

CSCI 4250/5250: Introduction to Computer Graphics
Middle Tennessee State University
Fall 2011

1. Instructor

Dr. Cen Li

Office: KOM 355

Phone: 904-8168

Email: cli@mtsu.edu

URL: www.mtsu.edu/~cli

Office Hours: M-R: 9:30-11:30am. Others by appointment.

I am generally available most days of the week via email.

2. Textbooks:

- *Computer Graphics Using OpenGL*, 3rd ed., by F. S. Hill Jr. and Stephen Kelley (ISBN 0-13-149670-0)

Optional:

- *OpenGL Primer* by Edward Angel (ISBN 0-201-74186-5)
- *The OpenGL Programming Guide: The Official Guide to Learning OpenGL Version 4.1 (8th Edition)* by Dave Shreiner, The Khronos OpenGL ARB Working Group
- The OpenGL “Redbook” v1.1 is in HTML format at <http://www.glprogramming.com/red/> and sample programs from the OpenGL “Redbook” v1.1 can be found at <http://www.opengl.org/resources/code/samples/redbook/>

3. Prerequisites:

A "C" or better in CSCI 2170 and 3080 or consent of instructor.
Programming maturity is advised.

4. Course Goals:

The primary goal of this course is to introduce students to the theory and practice of 2D and 3D interactive computer graphics. It is not to introduce the student to any specific graphics package used in industry.

Course Objectives:

1. To learn the fundamentals of computer graphics hardware systems and organization of graphics software systems.
2. To learn to use mathematical transformations and vector techniques in the production of computer graphics.
3. To learn both fundamental and advanced algorithms for computer graphics.
4. To learn to write graphics programs using OpenGL and GLUT to represent 2D and 3D interactive data models.

Learning Outcomes:

Upon successful completion of this course, a student will:

1. Be able to explain the theory, fundamental concepts, and practical concerns involved in representing, modeling, and interacting with graphical scenes in 2D and 3D spaces.
2. Demonstrate the application of mathematical transformations and vector techniques in producing graphics requiring rotation, translation, scaling, and 3D projection
3. Be able to apply algorithms used in computer graphics
4. Have developed experience in graphics programming using a modern API (OpenGL and

GLUT)

5. Demonstrate knowledge of computer graphics principles and concepts in the production of C/C++ programs that produce simple graphics.

5. Topics:

1. Survey of computer graphics applications
2. Introduction to graphics display devices
3. Introduction to OpenGL and GLUT
4. Graphics primitives, windows, viewports, clipping, 2D viewing in OpenGL
5. Interactive graphics, user input, animation
6. Vector tools for graphics, geometric transformations, homogeneous coordinates
7. 3D Viewing, Camera Analogy, perspective projections, orthographic projections
8. Modeling Shapes with Polygonal Meshes, extruded shapes, surfaces of revolution
9. Rendering faces for visual realism, shading models, texture mapping, adding shadows
10. Curves and Surfaces, Bezier curves, interpolation

6. Assessment Methods:

1. Students will demonstrate basic knowledge of computer graphics principles in written homework, programming exercises, and examinations.
2. Students will demonstrate knowledge of mathematical transformations and vector techniques in homework, programming exercises, and examinations.
3. Students will demonstrate ability to use OpenGL in programming exercises and a design project.

7. Attendance Policy:

School regulations state: "A student is expected to attend each class for which he or she is registered except in cases of unavoidable circumstances. The fact that a student may be absent from a class does not, in any way, relieve that student of the responsibility of work covered or assigned during the absences."

Attendance will be taken each class period. You are responsible for making up any material missed by being absent. You are also expected to be on time to class. Being late is considered rude and is definitely disruptive to class.

8. Academic Honesty:

All work for this class (including labs, exams, and homework) is to be done on an individual basis. The penalty for unauthorized collaboration will range from a grade of zero for an individual assignment to a failing grade for the course.

See <http://www.mtsu.edu/~csdept/Academics/academicIntegrity.htm> for additional details and complete policy:

- Each student is expected to complete his/her own work. This includes all homework and exams.
- Students are encouraged to study for exams in groups.
- Students are NOT allowed to complete homework or labs in groups.
- Students are allowed to ask any questions concerning homework to the class instructor or any other instructor at MTSU.
- Students may ask questions of other students on how to use the system at MTSU.
- Students may ask questions of other students on clarification of a homework or lab assignment.

Collaboration on assignments is not allowed!

See www.mtsu.edu/~csdept/Academics/academicIntegrity.htm for a description of unacceptable

collaboration. It should be noted that the first offense will result in a grade of zero for the homework/lab/test. A second offense will result in a grade of F for the class.

Exceptions to this policy may be made if any group lab assignments are given. Instances of cheating may result in punishment ranging from 0 or F for an assignment to F for the course to suspension from MTSU.

9. Grading procedures:

Tests (30%): Two in-class tests will be given. Tests will cover lectures, assigned readings, homework assignments, etc. Makeups will not be given on tests. If you miss a regularly scheduled exam, the final exam will replace this exam. If you did not miss a test and the grade on the final exam is higher than the grade on your lowest test, then the final exam can take the place of the lowest test score.

Final Exam (15%): A comprehensive final will be given at the end of the semester. If you do not miss any of the three in class tests and your course average is 'A' going into the final, then you may opt out of the final exam. You will need to verify your course average with Dr. Li when the third test is returned. The course average prior to taking the final exam will be calculated as if the two tests counted 45% of the grade.

Homework (15%): Homework assignments that do not require the use of a computer or brief lab assignments will be assigned. Homework assignments are due at the beginning of class on the day due. **NO HOMEWORK WILL BE ACCEPTED LATE.**

Programming assignments (Labs) (35%): Programming assignments usually require about two weeks to complete. All Programming assignments are given a due date and deadline. The late penalty is 10 points per **class** day after the due date. **NO PROGRAMS WILL BE ACCEPTED after the deadline.** Assignments in graphics are time consuming and should be started immediately after the assignment is made. Details concerning turning in programming assignments will be given when the first assignment is given.

Peer Learning Activity (5%)

Half of the class will participate in PeerSpace Peer Code Review activity. The students will be selected randomly. These students will peer-assess programming projects submitted by others in the group.

Students in the other half of the class will participate in peer learning activity by giving a short (10-15 min) presentation on a Computer Graphics related topic to class.

PeerSpace Participation

You are strongly encouraged to participate in the PeerSpace Online Collaborative Learning Community. Every forum and blog post and comment, and every group discussion topic and comment you post will add 100 point to your PeerSpace community participation score. PeerSpace users are ranked based on this score. In addition, PeerSpace groups are ranked based on the average community participation score of its members.

At the end of the semester, if you are one of the top 40 ranked students in PeerSpace, 1 bonus point will be added to your final course average. If you are a member of a group that is one of the top 10 ranked groups in PeerSpace, 1 bonus point will be added to your final course average.

Grading: Grading scale

Letter grades will be determined using a standard percentage point evaluation as outlined below:

A	90%-100%	
B+	87%-89%	B 80%-86%
C+	77%-79%	C 70%-76%
D+	67%-69%	D 60%-66%
F	0%-59%	

To calculate your final average

Determine your **test average** = (test 1 + test 2)/2.0 where one of the tests may be replaced by the final test score if it is lower than the minimum test grade

Determine your **homework average** = (your total points on homework)/(total points possible on homework) * 100

Determine your **program assignment average** = (your total points on programs)/ (total points possible on programs) * 100

Determine your **final course average** = $0.30 * \text{test average} + 0.15 * \text{Final exam score} + 0.15 * \text{homework average} + 0.35 * \text{program assignment average} + 0.05 * \text{peer learning score}$

10. Software:

Assignments in this class written in C++ using OpenGL and GLUT. You may use:

- Microsoft.NET 2010. This software is available for checkout to computer science students at <http://e5.onthefhub.com/WebStore/Welcome.aspx?vsro=8&ws=464FBC0B-CC9B-E011-969D-0030487D8897>, or
- Xcode on Mac OS X.

11. Important Notes:

Reasonable Accommodation for Students with Disabilities:

If you have a disability that may require assistance or accommodation, or you have questions related to any accommodations for testing, note takers, readers, etc., please speak with me as soon as possible. Students may also contact the Office of Disabled Students Services (898-2783) with questions about such services.

Cell Phone/Beeper Policy:

Please turn all cell phones/beepers to silent or vibrate. If you believe you will need to be answering a cell phone, please sit near the door, and quietly leave the room if you receive a call.

Inclement Weather Policy:

Unless the university is closed, I will meet class, so do not call the office. However, if the school system in your county of residence is closed for bad weather, you have an excused absence from this class.

Reasonable accommodation for students with disabilities:

If you have a disability that may require assistance or accommodation, or you have questions related to any accommodations for testing, note takers, readers, etc., speak with me as soon as possible. Students may also contact the Office of Disabled Student Services (898-2783) with questions about such services.

Financial aid notice:

Do you have a lottery scholarship? To retain **Tennessee Education Lottery Scholarship** eligibility, you must earn a cumulative TELS GPA of 2.75 after 24 and 48 attempted hours and a **cumulative** TELS GPA of 3.0 thereafter. You may qualify with a 2.75 **cumulative** GPA after 72 attempted hours (and subsequent semesters), if you are enrolled full-time and maintain a semester GPA of at least 3.0. A grade of C, D, F, or I in this class may negatively impact TELS eligibility. Dropping a class after 14 days may also impact eligibility; if you withdraw from this class and it results in an enrollment status of less than full time, you may lose eligibility for your lottery scholarship. Lottery recipients are eligible to receive the scholarship for a maximum of five years from the date of initial enrollment, or until a bachelor degree is earned. For additional lottery scholarship rules please refer to your Lottery Statement of Understanding form, review lottery scholarship requirements on the web at <http://scholarships.web.mtsu.edu/telsconteligibility.htm> , or contact the MTSU Financial Aid office at 898-2830.

For students receiving any form of financial aid, they should always consult with the Financial Aid Office before dropping a course. For additional information, contact the Financial Aid Office or see <http://www.mtsu.edu/financialaid>.