CS350: Advanced Computer Graphics II
Fall, 2016

Prerequisites:
> CS300

General Information:
> Class Schedule: Mon/Wed 2:00 pm – 3:20 pm
> Professor: Joshua Davis
> Contact: ext: 4428
> Email: jodavis@digipen.edu
> Class web page: distance.digipen.edu
> Office Hours: Mon-Wed: 12:30 pm – 2:00pm

Description:
> This course deals with the efficient representation and processing of complex 3D scenes in order to avoid bottlenecks in the use of the CPU and the GPU. Specific topics include a variety of spatial data structures (binary space-partitioning trees, octrees, kd-trees, and grid data structures), several object-culling methods (occlusion, viewport, and portal), and finally the construction and uses of bounding volumes and their hierarchies for collision detection and related geometric operations.

Course Objectives and Learning Outcomes:
> After the completion of this course, the student will understand the theory behind the different spatial data structures, culling methods, and spatial algorithms. The student will write various intersection functions and spatial partitioning algorithms in a provided framework.

Textbooks:
- Real-Time Collision Detection ("The Orange Book") (recommended)
    Christer Ericson
    ISBN-10: 1558607323
    ISBN-13: 978-1558607323

Weekly Schedule of Topics:
This is a tentative schedule of weekly topics and is subject to change.

Week	Programming Assignments	Topics
1	Assignment 1 due week 3	Simple Collision Intersection
2		Simple Collision Intersection Debug Drawing
3		Bounding Volumes
4	Assignment 2 due week 6	Spatial Partitioning Uniform grids
5		H-Grids

		SAP (sweep and prune)
6	Assignment 3 due week 9	Bounding Volume Hierarchies Aabb Trees
7		Quad/Oct Tree
8	Assignment 4 due week 12	Bsp Tree
9		Kd-Tree Hybrid Spatial Partitions
10		Geometric Robustness Collision Detection Topics: SAT (Separating Axis Theorem)
11	Assignment 5 due week 14	GJK (Gilbert-Johnson-Keerthi)
12		MPR (Minkowski Portal Refinement) Mesh Representations
13		Quick Hull EPA (Expanding Polytope Algorithm)
14		GJK/MPR Extensions Extra Topics
15		Finals Week

Grading Policy:
Breakdown:
- Programming Projects 90%
  - Each project is worth the same amount
- Quizes/Exercises 10%

Scale:

$x\%$	Grade
$x \geq 93$	A
$90 \leq x < 93$	A-
$87 \leq x < 90$	B+
$83 \leq x < 87$	B
$80 \leq x < 83$	B-
$77 \leq x < 80$	C+
$73 \leq x < 77$	C
$70 \leq x < 73$	C-
$60 \leq x < 70$	D
$x < 60$	F

Assignments:
1. Geometry Library
2. Bounding Volumes, Debug Drawing, Simple Spatial Partitioning
3. Aabb-Trees with Frustum Culling
4. Bsp-Trees with CSG operations
5. GJK (closest features)

Assignment Submission Guideline:

1. You must program in C++ using the provided Visual Studio project. You must use Visual Studio 2015.

2. Put the contents of your project (the folder that contains the .sln file) into a folder named <class>_<student login>_<assignment#>. For example, if your login is jodavis and you're submitting assignment 2 then the folder would be named CS350_jodavis_2.

3. Your folder must not contain any Debug or Release folders and no build artifacts (*.o, *.pdb, *.sdf, etc...) and no executable files (*.exe).

4. Upload your zip file after logging into the course web page using the link: https://distance.digipen.edu. DO NOT email your submissions to the instructor unless explicitly specified to do so.

Late Work:

The following penalties will apply to work submitted late:
Less than one week: 20% deduction
More than one week: 0 on the assignment

Exceptions to the late policy will rarely be made. Being busy with other classes is not an acceptable reason for being late.

Early Work:

Assignments turned in a week early or more will receive a 5% bonus.

Code Quality:

Code quality will be applied to each assignment as a modifier of up to -20%. This is to ensure that graders can understand your code. No particular style or specs are in place, just make sure that you comment and reasonably format your code.

Academic Integrity Policy:

Academic dishonesty in any form will not be tolerated in this course. Cheating, copying, plagiarizing, or any other form of academic dishonesty (including doing someone else's individual assignments) will result in, at the extreme minimum, a zero on the assignment in question, and could result in a failing grade in the course or even expulsion from DigiPen.

Disability Support Services:

If students have disabilities and will need formal accommodations in order to fully participate or effectively demonstrate learning in this class, they should contact the Disability Support Services Office at (425)629-5015 or dss[at]digipen[dot]edu. The DSS Office welcomes the opportunity to meet with students to discuss how the

accommodations will be implemented. Also, if you may need assistance in the event of an evacuation, please let the instructor know.