

TED UNIVERSITY, COURSE SYLLABUS

Faculty	Engineering	Department	CMPE
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Course Code & Number	CMPE 360	Course Title	Computer Graphics
Type of Course	<input type="checkbox"/> Compulsory <input checked="" type="checkbox"/> Elective	Semester	2023-2024 <input checked="" type="checkbox"/> Fall <input type="checkbox"/> Spring <input type="checkbox"/> Summer
Course Credit Hours	(3+0+0) 3	Number of ECTS Credits	CMPE 360: 6
Pre-requisite	N/A	Co-requisite	N/A
Mode of Delivery	<input checked="" type="checkbox"/> Face-to-face <input type="checkbox"/> Distance learning	Language of Instruction	<input checked="" type="checkbox"/> English <input type="checkbox"/> Turkish
Course Coordinator	Prof. Tolga Çapın	Course Lecturer(s)	Prof. Tolga Çapın
Teaching Assistant	Semihanur Aktay		
Required Reading	Steve Marschner, Peter Shirley, Fundamentals of Computer Graphics, 4 th Ed.	Optional Reading (*)	Edward Angel, Dave Schreiner, Interactive Computer Graphics, A Top-Down App with WebGL, 7 th Ed.

Course Catalog Description	Advanced application of computer graphics techniques. Shading. Deformation. Ray tracing. Radiosity. Texture mapping. Concepts of motion are introduced for the generation of digital animation. Concepts of graphical workstation design, especially concerning user interfaces and window managers are introduced.
Course Objectives	This course aims to introduce the mathematical foundations of computer graphics, various computer graphics techniques, and implementation tools used in generating computer graphics.
Course Learning Outcomes	Upon successful completion of this course, a student will be able to 1. Model a computer graphics scene 2. Use a graphics library for implementing computer graphics 3. Use various techniques of computer graphics for rendering life-like scenes 4. Design efficient and friendly user interfaces 5. Compute mathematical and physical properties of graphical scenes 6. Use advanced CG techniques such as shaders for rendering scenes
Course Contents	Advanced application of computer graphics techniques. Shading. Deformation. Ray tracing. Radiosity. Texture mapping. Concepts of motion are introduced for the generation of digital animation. Concepts of graphical workstation design, especially concerning user interfaces and window managers are introduced.

Teaching Methods & Learning Activities	<input type="checkbox"/> Telling/Explaining <input type="checkbox"/> Discussions/Debates <input type="checkbox"/> Questioning <input checked="" type="checkbox"/> Reading <input type="checkbox"/> Peer Teaching <input type="checkbox"/> Scaffolding/Coaching <input checked="" type="checkbox"/> Demonstrating <input checked="" type="checkbox"/> Problem-Solving <input type="checkbox"/> Inquiry <input checked="" type="checkbox"/> Collaborating <input type="checkbox"/> Think-Pair-Share <input type="checkbox"/> Predict-Observe-Explain <input type="checkbox"/> Microteaching <input type="checkbox"/> Case Study/Scenario Analysis	<input checked="" type="checkbox"/> Simulations & Games <input type="checkbox"/> Video Presentations <input type="checkbox"/> Oral Presentations/Reports <input type="checkbox"/> Concept Mapping <input type="checkbox"/> Brainstorming <input type="checkbox"/> Drama/Role Playing <input type="checkbox"/> Seminars <input type="checkbox"/> Field Trips <input type="checkbox"/> Guest Speakers <input checked="" type="checkbox"/> Hands-on Activities <input type="checkbox"/> Service Learning <input checked="" type="checkbox"/> Web Searching <input type="checkbox"/> Experiments <input type="checkbox"/> Other(s):
Assessment Methods (Formal & Informal)	<input checked="" type="checkbox"/> Test/Exam <input checked="" type="checkbox"/> Quiz/Homework <input type="checkbox"/> Oral Questioning <input type="checkbox"/> Performance Project <div style="margin-left: 20px;"> <input type="checkbox"/> Written <input type="checkbox"/> Oral </div>	<input type="checkbox"/> Observation <input type="checkbox"/> Self-evaluation <input type="checkbox"/> Peer Evaluation <input type="checkbox"/> Portfolio <input type="checkbox"/> Presentation (Oral, Poster) <input checked="" type="checkbox"/> Other(s): <div style="margin-left: 40px;">Programming Assignments</div>

Student Workload (Total 152 Hrs)	<input checked="" type="checkbox"/> Lectures42.. hrs <input checked="" type="checkbox"/> Course Readings20.. hrs <input type="checkbox"/> Workshop hrs <input type="checkbox"/> Online Discussion hrs <input type="checkbox"/> Debate hrs <input type="checkbox"/> Work Placement hrs <input type="checkbox"/> Field Trips/Visits hrs <input type="checkbox"/> Observation hrs <input type="checkbox"/> Lab Applications hrs <input type="checkbox"/> Hands-on Work hrs <input checked="" type="checkbox"/> Quizzes and Homeworks.....50.. hrs <input checked="" type="checkbox"/> Midterm20.. hrs <input checked="" type="checkbox"/> Final.....20.. hrs	<input type="checkbox"/> Resource Review hrs <input type="checkbox"/> Research Review hrs <input type="checkbox"/> Report on a Topic hrs <input type="checkbox"/> Case Study Analysis hrs <input checked="" type="checkbox"/> Oral Presentation hrs <input type="checkbox"/> Poster Presentation hrs <input type="checkbox"/> Demonstration hrs <input type="checkbox"/> Web Designs hrs <input type="checkbox"/> Mock Designs hrs <input type="checkbox"/> Team Meetings..... hrs <input type="checkbox"/> Other hrs
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COURSE POLICIES
<p>Programming Prerequisites</p> <p>We will be using WebGL, HTML, and Blender as the main platforms in the course. HTML / WebGL programming requires JavaScript, and Blender plugin programming requires Python. We will be using</p>

a minimal subset of these languages, mostly native data types, iterators, and Math libraries. Material will be provided to bring you to the level of programming necessary for the course assignments.

Fluency in Python and JavaScript is a big plus. A junior-level knowledge of programming, and familiarity with modern development tools such as Git, Visual Studio, XCode, or the GNU toolchain, is required.

Class Readings

Class readings are necessary to follow the course. The material covered in class by your instructor will only provide a fundamental understanding of the general context. If you are willing to effectively learn a topic, you must actively work on it yourself. Reading is one of the most successful ways of learning about a topic.

Missed Work

Make-ups for midterm and final exams will be provided if you can provide a legal document confirming a significant health issue at the time of the examination or with the approval of the instructor. There will be no make-up for programming and quiz assignments.

Assignment Rules

Assignment work must be done individually or in pairs; the specific rule for a homework assignment will be explicitly stated in the homework handout. You can submit only one work. In case of multiple submissions, only the latest submission will be considered. You cannot submit work on other students' behalf.

Late Assignment Submission

Assignments are expected to be completed by the due date. For every day the assignment is late after the due date, 20% of the maximum will be deducted from the assignment score. No assignments will be accepted once they are four or more days late.

Following a brief grace period (which students should confirm with an instructor beforehand), one minute late is the same as one day.

Extra Credits

Extra credits will not be provided. Optional bonus grades will be provided as part of homework assignments.

Plagiarism

All of the following are considered plagiarism:

- turning in someone else's work as your own
- copying words or ideas from someone else without giving credit
- failing to put a quotation in quotation marks
- giving incorrect information about the source of a quotation

- changing words but copying the sentence structure of a source without giving credit
- copying so many words or ideas from a source that it makes up the majority of your work, whether you give credit or not” (www.plagiarism.org)

Plagiarism is a serious offense and will be penalized by the university disciplinary committee. The best way to avoid accidentally plagiarizing is to work on your own before you ask for the help of other resources.

Cheating

Cheating has a very broad description which can be summarized as “acting dishonestly”. Some of the things that can be considered as cheating are the following:

- Copying answers on examinations, homework, and laboratory work,
- Using prohibited material on examinations,
- Lying to gain any type of advantage in class
- Providing false, modified, or forged data in a report
- Plagiarizing
- Modifying graded material to be regraded.
- Causing harm to colleagues by distributing false information about an examination, homework, or laboratory

TENTATIVE COURSE OUTLINE

W	Day	Topics	Readings	Assignments
1	02.10 - 08.10	Introduction Raster images Working with light		
2	09.10 - 15.10	Math review Transformations		Project 01: Compositing images (due W3)
3	16.10 - 22.10	Transformations (contd.) Virtual world Triangular meshes		Project 02: 2D transformations (due W4)
4	23.10 - 29.10	Ray tracing Viewing Recursive ray tracing		Project 03: Blender basics (due W5)
5	30.10 - 05.11	Ray tracing (contd.) Optics/shaders Rendering equation / global illumination		Project 04: Ray tracing (due W7)
6	06.11 - 12.11	Modeling WebGL basics		Project 05: Modeling and ray tracing II (due W7)
7	13.11 - 19.11	WebGL programming model Graphics pipeline		Project 06: WebGL I (due W8)
8	20.11 - 26.11	MIDTERM EXAM Graphics pipeline Viewing transformation		
9	27.11 - 03.12	Curves Surfaces		Project 07: WebGL II – textures, viewing (due W10)
10	04.12 - 10.12	Lighting/shading Shaders		
11	11.12 - 17.12	Texture mapping		Project 08: three.js (due W14)
12	18.12 - 24.12	Shadow algorithms		
13	25.12 - 31.12	Advanced data structures for computer graphics – scene graphs, meshes		Project 09: Animation/scene graphs (due W13)
14	01.01 - 07.01	Computer animation Simulation in graphics Misc. (paper review)		
		FINAL EXAMS WEEK		

COURSE ASSIGNMENTS	
A. Mid-term [30%]	
30% for one mid-term exam. The written exam covers all course material up to the exam date.	
The exam is closed-book; but you are permitted to bring an A4-size, double-sided, and hand-written note-sheet.	
B. Participation [5%]	
To earn the participation grade, you are expected to attend classes. Course participation will be assessed based on your answers to hands-on activities (you are expected to submit your answers for face-to-face lectures on paper or over LMS; otherwise that lecture will not be counted towards your attendance.)	
C. Programming / Homework Assignments [30%]	
Weekly/biweekly programming assignments.	
For each assignment, we will have an in-class quiz about the assignment topics. This will be about 20-30% of your assignment grade.	
The assignment weights will not be equal; some assignments will take longer time and have a larger weight than others. Assignment weights will be announced in the handout.	
D. Final Exam [35%]	
Closed book exam. The written exam covers all course material for the whole semester, i.e. the topics include both the midterm exam topics and the later ones (with more weight to the newer topics).	
The exam is closed-book; but you are permitted to bring an A4-size, double-sided, and hand-written note-sheet.	

COURSE ASSESSMENTS & LEARNING OUTCOMES MATRIX	
Assessment Methods	Course Learning Outcomes
Programming Homework, Midterm, Final	L01
Programming Homework	L02
Programming Homework, Midterm, Final	L03
Programming Homework,	L04
Programming Homework, Midterm, Final	L05
Programming Homework, Final	L06

Prepared By & Date	Prof. Dr. Tolga Çapın 20/09/2023	Revision Date	20/09/2023
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