TEACHING PLAN

FAKULTI TEKNOLOGI MAKLUMAT DAN KOMUNIKASI
UNIVERSITI TEKNIKAL MALAYSIA MELAKA

INTERACTIVE COMPUTER GRAPHICS

BITM 3213	SEMESTER 2	SESI 2015/2016

BITM 3213 INTERACTIVE COMPUTER GRAPHICS (3, 2, 2)

TYPE OF SUBJECT : K

1.0 LEARNING OUTCOME

Upon completion of this course, the student should be able to:

1. Apply the knowledge and concept of computer graphic application into 2D and 3D objects and image development. (C3, LL1)
2. Solve a computer graphic problem with a selected technique and method using OpenGL graphic application. (C3,P3, CTPS3, TS2)
3. Select a suitable technique from relevant information to solve a computer graphic application. (A3, C3, P3, CTPS3, LL1, CS3, TS2)

2.0 SYNOPSIS

This course is to expose the students to the basic concept and digital graphic technology. This includes understanding and designing aspects by using a computer graphics application. The students will be exposed to the skill of using a computer graphics application such as OpenGL. It also emphasizes on the latest graphics design context which will focus on the *'graphic thinking'* and *'creative design process'*.

3.0 PRE_REQUISITE

BITP 1113

4.0 PRACTICAL APPLICATION

Labs and practical sessions are conducted in a way that leads students to use OpenGL as an API and Visual C++ as a tool to develop a computer graphic application.

5.0 REFERENCES

[1] Edward Angel & Dave Shreiner (2012), Interactive Computer Graphics: A Top-down Approach With Shader-based OpenGL (6th edition), Pearson.

[2] Richard S. Wright, Jr. et. al, (2010), OpenGL Superbible (5th edition), Addison Wesley.

[3] Edward Angel, (2009), Interactive Computer Graphics: A Top Down Approach Using OpenGL. (5th edition), Addison Wesley.

[4] F.S.Hill. (2007), Computer Graphics Using OpenGL. (3rd edition), Prentice Hall.

[5] Donald Hearn & M. Pauline Baker,(2004), Computer Graphics with OpenGL (3rd editing). Prentice Hall.

[6] Mason Woo, et. Al, (1999). OpenGL Programming Guide.(3rd edition), Addison-Wesley.

[7] Alan Watt. (2000). 3D Computer Graphics (3rd edition), Addison-Wesley.

[8] Mark J. Kilgard. (1996). The OpenGL Utility Toolkit(GLUT) :Programming Interface, Silicon Graphics, Inc.

[9] website : www.opengl.com

6.0 COURSE IMPLEMENTATION

i) Lectures
   - 2 hours per week for 14 weeks (Total = 28hrs)

ii) Laboratory Activities
   - 2hours per week for 14 weeks (Total = 28hrs)

iii) Assessments

7.0 COURSE EVALUATIONS

Assessment Method	LO 1	LO 2	LO 3	Scheme, Rubric/ guideline
Quiz (2) = (5%)	Q1 (2.5%)	Q2 (2.5%)		
Assignment (1) = 20%			AS (20%),	
Lab Test (2) = 20%			LT1 (10%) LT2 (10%)	
Project (1) = 20%		P1 (5%)	P2 (10%)	
Mid Term (1) = 10%	MT1 (5%)	MT2 (5%)		
Final (1) = 30%	F1 (18%)	F2 (12%)		
Total	25.5%	34.5	40%	

8.0 STUDENT LEARNING TIME (SLT)

No.	Session	Hrs	Freq	Official Contact	SLT Hrs	Freq	Student Learning Time(SLT)
1	Lecture	2	14	28	1	14	14
2	Laboratory	2	14	28	1	14	14
3	Tutorial	0	0	0	1	0	0
4	Quiz	0.3	3	0.9	1	3	3
5	Theoretical Test	1.5	1	1.5	5	1	5
6	Lab Test	1	2	2	5	2	10
7	Discussion	0	0	0	1	0	0
8	Mini Project – Group	0.5	1	0.5	7	1	7
9	Mini Project – Individual	0	0	0	10	0	0
10	Assignment – Group	0.5	1	0.5	3.5	1	3.5
11	Assignment – Individual	0.5	1	0.5	5	1	5
12	Presentation – Group	0.5	1	0.5	1.5	1	1.5
13	Presentation – Individual	0	0	0	1.5	0	0
14	Final	2.5	1	2.5	7	1	7
TOTAL				64.9			70
GRAND TOTAL		134.9					
CREDIT CALCULATION		**3.4**					

9.0 WEEKLY SCHEDULE

WEEK	SESSION	CONTENTS	REFERENCE
1	LECTURE 1 LAB 1	**MODULE 1 : Introduction to Computer Graphics(CG)** ▪ What is the CG? ▪ Applications of CG. ▪ A Graphics System ▪ Images: Physical and Synthetic ▪ Graphics Architectures ▪ Computer Imaging : Computer Vision & Image Processing **Lab 1: Setting Up OPENGL in Lab Computer or Laptop**	[1,2,3]
2	LECTURE 2 LAB 2	**MODULE 2 : Graphics Programming.** ▪ The Sierpinski Gasket. ▪ The OpenGL API. ▪ Primitives and Attributes. ▪ Colour. ▪ Viewing : Understanding of perspectives **LAB 2:** • Introduction to OpenGL (API) • Try to write a very simple OpenGL programs • Learn how to specify colour in terms of RGB components • **Quiz 1**	[1,2,3,4]
3	LECTURE 3 LAB 3	**MODULE 2 : Graphics Programming (cont.)** ▪ Control Functions. ▪ The Gasket Program. ▪ Polygons and Recursion. ▪ The Three-Dimensional Gasket. **LAB 3:** • Drawing in space: lines, points and polygons • To write a basic program of the Gasket Program	[1,2,3,4]
4	LECTURE 4	**MODULE 3 : Input and Interaction**	[1,2,3,4]

WEEK	SESSION	CONTENTS	REFERENCE
		▪ Interaction. ▪ Input Devices. ▪ Clients and Servers. ▪ Display Lists. ▪ Programming Event-Driven Input. ▪ Menus. ▪ Picking.	
	LAB 4	**LAB 4:** • Draw a few shapes using lines, points and polygons (2D) • Draw a few simple 3D model **ASSIGNMENT 1 GIVEN** **PROJECT GIVEN**	
5	LECTURE 5	**MODULE 4 : Geometric Objects and Transformations** ▪ Scalars, Points, and Vectors. ▪ Three-Dimensional Primitives. ▪ Coordinate Systems and Frames. ▪ Modeling a Colored Cube. **QUIZ – PRACTICAL USING OPENGL – SIMPLE PROGRAM**	[1,2,3,4,5]
6	LECTURE 6	**MODULE 4 : Geometric Objects and Transformations. (cont.)** ▪ Affined Transformations. ▪ Rotation, Translation, and Scaling. ▪ Transformations in Homogeneous Coordinates. **LAB TEST ONE – USING OPENGL**	[1,2,3,4,5]
7	LECTURE 7	**MODULE 4 : Geometric Objects and Transformations. (cont.)** ▪ Concatenation of Transformations. ▪ OpenGL Transformation Matrices. ▪ Interfaces to Three-Dimensional Applications.	[1,2,3,4,5]
	LAB 5	**LAB 5:** • Apply transformations in the 2D using OpenGL coding. **SUBMISSION OF ASSIGNMENT 1**	
8		**MID SEMESTER BREAK**	

WEEK	SESSION	CONTENTS	REFERENCE
9	LECTURE 8 LAB 6	**MODULE 5 : Viewing** ▪ Classical and Computer Viewing. ▪ Positioning of the Camera. ▪ Simple Projections. ▪ Projections in OpenGL. **LAB 6:** • Apply transformations in the 3D using OpenGL coding.	[1,2,3,4,5,6,7,8]
10	LECTURE 9	**MODULE 5 : Viewing (cont.)** ▪ Hidden-Surface Removal. ▪ Walking Through a Scene. ▪ Parallel-Projection Matrices. ▪ Perspective-Projection Matrices. ▪ Projections and Shadows **LAB TEST ONE – USING OPENGL**	[1,2,3,4,5,6,7,8]
11	LECTURE 10 LAB 7	**MODULE 6 : Lighting and Shading.** ▪ Light and Matter. ▪ Light Sources. ▪ The Phong Reflection Model. ▪ Polygonal Shading. **LAB 7:** • Drawing a cubes • Creates perspectives views of 3D scenes • To set parallel and perspective view	[1,2,3,4,5,6,7,8]
12	LECTURE 11 LAB 8	**MODULE 6: Lighting and Shading (cont.)** ▪ Light Sources in OpenGL. ▪ Specification of Materials in OpenGL. ▪ Shading of the Sphere Model. ▪ Global Rendering. (intro to ray tracing and radiosity - simple, intro+comparison) **LAB 8:** • Add lights and shadows of objects to a scene. • Add textures to the surfaces of objects. • Add different material properties for faces of a surface.	[1,2,3,4,5,6,7,8]

WEEK	SESSION	CONTENTS	REFERENCE
13	LECTURE 12 LAB 9	**MODULE 7 : Hierarchical and Object-Oriented Graphics.** ▪ Symbols and Instances. ▪ Hierarchical Models. ▪ A Robot Arm. ▪ Trees and Traversal. **CREATING SIMPLE GAME/SIMULATION USING OPEN GL**	[1,2,3,4,5,6,7,8]
14	LECTURE 13 LAB 13	**MODULE 8: Visualizations** ▪ What is visualizations? ▪ Why visualize ▪ Visual metaphors ▪ The role of realism ▪ Handling complexity ▪ Examples of visualizations **LAB 13:** • Draw a hierarchical model	[1,2,3,4,5,6,7,8]
15		• **Project Presentation** • **Project Submission**	
16 -18		**REVISION WEEK** **EXAMINATION WEEK**	

10.0 MATRIX OF LEARNING OUTCOMES

SUBJECT vs PROGRAM OUTCOME (PO)

Subject	PROGRAM OUTCOME (PO)								
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9
BITM 3213	X	X	X		X	X	X		X

LEARNING OUTCOME (LO)

LO1	Apply the knowledge and concept of computer graphic application into 2D and 3D objects and image development. (C3, LL1)
LO2	Solve a computer graphic problem with a selected technique and method using OpenGL graphic application. (C3, P3, CTPS3, TS2)
LO3	Select a suitable technique from relevant information to solve a computer graphic application. (A3, C3, P3, CTPS3, LL1, CS3, TS2)

LEARNING OUTCOME (LO) vs PROGRAM OUTCOME (PO)

LO	PROGRAM OUTCOME (PO)								
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9
LO1	X	X	X		X	X	X		X
LO2					X	X	X		X
LO3	X	X	X		X		X		X

SUBJECT vs SOFT SKILLS

Subject	SOFT SKILLS																							
	communication skill					critical thinking & problem solving					team work			lifelong learning			entrepreneurship skills			ethics&moral professionalism			leadership skills		
	CS 1	CS 2	CS 3	CS 4	CS 5	CTPS 1	CTPS 2	CTPS 3	CTPS 4	CTPS 5	TS 1	TS 2	TS 3	LL 1	LL 2	LL 3	ES 1	ES 2	ES 3	EM 1	EM 2	EM 3	LS 1	LS 2	LS 3
BITM 3213	X	X	X			X	X	X			X	X		X										

LEARNING OUTCOME (LO) vs SOFT SKILLS

LO	SOFT SKILLS																							
	communication skill					critical thinking & problem solving					team work			lifelong learning			entrepreneurs hip skills			ethics & moral professionalism			leadership skills		
	CS 1	CS 2	CS 3	CS 4	CS 5	CTPS 1	CTPS 2	CTPS 3	CTPS 4	CTPS 5	TS 1	TS 2	TS 3	LL 1	LL 2	LL 3	ES 1	ES 2	ES 3	EM 1	EM 2	EM 3	LS 1	LS 2	LS 3
LO1														X										
LO2						X	X	X			X	X												
LO3	X	X	X			X	X	X			X	X		X										

SUBJECT vs TAXONOMY

Subject	Taxonomy																
	Affective					Cognitive						Psychomotor						
	A1	A2	A3	A4	A5	C1	C2	C3	C4	C5	C6	P1	P2	P3	P4	P5	P6	P7
BITM 3213	X	X	X			X	X	X				X	X	X				

LEARNING OUTCOME (LO) vs TAXONOMY

LO	Taxonomy																	
	Affective					Cognitive						Psychomotor						
	A1	A2	A3	A4	A5	C1	C2	C3	C4	C5	C6	P1	P2	P3	P4	P5	P6	P7
LO1						X	X	X										
LO2						X	X	X				X	X	X				
LO3	X	X	X			X	X	X				X	X	X				