SJSU SAN JOSÉ STATE UNIVERSITY

College of Science · Computer Science

Introduction to Computer Graphics

CS 116A

Fall 2025 In Person 3 Unit(s) 08/20/2025 to 12/08/2025 Modified 08/18/2025

Contact Information

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Office Hours

Tuesday, Thursday, 9:00 AM to 10:00 AM, MH 216

Note: Feel free to drop by my office during office hours—no appointment needed.

Course Information

This course offers an interdisciplinary introduction to the foundations and applications of Computer Graphics — particularly eXtended Reality (XR), including Virtual and Augmented Reality (VR/AR). Students will explore core principles of computer graphics and human-computer interaction, including interface metaphors, input technologies, direct manipulation techniques, requirements analysis, and user studies. Emphasis is placed on hands-on learning through the development of functional XR prototypes, equipping students with both conceptual knowledge and practical experience in immersive technology design.

Course Description and Requisites

Vector geometry, geometric transformations and the graphics pipeline. Basic raster graphics algorithms for drawing discrete lines, clipping, visible surface determination and shading. Display of curves and surfaces. Graphics data structures.

Prerequisite(s): MATH 31 or MATH 31X, MATH 39, CS 146 (with a grade of "C-" or better in each) and previous programming experience in C/C++; Allowed Majors: Computer Science, Data Science, Software Engineering or Applied/Computational Math or instructor's consent.

Letter Graded

Classroom Protocols

- Laptops may be used during class for notetaking and viewing lecture slides or lab materials.
- Cellphones must remain unused during class unless required for SJSU system authentication or for participating in quizzes.
- If you arrive late or need to leave during the lecture, please enter through the rear of the classroom and sit in the back to minimize disruptions.
- All students are expected to show respect toward both the instructor and their peers, promoting an environment of mutual understanding, collaboration, and courtesy.
- Students should use the Canvas messaging function to contact the instructor. Private emails sent directly to the instructor may be lost due to the high volume of messages received.
- The instructor does not respond to messages outside normal business hours, on weekends, or on holidays.
- Homework code reviews and technical troubleshooting will be handled during office hours or upon appointment request.

Use of AI tools

The use of AI tools is allowed to help and enhance your learning experience, but they should never replace your own critical thinking. **Use them as a helper, not a shortcut.**

- Approved:
  - Brainstorming ideas for projects or papers.
  - Getting explanations of difficult concepts.
  - Checking grammar and clarity.
  - Draft feedback or structure suggestions.
- Not Approved:
  - Submitting AI-generated work as your own without acknowledgment.
  - Using AI to complete take-home tests, quizzes, or other “no-assistance” assessments.
  - Copying AI output word-for-word into assignments without modification.
  - Generating misinformation or inappropriate content.

Students must disclosure the use of AI tools using SAID — Student AI Disclosure and submit the certificate along with their work.

Program Information

Diversity Statement - At SJSU, it is important to create a safe learning environment where we can explore, learn, and grow together. We strive to build a diverse, equitable, inclusive culture that values, encourages, and supports students from all backgrounds and experiences.

Course Learning Outcomes (CLOs)

Upon successful completion of this course, students will be able to:

- Develop a deep understanding of Computer Graphics to pursue advanced studies or gain experience in areas including research prototype and game development
- Gain in-depth understanding of eXtended Reality (XR), including Virtual Reality (VR), Augmented Reality (AR), Mixed Reality (MR), and Human-Computer Interaction (HCI) — covering metaphors, input and output devices, requirement analysis, and user studies)
- Engage in hands-on practice to develop XR prototypes

Course Materials

Suggested Readings

- Marschner and P. Shirley, Fundamentals of Computer Graphics, 4th Edition
- Doerner et al. (2022)., Virtual and Augmented Reality (VR/AR) – Foundations and Methods of Extended Realities (XR), Springer

Note: Learn how to use permalink to access the library's electronic resources, including databases, journals, articles, and eBooks here via Permalinks Introduction - Permalinks - Dr. Martin Luther King, Jr. Library at San José State University Library

Course Requirements and Assignments

- Development Projects (50%)
  - Students will complete a series of sequential programming assignments using Unity Game Engine and/or production tools introduced during the course.
  - These projects will be posted on Canvas and are designed to build upon one another, culminating in a comprehensive final project.
  - Successful course completion requires submission of *all* development projects.
  - Students are required to share videos of each project as instructed on Canvas.
- Homework/Lab Assignments (10%)
  - Homework/lab exercises will be assigned after learning several topics. Those exercises are tools for you to learn and prepare for projects.
- Mid-Term Exam (10%)
  - The mid-term will be administered as either a closed-book exam or a take-home problem, depending on course needs.
- Final Project (30%)

    - Instead of a traditional final exam, students must submit a final project showcasing comprehensive knowledge gained throughout the semester.
    - This project will include a recorded presentation and a functioning prototype incorporating elements from prior assignments.

Note:

- While attendance is not used as a direct criterion for grading, students are expected to attend all class meetings. Active participation is essential to ensure meaningful engagement and shared benefit for the entire class, as outlined in University Policy F69-24.
- All students have the right, within a reasonable time, to know their academic scores, to review their grade-dependent work, and to be provided with explanations for the determination of their course grades. See University Policy F13-1 at http://www.sjsu.edu/senate/docs/F13-1.pdf for more details.

✔ Grading Information

Criteria

Student development projects will be evaluated based on the following criteria:

- Fulfillment of all required features and project specifications.
- Reliability and effectiveness of the implemented features under expected usage.
- Overall quality of submitted work, including clarity, structure, and quality of code, as well as any required documentation.

Missed Assignments or Exams

If a student must miss an assignment deadline or exam due to illness or another emergency, the situation must be reported within one week of the due date.

Determination of Grades

Semester grades will be determined using a weighted average based on the scores earned in the specified categories. Late submissions of homework or other assignments will not be accepted. Additionally, in-class activities must be completed within the student's assigned section.

Nominal Grading Scale:

Percentage	Grade
94% and above	A
90	A-

87	B+
83	B
80	B-
77	C+
73	C
70	C-
67	D+
63	D
60	D-
Below 60	F

Note: Please be aware that numerical grades will not be rounded when converting to letter grades. For instance, a final score of 93.9% will result in an A-, not an A.

University Policies

Per University Policy S16-9 (PDF) (http://www.sjsu.edu/senate/docs/S16-9.pdf), relevant university policy concerning all courses, such as student responsibilities, academic integrity, accommodations, dropping and adding, consent for recording of class, etc. and available student services (e.g. learning assistance, counseling, and other resources) are listed on the Syllabus Information (https://www.sjsu.edu/curriculum/courses/syllabus-info.php) web page. Make sure to visit this page to review and be aware of these university policies and resources.

Course Schedule

The course schedule is subject to change with one week's notice.

Week	Date	Topic	Note

1	8/21	Introduction	
2	8/26, 8/28	Project Samples and Topics in Computer Graphics	
3	9/2, 9/4	Geometry and Transformations	
4	9/9, 9/11	Scene Graphs and Hierarchies	
5	9/16, 9/18	Color, Images, Cameras and Ray Tracing	
6	9/23, 9/25	Graphics Pipeline and Project Discussion	
7	9/30, 10/2	Animation and Simulation	
8	10/7, 10/9	Rendering	
9	10/14, 10/16	Rendering II	
10	10/21, 10/23	eXtended Reality (XR)	Midterm 10/21
11	10/28, 10/30	Computer Graphics in Medicine	
12	11/4, 11/6	Interaction Techniques	
13	11/11, 11/13	Interaction Techniques II	Veteran's day 11/11
14	11/18, 11/20	Project Discussion	
15	11/25, 11/27	Open Topic	Thanksgiving day 11/27
16	12/2, 12/4, 12/9	Final Project Presentations	