

Video Game Development

- Course Syllabus -

GAME 2021

1. **Name of Course:** *Console Programming*

2. **Number of Hours:** *14 lessons, 3 hours each*

3. **Course Description:**

This course covers the issues associated with developing for a console, focusing on the unique constraints and requirements. Topics for this course include: dev kits and how to use them, how the debugging cycle is different from other platforms, memory limits, user interface differences, and how to maximize use of what's available on the console.

Prerequisites: Video game Programming, C/C++ Programming Experience or consent of instructor.

4. **Course Learning Objectives:**

1. **Identify.** This course will allow the student to identify the unique challenges attendant to development on game consoles, and gain insight to avoid the pitfalls
2. **Understand.** Console development can be, and often is, the most difficult of the development paradigms. Application performance is of the essence, but more importantly, and increasingly with each new generation, the understanding of fundamental constraints all must live by in the closed world of the games console.
3. **Development.** This course will therefore focus on development of core skills required by all to be successful in the console games arena. These areas are: constraints (graphics, memory, and Input/Output), debugging the impossible, Input/Output, and logic.
4. **Design.** Students will be required to design a simple 2D application on the Gameboy Advance. This game will have all the elements of a polished game (as previously identified. Marks will be awarded for concise designs.
5. **Implementation.** The students will be required to implement their design with the help of a 2D graphics API library to be implemented by the instructor.

5. **Prerequisites:**

Students must have a working knowledge of C and C++, familiarity with assembly language considered a plus.

6. **Required Materials** (Available at the ACC Bookstore):

Code Complete, Second Edition, by Steve McConnell. ISBN: 0735619670.

7. **Evaluation:**

Grading Policies

College work must exhibit higher order thinking skills including analysis, synthesis, and evaluation. Mere knowledge about a situation or demonstration of comprehension of the material

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is not sufficient to prepare you for employment consideration. As a Video Game Development student, you must consistently apply higher order thinking in order demonstrate mastery of the material covered in this course. Grades are given for results not for effort. Read the definitions for each grade noted below, as this is really how grades are determined.

Grading is based on an absolute scale - you are not competing with anyone else, but you will be challenging yourself. There are no distributions of grades; hence, all of you can earn an A in this course. Note: Students earns grades, faculty members do not give them. Your final grade will be based on both individual and learning team performance.

Your final grade will be based on the points that you earn during the course. You may receive “fractions” of points on some assignments. When calculating your final grade, I will use the standard rounding convention – meaning that scores with a fraction of ½ or greater will be rounded up, those with a score of less than ½ will be rounded down. I will use the following grading scale to calculate your letter grade.

The grading scale is based on a 100-point (or percentage) scale:

How points and percentages equate to grades

A	90 and above	A = Excellent performance. Work is exemplary and worthy of emulation by others. Student is in full attendance and constructively contributes to the learning environment.
B	80-89	B = Above average performance. All assignments are complete and exhibit a complete understanding and an ability to apply concepts.
C	70-79	C = Average performance. Accomplishes only the minimum requirements. Oral and written communication is at an acceptable level for a college student.
D	60-69	D = Demonstrates understanding at the most rudimentary level. Work is minimally passing.
F	< 59	F = Work is not passing, characterized by incompleteness, lateness, unsatisfactory demonstration of understanding and application.

The breakdown for the four areas of the student's final grade is as follows:

Attendance and Participation	35%
Assignments	15%
Quizzes/Tests	20%
Project Deliverables	30%

Total:	100%

8. Course Outline:

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Modules:

1. A Historic Console Primer.

The goal of this module is to provide a rationale behind the sometimes arcane science of console development. Much anecdotal evidence provided from the instructor's experience working on titles ranging from Populous II (Amiga), Sega Genesis (The Simpson's: Bart's Nightmare), Test Drive Cycles (Gameboy Color), to the recent port of Area51 from the Playstation 2 to Xbox.

2. Constraints

There are many constraints on a console. To deal with these application development is exclusively performed on a PC running Windows, and Linux (PS2/PS3).

- a. Development Kits ("Devkits")
 - i. How do Devkits differ from retail hardware?
 - ii. Boot up procedures.
 - iii. Kernels
- b. Memory constraints
 - i. ROM vs. RAM
 - ii. Limited resources
- c. I/O constraints
 - i. Memory cards
 - ii. DVD/Cartridges
 - iii. UI and the asynchronous state machine
- d. CPU performance
- e. GPU performance

3. Debugging the impossible.

There are often occasions that a bug crops in the code, incident to the often overwhelming complexity of a project that simply cannot be traced. The deadline has passed, the stress is mounting, and your boss decides *now* is the time to micromanage you. How to survive?

- a. Binary search approach.
- b. The dreaded *Heisenbug* of doom! (A crash that changes behavior each time you run the game, or doesn't show up at all!).
- c. Kernel debugging: what to do when your devkit crashes! (Crash logs, C++ exception handling, etc.)

4. Space Invaders Project

The class will be required to design and implement a simple space invaders game on the Nintendo Gameboy Advance. Extra points will be awarded for ingenuity, but not at the expense of the deadline. Complete games score the highest to reflect the real world expectation of a actually shipping a game.

- a. Design a game using the old space invaders as a template.
- b. How to realistically improve on the original.
- c. A discussion of the 2D library to help with the details (our focus is on console not engine development so this library will be fairly complete).
- d. Implementation.

5. Final exam.

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9. Video Game Development Program Philosophy

The Video Game Development Program has been designed, developed and implemented in partnership with leading video games studio managers and directors in Austin. The video games industry has undergone significant changes in how games are developed. They are rarely developed by few persons working in isolation. Today's games are often developed by teams of 50 to 200 on schedules from 2 to 3 years with budgets of \$10M to \$20M. The large publishers drive the game development funding and schedules. Consequently, it is critical that personnel in the industry communicate and collaborate effectively.

This drove the certificate requirements definition. Students are required to successfully complete courses in four categories:

1. The base industry courses: Video Games Industry, Business of Video Games and Video Games Development.
 - a. Students will understand what drives the industry, why games are developed, what is needed for success and how to get from idea to delivery.
2. The course specialization courses: Video Game Programming, Video Game Art, Video Game Design and Video Game Production.
 - a. Students will understand the requirements, objectives, limitations and goals of the different disciplines in a studio. This is essential for communication and collaboration.
 - b. Students in these core courses will be cross-discipline in order to build an understanding and appreciation of how different discipline teams collaborate and contribute to the final product.
3. The five specialization electives.
 - a. Students will develop skills in the discipline in which the student will seek employment.
4. Non-specialization electives
 - a. These are optional courses that will give you a deeper understanding of what other disciplines do and how they function. They will help you understand how to work with others on the team and to get the 'big picture.' These courses do not count towards the Video Game development certificate.
5. Capstone Project
 - a. This multi-person team project will simulate the real video game development environment. Students will develop a concept, turn it into a design, implement the programming and art required and produce it on the committed schedule. Go/no go milestones and final "publisher" acceptance reviews will mimic the industry. The students will have a deliverable for their portfolio that can be used for employment purposes.

Throughout the program each course will focus on knowledge transfer, skill building and teamwork. There will be a heavy emphasis on projects that will broaden and deepen each student's portfolio development. Portfolios are critical to demonstrating an individual's capabilities. Some projects will individual, many will be team based. How much a student gets

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out of each course will largely be determined by how much the students puts into the course. Video game development is highly complex, difficult work. The courses are designed to prepare students for that environment. So, come expecting to work hard.

The program is designed to reinforce key concepts such as teamwork, collaboration, and cooperation across all disciplines in the games development and management process. Many concepts are repeated throughout the program because they are extremely important to successful game development.