Course Title: Computer Graphics  
Course code: 750371  
Course prerequisite(s) and/or corequisite(s):  
210103 + 721211  
Lecture Time:  
Credit hours: 3

Course Description:
This module introduces interactive computer graphics and some drawing algorithms.

Course Objectives:
The main objective of this module is to introduce to the students the concepts of computer graphics. It starts with an overview of interactive computer graphics, two dimensional system and mapping, then it presents the most important drawing algorithm, two-dimensional transformation; Clipping, filling and an introduction to 3-D graphics.

Course Components
- Introduction to computer graphics
- Point-plotting techniques
- Two-dimensional transformation
- Clipping and drawing
- Polygon Filling
- Introduction to 3-dimensional graphics

Textbooks:
Title: Computer Graphics  
Author: D. Hearn & M. Baker  
Publisher: Prentice Hall, 2000

In addition to the above, the students will be provided with handouts by the lecturer.
**Teaching Methods:**
*Duration:* 16 weeks in first semester, 60 hours in total
*Lectures:* 32 hours (2 hours per week),
*Tutorials:* 13 hours, 1 per week,
*Laboratories:* 16 hours, 1 per week
*Project Presentation:* 3 hours

**Learning Outcomes:**
- **Knowledge and understanding**
  - Have a knowledge and understanding of the structure of an interactive computer graphics system, and the separation of system components.
  - Have a knowledge and understanding of geometrical transformations and 3D viewing.
  - Have a knowledge and understanding of techniques for representing 3D geometrical objects.
  - Have a knowledge and understanding of interaction techniques.

- **Cognitive skills (thinking and analysis).**
  - Be able to create interactive graphics applications.

- **Communication skills (personal and academic).**
  - Use C++ builds functions or equivalent graphics tools (Java, Pascal) to perform item (3), above.

- **Practical and subject specific skills (Transferable Skills).**
  - Perform simple 2D graphics with lines, curves and can implement algorithms to rasterizing simple shapes, fill and clip polygons and have a basic grasp of anti-aliasing techniques.

**Assessment Instruments**

<table>
<thead>
<tr>
<th>Assessment Instruments</th>
<th>Mark</th>
</tr>
</thead>
<tbody>
<tr>
<td>First examination</td>
<td>15%</td>
</tr>
<tr>
<td>Second examination</td>
<td>15%</td>
</tr>
<tr>
<td>Final Exam (written unseen exam)</td>
<td>40%</td>
</tr>
<tr>
<td>Final project (defended)</td>
<td>10%</td>
</tr>
<tr>
<td>Reports, assignments, Quizzes, Home works, Tutorials</td>
<td>20%</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>100%</td>
</tr>
</tbody>
</table>

* Make-up exams will be offered for valid reasons only with consent of the Dean. Make-up exams may be different from regular exams in content and format.

**Practical Submissions**
The assignments that have work to be assessed will be given to the students in separate documents including the due date and appropriate reading material.

**Documentation and Academic Honesty**
Submit your home work covered with a sheet containing your name, number, course title and number, and type and number of the home work (e.g. tutorial, assignment, and project).
Any completed homework must be handed in to my office (room IT ---) by 15:00 on the due date. After the deadline “zero” will be awarded. You must keep a duplicate copy of your work because it may be needed while the original is being marked.

You should hand in with your assignments:
1- A printed listing of your test programs.
2- A brief report to explain your findings.
3- Your solution of questions.

For the research project, you are required to write a report similar to a research paper. It should include:
- **Abstract**: It describes the main synopsis of your paper.
- **Introduction**: It provides background information necessary to understand the research and getting readers interested in your subject. The introduction is where you put your problem in context and is likely where the bulk of your sources will appear.
- **Methods (Algorithms and Implementation)**: Describe your methods here. Summarize the algorithms generally, highlight features relevant to your project, and refer readers to your references for further details.
- **Results and Discussion (Benchmarking and Analysis)**: This section is the most important part of your paper. It is here that you demonstrate the work you have accomplished on this project and explain its significance. The quality of your analysis will impact your final grade more than any other component on the paper. You should therefore plan to spend the bulk of your project time not just gathering data, but determining what it ultimately means and deciding how best to showcase these findings.
- **Conclusion**: The conclusion should give your reader the points to “take home” from your paper. It should state clearly what your results demonstrate about the problem you were tackling in the paper. It should also generalize your findings, putting them into a useful context that can be built upon. All generalizations should be supported by your data, however; the discussion should prove these points, so that when the reader gets to the conclusion, the statements are logical and seem self-evident.
- **Bibliography**: Refer to any reference that you used in your assignment. Citations in the body of the paper should refer to a bibliography at the end of the paper.

**Protection by Copyright**
1. Coursework, laboratory exercises, reports, and essays submitted for assessment must be your own work, unless in the case of group projects a joint effort is expected and is indicated as such.
2. Use of quotations or data from the work of others is entirely acceptable, and is often very valuable provided that the source of the quotation or data is given. Failure to provide a source or put quotation marks around material that is taken from elsewhere gives the appearance that the comments are ostensibly your own. When quoting word-for-word from the work of another person quotation marks or indenting (setting the quotation in from the margin) must be used and the source of the quoted material must be acknowledged.
3. Sources of quotations used should be listed in full in a bibliography at the end of your piece of work.

**Avoiding Plagiarism**
1. Unacknowledged direct copying from the work of another person, or the close paraphrasing of somebody else's work, is called plagiarism and is a serious offence, equated with cheating in examinations. This applies to copying both from other students' work and from published sources such as books, reports or journal articles.
2. Paraphrasing, when the original statement is still identifiable and has no acknowledgement, is plagiarism. A close paraphrase of another person's work must have an acknowledgement to the source. It is not acceptable for you to put together unacknowledged passages from the same or
from different sources linking these together with a few words or sentences of your own and changing a few words from the original text: this is regarded as over-dependence on other sources, which is a form of plagiarism.

3. Direct quotations from an earlier piece of your own work, if not attributed, suggest that your work is original, when in fact it is not. The direct copying of one's own writings qualifies as plagiarism if the fact that the work has been or is to be presented elsewhere is not acknowledged.

4. Plagiarism is a serious offence and will always result in imposition of a penalty. In deciding upon the penalty the Department will take into account factors such as the year of study, the extent and proportion of the work that has been plagiarized, and the apparent intent of the student. The penalties that can be imposed range from a minimum of a zero mark for the work (without allowing resubmission) through caution to disciplinary measures (such as suspension or expulsion).

**Course Academic Calendar**

<table>
<thead>
<tr>
<th>Week</th>
<th>Basic and support material to be covered</th>
<th>Homework/reports and their due dates</th>
</tr>
</thead>
<tbody>
<tr>
<td>(1)</td>
<td>Introduction to computer graphics</td>
<td></td>
</tr>
<tr>
<td>(2)</td>
<td>Introduction to computer graphics</td>
<td>Tutorial 1</td>
</tr>
<tr>
<td>(3)</td>
<td>Point-plotting techniques</td>
<td>Tutorial 2</td>
</tr>
<tr>
<td>(4)</td>
<td>Point-plotting techniques</td>
<td>Tutorial 3</td>
</tr>
<tr>
<td>(5)</td>
<td>Point-plotting techniques</td>
<td>Tutorial 4, Assignment 1</td>
</tr>
<tr>
<td>(6)</td>
<td>Point-plotting techniques, <strong>Exam 1</strong></td>
<td>Tutorial 5</td>
</tr>
<tr>
<td>(7)</td>
<td>Two-dimensional transformation</td>
<td>Tutorial 6</td>
</tr>
<tr>
<td>(8)</td>
<td>Two-dimensional transformation</td>
<td>Tutorial 7, Assignment 2</td>
</tr>
<tr>
<td>(9)</td>
<td>Two-dimensional transformation</td>
<td>Tutorial 8</td>
</tr>
<tr>
<td>(10)</td>
<td>Clipping and drawing</td>
<td>Tutorial 9, Assignment 3</td>
</tr>
<tr>
<td>(11)</td>
<td>Clipping and drawing, <strong>Exam 2</strong></td>
<td>Tutorial 10, project</td>
</tr>
<tr>
<td>(12)</td>
<td>Polygon Filling</td>
<td>Tutorial 11</td>
</tr>
<tr>
<td>(13)</td>
<td>Polygon Filling</td>
<td></td>
</tr>
<tr>
<td>(14)</td>
<td>Polygon Filling</td>
<td>Tutorial 12</td>
</tr>
<tr>
<td>(15)</td>
<td>Polygon Filling</td>
<td>Introduction to 3-dimensional graphics</td>
</tr>
<tr>
<td>(16)</td>
<td>Final Examination</td>
<td>Project presentation</td>
</tr>
<tr>
<td>Specimen examination (Optional)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Expected Workload:**
On average students need to spend 2 hours of study and preparation for each 50-minute lecture/tutorial.

**Attendance Policy:**
Absence from lectures and/or tutorials shall not exceed 15%. Students who exceed the 15% limit without a medical or emergency excuse acceptable to and approved by the Dean of the relevant college/faculty shall not be allowed to take the final examination and shall receive a mark of zero for the course. If the excuse is approved by the Dean, the student shall be considered to have withdrawn from the course.
Module References

Students will be expected to give the same attention to these references as given to the Module textbook(s)

2- Edward Angel, Interactive Computer Graphics, Addison-Wesley, 2000

Website(s):

- www.cee.hw.zc.uk/~pjbk/pathways/cpp1/cpp1.html
- www.edm2.com/0507/introcsp1.html
- www.doc.ic.ac.uk/~wjk/C++intro
- www.cprogramming.com/tutorial.html
- www.deakin.edu.au/~agoodman/Ctutorial.html
- www.tldp.org/howto/c++programming.howto.html
- www.vb-bookmark.com/cpptutorial.html

DOCUMENTATION FOR PROGRAMS:

(All programming assignments must include at least the following comment lines)

```c
#include <stdio.h>
main ( )
    { … }  
    (If your program includes any function modules, each function needs to be documented)
```

/ * TASK: Identify what the program will accomplish */  
/ * */  
/ * WRITTEN BY: */  
/ * */  
/ * DATE: List creation & modification dates */  
/ * */  
/ * VARIABLES: List and give what each represents */  
/ * */  
/ * INPUT: Identify the input parameters: Give examples */  
/ * */  
/ * OUTPUT: Identify the expected output: Give examples */  
/ * */  
/ * ALGORITHM: Briefly describe the algorithm used*/

# include <stdio.h>
main ( )
{ … }  
(If your program includes any function modules, each function needs to be documented)

/ * TASK: Identify what the subprogram accomplishes */  
/ * */  
/ * DATE: List creation and modification dates */  
/ * */  
/ * WRITTEN BY: */  
/ * */  
/ * VARIABLES: List names and what each represents */  
/ * */  
/ * INPUT: Identify the input parameters, if any. Give examples */  
/ * */  
/ * OUTPUT: Identify the output. Give examples */  
/ * */
Computer graphics (CG) is the field of visual computing, where one utilizes computers both to generate visual images synthetically and to integrate or alter visual and spatial information sampled from the real world. The first major advance in computer graphics was the development of Sketchpad in 1962 by Ivan Sutherland. This field can be divided into several areas: real-time 3D rendering (often used in video games), computer animation, video capture and video creation rendering, special effects Previous (Computer assisted instruction). Next (Computer museum). Computer graphics, a subfield of computer science, is concerned with digitally synthesizing and manipulating visual content. Although the term often refers to three-dimensional (3D) computer graphics, it also encompasses two-dimensional (2D) graphics and image processing. Graphics is often differentiated from the field of visualization, although the two have many similarities. Entertainment (in the form of animated movies and video) Computer graphics deals with generating images with the aid of computers. Today, computer graphics is a core technology in digital photography, film, video games, cell phone and computer displays, and many specialized applications. A great deal of specialized hardware and software has been developed, with the displays of most devices being driven by computer graphics hardware. It is a vast and recently developed area of computer science. The phrase was coined in 1960 by computer graphics researchers. Computer graphics - Quick Guide - Computer graphics is an art of drawing pictures on computer screens with the help of programming. It involves computations, creation, and manipulation of data. Computer Graphics - Basics. Computer graphics is an art of drawing pictures on computer screens with the help of programming. It involves computations, creation, and manipulation of data. In other words, we can say that computer graphics is a rendering tool for the generation and manipulation of images. Computer graphics are graphics created using computers and, more generally, the representation and manipulation of image data by a computer with help from specialized software and hardware. The development of computer graphics has made computers easier to interact with, and better for understanding and interpreting many types of data. Developments in computer graphics have had a profound impact on many types of media and have revolutionized animation, movies and the video game industry. Contents.