Courant Institute of Mathematical Sciences
Computer Science Department
CSCI-GA.2270-001 Computer Graphics

Syllabus

Please note that this syllabus is subject to change at any time without notice by the instructor.
If a change occurs, a new version will be uploaded on Brightspace.

Course Number
CSCI-GA.2270

Course Title
Computer Graphics

Section
001

Course Type
In-Person

Semester
xxx

Course Description
This course provides an introduction to the field of Computer Graphics. We will cover the basic mathematical concepts, such as 2D and 3D transformations, study the interaction of light with geometry to derive shading models, and implement rendering algorithms such as raytracing and rasterization. We will investigate how these fundamental components are integrated in current graphics processors and study the corresponding programming APIs. This course will also include a brief introduction to C++, OpenGL and physically-based simulation systems.

Course Learning Outcomes

By the end of this semester, the student will be able to:
- Explain and apply the fundamental mathematical concepts used in image synthesis algorithms
- Implement a basic rendering system based on raytracing
- Implement a basic rendering pipeline based on rasterization
- Develop graphics programs in C++ using the Simple Directmedia Library (SDL)

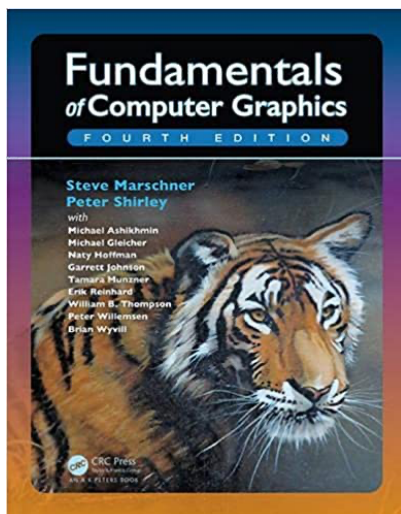## Instructor

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Office Hours: TBA

Textbook

Fundamentals of Computer Graphics, 4th Ed. By A K Peters
ISBN 9781482229394

Online Resources

Here are some instructions we got from the library on getting the NYU license for Safari books online to work in the O'Reilly app.
1. Start here, on your computer: https://www.oreilly.com/library/view/temporary-access/ Click on the "Select your institution" dropdown, but choose the very first option: "Not listed? Click here."
2. Enter your NYU email address, then click "Let's Go". It will give you temporary access to Safari, but more importantly, about 30-60 minutes later, you'll get an email from them, asking you to set a password for your new account.
3. Log in to the O'Reilly app using the NYU email address you entered and the password you just set.

Topics To Be Covered

- Introduction
- Basic Linear Algebra
- Introduction to C++ and OpenGL
- Images
- Ray Tracing
- Spatial Data Structures
- Procedural Synthesis
- 2D Transformations
- Viewing Transformations
- Rasterization
- Perspective projection
- Texture Mapping
- Parameterization
- Interpolating Curves
- Approximating Curves
- Surfaces
- Mesh Deformation
- Mesh Data Structures
- Introduction to physically-based simulation systems

Assignments

The assignments will be sent out via the Brightspace and the course website.

HW Submission: You will be asked to send your assignments via Brightspace. As you send your files (source codes, zip files, etc.), please use appropriate file names. assignments are due before class on the due date indicated on the schedule for every 24 hours that an assignment is late, we will apply a 10% penalty on the grade, up to a maximum penalty of 30%. After 72 hours, we will no longer accept the assignment.

Tutoring

Yiyi Tong (CA) - Monday 4pm-5pm

Yiyi Tong (CA) - Tuesday 2pm-3pm.

Zoom link will be shared with you once available.

Grading

Please note that this grading policy is subject to change at any time without notice. If a change occurs, a new version will be uploaded.

Final grades for the course will be determined using the following weights:

60% Assignments
40% One Exam

Students' Requirements

Basic requirements for an effective computer science class include **reading chapters** prior to the lecture. You should be proactive and look for the corresponding chapters of the topics we are covering in class. You may be assigned readings from the book and you are encouraged to read beyond the topics covered in class.

You will need to **attend every class or watch the recordings.** You will be asked randomly to answer questions and solve problems on your computer where you will demonstrate your solution to the whole class. You will be required to complete the in-class practice and spend a substantial amount of time in doing your homework and the programming assignments.

Cheating Policy

Please check the department's Academic Integrity Policy.

https://cs.nyu.edu/home/undergrad/policy.html