APT 2090: COMPUTER GRAPHICS

Pre-requisites APT 2060: Data structures& Algorithms

3 Credit Units

Rationale

This course will provide students with two important skills to better understanding of large software development and better understanding of practical techniques that support real-time 3D graphics, Entertainment - computer animation; User interfaces; Interactive visualization - business and science;

Cartography; Computer aided design; Multimedia systems; Computer games.

Course Description

This course is an introduction to some of the aspects of computer graphics through the use of OpenGL and associated libraries. The course will look at many of the aspects of generating and manipulating 3 Dimensional scenes. Other topics we will cover are the human visual system, perception, virtual reality, and visualization. Please note this is NOT a Photoshop or image manipulation course. We will be looking at the matrix algebra, calculus, and algorithms associated with 3D Graphics and will be mathematically oriented.

Learning Outcomes

After taking this course, the students should be able to:

1. List the features of a graphics API

2. Give examples of how computer graphics can be used

3. Apply the mathematics and algorithms behind computer graphics

4. Analyze computer graphics algorithms

5. Design computer graphics software and implement such software efficiently

6. Obtain an overview of computer graphics techniques.

7. Learn to think geometrically and to understand computer graphics algorithms.

8. Learn graphics programming skills

9. Describe the purposes and benefits of computer graphics.

10. Communicate using the vocabulary associated with computer graphics.

11. Identify the components and functions of a computer graphics system.

12. Utilize menu driven software in a variety of hardware configurations.

13. Produce computer graphics through a variety of output methods.

14. Write computer programs to produce graphics.

15. Identify factors to be considered in selecting a computer graphics system.

Course Content

Graphics pipeline, Graphics algorithms, Geometrical operations used in graphics, Methods for modeling curves, surfaces, and solids, Lighting models and color, Computer vision, Parallel implementations, Image and movie file formats, Compression technique, Volume visualization, Animation, VRML, 2D graphics and geometrical transformations, Introduction to OpenGL programming, Viewing in 3D, Programming 3D graphics using OpenGL, Illumination and shading, Textures, Visible surface problem, Rendering pipelines and modern computer graphics, Conceptual models for Computer Graphics, Graphics hardware issues.

Teaching and Learning Methodologies

A combination of lectures, seminars, group discussions & presentations, case study, and use of library and Internet.

Instructional material & equipment

Textbooks, whiteboard & marker pens, handouts, electronic projector and laptop, Internet access, special graphics software's and library.

Methods of Evaluation

Laboratory Work	20%	
Project		20%
Assignments		10%
Mid-semester	20%	
Final semester exams	30%	
Total	**100%**	

Course Text

Computer Graphics by A.P.Godse , Technical Publications;2009

Recommended Reading:

Computer graphics: theory into practice by Jeffrey J. McConnell – 2006

Computer Graphics by Sinha and Udai, Arun D Udai, Sinha, Sinha and Udai – 2008

Computer Graphics Using OpenGL (3rd Edition) (Hardcover) by Francis S Hill Jr. (Author), Stephen M Kelley (Author), Prentice Hall; 3rd edition, ISBN-10: 0131496700

Angel, E. 2002. OpenGL: A Primer, Reading, Massachusetts: Addison-Wesley.

Schaum's Outline of Computer Graphics (Paperback) by Zhigang Xiang (Author), Roy A. Plastock (Author) McGraw-Hill; 2 edition (September 8, 2000), ISBN-10: 0071357815

OpenGL: A Primer (3rd Edition) (Paperback) by Edward Angel (Author), Addison Wesley; 3 edition (February 1, 2007), ISBN-10: 0321398114

Game Books: Mark DeLoura, Game Programming Gems, Charles River Media, Inc., Rockland Mass. ISBN 1-58450-049-2

Alan Watt, Fabio Policarpo, 3D Games: Real-time Rendering and Software Technology, Vol 1, Addison-Wesley, Toronto, ISBN 0201-6192-0.

Tomas Moller, Eric Haines, Real-Time Rendering, A.K.Peters Ltd, Natick, Massachusetts, ISBN 1-56881-101-2.

Foley, J., A. van Dam, S. K. Feiner, J. F. Hughes, and R. L. Phillips 1993. Introduction to Computer Graphics, Reading, Massachusetts: Addison-Wesley.

Hill, F. S., 2000. Computer Graphics using OpenGL, Second Edition, London: Prentice Hall. Woo, M. and Neider, J. and Davis, T. and Shreiner, D., 1999.

OpenGL Programming Guide, Third Edition, Reading, Massachusetts: Addison-Wesley.

Foley, J., A. van Dam, S. K. Feiner, and J. F. Hughes 1996. Computer Graphics: Principles and Practice (Second Edition in C ed.). Reading, Massachusetts: Addison-Wesley.