Course Specification

— (Bachelor)

Course Title: Computer Graphics

Course Code: 501472-3

Program: Bachelor of Computer Science

Department: Department of Computer Science

College: College of Computers and Information Technology

Institution: Taif University

Version: 1

Last Revision Date: 01-02-2024

Table of Contents

A. General information about the course:

1. Course Identification

1. Credit hours: (45)

2. Course type

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

3. Level/year at which this course is offered: (8th)

4. Course general Description:

Introduce techniques for constructing 2-D and 3-D Graphics using OpenGL. The topics include the rendering pipeline, primitive drawings, geometric transformations, clipping, lighting and illumination, color models texture mapping, and ray-tracing animation.

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

501324-3 Data Structures

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

202262-3 Linear Algebra

7. Course Main Objective(s):

By the end of this course, the students should be able to:
- Understand the foundations of computer graphics hardware systems, math basis, light and color.
- Know how to implement graphics primitives such as windows, points, line and circle using graphics programming library such as OpenGL library.
- Understand the full graphics pipeline and implement it in OpenGL.

2. Teaching mode (mark all that apply)

No	Mode of Instruction	Contact Hours	Percentage
1	Traditional classroom	-	-
2	E-learning	-	-
3	Hybrid • Traditional classroom • E-learning	2 1	67% 33%

No	Mode of Instruction	Contact Hours	Percentage
4	Distance learning	-	-

3. Contact Hours (based on the academic semester)

No	Activity	Contact Hours
1.	**Lectures**	45
2.	**Laboratory/Studio**	-
3.	**Field**	-
4.	**Tutorial**	-
5.	**Others (specify)**	-
Total		45

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	Understand the foundations of computer graphics hardware systems, math basis, light, color, modeling, and transformation.	**K1**	Lectures Tutorials	**Direct Assessment Tool** Quizzes / Homework/Project/ Exams **Indirect Assessment Tool** Course Exit Survey
1.2	Understand basic transformations types in computer graphics.	**K1**	Lectures Tutorials	**Direct Assessment Tool** Quizzes / Homework/Project/ Exams **Indirect Assessment Tool** Course Exit Survey
1.3				
2.0	**Skills**			
2.1	Model 2D and 3D transformations such as translation, scaling, shearing, rotation, and affine transformations.	**S1**	Lectures E-learning Videos	**Direct Assessment Tool** Quizzes / Homework/Project/ Exams **Indirect Assessment Tool** Course Exit Survey

Code	Course Learning Outcomes	Code of CLOs aligned with program	Teaching Strategies	Assessment Methods
2.2	Implement texture mapping and clipping and a full graphics pipeline.	**S2**	Lectures Videos Projects	**Direct Assessment Tool** Quizzes / Homework/Project/ Exams **Indirect Assessment Tool** Course Exit Survey
3.0	**Values, autonomy, and responsibility**			
3.1	…..	……….		
3.2	…..	……….		

C. Course Content

No	List of Topics	Contact Hours
1.	Overview of computer graphics concepts	2
2.	CRT, spots and lights, raster and random scan displays, color models.	3
3.	Color CRT monitors, color models, flat CRT and Video controller systems Raster and vector graphics.	4
4.	OpenGl program and structures.	4
5.	Windows, points, coordinate system.	4
6.	line drawing: DDA algorithm, Brasenham's algorithm.	4
7.	Circle and midpoint circle algorithms, Brasenham's algorithm.	4
8.	Primitive objects and fill colors in OpenGL.	4
9.	2D/3D transformation such as translation, scaling, shearing, rotation, and affine transformations.	6
10.	2D/3D deformation such as shearing, tapering, twisting, bending.	5
11.	Model view matrix: viewing in 3D orthographic projection and perspective projection.	5
Total		**45**

D. Students Assessment Activities

No	Assessment Activities *	Assessment timing (in week no)	Percentage of Total Assessment Score
1.	HomeWorks /Student Participation-Attendance	Weeks 3- 12	15%
2.	Quizzes	Week 13	15%
3.	Projects	Week 14	10%
4.	Mid-Term	Week 8	20%

No	Assessment Activities *	Assessment timing (in week no)	Percentage of Total Assessment Score
5.	Final Examination	Week 16	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 by Donald D. Hearn, M. Pauline Baker ISBN-13: 978-0136053583
Supportive References	• Computer Graphics Through OpenGL: From Theory to Experiments 2nd Edition ISBN-13: 978-1482258394 • OpenGL: A primer by Edward Angel
Electronic Materials	• http://www-inst.eecs.berkeley.edu/~cs184/sp12/slides.html • http://www.cs.cmu.edu/afs/cs/academic/class/15462-f10/www/
Other Learning Materials	-

2. Required Facilities and equipment

Items	Resources
facilities (Classrooms, laboratories, exhibition rooms, simulation rooms, etc.)	• Classroom with 30 chairs, • Lab with 20 PCs and required software tools installed (C++ editor with OpenGL support)
Technology equipment (projector, smart board, software)	• Video projector / data show / White board
Other equipment (depending on the nature of the specialty)	-

F. Assessment of Course Quality

Assessment Areas/Issues	Assessor	Assessment Methods
Effectiveness of teaching	• Students • Faculty members • Coordinator • Council • Curriculum Committees	• Course exit survey • Feedback from Faculty members • Feedback from Course Coordinator • Feedback from council • Feedback from Curriculum Committees
Effectiveness of Students assessment	• Students • Faculty members • Coordinator • Council • Curriculum Committees	• Course exit survey • Feedback from Faculty members • Feedback from Course Coordinator

Assessment Areas/Issues	Assessor	Assessment Methods
		• Feedback from council • Feedback from Curriculum Committees
Quality of learning resources	• Students • Faculty members • Coordinator • Council • Curriculum Committees	• Course exit survey • Feedback from Faculty members • Feedback from Course Coordinator • Feedback from council • Feedback from Curriculum Committees
The extent to which CLOs have been achieved	• Students • Faculty members • Coordinator • Council • Curriculum Committees	• Course exit survey • Feedback from Faculty members • Feedback from Course Coordinator • Feedback from council • Feedback from Curriculum Committees
Other		

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

Assessment Methods (Direct, Indirect)

G. Specification Approval

COUNCIL /COMMITTEE	CS council
REFERENCE NO.	Meeting #11
DATE	07/03/2024