Course Number	CS 485	Course Title	Computer Graphics
Semester Hours	3	Course Coordinator FA20	Shu Tong
Catalog Description SP15	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.		

Textbooks
SP17

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.

References
SP15

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

Course Learning Outcomes

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

Assessment of the Contribution to Student Outcomes
SP20

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

Prerequisites by Topic

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

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 rester 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.