COMPUTER SCIENCE 315
COMPUTER GRAPHICS

I. Introduction

   A. Catalog Description

   This course is an introduction to the process of generating images with a computer. The emphasis will be on the design and use of graphical facilities for two- and three-dimensional graphics. Students will study the techniques of line-drawing, raster graphics, and the mathematical theory underlying computer generated graphics. The mathematical topics to be covered, include rotations, translations, perspective, and curve and surface descriptions. Additional topics to be covered may include color theory, texture mapping, and anti aliasing. *Prerequisite: CSci 261.*

   B. Objectives

   This course should provide the student with an understanding of many aspects of modern interactive graphics: hardware, software, data structures, mathematical manipulation of graphical objects, and the fundamental implementation algorithms.

   C. Prerequisites

   CSci 261. This course will emphasize the mathematical and programming techniques of computer graphics as opposed to a graphics application course. Students must have an adequate background in matrix operations in order to follow discussions of three-dimensional transformations and projections. A high level language will be used extensively; students must be fully familiar with the implementations of abstract data structures. A grade of C- is required in the prerequisite courses.

   D. Evaluation

   Students will be evaluated on the basis of programming assignments, written assignments, and a major graphics project.

II. Required Topics

   1. Point-Plotting and Line-Drawing

      Coordinate Systems
      Incremental methods
      Line-drawing algorithms

   2. Two-Dimensional Graphics

      Mathematical transformations
      Clipping
      Windowing
      Viewing transformations

II.   Required Topics   (cont.)

   3. Raster Graphics

      Fame Buffers
      Scan conversion algorithms

   4. Three-Dimensional Graphics

      Curves and surfaces
      Transformations and perspective clipping
      Hidden lines and surfaces
      Shading

III. Optional Topics

   1. Modeling methods

   2. User Interface

IV.   Bibliography

Chasen:	Geometric Principles and Procedures for Computer Graphic Applications, 1978, Prentice-Hall.
Demel & Miller:	Introduction to Computer Graphics, 1984, Wadsworth.
Foley & Van Dam:	Fundamentals of Interactive Graphics, 1982, Addison-Wesley.
Giloi:	Interactive Computer Graphics: Data Structures, Algorithms, Languages, 1978, Prentice-Hall.
Harrington:	Computer Graphics: A Programming Approach, 1983, McGraw-Hill
Hearn & Baker	Computer Graphics, 1986, Prentice-Hall,
Pavlidis:	Algorithms for Graphics and Image Processing, 1982, Computer Science Press.
Penna & Patterson:	Projective Geometry and its Application to Computer Graphics, 1986, Prentice-Hall
Rogers & Adams:	Mathematical Elements of Computer Graphics, 1976, McGraw-Hill
Ryan:	Computer Programming for Graphical Displays, 1984, Wadsworth.
Newman & Sproull:	Principles of Interactive Graphics, McGraw-Hill
Shreiner:	Open GL Reference Manual, Addison-Wesley.