

- Instructor:** Dr. K.R.Subramanian, Rm. 435E, Woodward Hall.
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WWW: <http://www.cs.uncc.edu/~krs>
- Course Website** <http://www.cs.uncc.edu/~krs/courses/4120-5120>
- Office Hours:** Mon. 5-6pm, Thurs. 3-4 pm, or by appointment.
- Meeting Times:** Mon. 12.30-1.45pm, Woodward 155
- Prerequisites:** Data Structures (ITCS 2214 or equivalent), linear/vector algebra (MATH 2164), good programming skills(C++ or Java).
- Lab Facilities:** Linux PCs, Woodward Hall 335 Student Lab
- Text:** Donald Hearn and Pauline Baker, *Computer Graphics - with OpenGL*, Pearson Prentice Hall, Third Edition, 2004.
- Reference:** Dave Shreiner, Mason Woo, Jackie Neider, Tom Davis, *OpenGL Programming Guide, Sixth Edition*, Addison Wesley, 2007.
- Documentation:** **OpenGL:**
OpenGL Resources: <http://www.opengl.org>
OpenGL Programming Guide: <http://www.glprogramming.com/red/>
OpenGL Reference Guide: <http://www.glprogramming.com/blue/>
- FLTK:** <http://www.fltk.org>
- Grading:** Programming projects: 50%, Midterms(2) 15% each, Final: 20%.
No other graded homework. All projects evaluated by interactive demonstrations on campus.
- Grading roughly on 90-80-70-60 scale, with letter grades separated by suitable breakpoints.
Passing grade on projects required to pass the course.
Incompletes, only under exceptional circumstances and at the discretion of instructor.

Course Materials

Lecture slides, projects and other materials will be available at the website below.

www.cs.uncc.edu/~krs/courses/4120-5120

Attendance Policy

Attendance of all scheduled classes is required, as the material covered in the lectures will not necessarily be restricted to that in the prescribed text. You are responsible for all material covered in class. Attendance for all exams is mandatory. Makeup Exams will not be given except under special circumstances.

Academic Integrity

Cheating in any form is subject to disciplinary action(UNCC Code, under <http://www.legal.uncc.edu/policies/ps-105.html>). As far as programming projects are concerned, you are allowed to discuss general concepts and strategies for solving problems. No sharing of modules or parts of programs will be allowed.

COURSE SCHEDULE

Topic	Chapters	Schedule
Graphics Applications, Hardware, Math Background	1, 2, A-1	8/24,8/26
Graphics Packages, OpenGL	2, 3	8/26, 8/31, 9/9, 9/14
Raster Graphics	3, 4	9/16,9/21,9/23,9/27
Mid Term 1 - 10/5(Roughly)		
Geometric Transformations	5	10/7,10/14,10/19
3D Viewing and Projections	7	10/21,10/26,10/28,11/2
Mid Term 2 - 11/4(Roughly)		
Shading Models, Rendering	10	11/9,11/11,11/16
Visible Surface Detection	9	11/18,11/23,11/30
Texture Mapping, Modeling	8,10	12/2, 12/7
Final Exam, May 4		

COURSE OUTLINE

■ Introduction, Applications, Math Background

- What is Computer Graphics?
- Applications of computer graphics.
- Graphics pipeline, display hardware
- Math background: linear algebra - coordinate systems, points, vectors, matrices

■ Graphics Packages and OpenGL

■ Raster Graphics(2 weeks)

- Graphics primitives, attributes
- Raster algorithms: Filling, Scan-conversion.
- Aliasing and Anti-aliasing.
- Clipping algorithms: Line and Polygon Clipping.

■ Geometric Transformations

- 2D/3D Affine Transformations
- Matrix representation and homogeneous coordinates
- Window - Viewport transformation

■ Modeling (1 week)

- Hierarchical Modeling .
- Surface and Scene Representations(CSG, Scene Graphs)

■ 3D Viewing and Projections

- Parallel and perspective projections
- The camera transformation
- Mathematics and implementation of geometric projections.
- 3D Clipping

■ Shading Models and Rendering Algorithms

- Local Reflectance Models, Flat, Gouraud and Phong shading.
- Global Illumination Algorithms - Ray Tracing, Radiosity
- The Rendering Equation

■ **Visible Surface Detection**

- Image vs. Object precision algorithms
- Z-buffer, painter's, Warnock's algorithms.
- Scanline algorithm, BSP trees, Ray Tracing.

■ **Texture Mapping, Cubic Curves/Surfaces**

- Surface Detail
- Mipmaps
- Bump mapping, displacement maps, cube maps
- Cubic curves (Bezier, B-Spline)