

# Course Outline

## 1. Document Information

<b>Degree Program</b>	Computer Science
<b>Course Number</b>	CS 485
<b>Course Title</b>	Computer Graphics
<b>Semester Hours</b>	3
<b>Course Coordinator</b>	Shu Tong
<b>Revision Term</b>	Fall 2020
<b>Latest Revision</b>	Spring 2021

## 2. Catalog Description

Principles and techniques of computer graphics. Interactive graphics software development using a modern graphics standard such as OpenGL. Topics include: primitives, transforms, clipping, modeling, viewing, texture, lighting and shading. Advanced rendering and modern graphics hardware.

## 3. Textbooks

- Kessenich, J., Sellers, G. & Shreiner, D. (2016). Open GL Programming Guide: The Official Guide to Learning OpenGL, Version 4.5 with SPIR-V., Addison-Wesley, 9th Edition. ISBN 978-0134495491.
- Kaeli, D., Mistry, P., Schaa, D., and Zhang, D.P. (2015). Heterogeneous Computing with Open CL 2.0. Morgan Kaufmann, 3rd edition. ISBN: 9780128014141.

## 4. References

- Steve Marschner & Peter Shirley, Fundamentals of Computer Graphics, AK Peters/CRC Press, 2021, 5th edition ISBN: 978-0367505035.

## 5. Course Learning Outcomes

- To learn the principles of modern computer graphics.
- To be able to design and implement computer graphics models and applications.

## 6. Assessment of the Contribution to Student Outcomes

Outcome	1	2	3	4	5	6	7
Assessed	X	X	X	X	X	X	

## 7. Prerequisites by Topic

CS 306 with a grade of C or better or graduate standing; Mathematics 150 and 221 are recommended.

## 8. Major Topics Covered in the Course

1. Introduction: applications, basic concepts, overview {3 classes}
2. Graphics programming and the OpenGL API, primitives, attributes {4 classes}
3. Graphics devices: CRTs, random scan and raster scan, input devices, etc. {3 classes}
4. Interactive input methods: input devices (logical and physical), handling user events and interactions {3 classes}
5. 2-D Graphics: transformations, matrix representations, composite transformations {4 classes}
6. Graphics client/server; display lists; hierarchical modeling {3 classes}
7. 3-D Graphics: primitives, transforms, hidden surface removal {4 classes}
8. Clipping and viewpoints, clipping algorithms {3 classes}
9. 3-D Viewing and projections {4 classes}
10. Object representations, CSG, sweeps etc. {3 classes}
11. Lighting, texture, ray tracing, anti-aliasing, animation {6 classes}

NOTE: When course is taken as 500-level credit (CS 591 "Special Topics"), there will be additional requirements such as a research project.