Far Western University

Faculty of Engineering

Bachelor in computer engineering

(Course of Study)

Course Title: Computer Graphics	**Credit: 3**
Course Code: EX 353	**Number of lecture/week: 3**
Year/Semester: Third/Fifth	**Tutorial/week: 1**
Level: Bachelor of Engineering (Computer)	**Total hours: 45**

Course Introduction

This course will provide the principles of:

- Creation of image of real world object
- Manipulation of the image
- Give realistic representation of created image

Course Objectives

Through this course, Students will learn how to create image of real world object by using the concept of drawing line, circle, ellipse and curve. Students will learn to manipulate the object by using transformation and will use the concept to represent the object in three dimension. They will learn to give realistic representation of image by using the concept of illumination and surface rendering.

Course Outline

Specific Objectives	Contents (UNIT/CHAPTER)	Duration (Time allocated)
Introduction and applications	**Chapter 1. Introduction** History of computer graphics, applications, Raster and Random displays, Display architectures	**3hr**
Scan Conversion	**Chapter 2. Scan Conversion** Scan Conversion of a Point, Scan Conversion of a straight line: DDA and Bresenham's Algorithm, Scan Converting a Circle and Ellipse: Mid Point Algorithm	**8hr**
Two Dimensional Transformation	**Chapter 3. 2 Dimensional Transformation** 2D Transformation: Translation,	**7hr**

	Scaling, Rotation, Shearing, Reflection 2D Viewing Pipeline, World to Screen Viewing Transformation, Clipping (Cohen Sutherland and Liang Barskey Algorithm)	
Three Dimensional Transformation	**Chapter 4. 3D Transformation** 3D Transformation: Translation, Scaling, Rotation, Shearing, Reflection 3D Viewing Pipeline, World to Screen Viewing Transformation, Projections (Parallel and Perspective)	**7hr**
Three Dimensional Object Representation	**Chapter 5. Surface and Curve Modeling** Polygon Surface, Surface Normal and Spatial Orientation of Surface, Octree Representation, BSP Tree, Bezier Curve and properties, Hermite Interpolation, Parametric Cubic Curve, Spline	**6hr**
Visible Surface Detection	**Chapter 6. Visible Surface Detection** Object and Image Space Techniques, Back face detection, Z Buffer and A Buffer Method, Scanline method	**6hr**
Illumination and Surface Rendering	**Chapter 7. Illumination and Surface Rendering** Algorithms to simulate Ambient, Diffuse and Specular Reflections Constant, Gouraud and Phong Shading Models	**8hr**

Project work

There will be final project at the end of the course. The project will be designed to build the real-world 3D object using the mathematical concepts of projections, visible surface detection and rendering.

Tutorials/Assignments

Four to five class assignments will be provided to the students along with class works in classes.

Practical

Each practical lab is fully instructed and the lab manual consists of stepwise instruction necessary for carrying out lab work. Each lab consists of sets of questions that has to be answered and submitted to the instructor via eLearning.

SN	Topics	Hours	Remarks
1	C- programming (Graphics: line, circle and ellipse)	3	
2	DDA Line Drawing Algorithm	3	
3	Bresenham's Line Drawing Algorithm	3	
4	Mid Point Circle Drawing Algorithm	3	
5	Mid Point Ellipse Drawing Algorithm	3	
6	2D Transformation: Translation, Scaling, Rotation	3	
7	Parallel and Perspective Projection	3	
8	Bezier Curve	3	

References

Donald Hearn and M. Pauline Baker, "Computer Graphics C Version

Foley, Van Dam, Feiner, Hughes "Computer Graphics Principles and Practice"

Evaluation scheme

The questions will cover all the chapters in the syllabus. The evaluation scheme will be as possible as indicated in the table below:

Chapters	Hours	Marks distribution* (Tentative %)
Chapter 1. Introduction	3	10
Chapter 2. Scan Conversion	8	15
Chapter 3. 2D Graphics	7	15
Chapter 4. 3D Graphics	7	15
Chapter 5. Surface/Curve Modeling	6	15
Chapter 6. Visible Surface Detection	6	15
Chapter 7. Illumination and Surface Rendering	8	15

* There may be minor variation in marks distribution

Internal Evaluation (Marks Weightage)		Final Exam (Marks Weightage)	Total	Remarks
Assessment/Class Performance/Attendance/Quizzes/	Practical			

Tutorials/Presentation				
20	20	60	100	Internal marks will be of 20 if there are practicals in the course (20 marks will be allocated for Practicals)