Course specification

(3202 Computer Graphics)

Faculty:	*HICIT- **Higher Institute for Computers & Information Technology**-El Shorouk Academy*
Programme(s) on which the course is given:	Under graduate program in Computer Science
Major or minor element of programme:	Compulsory
Department offering the programme	Department of Computer Science
Department offering the course:	Department of Computer Science
Year / Class	3rd Year – 2nd semester
Date of specification approval	1/8/2022

A- Basic Information

Title: Computer Graphics	***Code:** 3202*		
Weekly Hours:			
Lecture : 3	**Exercise: -**	**Practical :**3	**Total:** 6

B- Professional Information

1- Course Aims:

The objective of CS3202 is to teach concepts and the fundamentals of Computer Graphics with hands to build up simple applications using openGL. The course starts with Understanding of computer generated pictures, the objective of the graphics and the relation to modern systems. The core of the study subjects are: elements of computer generated picture, graphic devices, real to device mapping, rasterization to polyline, general function raterization, filling regions, 2D and 3D rasterizations, projection, lightening and clipping and containment.

2- Program ILOs Covered by Course

Program Intended Learning Outcomes			
Knowledge and understanding	**Intellectual Skills**	**Professional and practical skills**	**General and Transferable skills**
A12, A21	**B2, B3, B4**	**C1, C7, C10**	**D5**

3- Intended learning outcomes of course (ILOs)

a. Knowledge and Under-Standing:

a1- Explain projection of 3-D views on 2-D plane using parallel projection. [A12, A21]
a2- Explain projection of 3-D views on 2-D plane based on perspective projection. [A12, A21]
a3- Explain lighting to a seen based on local reflection model. [A12, A21]
a4- Define 2-D and 3-D transformations to objects [A12]

b. Intellectual Skills:

b1– Apply Transformations to 2D-shapes and 3D-shapes.[B3, B4]
b2 – analyze the problem and decompose it to a set of tasks. [B2,B4]
b3 – analyze complex computation problems with less computational approaches. [B2, B3, B4]
b4- Differentiate between the computer generated pictures and raster images [B2]

c- Professional and practical skills

c1- Implement graphics based applications in 2D. [C1, C10]
c2- Developing graphics based applications using OPENGL.[C1,C7,C10]
c3- Developing graphics based applications that has 3D views. [C1,C10]
c4- Apply transformations and its inverse to the 2D, and 3D pictures.[C1,C7,C10]
c5- Perform systems analysis and design. [C7]

d- General and transferable skills

d1- Communicate with others; work in a team and involvement in group discussion and seminars. [D5]
d2. Write technical Report.[D5]

4- Contents

Topic	Hours	Lec.	Exc/Lab
Computer generated picture elements, attributes, uses	6	3	3
Mapping real window with coordinates to a device window	6	3	3
Rastering line segment, polyline, and polygon	6	3	3
General functions drawing and 2D transformations	12	6	6
Filling a region techniques	9	6	3
Parallel and perspective projections	6	3	3
3D transformations	6	3	3
Textures	6	3	3
Lightening	6	3	3
Clipping and containments	6	3	3
Selected topics	3	3	-
Course project	6	3	3

5- Teaching and learning methods

Teaching and learning methods	Used
Active Learning	
Lectures(blending learning – online learning using virtual classroom)	√
Tutorial Exercises (hybrid learning – online learning)	√
Practical Lab(blending learning– online learning)	√
Exercises	-
Discussions.	√
Self – Learning strategy	
Reading material	√
Websites search	√
Research and reporting	√
Self-studies	√
Experimental strategy	
Group work	√
Presentation	
Problem solving strategy	
Problem solving/problem solving learning based	√
Case study	
Synchronous E-Learning	
Virtual lab	-
Virtual class	-
Chat Room	√
Video lectures	√
Asynchronous E-Learning	
E-Learning	√

6- Student assessment methods

Methods	Assessment	Used
Electronic Midterm Exam	To assess the knowledge and understanding achieved by the student during the previous weeks. (online on e-learning hub)	√
Pencil-to-Paper Final Exam	To evaluate what the student gain at the end of the course, and to assess: the knowledge and understanding, general skills, and intellectual skills.	√
Course Project	To allow students work in team, and to evaluate knowledge, understanding, intellectual, and transferable skills. (online on e-learning hub , FTF)	√
Electronic Course Work & Quizzes	To keep the student always in the course, and to evaluate knowledge, understanding, intellectual, and transferable skills.(online on e-learning hub)	√
Participation	To assess the knowledge and understanding achieved by the student during the previous weeks.	√

Assessment Schedule

Assessment	Week #
Participation	**3-14**
Electronic Mid Term Exam	**8**
Final Exam	**16**
Electronic/ hard copy Course Project	**3-14**
Electronic/ hard copy Course Work &Quizzes	**2-14**

Assessment Weight

Assessment	Weight %
Participation	**5%**
Electronic Mid Term Exam	
Final Exam	**80%**
Electronic / hard copy Course Project	**10%**
Electronic/ hard copy Course Work &Quizzes	**5%**
Total	**100**

- Course Work &Quizzes:
  - Short Exams, Assignments, Researches, Reports, Presentations on e-learning hub
  - Class/Project discussion in a virtual classroom

7 -List of references

Essential books (text books)	• Guha, Sumanta. *Computer Graphics Through OpenGL: From Theory to Experiments*. 2022. • Marschner, Steve, and Peter Shirley. *Fundamentals of Computer Graphics*. 2021.
Course notes	– https://drive.google.com/file/d/1g1f7aTlDVAVKb5Z4EiLFjkHNhB1sLaLE/view?usp=sharing – [https://www.tutorialsduniya.com/notes/computer-graphics-notes/]
Recommended books	• Evangeline, D., and S. Anitha. *Computer Graphics and Multimedia: Insights, Mathematical Models and Programming Paradigms*. 2016. • Guha, Sumanta. *Computer Graphics Through OpenGL: From Theory to Experiments*. 2022. •
Periodicals,website	**Powerpoint presentations of all course materials** **All labs material** **[https://moodle.sha.edu.eg/course/view.php?id=2259]**

8- Required Facilities

To assess professional and practical skills given the following facilities:

a. Tools & SW (Technologies facilities):
- **Anaconda Python**
- **Microsoft TEAMS to create virtual classrooms for lectures, discussions for project**
- **portal(MOODLE) to make electronic quizzes and electronic midterm exam**
- **portal(MOODLE) to upload project deliverable and assignment**
- **academy portal(MOODLE) to upload electronic material**

b. Teaching facilities:

	Lecture	*class*	*Lab*
Whiteboard	used	-	used
Pc/laptop	used	-	used
Data show	used	-	used
Webinars	MS TEAMS	-	MS TEAMS
SocialMedia	Facebook Page for 3rd year	-	Facebook Page for 3rd year
ChatRoom	ChatTeams	-	ChatTeams
Videos	Stream-MOODLE	-	Stream-MOODLE
Website	MOODLE	-	MOODLE

9- Course Matrices

9.1- Course Content/ILO Matrix

Course Contents	Knowledge & understanding				Intellectual skills				Professional and practical skills					General	
	a1	a2	a3	a4	b1	b2	b3	b4	c1	c2	c3	c4	c5	d1	d2
Computer generated picture elements, attributes, uses								x							
Mapping real window with coordinates to a device window	x											x			
Rastering line segment, polyline, and polygon								x							
General functions drawing and 2D transformations		x			x	x	x								
Filling a region techniques	x	x							x	x		x			
Parallel and perspective projections															
3D transformations										x					
Textures			x												
Lightening .													x		
Clipping and containments				x											
Selected Topics	x				x	x									
Course project													x	x	x

9.2- Learning Method /ILOs Matrix

Learning Methods	Knowledge and understanding				Intellectual skills				Professional and practical skills					General	
	a1	a2	a3	a4	b1	b2	b3	b4	c1	c2	c3	c4	c5	d1	d2
Lectures	x	x	x	x	x	x	x	x	x	x	x	x	x		
Tutorial Exercises					x	x	x	x	x	x	x	x	x		
Reading material	x	x	x	x	x	x	x	x	x	x	x	x			
Websites search	x	x	x	x	x	x	x	x		x			x	x	x
Research and reporting	x	x	x	x									x	x	
Problem solving/problem solving learning based							x	x							
Group work									x	x	x	x	x	x	x
Presentations															
Practical Lab					x	x	x	x	x	x	x	x	X		
Discussions.					x	x	x	x	x	x	x	x	x	x	x

9.3 Assessment Methods /ILOs Matrix

Assessment Methods	Knowledge & understanding				Intellectual skills				Professional & practical skills					General	
	a1	a2	a3	a4	b1	b2	b3	b4	c1	c2	c3	c4	c5	d1	d2
Electronic Mid Term Exam	x	x	x	x	x	x	x	x	x	x	x	x	x		
Final Exam	x	x	x	x	x	x	x	x	x	x	x	x	x		
Electronic Course Project	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
Electronic Course Work &Quizzes	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x

10. Course ILOs Vs Program ILOs

Prog ILOS / Course ILOS		Knowledge & understanding		Intellectual skills			Professional and practical skills			General
		A12	A21	B2	B3	B4	C1	C7	C10	D5
k&u	a1	√	√							
	a2	√	√							
	a3	√	√							
	a4	√								
int.	b1				√	√				
	b2			√		√				
	b3			√	√	√				
	b4			√						
p. &p.	c1						√		√	
	c2						√	√	√	
	c3						√		√	
	c4						√	√	√	
	c5							√		
general	d1									√
	d2									√

Course Coordinator: Prof**.** Dr. Abdelatef Hussien **( )**
Head of Department: Dr. Ahmed El-Abbassy **( )**
Date: 1/8/2022