

## COURSE SYLLABUS

<b>Course Number:</b>	CS179.14A		
<b>Title:</b>	Special Topics in Multimedia: PC and Console Game Development I		
<b>Department/Program:</b>	DISCS	<b>School:</b>	Science and Engineering
<b>Semester:</b>	First	<b>School Year:</b>	2017-2018
<b>Instructors:</b>	Diy, Walfrido David A.		
<b>Section and Schedule:</b>	MWF 1100 – 1200 [CTC 112]		

### A. COURSE DESCRIPTION

The course focuses on the fundamentals of PC game programming to complement the skills learned mostly in CS177: Computer Graphics Programming but also uses some concepts in CS162 and CS130. Students will learn how to build a game from scratch in order to gain a deep understanding of their architecture and components, as opposed to using a premade game-making software. The format of the lesson will be a mix of lectures followed-by hands-on implementation. By the end of the semester, the students should be able to produce a non-trivial game.

### B. LEARNING OUTCOMES

By the end of this course, students should be able to:

- Create, compile, and debug native applications on various platforms
- Prototype gameplay in a short amount of time
- Apply various architectures to make their game scale
- Apply mathematics to solve certain challenges in game programming

### C. COURSE OUTLINE / TIMEFRAME

WEEK/TOPIC	LEARNING OBJECTIVES	ACTIVITIES	STUDENT OUTPUT
1-2: Introduction and C/C++ Review	Describe the different types of games and the possible divergence in their implementations  Identify game components from a software engineering perspective  Describe different game platforms  Discuss the memory model of C/C++  Track down constructor and destructor execution and use them for the RAI pattern	Lectures  Hands-on Exercises	Text-based Game
3-4: Game Loop and Timing	Link to static and dynamic libraries  Describe the different types of system clocks  Query for high-resolution monotonic clocks  Create a fixed-time step loop  Create a free-running game loop	Lectures  Hands-on Exercises	Text-based Game (with Timing)  Squares and Circles Game (graphics only)
5-7: Physics and Collision Detection	Build simple simulations using dynamics and kinematics for circular rigidbodies	Lectures  Hands-on Exercises	Squares and Circles Game (with player input)

	Perform appropriate collision responses		Circle Game (with basic physics and super-elastic walls)  Circles Game (with linear collision responses)
8-9: Data-Driven Design	Externalize level data to files  Describe entities and levels using external files	Lectures  Hands-on Exercises	Map Editor
10-12: Polygons	Describe axis-aligned and oriented bounding boxes  Use the separating axis theorem to detect collisions	Lectures  Hands-on Exercises	Separating Axis Theorem Implementation  Project Consultation: Feasibility
13-15: Spatial Data Structures	Create a uniform grid and quad tree  Use the data structures to cull items in querying	Lectures  Hands-on Exercises	2D Shmup (with uniform grid implementation)  Circles Game (with quad tree implementation)
16-17: Entity Manager	Create an entity framework  Convert an entity framework to make it component-based  Accommodate entity interactions	Lectures  Hands-on Exercises	Project Consultation: Rough Prototype
18: Finals			

## D. REQUIRED READING

All lecture slides and announcements can be found at the course web site on Moodle:  
<https://moodle.ateneo.edu/ls/course/view.php?id=3163>

## E. SUGGESTED READINGS

Game Programming Patterns by Robert Nystrom (ISBN-13: 978-0990582908), 2014 (available online for free at <http://gameprogrammingpatterns.com>)  
C++Now 2014 Presentations: [https://github.com/boostcon/cppnow\\_presentations\\_2014](https://github.com/boostcon/cppnow_presentations_2014)  
Game Engine Architecture, by Jason Gregory, Jeff Lander and Matt Whiting, A K Peters (ISBN-13: 978-1568814131), 2009  
Real-time Collision detection by David H. Eberly, Morgan Kaufmann (ISBN-13: 978-1558607323), 2005  
Computer Graphics using OpenGL, 2nd Ed by F.S. Hill, Prentice Hall (ISBN: 0-02-354856-8), 2001  
Ten C++11 Features Every C++ Developer Should Use: <http://www.codeproject.com/Articles/570638/Ten-Cplusplus-Features-Every-Cplusplus-Developer>  
Game Programming Gems series  
Game Engine Gems series  
Glenn Fiedler's Game Development Articles and Tutorials: <http://gafferongames.com/>  
The Witness: <http://the-witness.net/news/>  
Wolfire Games Blog: <http://blog.wolfire.com/>  
Gamasutra: <http://www.gamasutra.com/>  
Game Physics by David H. Eberly, Morgan Kaufmann  
Thinking in C++ 2nd Ed. (Eckel, Bruce): <http://www.mindview.net/Books/TICPP/ThinkingInCPP2e.html>  
C++ FAQ lite: <http://www.parashift.com/c++-faq-lite/>  
What Every Computer Scientist Should Know About Floating-Point Arithmetic [http://docs.oracle.com/cd/E19957-01/806-3568/ncg\\_goldberg.html](http://docs.oracle.com/cd/E19957-01/806-3568/ncg_goldberg.html)  
A Primer on Bézier Curves <http://pomax.github.io/bezierinfo>  
Standard C++ <https://isocpp.org/>

## F. COURSE REQUIREMENTS

Quizzes/Recitation	20%	(Counts as attendance. Quizzes usually 5 points each.)
Homework*	35%	
Project Consultations	5%	
Project**	20%	
Project Defense***	20%	
Total	100%	

\*/\*\* Homework and the project are to be done in groups of two or three. No going solo unless you enrolled after groups were formed.

\*\* The project will be an application of the lessons learned in the course.

\*\*\* No project = no defense. Defense will take a maximum of 1 hour. At the very least, you will be asked to compile your program on the spot, modify your program on the spot, and explain the techniques or derive equations/formulas used in your project.

## G. GRADING SYSTEM

The undergraduate grading system will be used. In addition, numeric grades higher than 60 will be rounded up.

93-100	A	Excellent
87-92	B+	Very Good
81-86	B	Good
75-80	C+	Satisfactory
69-74	C	Sufficient
60-68	D	Passing
< 60	F	Failure

## H. CLASSROOM POLICIES

1. Students should check the course website on Moodle for class updates and be reachable by the class beadle.
2. Kindly arrive on time, as being late will distract everyone in the room.
3. All phones and other gadgets off or in silent mode. No playing computer games, checking email, instant messaging, watching movies, etc. No working on submissions for other subjects during lecture. Do not do anything that will unnecessarily distract others or disrupt the class. I have nothing against zeroing your highest quiz/homework AND throwing you out if oral/glare warnings do not deter you. I also have nothing against giving bonus points to the whole class if my phone rings or beeps. Static noise caused by computer speakers not included.
4. I have no plans of allowing anyone other than enrolled students in my class during the entire semester. For exceptions, you are responsible for sit-ins that you bring in, and any penalty from policy #3 that the sit-in incurs will be redirected to you.
5. Unannounced quizzes will be given occasionally during lecture hours. It is your responsibility to be ready when you come to class. ALWAYS BRING A NON-GRAPHING CALCULATOR, AND A BLANK SHEET OF ¼ PAPER. Students that purposely delay the start of a quiz for any reason (need to borrow paper from classmates, etc.) will be asked to step out.
6. Quizzes and recitation are used to check attendance. Be reminded that it is still your responsibility to find out what you missed on days that you were absent.
7. No make-up quizzes. No homework/project deadline extension unless you were hospitalized or an immediate member of your family died (grandparents and legal guardians included) or there were circumstances that prevented you from coming to class. Adequate proof must be provided (e.g. medical certificate, news report) and the hospitalization/wake/disaster/aftermath period must cover the date of the exam or report deadline. All bonus point opportunities are removed for make-up tests.
8. The project submission must include a certificate of authorship, which can be found in <http://www.ateneo.edu/ls/sose/iscs/downloads>. It must state all resources and references that you used except for the references listed in the syllabus/slides. Submissions without a certificate will not be accepted and may incur a late penalty once a certificate has been included.

9. Late deliverables are subject to deductions (-10% of maximum score per day late, rounded up). This does not apply to quizzes (late submissions not accepted).
10. For each group deliverable (homeworks and group project), each student must personally submit peer evaluations to their instructor via e-mail on or before the requirement's due date. The evaluations should contain the following:
  - Their name
  - The name of their partner/s
  - A score ranging from 1 to 5 that they are giving each of their groupmates (WHOLE NUMBERS ONLY, NO FRACTIONS)
  - Any score below 4 must be accompanied by a short VALID explanation/reason/example/etc.
11. Peer evaluation requirement obviously does not apply if a "group" is comprised of only one student.
12. For peer evaluation scores, use the guide below:
  - A score of 1 would mean that person was completely useless. As in ZERO participation.
  - A score of 2 would mean that person HARDLY did anything and was often doing something unrelated.
  - A score of 3 would mean that person did only HALF the work they were supposed to do.
  - A score of 4 would mean that person participated and did their FAIR share of work.
  - A score of 5 would mean that person was TOTALLY AWESOME (still counts as a 4).
13. Peer evaluation scores will be averaged and rounded down then converted to a multiplier for that particular deliverable:
  - 3.5~ = 100% of the grade for the activity in question (note: no separate peer evaluation for defenses)
  - 3.0~ = 90% of the grade
  - 2.0~ = 80% of the grade
  - 1.0~ = 0%
14. Each student will only be reminded ONCE in the entire semester to submit peer evals with the proper format should they either not submit on time or not follow directions. Beyond the first reminder, an automatic 1-point deduction to your average peer evaluation score will be applied and it will be assumed that you gave each of your groupmates a rating of 4.
15. I will request a meeting with your group if there is an average score lower than 3.5 (to inform affected parties).
16. In the event of a group split for any reason, students' scores from their previous group will still apply to them. All members will also not be allowed to join existing groups.
17. Grades below 60 are NOT rounded off, even if the grade is 59.9999~~~
18. No extra-credit work will be issued. Ever. Even if you ask nicely. I will ignore any requests for extra-credit work regardless of the circumstances that led to your making the request.
19. Please submit a 3x5 index card\* with the following (write LEGIBLY) in front:
  - 1x1 picture of yourself (If I cannot recognize you in the picture, I will not accept it.)
  - Name (last name then first name, please)
  - Nickname (enclosed in double quotation marks)
  - Course and ID number
  - At least one of the following: e-mail address/landline/mobile
  - With the remaining space IN FRONT, draw something, anything... well, almost anything.

\* If you have had me as a teacher before in any subject, you might not need to do this since there is a chance that I still have your index card (regardless of size or format) from a previous subject.

\* Cards that do not follow the correct size or format will not be accepted.
20. More policies may be added should the need to do so arise. However, these will require your consent if they are not issued by the department chair or another university authority.

## I. CONSULTATION HOURS

**Walfrido David A. Diy**

MWF 1300 – 1500

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