Technical university of Kenya

COURSE TITLE: COMPUTER GRAPHICS

COURSE OUTLINE

Course Objectives

There are three main objectives of the course:

- To provide students with a foundation in graphics applications programming
- To introduce students with fundamental concepts and theory of computer graphics
- To give basics of application programming interface (API) implementation based on graphics pipeline approach
- The interdisciplinary nature of computer graphics is emphasized in the wide variety of examples and applications.

Learning Outcomes

Upon successful completion of the course, students will:

- Students will have an appreciation of the history and evolution of computer graphics, both hardware and software. Assessed by written homework assignment.
- Gain proficiency with C graphics programming and OpenGL, a standard specification defining a cross-language, cross-platform API for writing applications that;
  - Produce 2D and 3D computer graphics
  - Learn the principles and commonly used paradigms and techniques of computer graphics
  - Develop a facility with the relevant mathematics of computer graphics
  - Be able to write basic graphics application programs including animation
  - Be able to design programs to display graphic images to given specifications

- Students will understand the concepts of and techniques used in 3D computer graphics, including viewing transformations, hierarchical modeling, color, lighting and texture mapping. Students will be exposed to current computer graphics research areas. Assessed by tests, homework and programming assignments.

- Students will have an understanding of 2D graphics and algorithms including: line drawing, polygon filling, clipping, and transformations. They will be able to implement these. Assessed by tests and programming assignments.

- Students will be introduced to algorithms and techniques fundamental to 3D computer graphics and will understand the relationship between the 2D and 3D versions of such algorithms.
- Students will be able to reason about and apply these algorithms and techniques in new situations. Assessed by tests and programming assignments.
- Students will be able to describe the concepts of computer graphics in;
    - Hidden surface detection
    - Curved surfaces.
- Students will be able to and apply the computer graphics knowledge in animation.

COURSE MODULE OUTLINE

MODULE1.

- Introduction to Computer Graphics
- Application of Computer Graphics
- Video Display Devices
- Raster Scan Displays
- Random Scan Displays
- Color CRT Monitor
- Shadow Mask Methods

MODULE2.

- Transformation in 2-dimension & 3-dimension
- Translation in 2 dimension and 3 dimension
- Rotation in 2-dimension & 3-dimension
- Scaling in 2-dimension & 3-dimension
- Composite Transformation

MODULE3.

- Output Primitives
- Line Drawing Algorithms
- DDA
- Bresenham‟s Algorithm
- Mid-point drawing algorithm
- Circle Drawing Algorithm
- Ellipse Drawing Algorithm

MODULE4.

- Introduction to Clipping
- Application of Clipping
- Clipping Algorithm
    - Line Clipping Methods
    - Cohen Sutherland Method
    - Cyrus – Beck Algorithm

MODULE5.

- Visible Surface Detection
  - Depth Buffer Method
  - Z – Buffer Method
- Object Space Method
- Image Space Method
- Painter‟s Algorithm
- Back – Face Detection
  - A – Buffer Method
  - Scan Line Method

MODULE6.

- Computer animation
- Types of animations
- application

TEACHING METHODS

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- Lecture
- Questions & Answers
- Group Discussion
- Demonstration
- Practical's
- Individual Learning
- Seminars
- Case Study
- Role Play
- Project/ Assignment

UNIT TEXTBOOKS

1. J. Foley, A. Van Dam, S. Feiner, J. Hughes: Computer Graphics- Principles and Practice, Pearson
2. Hearn and Baker: Computer Graphics, PHI.
3. Tay Vaughan - Multimedia : Making it Work, Fourth Edition MCGraw 1998

REFERENCE READING MATERIAL

1. Computer Graphics by Pradeep K. Bhatia
2. Computer Graphics: Principles & Practice In C Foley
3. Computer graphics: Francis S. Hill
4. John Villamyl & Louis molina, Multimedia an introduction. PHI-1998.

Best sites for computer graphics:-

1. http://www.cgsociety.org/
2. http://forums.cgsociety.org/
3. http://www.maacindia.com/
4. http://cg.tutsplus.com/
5. http://programmedlessons.org/VectorLessons/index.html

METHODS OF ASSESSMENT

This course is assessed by coursework (30%) and Main exam (70%).

NO	TOPICS			Weight age
1	**COURSEWORK**			**30%**
	Practical Assignments 1			5%
	Practical's Assignment 2			5%
	Practical's Assignment 3			5%
2	**CONTINUOUS ASSIGNMENT TEST (C.A.T)**			
	Continuous Assignment Test 1:			5%
	Continuous Assignment Test (Practical's):			5%
	Continuous Assignment Test 2:			5%
3	**FINAL EXAM (Question one compulsory in section A and any other TWO from section B)**			**70%**
	NO	**Frequency**	**Weight age**	
	1	Question One	30 Marks	
	2	Question Two	20 Marks	
	3	Question Three	20 Marks	
	4	Question Four	20 Marks	
4	**Total**			**100%**