/A

G. Course Quality Evaluation

Evaluation Areas/Issues	Evaluators	Evaluation Methods
Questionnaires (course evaluation) achieved by the students and it is electronically organized by the university.	Students	Indirect
Student-faculty management meetings.	Program Leaders	Direct
Discussion within the staff members teaching the course	Peer Reviewer	Direct
Departmental internal review of the course.	Peer Reviewer	Direct
Reviewing the final exam questions and a sample of the answers of the students by others.	Peer Reviewer	Direct
Visiting the other institutions that introduce the same course one time per semester.	Faculty	Indirect

Evaluation areas (e.g., Effectiveness of teaching and assessment, Extent of achievement of course learning outcomes, Quality of learning resources, etc.)
Evaluators (Students, Faculty, Program Leaders, Peer Reviewer, Others (specify)
Assessment Methods (Direct, Indirect)

H. Specification Approval Data

Council / Committee	Dr. Maria Altaib
Reference No.	
Date	19/09/2019