

CSE 472: Computer Graphics

Spring Term 2009

Course Information:

This course will study the use of computer graphics for image and animation creation. Students will study 3D modeling and rendering. We will learn how to create and render 3D images and animations. We will also study the underlying mechanisms used by various rendering technologies.

Objective: Students completing this course are expected to be able to:

- Write programs that utilize the OpenGL graphics environment.
- Use polygonal and other modeling methods to describe scenes.
- Understand and be able to apply geometric transformations.
- Create basic animations.
- Understand scan-line, ray-tracing, and radiosity rendering methods.

Instructor: Yiying Tong
Office: 1140 Engineering Building
Phone: 803-2234
Office Hours: MW, 2:00-3:00PM, T 2:00-3:00PM and by appointment.
Feel free to contact me at any time.
ytong@msu.edu

TA: Jonathan Battista, battist5@cse.msu.edu

Schedule: MW 12:40-2:00pm in 1225 Engineering Building

Textbooks: *Computer Graphics using OpenGL*, Third Edition, F. S. Hill, Jr., Prentice Hall, ISBN 0-131-49670-0.

Fundamentals of Computer Graphics (2nd Edition)*, Peter Shirley and others. AK Peters. ISBN: 978-1-56881-269-4. (Optional)

OpenGL Programming Guide, Sixth Edition, Woo, Neider, Davis, and Shreiner, Addison Wesley, ISBN 0-321-48100-3. (Optional)

The *OpenGL Programming Guide* is optional, but highly recommended as a reference for OpenGL. It contains many useful examples and lots of information on OpenGL programming and is very well written. You can access reference materials in other places, but it's often much more cryptic than in this text. The most recent edition (6th) is best, but editions 4 and 5 will be just about as useful if you already have one.

WWW: Information about the class will be posted at: <http://www.cse.msu.edu/~cse472/>.

Prerequisites: CSE 331.

Notice: MTH 314 is Linear Algebra I and is currently listed as a prerequisite, but we will be removing it in the future. All material from that class will be covered in this class again.

Angel: This class will be utilizing angel, the online course management system. This is in addition to the regular class web site, which I will also use. <http://angel.msu.edu>.

Privacy: Electronic conversation via email, bulletin boards, or any of the angel features, is different from verbal communication because it retains the identity of the participant. In this course, all participants will have access to a list of names and e-mail addresses of other course participants. Participants in the course will be able to send bulk e-mail to all other participants.

It is inappropriate to use the email features of this course to send bulk e-mail to all enrolled in the class, unless this type of activity is for a specific educational objective, e.g., to facilitate collaborative learning within the class. All use of the e-mail function within Blackboard is governed by the "Good Citizenship In Cyberspace" section contained in MSU's Acceptable Use policy (<http://www.msu.edu/unit/complab/policies.html> and <http://www.cse.msu.edu/facility/policy.html>)

Exams: Lab Exam: Week of March 23, 2009.
In-class Exam: April 22, 2009.

Notice: This course will not have a final. We will, however, meet Tuesday, May 5, 2009, the scheduled day of the final exam from 12:45-2:45pm for evaluation of final projects. Attendance will be required.

Toe-Tippers: Many class sessions will include a handout referred to as a "toe-tipper". This assignment will be completed during the lecture period. Notice: toe-tippers are to be done ONLY in class and cannot be made up! If you miss class, you miss it. The two lowest-score toe-tippers are discarded in the grading process. This is provided to allow for some legitimate missing of classes. If you must miss more than two classes for university excused absences, the toe-tippers beyond the first two can be made up.

You must bring to class a red inking pen. Many of the Toe-Tippers will be collaboratively executed and graded in class.

Step Assignments: Many weeks there will be a smaller programming assignment that must be completed during that week. All step assignments are due Monday of the following week unless otherwise indicated. Some step assignments will include questions that must be answered as well as programming assignment steps.

Step Assignments Completion Rule:
If you fail to turn in any step assignment, that assignment will be assigned a grade of negative 100%.

Programming Assignments:
3 programming assignments will be assigned during the course of the term. The grades for these assignments may also be reflected in lab assignment grades. Projects 1 and 3 will be a group project.

Excellence Points:
The majority of the assignments in CSE 472 will be graded using a grading rubric with clearly indicated requirements to achieve the assignment points. In fact, you will submit your own grade with each of the projects based on your completion of the grading rubric. However, there can be a big difference between the technical completion of a requirement and an impressive presentation. For this reason, we will be assigning "excellence points". Excellence points will be available ONLY on projects. Up to three excellence points can be earned for each project for a possible total of 9 excellence points.

Grading: Lab examination: 15%

In-class examination:	15%
Step assignments:	15%
Project 1:	10%
Project 2:	15%
Project 3:	10%
Toe-tippers:	15%
Excellence points:	5%

Final grades will be based on this scale:

4.0	90%+
3.5	85%
3.0	80%
2.5	75%
2.0	70%
1.5	65%
1.0	60%

Attendance: You are expected to attend all class sessions. Failure to attend a class may be reflected in your toe-tipper scores.

Extra credit: There may be limited opportunities for extra credit. I do also make alternative incentives available for exceptional performance and competitive success. I also have on occasion assigned optional *loss abatement* questions.

Academic Honesty: Article 2.3.3 of the Academic Freedom Report states that "The student shares with the faculty the responsibility for maintaining the integrity of scholarship, grades, and professional standards." In addition, the (insert name of unit offering course) adheres to the policies on academic honesty as specified in General Student Regulations 1.0, Protection of Scholarship and Grades; the all-University Policy on Integrity of Scholarship and Grades; and Ordinance 17.00, Examinations. (See Spartan Life: Student Handbook and Resource Guide and/or the MSU Web site: www.msu.edu.) Therefore, unless authorized by your instructor, you are expected to complete all course assignments, including homework, lab work, quizzes, tests and exams, without assistance from any source. You are expected to develop original work for this course; therefore, you may not submit course work you completed for another course to satisfy the requirements for this course. Also, you are not authorized to use the www.allmsu.com Web site to complete any course work in (insert course number here). Students who violate MSU rules may receive a penalty grade, including--but not limited to--a failing grade on the assignment or in the course. Contact your instructor if you are unsure about the appropriateness of your course work. (See also <http://www.msu.edu/unit/ombud/honestylinks.html>)

That's the university policy. My specific policies are as follows: You may discuss individual assignments with other students, but the assignment must be entirely your own work. Plagiarism just makes me mad! All work turned in must be your own. If you borrow or adapt software from a textbook or from source code that is obviously public, you must treat this as a quotation or paraphrase, acknowledging the source in the heading or the program module.

You may discuss assignments in general terms with your classmates, the course staff, or the instructor, but you are not permitted to receive solutions from others or to read or copy part or all of another person's solution to a problem.

Disabilities: Students with disabilities should contact the Resource Center for Persons with Disabilities to establish reasonable accommodations. For an appointment with a disability specialist, call 353-9642 (voice), 355-1293 (TTY), or visit MyProfile.rcpd.msu.edu.

- Drops and Adds:** The last day to add this course is the end of the first week of classes. The last day to drop this course with a 100 percent refund and no grade reported is 2-6-09. The last day to drop this course with no refund and no grade reported is 3-4-09. You should immediately make a copy of your amended schedule to verify you have added or dropped this course.
- Religious Holidays:** You may make up course work missed to observe a major religious holiday only if you make arrangements in advance with the instructor.
- Required Activities:** To make up course work missed to participate in a required activity for another course or a university-sanctioned event, you must provide the instructor with adequate advanced notice and a written authorization from the faculty member of the other course or from a university administrator.
- Commercialization:** Commercialization of lecture notes and university-provided course materials is prohibited in this course.
- Attendance:** Students whose names do not appear on the official class list for this course may not attend this class.
- Internet:** Some professional journals will not consider a submission for publication if the article has appeared on the Internet. Please notify your instructor in writing if you do not want your course papers posted to the course Web site.
- Disruptive Behavior:** Article 2.3.5 of the Academic Freedom Report (AFR) for students at Michigan State University states that "The student's behavior in the classroom shall be conducive to the teaching and learning process for all concerned." Article 2.3.10 of the AFR states that "The student has a right to scholarly relationships with faculty based on mutual trust and civility." General Student Regulation 5.02 states that "no student shall . . . interfere with the functions and services of the University (for example, but not limited to, classes . . .) such that the function or service is obstructed or disrupted. Students whose conduct adversely affects the learning environment in this classroom may be subject to disciplinary action through the Student Faculty Judiciary process.

Course Content (in an approximate order of presentation)

- Introduction to OpenGL and Visual C++
- Basics of computer graphics and rendering
- Geometric transformations
- Modeling
- Interaction
- Viewing in 3D
- Light and color, illumination and shading
- Clipping and Hidden Surface removal
- Scan conversion algorithms
- Antialiasing
- Curves and curve algorithms
- Textures, bump maps, and environment maps
- Recursive ray tracing
- Radiosity
- Movie day

As time permits:

- Particle systems and Fractals
- Collision detection

Notice: I never specify exactly what material will be covered on any particular week and reserve the right to modify the presentation order of materials. This is for your benefit. Course progress will be based on feedback from students, be it through grades or directly. Note, however, that we must cover the course materials, so if we slow in one area, we must accelerate elsewhere.

Important Dates

See the class web site for important dates.

The course schedule is subject to change with appropriate notice.