Course Outline

School:	Eng. Tech. & Applied Science
Department:	Information and Communication Engineering Technology (ICET)
Course Title:	Advanced Graphics
Course Code:	COMP 392
Course Hours/Credits:	56
Prerequisites:	COMP 212, COMP 228
Co-requisites:	N/A
Eligible for Prior Learning, Assessment and Recognition:	Yes
Originated by:	Narendra Pershad
Creation Date:	Winter 2015
Current Semester:	Winter 2018
Approved by:	ppesikan c/o

Chairperson/Dean

PLEASE NOTE THAT THE WINTER 2018 SEMESTER WILL BE 13 WEEKS IN DURATION. THIS MAY AFFECT COURSE HOURS. THIS DOES NOT APPLY TO COURSES IN THE AIRCRAFT MAINTENANCE AND AVIONICS MAINTENANCE PROGRAMS (COURSE CODES AIRC).

Students are expected to review and understand all areas of the course outline.

Retain this course outline for future transfer credit applications. A fee may be charged for additional copies.

This course outline is available in alternative formats upon request.

Acknowledgement of Traditional Lands

Centennial is proud to be a part of a rich history of education in this province and in this city. We acknowledge that we are on the treaty lands and territory of the Mississaugas of the Credit First Nation and pay tribute to their legacy and the legacy of all First Peoples of Canada, as we strengthen ties with the communities we serve and build the future through learning and through our graduates. Today the traditional meeting place of Toronto is still home to many Indigenous People from across Turtle Island and we are grateful to have the opportunity to work in the communities that have grown in the treaty lands of the Mississaugas. We acknowledge that we are all treaty people and accept our responsibility to honor all our relations.

Course Description

Students in Advanced Graphics will learn the core computer graphics concepts that are commonly used in building modern computer games. Different 2D and 3D graphics techniques are explained and applied to building working examples of features that are very popular in today's fast expanding games industry.

The course includes lectures, demos and discussions of the fundamentals of graphics for game developers, followed by labs and programming assignments that re-enforce the understanding and familiarity of the students with these concepts.

Program Outcomes

Successful completion of this and other courses in the program culminates in the achievement of the Vocational Learning Outcomes (program outcomes) set by the Ministry of Advanced Education and Skills Development in the Program Standard. The VLOs express the learning a student must reliably demonstrate before graduation. To ensure a meaningful learning experience and to better understand how this course and program prepare graduates for success, students are encouraged to review the Program Standard by visiting http://www.tcu.gov.on.ca/pepg/audiences/colleges/progstan/. For apprenticeship-based programs, visit http://www.collegeoftrades.ca/training-standards.

Course Learning Outcomes

The student will reliably demonstrate the ability to:

1. Describe graphics systems and models.
2. Use geometric objects and transformations.
3. Apply viewing concepts.
4. Render using simple and complex techniques.
5. Render with meshes, use lighting techniques.
6. Use advanced mesh features.
7. Use and apply shading concepts.
8. Apply 2D graphics concepts and techniques.
9. Use WebGL resources.

Essential Employability Skills (EES)

The student will reliably demonstrate the ability to*:

1. Communicate clearly, concisely and correctly in the written, spoken, and visual form that fulfills the purpose and meets the needs of the audience.
2. Respond to written, spoken, or visual messages in a manner that ensures effective communication.
3. Execute mathematical operations accurately.
4. Apply a systematic approach to solve problems.
5. Use a variety of thinking skills to anticipate and solve problems.
6. Locate, select, organize, and document information using appropriate technology and information systems.
7. Analyze, evaluate, and apply relevant information from a variety of sources.
8. Show respect for diverse opinions, values belief systems, and contributions of others.
9. Interact with others in groups or teams in ways that contribute to effective working relationships and the achievement of goals.
10. Manage the use of time and other resources to complete projects.
11. Take responsibility for one's own actions, decisions, and consequences.

**There are 11 Essential Employability Skills outcomes as per the Ministry Program Standard. Of these 11 outcomes, the following will be assessed in this course.*

Global Citizenship and Equity (GC&E) Outcomes

N/A

Methods of Instruction

Professor led discussion, directed reading and hands on labs

Text and other Instructional/Learning Materials

Text Book(s):

Jos Dirksen. 2013. Learning Three.js: The JavaScript 3D Library for WebGL. Packt Publishing

ISBN 13: 978-1-78216-628-3

Online Resource(s):

http://proquestcombo.safaribooksonline.com.rap.ocls.ca/book/programming/javascript/9781782166283

Material(s) required for completing this course:

Computers and assess to required software

Custom Courseware:

None

Classroom and Equipment Requirements

Computers with access to college storage

Evaluation Scheme

- Test 1: To be completed in the last class of week 4
- Test 2: To be completed in the last class of week 9
- Test 3: To be completed in the last class of week 14
- Assignments: Five assignments to be completed in weeks 2, 5, 7, 8, 10 and 11
- Lab exercises and quizzes: Quizzes at the completion of each topic. Lab exercises at least once per week

Evaluation Name	CLO(s)	EES Outcome(s)	GCE Outcome(s)	Weight/100
Test 1	1, 2, 3	7, 8, 9, 10, 11		20
Test 2	4, 5, 6	7, 8, 9, 10, 11		20
Test 3	7, 8, 9	7, 8, 9, 10, 11		15
Assignments	1, 2, 3, 4, 5, 6, 7, 8, 9	1, 2, 7		35
Lab exercises and quizzes	1, 2, 3, 4, 5, 6, 7, 8	3, 4, 5, 6		10
Total				100%

If students are unable to write a test they should immediately contact their professor or program Chair for advice. In exceptional and well documented circumstances (e.g. unforeseen family problems, serious illness, or death of a close family member), students may be able to write a make-up test.

All submitted work may be reviewed for authenticity and originality utilizing Turnitin®. Students who do not wish to have their work submitted to Turnitin® must, by the end of the second week of class, communicate this in writing to the instructor and make mutually agreeable alternate arrangements.

When writing tests, students must be able to produce official College photo identification or they may be refused the right to take the test or test results will be void.

Student Accommodation

Students with permanent or temporary accommodations who require academic accommodations are encouraged to register with the Centre for Students with Disabilities (CSD) located at Ashtonbee (L1-04), Progress (C1-03), Morningside (Rm 190), and Story Arts Campus (Rm 284). Documentation outlining the functional limitations of a disability is required; however, interim accommodations pending receipt of documentation may be possible. This service is free and confidential. For more information, please email csd@centennialcollege.ca.

Use of Dictionaries

- Any dictionary (hard copy or electronic) may be used in regular class work.

Program or School Policies

N/A

Course Policies

N/A

College Policies

Students should familiarize themselves with all College Policies that cover academic matters and student conduct.

All students and employees have the right to study and work in an environment that is free from

discrimination and harassment and promotes respect and equity. Centennial policies ensure all incidents of harassment, discrimination, bullying and violence will be addressed and responded to accordingly.

Academic honesty is integral to the learning process and a necessary ingredient of academic integrity. Academic dishonesty includes cheating, plagiarism, and impersonation. All of these occur when the work of others is presented by a student as their own and/or without citing sources of information. Breaches of academic honesty may result in a failing grade on the assignment/course, suspension or expulsion from the college.

For more information on these and other policies, please visit www.centennialcollege.ca/about-centennial/college-overview/college-policies.

Students enrolled in a joint or collaborative program are subject to the partner institution's academic policies.

PLAR Process

This course is eligible for Prior Learning Assessment and Recognition (PLAR). PLAR is a process by which course credit may be granted for past learning acquired through work or other life experiences. The PLAR process involves completing an assessment (portfolio, test, assignment, etc.) that reliably demonstrates achievement of the course learning outcomes. Contact the academic school to obtain information on the PLAR process and the required assessment.

Semester:	Winter 2018	Professor Name:	Arben Tapia
Section Code:	001	Contact Information:	atapia@centennialcollege.ca
Meeting Time & Location:	Mon.02:30 pm - 04:20 pm, Room A3-17 Wed.10:30 am - 12:20 pm, Room A3-17	Additional Information:	After class or by apptmt.

Topical Outline (subject to change):

Week	Topics	Readings/Materials	Weekly Learning Outcome(s)	Instructional Strategies	Evaluation Name	Evaluation Date
1	Creating a 3D Scene	Chapter 1	After completing this work, the student shall be capable of : Understanding the requirements for using Three.js Creating an HTML skeleton page Rendering and viewing a 3D object Adding materials, lights, and shadows Expanding your first scene with animations Using the dat.GUI library to make experimenting easier Using the ASCII effect	Lecture Demonstration Lab Session		
2	Working with the Basic Components that make up a Scene	Chapter 2	Upon completion of this work, the learner will be able to: Creating a scene Work with the Geometry and Mesh objects Use the available cameras for different uses	Lecture Demonstration Lab Session	Assignment 1	
3	Working with Different Light Sources	Chapter 3	After completing this work, the student shall be capable of : Exploring the different lights Learning about the basic lights	Lecture Demonstration Lab Session		
4	Working with Materials	Chapter 4	Upon completion of this work, the learner will be able to: Understand the common material properties starting with the simple Mesh materials (basic, depth, and face) Learn about the advanced materials Use the materials for a line geometry	Lecture Demonstration Lab Session	Test 1	Test 1 is on the last class of the week
5-6	Working with Geometries	Chapter 5 & 6	After completing this work, the student shall be capable of : Using basic geometries Using ConvexGeometry Using LatheGeometry Create a geometry by extruding	Lecture Demonstration Lab Session	Assignment 2	

Week	Topics	Readings/Materials	Weekly Learning Outcome(s)	Instructional Strategies	Evaluation Name	Evaluation Date
			Creating 3D text Using binary operations to combine meshes			
7	Particles and Particle System	Chapter 7	Upon completion of this work, the learner will be able to: Understand particles Use particles, the particle system, and the BasicParticleMaterial Style particles with the HTML5 canvas Use textures to style particles Create a particle system from an advanced geometry	Lecture Demonstration Lab Session	Assignment 3	
8	Creating and Loading Advanced Meshes and Geometries	Chapter 8	After completing this work, the student shall be capable of : Grouping and merging Geometry Using advanced Mesh features	Lecture Demonstration Lab Session	Assignment 4	
9	Animations and Moving the Camera	Chapter 9	Upon completion of this work, the learner will be able to: Use Basic animations Work with the camera Perform Morphing and skeletal animation Create animations using external models	Lecture Demonstration Lab Session	Test 2	Test 2 is on the last class of the week
10	Interaction	Chapter 5 (WebGL Up and Running)	After completing this work, the student shall be capable of : Performing Hit Detection, Picking, and Projection Implementing Rollovers and Clicks Implementing Dragging Using Tweens with Dragging Using Hit Point and Normal Information Doing Camera-Based Interaction Implementing a Model Viewer with Camera Interaction Navigating Within a Scene	Lecture Demonstration Lab Session	Assignment 5	
11	Loading and Working with Textures	Chapter 10	Upon completion of this work, the learner will be able to: Use textures in materials Understand advanced usage of textures	Lecture Demonstration Lab Session	Assignment 6	
12	Custom Shaders and Render Post Processing	Chapter 11	After completing this work, the student shall be capable of : Setting up the post processing Doing post processing passes Creating custom post processing shaders	Lecture Demonstration Lab Session		

Week	Topics	Readings/Materials	Weekly Learning Outcome(s)	Instructional Strategies	Evaluation Name	Evaluation Date
			Creating custom post processing shaders			
13-14	Working with Physics	Chapter 12	Upon completion of this work, the learner will be able to: Create a basic scene ready for Physics Understand Material properties Use Basic supported shapes Use constraints to limit movement of objects	Lecture Demonstration Lab Session	Test 3	Test 3 is on the last class of the week