Course Syllabus

1. Program of Study Bachelor of Science (Computer Science)
Faculty/Institute/College Mahidol University International College

2. Course Code ICCS 415 **Course Title** Computer Graphics

3. Number of Credits 4 (Lecture/Lab) (3-2)

4. Prerequisite(s) ICCS 321

5. Type of Course Elective

6. Trimester / Academic Year 3rd trimester / every academic year

7. Course Description

Mathematical concepts for graphics, line drawing algorithms, clipping algorithms, polygon filling algorithms, physical and logical input and output devices, graphical standard for software, data structures for graphics. Space curves, surfaces in three dimensions, hidden line and hidden surface algorithms, illumination models, rendering techniques, color and ray tracing. Practical exercises are included.

8. Course Objective(s)

Upon the course completion, students will be able to

1. understand the basic concepts and algorithms for computer graphics,
2. explain and perform pipelining processes in CG,
3. explain and perform geometric transformations in 2D and 3D spaces, changing co-ordinate systems,
4. explain and perform projections, parallel and perspective projections,
5. explain and perform window-to-viewport mapping,
6. explain and perform hidden line and hidden surface removal algorithms, ray tracing,
7. explain and perform surface rendering techniques, illumination modeling,
8. complete projects of high standard 3D graphics and animations, and games.

9. Course Outline

Week	Topic				Instructor
	Lecture	Hour	Lab	Hour	
1	Introduction to mathematics for Computer Graphics, matrix, vector, primitives in CG.	3	Coding of line drawings and polygons.	2	**Dr. Udom Silparcha**
2	Graphics API, Introduction to OpenGL, using MS Windows with OpenGL.	3	Simple 2D graphics using OpenGL	2	
3	Coordinate systems and conversion, geometric transformations, translation, rotation,	3	Geometric transformations	2	

	scaling, and shearing.				
4	Primitives, transformations in OpenGL.	3	Geometric transformations with OpenGL	2	
5	3D-2D conversion, parallel and perspective projections, window-viewport mapping.	3	Window-Viewport mapping	2	
6	Midterm Examination, Algorithms for hidden-surface removal, z-buffering, ray-tracing.	3	Materials in OpenGL	2	
7	Rendering and Illumination models, local vs global illuminations, Phong's model.	3	Phong's model with OpenGL	2	
8	Image and Texture mapping.	3	Image and Texture mapping in OpenGL	2	
9	Display list and Buffering.	3	Display list and OpenGL Buffering	2	
10	Physics Modeling with OpenGL: collisions, dynamic simulation.	3	Collision handling, dynamic simulation	2	
11	Behavior and AI	3	AI and CG	2	
	Total	**33**		**22**	

10. Teaching Method(s)

1. Lectures
2. Lab exercises
3. Tests / Assignments
4. Projects

11. Teaching Media

1. Textbooks
2. Lecture notes
3. Powerpoint presentations
4. Videos
5. Demonstrations

12. Measurement and evaluation of student achievement

Marks	Grade
81 or more	A
76 – 80	B+
71 – 75	B
66 – 70	C+
61 – 65	C
56 – 60	D+
51 – 55	D

50 or less	F

13. Course evaluation

Components	%
Tests & Assignments	10
Projects	25
Midterm Exam	25
Final Exam	40
Total	100

14. Reference(s)

1. Hearn, D., Baker P., "*Computer Graphics with OpenGL*", Prenticel Hall, 2003
2. Hill, F.S, "*Computer Graphics Using OpenGL*", Prenticel Hall, 2000
3. K. Hawkins, D. Astle, "*OpenGL Game Programming*", Premier Press, 2004
4. A.Watt, F. Policarpo, "*3D Game: Volume 1: Real-time Rendering and Software Technology*", Addison-Wesley, 2001.

15. Instructor(s)

Dr. Udom Silparcha

16. Course coordinator

Dr. Udom Silparcha