

COMP 3501 – Fall 2012
**Foundations of Game Programming
and Computer Graphics**

Doron Nussbaum

Instructor Information

- **Instructor:** Doron Nussbaum
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- **Office hours:** Monday 13:00-15:00
or by appointment

Class TAs

TA	E-mail	Office hours
Gail Carmichael	gail_c@scs.carleton.ca	TBA

Course Text Book:

- There is no specific book.
- Significant amount of material on the web
- Library has multiple books as electronic resource

- Frank Luna, Introduction to 3D Game Programming a Shader Approach,
- Allen Sherrod, Ultimate Game Programming with DirectX: Second Edition
- Allen Sherrod and Wendy Jones, Beginning DirectX 11 Game Programming

Other Books:

- Foley, van Dam, Feiner, Hughes, Computer Graphics Principles and Practice, Addison Wesley
- Stahler, Beginning Math and Physics for Game Programming, New Riders,
- J. Gregory, Game Engine Architecture

Course Evaluation

- Assignments: 15%
- Project Proposal 10%
- Project code demo 5%
- Project design 10%
- Project Presentation 15% (weighted scheme)
- Project Report 15% (weighted scheme)
- Individual Report* 0% (use in weighted scheme)
- Final exam 30%
- Class participation: 5%

*incomplete individual report may affect the student's project report grade

Course Evaluation

$$E_i = \sum_{k=1}^n R_{ki}$$

$$WE_i = E_i / \max_{i=1..k}(E_i)$$

where

R_{ki} - grade given by member k to member i ,

E_i - total effort grade from all team members

ES_i - weight effort (normalized effort)

$$\begin{aligned} \text{Grade} = & \sum_{i=1}^n A_i / n * 15\% + \\ & \text{Proposal} * 10\% + \\ & \text{Design} * 10\% + \\ & \text{Demo} * 5\% + \\ & WE_i * \text{Presentation} * 15\% + \\ & WE_i * \text{Report} * 15\% + \\ & \text{Final exam} * 30\% + \\ & \text{Participation} * 5\% \end{aligned}$$

Assignments

- 4-8 assignments
 - Assignment are for you to practice (similar to a self tutorial)
 - Various complexity
 - Some may be optional
- Assignments must be handed **on the due date**
 - **Electronic submission only** (unless otherwise specified)
 - E-mail or hardcopy submissions are not accepted
- **At least 50% assignments** must be submitted in order to meet the course requirements
 - If needed submit a blank assignment with your name
- **No late** submission of assignments - budget your time
- Assignments and project **must run** on the lab computers **HP5151**

Assignments

- All marked assignments (once handed back) **should be retained** by students as proof of completion and meeting course requirements.
- **Verify** that all assignment marks were entered correctly (especially at the end of the term)
 - in case of discrepancy please contact the TA or me.

Labs

- Gaming lab
 - HP5151
- Make sure that you obtain lab access

Class Code of Conduct Collaboration/References

- Collaborations and discussions are welcomed and encouraged
- Accepted collaboration should be limited to
 - Getting ideas (books, web sites)
 - Discussing ideas, approaches with your colleagues
 - Consult example programs, algorithms, text books

Class Code of Conduct Collaboration/References

- You must **write** your own assignments.
- External Contribution
 - all external contributions must be properly **referenced and acknowledged** (books, example algorithms, ideas)

Class Code of Conduct Collaboration/References

- Not Accepted
 - Share your assignments/code with your colleagues
 - Present ideas from other sources as yours
 - Present solutions from other sources as yours

Not Meeting University/Class Code of Conduct

- **Possible Outcomes**
 - The mark of the student (s) involved may be reduced
 - Student may be asked to withdraw from the course (handled in the same way as below)
 - Case may be forwarded to the Dean of Faculty of Science

Project

- The project must be your own work.
- Do not use/copy from others
- A lot of code is available on the internet
 - Do not copy the code (you can consult it)
 - If you are not sure whether you can use ideas/code that you found please consult the TA or me.

Communication

- Course Web Page
 - Contains important information
 - TA hours, assignments, news, etc.
 - www.scs.carleton.ca/~courses/COMP3501
 - [webCT](#)
 - It is the student's responsibility to check the web pages for new information
- E-mail
 - messages may be sent to the class using Carleton's connect mail and/or webCT
 - Obtain an e-mail address on connect mail
- Announcements on the course web pages or on webCT

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Science Student Success Centre

How to reach us!

Office: 1152 HP
Phone: 613- 520-2600
ext 3111
Email: sssc@carleton.ca
Website: www.carleton.ca/sssc
Facebook Group:
SSSC - Carleton University
Student Success

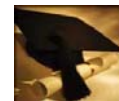


We can help you.....

- Find the resources you need on campus
- Improve the way you prepare for your semester.
- Find summer research Opportunities
- Improve the way you
 - Manage your time
 - Take notes
 - Study for science exams
 - Clarify ideas and concepts to better understand course content

We are here to help you **learn how to learn** the things you need to know.

Office hours: Monday-Friday 9:00 – 5:00



Paul Menton Centre

- Students requiring academic accommodations are encouraged to contact the Paul Menton Centre to complete the necessary letters of accommodation.
- The Paul Menton Centre is located in room 500 at the Unicentre
 - Tel: ext. 6608 (520-6608).
 - <http://www.carleton.ca/pmc/>
- Please note that there are deadlines for submitting completed forms to the Paul Menton Centre
 - In class tests (midterm) - 2 weeks before exam date
 - Final Exam – check at the PMC
- **In addition to PMC**, discuss your needs with me at least two weeks before the midterm and/or final exam. This is to ensure sufficient time to make the necessary accommodation arrangement.

Other Accommodations

- You may need special arrangements to meet your academic obligations (e.g., disability, pregnancy or religious obligations).
- Review the course outline promptly – e.g., in-class tests, midterm, final exam, as well as any change in due dates for papers.
- Make a request for accommodation by writing to me within the first two weeks of the term, or as soon as possible after the need for accommodation is known to exist.
- Visit the Equity Services website to view the policies and other related information
 - <http://www.carleton.ca/equity/accommodation>

Other Accommodations

- You may need special arrangements to meet your academic obligations during the term because of disability, pregnancy or religious obligations. Please review the course outline promptly and write to me with any requests for academic accommodations during the first two weeks of the class, or as soon as possible after the need for accommodation is known to exist.
- It takes time to review and consider each request individually, and to arrange for accommodations where appropriate. Please make sure you respect these timelines particularly for in-class tests, midterms and final exams, as well as any change in due dates for papers.
- You can visit the Equity Services website to view the policies and to obtain more detailed information on academic accommodation at <http://www.carleton.ca/equity/accommodation>

Important Dates

Sept. 17	Submission of groups
Sept. 19	Finalizing groups (un placed students assigned in groups)
Oct. 1, Oct. 3	Game proposal presentation
Oct. 26	Game Design document
November 12-16	Game progress demo
Nov. 26, 28, Dec. 3	Project Presentations

Course Objectives

- To build **basic knowledge** of computer graphics for game development
- To be familiar with 3D computer Graphics
 - DirectX (direct3d as a tool for creating games)

Course is about...

- Computer graphics for game development
 - 3D graphics
 - Real-time rendering
 - Lighting models
 - Textures
- Physics
- Mathematics for computer graphics

Possible Course Topics

- Graphics
 - Shaders
 - Illumination
 - ...
- DirectX
- Meshes and Terrains
- Physics simulation
- Other Possible Topics
 - Revisit collision detection
 - Procedural Generation
 - Some SW design
 - AI
 - Min max trees

Environment

- Windows 7 (XP?)
- Programming Language
 - C and/or C++
- DirectX

Project

- Objective: develop a 3D game (not 2.5D)
- Requirements:
 - Consists of 3D graphics
 - Consists of more than one level
 - Real time
 - Contain some level of interaction with user
 - Developed in DirectX and C/C++
- Teams:
 - 3-4 people
- Due Date:
 - End of term
 - Two sets of presentations – Proposal and final

Project Ideas

- A small/simple game
 - Balancing a plane (balls in holes, merging balls)
 - Collection games – collecting items in space, on a terrain.
 - Space invaders
 - Race
 - Dodge ball
- Simulation Games
 - solar system – flying through black holes (limited fuel)
 - Flight simulation

Project Dates

- Group Selection – September 17
 - Team members
- Proposal: October 1, 3
 - A quick overview of the proposed project
- Game Design – October 26
 - An overview of the game design
- Game Demo – November 12-16
 - Schedule a demo during the week
 - 10-15
- Project Presentation – November 26, 28, Dec. 3
 -

Project resources*

- Course TA/instructor
- Graphics literature
- Textbooks and other texts
- Tutorials and code snippets found online

- All of these are fair game, but remember:

You MUST give credit when you have used someone else's work!

Your work must be original

* - taken from David Mould's course notes

Pitfalls*

- Various problems inevitably emerge during the term
- people problems
- design problems
- technical problems
- *time management problems*

* - taken from David Mould's course notes

People problems*

- DO:
 - keep your group informed (of absences, illnesses, travel plans, future plans)
 - involve everyone in all parts of the project
 - maintain a single build
- DO NOT:
 - change groups without discussing it with your current group
 - fork development with the idea of merging later
 - merge multiple projects the week before the end of term

* - taken from David Mould's course notes

Design problems*

- DO: (or at least think about doing)
 - design a small game that can be expanded
 - prototype novel game mechanics on paper
 - separate level design from game technology
- DO NOT:
 - try to make Oblivion
 - focus on design to the exclusion of technology

* - taken from David Mould's course notes

Technical problems*

- DO:
 - use tricks to avoid AI programming
 - separate design problems and technical problems
 - ask the TA/Instructor for help
- DO NOT:
 - wait to see if a topic will be covered in class
 - attempt to use human-figure animation
 - design your own camera from scratch

* - taken from David Mould's course notes

Time management

- Most of the preceding can be solved by taking more time
 - But, the term is of fixed length
- Plan ahead! Write an explicit time budget
- Include 2 weeks of bug fixes at the end
- Front-load your development
- Have a playable prototype by Oct 26!

* - taken from David Mould's course notes

Topics of interest?