Level 5 Diploma in Graphic Design (991) 177 Credits

Unit: Introduction to Computer Graphics **Exam Paper No.:** 1	**Guided Learning Hours:** 260 **Number of Credits:** 26
Prerequisites:. Computing terminology and good knowledge in Maths.	**Corequisites:** A pass or better in Diploma in eCommerce & Web Design or Diploma Information Technology or equivalence.
Aim: This unit introduces techniques for 2D and 3D primitives, including modeling and representation, illumination and shading algorithms, rendering, texturing, projections, matrix composition and advanced software tools. Learners will learn fundamental algorithms and techniques and gain the knowledge necessary to understand and augment the latest innovations in computer graphics. The unit introduces techniques of modeling, transformation, and rendering for computer generated imagery. It also prepare learners majoring in Computer Graphics with the necessary visual and design capabilities to develop a portfolio emphasising on creative and applied business needs. The good news is that Computer Graphics is fun: fun to look at, fun to use, and when done properly even fun to program and debug. There are also many fun applications of Computer Graphics, ranging from video games, animated cartoons, to full length feature movies. Art and architecture, biomedical imaging, computational photography: whatever people can see, or imagine can see, designers can design with geometric modeling and displayed with Computer Graphics. Broadly, the major themes of Computer Graphics can be divided into three categories: **graphics**, **modeling**, and **mathematical foundations**. Graphics consists of lighting and shading - reflection and refraction, recursive ray tracing, radiosity, illumination models, polygon shading, and hidden surface procedures. Modeling is the theory of curves, surfaces, and solids - planes and polygons, spheres and quadrics, algebraics and parametrics, constructive solid geometry, boundary files, and octrees, interpolation and approximation, Bezier and B-spline methods, fractal algorithms and subdivision techniques. The mathematical foundations are mostly linear algebra, but from a somewhat idiosyncratic perspective not typically encountered in standard linear algebra classes - vector geometry and vector algebra, affine spaces, affine maps and projective transformations, matrices and quaternions.	
Required Materials: Recommended Learning Resources.	**Supplementary Materials:** Lecture notes and tutor extra reading recommendations.
Special Requirements: Learners are recommended to read and practice the mathematical concepts behind computer graphics outside class time.	

Intended Learning Outcomes:	**Assessment Criteria:**
1. The basics of graphic design; different applications and important fundamental design components.	1.1 Examine graphics disciplines 1.2 Compare image processing vs image analysis 1.3 Analyse the importance of graphics 1.4 Analyse the history of computer graphics 1.5 Analyse computer graphics application divisional areas
2. The differences between 2D and 3D computer graphics, graphic image technology, such as animation and computer graphics.	2.1 Define 2D/Define 3D 2.2 Describe graphics terminology 2.3 Explain projections 2.4 Define clipping 2.5 Demonstrate how the 2D and 3D graphics features are mapped from polygons 2.6 Describe the difference between vector and raster graphics 2.7 Analyse the difference and similarities between 2D and 3D graphics
3. How mathematics is the basis for graphical perspective and how computer games (especially games using 3-D polygons) use linear.	3.1 Analyse the elements of geometry 3.2 Define vector spaces 3.3 Describe linear transformations 3.4 Evaluate the mathematical concepts that a game developer needs to develop 3D computer graphics

4. The different types of computer graphics devices and the input devices for computer graphics.	4.1 Analyse and define output technology 4.2 Explain processor technology 4.3 Describe input devices 4.4 Explain memory technology 4.5 Define frame buffer
5. Understand what graphics software is and isn't, by analysing the examples of computer graphics software.	5.1 Describe different graphics software programs 5.2 Analyse graphics system components 5.3 Compare polling vs sampling 5.4 Define event-loop processing
6. The algorithms developed for drawing lines and circles and design of line and circle algorithms.	6.1 Analyse line and circle equations 6.2 Explain line and circle drawing algorithms 6.3 Describe aliasing problems and solutions
7. 2D and 3D clipping concepts; the different kinds of clipping and clipping techniques.	7.1 Describe clipping 7.2 Explain the different types of clipping 7.3 Explain the basic implementation strategies 7.4 Describe clipping algorithms for polygons 7.5 Explain line drawing algorithms
8. Shade objects; addressing issues with shaded curved surfaces to create realistic natural objects.	8.1 Demonstrate how to create shaded objects 8.2 Outline and analyse shade for modelling, animation and 3D printing 8.3 Define shading 8.4 Describe the purpose of shading 8.5 Describe the Phong Model 8.6 Describe the OpenGL shading functions
9. Texture mapping as a method for adding detail, surface texture (a bitmap or raster image), or colour to a computer-generated graphic or 3D model.	9.1 Define a texture 9.2 Describe texture mapping in computer graphics 9.3 Describe environment mapping 9.4 Describe bump mapping 9.5 Analyse the basic mapping strategies 9.6 Describe the application of a type of surface to a 3D image 9.7 Explain the digital representation of the surface of an object.
Methods of Evaluation: A 2½-hour written examination paper with five essay questions, each carrying 20 marks. Candidates are required to answer all questions. Candidates also undertake coursework/project in Introduction to Computer Graphics with a weighting of 100%	

Recommended Learning Resources: Introduction to Computer Graphics

Text Books	• Good: An Introduction to Ethics in Graphic Design by Lucienne Roberts ISBN-10: 2940373140 • An Introduction to Graphic Design by Peter Bridgewater ISBN-10: 1555211453 • Graphic Design: From Concept to Form by Scott Santoro and Emily Santoro ISBN-10: 0132300702
Study Manuals 	BCE produced study packs
CD ROM 	Power-point slides
Software 	2D and 3D Graphics Software