**UNIVERSITY OF GUYANA**

**FACULTY OF NATURAL SCIENCES**

**DEPARTMENT OF COMPUTER SCIENCE**

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**Course Number:** CSE 3200

**Course Name:** Computer Graphics & Image Processing

**Course Credit:** 4

**Description:** This course is a third year second semester course intended for students pursuing the two year full time BSc Computer Science program. The course is designed as an introduction to computer graphics. Students will be exposed to methods and techniques to generate, manipulate, process and display raster and vector graphics.

**Exemption(s):** There are no exemptions for this course.

**Pre-requisites:** CSC 1201 – Introduction to Programming

**Learning Outcomes:**

By the end of this course students will be able to:

1. Model concepts, perform mathematical representation of and implementation of lines, curves and surfaces
2. Describe Rendering and the rendering pipeline: projection, clipping and visible surface determination
3. Describe and Use Rasterisation and buffer management
4. Describe Graphics Hardware and use and create interactive graphics
5. Identify and Use Image processing techniques

**Course Content:**

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| **WEEK** | **TOPICS** | **Lecture HOURS** | **LAB**  **HOURS** |
| 1 | Course Introduction  Digital Images and file formats  Image Processing Techniques  Labs | 3 | 2 |
| 2 | Image Processing Mathematical Operations & Algorithms  Graphics Hardware & Input Processing  Graphics Architecture  Labs | 3 | 2 |
| 3 | Introduction to Graphics API  Raster & Vector Graphics Pipeline  Graphics Programming  Labs | 3 | 2 |
| 4 | Coordinate Systems  Vectors and Matrices  2D Coordinate Geometry  Labs | 3 | 2 |
| 5 | 3D Coordinate Geometry  Algorithms 1 - lines, circles and planes  Algorithms 2 – curves and surfaces  Labs | 3 | 2 |
| 6 | Imperative and Declarative Modeling Concepts  Modeling-Rendering Paradigm  The Synthetic-Camera Model  Labs | 3 | 2 |
| 7 | Colour Representation  3D Viewing  Test #1 & Review  Labs | 2  1 | 2 |
| 8 | Projections  Transformation  Visible Surface Algorithms  Labs | 3 | 2 |
| 9 | Lighting Models  Shadows Techniques  Blending  Labs | 3 | 2 |
| 10 | Anti-aliasing and Other Effects  Fog and Polygon offset  Texture and Bump mapping  Labs | 3 | 2 |
| 11 | Bitmap & Fonts  Event-driven Graphics  Interaction  Labs | 3 | 2 |
| 12 | Animation Techniques  Hierarchical & Object Oriented Graphics  Particle Systems  Labs | 3 | 2 |
| 13 | Application of Computer Graphics  New Trends in Computer Graphics  Test #2  Labs | 2  1 | 2 |
| 14 | Revision |  |  |
| 15 | Final Examination | 39 | 26 |

**Method of Teaching:**

Lectures 3 x 13 = 39 hrs.

Laboratories/ Tutorials 2 x 13 = 26 hrs.

**Method of Assessment:**

**Coursework (40%)**

Tests (20%)

Assignments (20%)

**Final Examination (60%)**

**Text and Recommended Reading**

Ed Angel and Dave Shreiner, Interactive Computer Graphics: A Top-Down Approach with shader-based OpenGL, 6th Edition.

Computer Graphics with OpenGL / Hearn & Baker. ISBN: 0-13-015390-7