Syllabus

CSE4303 / CSE5365 Computer Graphics Fall 2017

Instructor:	Farhad Kamangar
Office Location:	ERB 524
Office Telephone Number:	817-272-3617
Email Address:	kamangar@uta.edu
Faculty Profile:	https://www.uta.edu/profiles/farhad-kamangar
Office Hours:	• Tuesdays & Thursdays 3:00-4:45 PM • Other times by appointment.
Section Information:	CSE-4303-001 and CSE-5365-001
Time and Place of Class:	LS Room 100, TuTh 5:30-6:50 PM
Course Website:	http://ranger.uta.edu/~kamangar/CSE-4303-FA17

Description of Course Content:

Theory and practice for the visual representation of data by computers including display devices, output primitives, planes and curved surfaces, two- and three-dimensional transformations, parallel and perspective viewing, removal of hidden lines and surfaces, illumination models, ray tracing, radiosity, color models, and computer animation. Prerequisite: CSE 2320, and MATH 3319 or MATH 3330.

Student Learning Outcomes:

This course focuses both on the theoretical and practical implementation of the most common algorithms and techniques in computer graphics. After completing this course, students will be able to:

- Represent and construct mathematical models of 3D scenes containing planar and curved objects and surfaces.
- Understand the mathematics and representation of various transformations.
- Understand and use matrices to transform and position 3D objects in space.
- Use OpenGL to create high quality computer graphics.
- Understand shading models.
- Understand and implement ray tracing algorithms.

Requirements:

Prerequisite: CSE 2320, and MATH 3319 or MATH 3330, working knowledge of a high level programming language, or consent of instructor.

Textbook:

All the required reading materials will be provided online.

Supplemental Books (Recommended):

- Introduction to Computer Graphics by Foley, VanDam, Feiner, Hughes, Phillips, Addison-Wesley
- Practical Linear Algebra - A Geometry Toolbox by Gerald Farin and Dianne Hansford, A K Peters

Course Schedule and Important Dates

- First day of class: Aug. 24, 2017
- Labor Day holiday: Sept. 4, 2017
- Census day: Sept. 11, 2017
- Midterm Exam Thursday, Oct. 19, 2017
- Last day to drop classes: Nov. 1, 2017
- Thanksgiving Holidays: Nov. 23 & 24, 2017
- Last day of classes: Dec. 6, 2017
- Final Exam Tuesday, Dec. 12, 2017 (5:30-8:00 PM)

Descriptions of major assignments and examinations:

There will be programming assignments, one midterm exams, one final exam, and in-class quizzes.

Exams and Quizzes:

- Midterm and final exams will include theoretical and programming questions.
- Exams and quizzes will be comprehensive and shall include information from the textbook as well as information from class lectures.
- Quizzes consist of occasional, unannounced, written questions and they will be based on the assigned readings and class lectures. A quiz may be given at any time during any class period. There will be no make-up quizzes. Quizzes will be given only to those students who are present when the quizzes are passed out.
- The lowest quiz score will be dropped (The midterms and final exam are absolutely required).
- The quiz policy may be adjusted in the case of documented disability.
- There will be no makeup exams or quizzes. If, and only if, you have an approved medical or university excuse for being absent from a test or a quiz, the next scheduled exam shall count twice.

Assignments

- The instructor and the teaching assistant are available outside the class to offer help and clarify the concepts. However, you are expected to be expert programmers. This means that you should be able to implement the concepts in real code and debug your own program. No programming or debugging help will be offered.
- All assignments will be assigned well in advance of the due date. All assignments are due at 11:59 PM on the specified date. There is a 24 hour grace period after the due date. The purpose of the grace period is to compensate for the unforeseen events such as network or server problems. No assignment will be accepted after the grace period.
- Assignments must be submitted electronically using the Blackboard at https://elearn.uta.edu.
- The programming language for this class will be Python. The examples and demos in the lectures will also use the Python language. However, you may use any other programming language that you choose for submitting your assignments.
- For certain assignments there will be a signup sheet for each student to reserve a time slot to personally demonstrate the assignment to the teaching assistant.
- Each assignment must be self-contained, i.e. it must include all the required components to run. The teaching assistant will only use the submitted files. No additional or supplemental files may be used at the run time. In other words, your assignments must run as submitted.
- Programs that do not run will receive no credit (No partial credits).
- Programs that implement some, but not all, of the requirements may receive partial credit. However, these programs must still run without errors.
- It is each student's responsibility to completely test their program PRIOR to submission and make sure that it executes without error(s) as submitted.

Grading Policy:

Grades will be calculated based on the following percentages:

Quizzes	25%
Assignments	25%
Midterm Exam	25%
Final	25%

Letter grades are assigned as follows:

87%–100%	A
75%–87%	B
65%–75%	C
55%–65%	D
0%–55%	F

- There will be **no curves** and the letter grades will be absolutely based on the table shown above. Multiple studies have shown that grading on a curve discourages studying. The problem with grading curves is that they are not applied until the end of a semester. This uncertainty may lead to high stress levels and leaves students with no idea where they stand in a course or what it will take to get a certain grade.
- Grading only depends on your performance in the tests, quizzes, and assignments. Grading criteria does not include effort. All requests for leniency in the grading will be ignored.
- All the grades and assignment will posted on Blackboard and students are expected to keep track of their performance throughout the semester and seek guidance from the instructor if their performance drops below satisfactory levels.

General Policies:

- Your opinion matters and all constructive suggestions will be seriously considered. However, your suggestions should be applicable to all students in the class and not to a particular group or individual. Please do not ask for any exception.
- All announcements will be communicated via email. You are responsible for checking your email.
- Do not be late in attending the class. Your late arrival will disturb the continuity of the subject and may break other student's concentration. DO NOT enter the classroom if you are late.
- Turn off your cell phone during the class.
- **Be there.** You learn better when you are mentally present. If you bring a notebook (laptop, pad, ...) to class it should only be used for work which is related to the ongoing subject in this class. DO NOT use your computer for anything which is not related to this class (email, social networks, games, chat, or work related to other courses).
- No special make-up work will be accepted after the end of the semester. In the event of a documented major medical problem, a grade of Incomplete will be given pending the submission of complete work. However, make-up work “to improve one’s grade” will not be accepted.
- Part of the objective of this course, and any other course, is to prepare students for professional life in real world. In real world there is no excuse for not knowing the rules and responsibilities. You are responsible for understanding the rules and carry out your responsibilities. In real world if you do not get the job done, nobody will care about the reasons or excuses.
- You are responsible for all material presented during classes from which you were absent.
- If your goal is an easy grade, or a light load, then this is not the right class for you.

Frequently Asked Questions (FAQ):

Question: I REALLY need a grade of X because of GPA, … . What can I do?

Answer: Invent a time machine. Come back to the start of the semester and make sure that your semester average exceeds the threshold for grade X. There is no other option.

Question: I made a mistake and submitted a wrong file as my assignment. What can I do?

Answer: All assignments are graded as submitted. You can submit your assignments as many times as you want before the deadline, however, it is your responsibility to verify your submission and make sure it is correct. There will be no leniency.

Attendance:

At The University of Texas at Arlington, taking attendance is not required but attendance is a critical indicator in student success. Each faculty member is free to develop his or her own methods of evaluating students' academic performance, which includes establishing course-specific policies on attendance. As the instructor of this section, I will not take attendance. However, while UT Arlington does not require instructors to take attendance in their courses, the U.S. Department of Education requires that the University have a mechanism in place to mark when Federal Student Aid recipients "begin attendance in a course." UT Arlington instructors will report when students begin attendance in a course as part of the final grading process. Specifically, when assigning a student a grade of F, faculty report the last date a student attended their class based on evidence such as a test, participation in a class project or presentation, or an engagement online via Blackboard. This date is reported to the Department of Education for federal financial aid recipients.

Make-up Exam Policy:

There are no make-up exams. If and only if you have a University excuse for being absent from a test, the next scheduled exam shall count twice.

Incomplete Grade Policy:

No incomplete shall be given in this course, except if you miss the final with a university approved letter.

Grade Grievances:

Any appeal of a grade in this course must follow the procedures and deadlines for grade-related grievances as published in the current University Catalog:

http://catalog.uta.edu/academicregulations/grades/#undergraduatetext

http://catalog.uta.edu/academicregulations/grades/#graduatetext

http://www.uta.edu/deanofstudents/student-complaints/index.php.

Drop Policy:

Students may drop or swap (adding and dropping a class concurrently) classes through self-service in MyMav from the beginning of the registration period through the late registration period. After the late registration period, students must see their academic advisor to drop a class or withdraw. Undeclared students must see an advisor in the University Advising Center. Drops can continue through a point two-thirds of the way through the term or session. It is the student's responsibility to officially withdraw if they do not plan to attend after registering. **Students will not be automatically dropped for non-attendance**. Repayment of certain types of financial aid administered through the University may be required as the result of dropping classes or withdrawing. For more information, contact the Office of Financial Aid and Scholarships (http://wweb.uta.edu/aao/fao/).

Disability Accommodations:

UT Arlington is on record as being committed to both the spirit and letter of all federal equal opportunity legislation, including *The Americans with Disabilities Act (ADA), The Americans with Disabilities Amendments Act (ADAAA),* and *Section 504 of the Rehabilitation Act.* All instructors at UT Arlington are required by law to provide "reasonable accommodations" to students with disabilities, so as not to discriminate on the basis of disability. Students are responsible for providing the instructor with official notification in the form of **a letter certified** by the Office for Students with Disabilities (OSD). Only those students who have officially documented a need for an accommodation will have their request honored. Students experiencing a range of conditions (Physical, Learning, Chronic Health, Mental Health, and Sensory) that may cause diminished academic performance or other barriers to learning may seek services and/or accommodations by contacting: **The Office for Students with Disabilities, (OSD)** www.uta.edu/disability or calling 817-272-3364. Information regarding diagnostic criteria and policies for obtaining disability-based academic accommodations can be found at www.uta.edu/disability. Counseling and Psychological Services, (CAPS) or calling 817-272-3671 is also available to all students to help increase their understanding of personal issues, address mental and behavioral health problems and make positive changes in their lives.

Non-Discrimination Policy:

The University of Texas at Arlington does not discriminate on the basis of race, color, national origin, religion, age, gender, sexual orientation, disabilities, genetic information, and/or veteran status in its educational programs or activities it operates. For more information, visit uta.edu/eos.

Title IX Policy:

The University of Texas at Arlington ("University") is committed to maintaining a learning and working environment that is free from discrimination based on sex in accordance with Title IX of the Higher Education Amendments of 1972 (Title IX), which prohibits discrimination on the basis of sex in educational programs or activities; Title VII of the Civil Rights Act of 1964 (Title VII), which prohibits sex discrimination in employment; and the Campus Sexual Violence Elimination Act (SaVE Act). Sexual misconduct is a form of sex discrimination and will not be tolerated. *For information regarding Title IX, visit* or contact Ms. Jean Hood, Vice President and Title IX Coordinator at (817) 272-7091 or jmhood@uta.edu.

Academic Integrity:

All students enrolled in this course are expected to adhere to the UT Arlington Honor Code:

I pledge, on my honor, to uphold UT Arlington's tradition of academic integrity, a tradition that values hard work and honest effort in the pursuit of academic excellence.

I promise that I will submit only work that I personally create or contribute to group collaborations, and I will appropriately reference any work from other sources. I will follow the highest standards of integrity and uphold the spirit of the Honor Code.

UT Arlington faculty members may employ the Honor Code in their courses by having students acknowledge the honor code as part of an examination or requiring students to incorporate the honor code into any work submitted. Per UT System *Regents' Rule* 50101, §2.2, suspected violations of university's standards for academic integrity (including the Honor Code) will be referred to the Office of Student Conduct. Violators will be disciplined in accordance with University policy, which may result in the student's suspension or expulsion from the University. Additional information is available at https://www.uta.edu/conduct/.

All students are expected to pursue their academic careers with honesty and integrity. "Scholastic dishonesty includes, but is not limited to, cheating, plagiarism, collusion, the submission for credit of any work or materials that are attributable in whole or in part to another person, taking an examination for another person, any act designed to give unfair advantage to a student or the attempt to commit such acts" (Regents' Rules and Regulations, Part One, Chapter VI, Section 3, Subsection 3.2, Subdivision 3.22.). Students found guilty of dishonesty in their academic pursuits are subject to penalties that may include suspension from the university. **Any student found guilty of academic dishonesty will receive a -100% for that work (assignments, project, etc.) as well as having the course grade lowered one full letter grade - in addition to any other penalties assessed (suspension, expulsion, probation).** These and other applying UTA rules, will be strictly enforced. Any case of academic dishonesty will be treated in accordance with the UTA Handbook of Operating Procedures or the Judicial Affairs. If you do not understand this policy, it is your responsibility to obtain clarification or any additional information you may require. Students are not allowed to:

- Collaborate with others on the code they write
- Copy any part of someone else's program, even if they have permission and/or have modified the code
- Share or give their code, or even a subset of the code to, another student
- Review another student's solution (including from past semesters)
- All work turned in for grading must be the student's own work.

Electronic Communication:

UT Arlington has adopted MavMail as its official means to communicate with students about important deadlines and events, as well as to transact university-related business regarding financial aid, tuition, grades, graduation, etc. All students are assigned a MavMail account and are responsible for checking the inbox regularly. There is no additional charge to students for using this account, which remains active even after graduation. Information about activating and using MavMail is available at http://www.uta.edu/oit/cs/email/mavmail.php.

Campus Carry:

Effective August 1, 2016, the Campus Carry law (Senate Bill 11) allows those licensed individuals to carry a concealed handgun in buildings on public university campuses, except in locations the University establishes as prohibited. Under the new law, openly carrying handguns is not allowed on college campuses. For more information, visit http://www.uta.edu/news/info/campus-carry/

Student Feedback Survey:

At the end of each term, students enrolled in face-to-face and online classes categorized as "lecture," "seminar," or "laboratory" are directed to complete an online Student Feedback Survey (SFS). Instructions on how to access the SFS for this course will be sent directly to each student through MavMail approximately 10 days before the end of the term. Each student's feedback via the SFS database is aggregated with that of other students enrolled in the course. Students' anonymity will be protected to the extent that the law allows. UT Arlington's effort to solicit, gather, tabulate, and publish student feedback is required by state law and aggregate results are posted online. Data from SFS is also used for faculty and program evaluations. For more information, visit http://www.uta.edu/sfs.

Final Review Week:

For semester-long courses**,** a period of five class days prior to the first day of final examinations in the long sessions shall be designated as Final Review Week. The purpose of this week is to allow students sufficient time to prepare for final examinations. During this week, there shall be no scheduled activities such as required field trips or performances; and no instructor shall assign any themes, research problems or exercises of similar scope that have a completion date during or following this week *unless specified*

in the class syllabus. During Final Review Week, an instructor shall not give any examinations constituting 10% or more of the final grade, except makeup tests and laboratory examinations. In addition, no instructor shall give any portion of the final examination during Final Review Week. During this week, classes are held as scheduled. In addition, instructors are not required to limit content to topics that have been previously covered; they may introduce new concepts as appropriate.

Emergency Exit Procedures:

Should we experience an emergency event that requires us to vacate the building, students should exit the room and move toward the nearest exit, which is located on the west of the classroom. When exiting the building during an emergency, one should never take an elevator but should use the stairwells. Faculty members and instructional staff will assist students in selecting the safest route for evacuation and will make arrangements to assist individuals with disabilities.

Student Support Services:

UT Arlington provides a variety of resources and programs designed to help students develop academic skills, deal with personal situations, and better understand concepts and information related to their courses. Resources include tutoring, major-based learning centers, developmental education, advising and mentoring, personal counseling, and federally funded programs. For individualized referrals, students may visit the reception desk at University College (Ransom Hall), call the Maverick Resource Hotline at 817-272-6107, send a message to resources@uta.edu, or view the information at http://www.uta.edu/universitycollege/resources/index.php.

The IDEAS Center:

(2nd Floor of Central Library) offers **free** tutoring to all students with a focus on transfer students, sophomores, veterans and others undergoing a transition to UT Arlington. To schedule an appointment with a peer tutor or mentor email IDEAS@uta.edu or call (817) 272-6593.

- Emergency Phone Numbers:

In case of an on-campus emergency, call the UT Arlington Police Department at 817-272-3003 (non-campus phone), 2-3003 (campus phone). You may also dial 911.

Course Topics:

Introduction **Two-dimensional concepts.** • Translation, rotation, and scaling.	Week 1

• Homogeneous coordinate systems. • Plane equations. • Parametric equations. • Matrix representations. • Window to viewport mapping	
Mathematics for 3D computer graphics • Parametric equations • Plane equations **Three-dimensional transformations.** • Translation. • Rotation. • Scaling. • Shear. • Composite transformations.	Week 2-3
Viewing in 3-dimensions. • Orthographic parallel projections. • Oblique parallel projections.. • Perspective projections. • Mathematics of 3-dimensional projections.	Week 4 - 5
Three-dimensional representation of curved surfaces • Polygon meshes. • Bezier curves and surfaces. • Hermite curves. • Spline curves and surfaces.	Week 6-8
Color • Color Spectrum • CIE Chromaticity • Color space (RGB, HSV, YIQ, YCbCr, ..) • Color conversion	Week 9
OpenGL • Facts and Concepts • Naming Convention	Week 10-12

• Installation • Primitives • Transformations • Lighting and Shading • Texture • Display Lists • Packages • Vertex Shader • Fragment Shader	
Hierarchical modeling • Structure concepts • Editing structures • Hierarchical models • Local coordinates • Modeling transformations **Output primitives** • Line drawing algorithms • Frame buffer • Filled-area primitives • Polygon fill algorithm **Hidden Lines and Surfaces** • Visible line determination. • z-Buffer algorithm.	Week 13
Illumination and Shading • Illumination models. • Shading models for polygons. • Shadows. • Reflections. • Ray tracing.	Week 14 - 15

As the instructor for this course, I reserve the right to adjust this schedule in any way that serves the educational needs of the students enrolled in this course. –Farhad Kamangar.