CSCI 6821 – Advanced Computer Graphics

Department of Computer Science
Georgia Southwestern State University

Online Orientation
Semester Spring 2015

INSTRUCTOR

<table>
<thead>
<tr>
<th>Name</th>
<th>Alexander Yemelyanov</th>
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<tr>
<td>Office</td>
<td>CWH Room 211</td>
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<tr>
<td>Office Hours</td>
<td>12:30 - 2:00 pm, M,T,W,Th (or by appointment)</td>
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CATALOG DESCRIPTION

This course is an exposition of the techniques needed to generate and render three-dimensional computer images. It will provide a theoretical understanding of these techniques together with the programming expertise required to implement them. Two-dimensional graphics will be reviewed in detail. Homogeneous (4-coordinate) representation of three-dimensional points and vectors are presented with matrix transformations for orthographic and perspective projection.

COURSE SUMMARY

The goal of this course is to understand the fundamentals of graphical systems and develop some graphics programs by using a powerful programming package. In particular, you will use OpenGL, a platform-independent state-of-the-art graphics library and the industry standard for graphics programming. OpenGLUT Library will let you compile different projects in the Microsoft Visual Studio 2010 environment. You will need some background in discrete mathematics, data structures and basic algorithms to understand the theoretical material in this course. For programming assignments you have to have some basic knowledge in the C/C++ language and familiarity with MS Visual Studio IDE.

LEARNING OUTCOMES

After completing this course, students will be able to
1) Use the general principles of modern graphics design.
2) Apply fundamental graphics algorithms and mathematics.
3) Use OpenGL to implement interactive 3D graphics applications.

TEXTBOOK


REQUIRED SOFTWARE

OpenGL and Microsoft Visual Studio C++ IDE.

COURSE OUTLINE

1. Graphics systems and models
   1.1. Graphics and imaging systems
   1.2. The synthetic-camera model
   1.5. Graphics architectures
2. Graphics Programming
   2.1. Programming two-dimensional applications
   2.2. The OpenGL API
   2.3. Color, viewing, and control functions
3. Input and Interaction
   3.1. Input devices and display lists
   3.2. Programming event-driven Input
   3.3. Building interactive models
4. Geometric objects and transformations
   4.1. Scalars, points, vectors, and coordinate systems
   4.2. Three-dimensional primitives
   4.3. Affine Transformations
   4.4. Translation, Rotation, and Scaling
   4.5. Transformations in Homogeneous Coordinates
5. Viewing
   5.1. Classical and computer viewing
   5.2. Parallel and perspective projections
   5.3. Hidden-surface removal
   5.4. Displaying meshes
6. Shading
   6.1. Light sources
   6.3. The Phong reflection model
   6.4. Computation of vectors
   6.5. Polygonal shading
GAVIEW SUPPORT

1. How to Log in to GaVIEW:
   On the GSW GaVIEW page, click the link Login to GaVIEW and enter your username and password.
   - Your username is the first part of your RADAR e-mail address (everything before the @ symbol).
   - You have to set up your password using the Forgot Password? link, if you log in for the first time.

2. There is important information for students under the Student Orientation link on the GaVIEW home page. If you work on your personal computer, you have to explore this information to familiarize yourself with technology requirements and GaVIEW tools and components.

3. You also must go through the browser checker before you log in the first time.

4. The “Downloads” link will help you to install the plug-ins into your system.

5. Read the D2L Student Self-Paced Tutorial located in the Student Resources widget in GaVIEW.

6. If you experience technical issues with GaVIEW, you may contact the D2L Help Center (24 x 7 support) at https://d2lhelp.view.usg.edu/ or GSW GeorgiaVIEW help at gaview@gsw.edu (available Monday - Friday during business hours).

7. Explore all links and read useful information on the GaVIEW Home page.

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<th>IMPORTANT DATES TO REMEMBER</th>
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<tr>
<td>Classes Begin</td>
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<tr>
<td>Martin Luther King Jr. Day (no classes)</td>
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<td>Mid Term</td>
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<td>Spring Break (no classes)</td>
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<td>Last Day to Withdraw Without Academic Penalty</td>
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<td>Last Day of Class</td>
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<tr>
<td>Wednesday, January 14, 2015</td>
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<td>Monday, January 19, 2015</td>
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<td>Wednesday, March 5, 2015</td>
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<td>Monday, March 16 – Saturday, March 21, 2015</td>
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<td>Monday, March 30, 2015</td>
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<td>Wednesday, April 29, 2015</td>
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Deadline for the first login: January 21, 2015