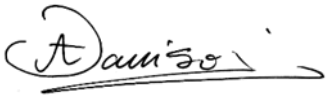
Approved by Chair:



Aug 21, 2023

Signature

GAME2012 – 3D Graphics Programming

Course Description

Students learn about 3D graphical programming both in theory and in practice using the OpenGL Application Programming Interface API). Topics include working with basic 3D primitives, transformations, animation, modeling, texturing, lighting, and special effects. Students will apply the theory and mathematics behind these concepts to produce complex 3D-based applications. This course builds on basic programming concepts and combines various graphics techniques to produce interactive 3D programs.

Course Outcomes

1. Create various 3D programs using OpenGL/GLUT.
2. Explain the basic concepts of 3D programming.
3. Explain the fixed and programmable graphical pipelines.
4. Manipulate and animate 3D objects to produce games.
5. Apply textures and lighting to 3D objects to produce realistic and/or stylized effects.
6. Apply special effects to enhance the visual quality of 3D scenes.
7. Use primitive 3D objects as well as complex models to produce games.
8. Format all deliverables to comply with Canadian laws and policies.

List of Textbooks and Other Teaching Aids:

Recommended:

- Interactive Computer Graphics: A Top-Down Approach with Shader-Based OpenGL, 6e
  By: Edward Angel and Dave Shreiner
  ISBN-13: 978-0-13-254523-5
  Publisher: Pearson/Addison-Wesley

- OpenGL 4.0 Shading Language Cookbook
  By: David Wollf
  ISBN-13: 978-1-849514-76-7
  Publisher: Packt

Recommended Resources:

- None

Course Delivery Mode

- This course has a combined 2-hour lecture, and separate 2-hour lab sections per week.
- **T163:** All classes are on-campus.
- **T193:** All classes are online.

  Any variation to the above will be posted in the online course shell in advance.

Assignment Policy

All assignments must be submitted on the due date of each respective assignment by means specified by their professor for that assignment. For every day past the due date there will be 10% penalty unless the student has notified the professor (via e-mail, phone or in person) ahead of due date that he/she has a valid reason for late submission. Submissions will no longer be accepted after five days past an assignment due date.

Test Policy

Students are required to complete lab tests, quizzes, exams as well as take-home assignments. If a student misses a test for valid reasons, including medical, and can provide a doctor's note, he/she will be given a chance to rewrite the test at a later date.

Students are required to adhere to all George Brown College policies and procedures regarding withdrawals, exemptions, attendance, class assignments and academic dishonesty. Please refer to the following: https://www.georgebrown.ca/about/policies/.

Detailed Evaluation System

Assessment Tool:	**Description:**	**Outcome(s) assessed:**	**EES assessed:**	**Date / Week:**	**% of Final Grade:**
Assignment 1	Practical coding OpenGL exercise	1, 4-8	1-11	3	10
Assignment 2	Practical coding OpenGL exercise	1, 4-8	1-11	5	10
Assignment 3	Practical coding OpenGL exercise	1, 4-8	1-11	7	10
Assignment 4	Practical coding OpenGL exercise	1, 4-8	1-11	11	10
Assignment 5	Practical coding OpenGL exercise	1, 4-8	1-11	13	10
Midterm Exam	Test on code and theory	2, 3, 6	2, 4-7, 11	7	30
Project	Practical coding OpenGL project	1, 4-8	1-11	15	20
TOTAL:					**100%**

Topical Outline

Learning Schedule / Topical Outline (subject to change with notification)

Week	**Topic / Task**	**Outcomes**	**Content / Activities**	**Resources**
1	- Introduction to OpenGL/GLUT - Useful Tools	1, 2	Lab	Ch. 1, 2
2	- Transformations and Animation	1, 3	Lab	Ch. 3
3	- Advanced Animation (frustum culling) **- Assignment 1 Due**	1, 3	Lab	Ch. 3, 4
4	- 3D Geometry	1, 6	Lab	Ch. 3
5	- Orientation **- Assignment 2 Due**	1, 3, 6	Lab	Ch. 4
6	- 3D Models	1, 3, 6	Review	Ch. 8, 10

7	**- Assignment 3 Due** **Midterm Exam**			
8	*INTERSESSION WEEK*			
9	- Texturing	1, 4	Lab	Ch. 7
10	- Lighting	1, 4	Lab	Ch. 5
11	- Lighting, cont'd **- Assignment 4 Due**	1, 4	Lab	Ch. 5
12	- Special Effects	1, 4-6	Lab	Ch. 6, 13
13	- Advanced Curves **- Assignment 5 Due**	1, 2, 6	Lab	Ch. 10
14	- Advanced Surfaces	1, 2, 6	Review	Ch. 10, 11
15	**- Final Project Due**	1, 4-8		

Please note: this schedule may change as resources and circumstances require.
For information on withdrawing from this course without academic penalty, please refer to the College Academic Calendar: **http://www.georgebrown.ca/Admin/Registr/PSCal.aspx**