Introduction to Computer Programming for Game Design & Development

GAME399
TR 1:30 pm – 2:45 pm

Instructors: Sang Nam & Rob Dieterich
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Office: A&D Building 2025
Phone: 703-993-3163/office
Office Hours*: TBA

* Other times by appointment. The best way to reach instructors is via email.

MAISON MISSION STATEMENT
Mission-Who we are and why we do what we do
A public, comprehensive research university established by the Commonwealth of Virginia in the National Capital Region, we are an innovative and inclusive academic community committed to creating a more just, free, and prosperous world.

MAISON GAME DESIGN MISSION STATEMENT
The Mission of the Computer Game Design Program at George Mason University is to prepare students for employment and further study in the computer game design and development field, doing so with a curriculum designed to reflect the gaming industry’s demand for an academically rigorous technical program coupled with an understanding of the artistic and creative elements of the evolving field of study.

CATALOG DESCRIPTION
This class covers basic programming concepts, data structures, and techniques specifically relevant to game design. The techniques covered in this class will provide a fundamental understanding of programming with regards to game design that is independent of any particular engine or toolset.

COURSE OVERVIEW
In this course, you will learn the fundamental techniques necessary to build a game using C/C++ without relying on a game engine. Through this process, you will learn how to organize game-relevant data and break-down game designs into logic, implementable chunks. The fundamental ideas and techniques learned during this course will help you construct game logic in other projects regardless of the tools required.

STUDENT LEARNING OBJECTIVES
Upon completion of this course, students will
- Be able to use of a C/C++ compiler to produce a working executable
- Have a fundamental understanding of basic features of C/C++
- Better understand to how to organize game data in a logical fashion
- Have created several simple 2D games without having relying on a game engine
- Be able to use a debugger to diagnose coding errors
- Know how to use source control to save and share their work

REQUIRED TEXTS
There’s no required text for this course. Necessary materials will be distributed online if applicable.
REQUIRED SOFTWARE
Students will be required to have access to the following software in order to complete the required assignments:

Visual Studio Community 2015
SourceTree

In addition, students will need access and ability to produce 2D game art on a suitable graphics program like Adobe Photoshop / Illustrator. The usage of this software will not be specifically covered in-class.

GRADING & ASSESSMENT OVERVIEW
Course work will include:

5% Participation (Course Discussion & Critique)
65% Assignments (5 Assignments, first one 5%, others 15% each)
30% Final Project (Individual Project to be presented on Final Exam Day in lieu of an exam)

* Note that if you are having trouble in the class, need an extension on a given assignment, or things outside of class are affecting your ability to do the work, talk with me about it sooner. In all likelihood, we can work something out.

29 class meetings including the final presentation

A: 90% - 100%  B: 80% - 89%  C: 70% - 79%  D: 60% - 69%  F: 0% - 59%

CLASS POLICIES
Cell phones must be turned off or turned to “silent” mode.
Please do not text during class.
No food is allowed in the classroom unless related to class activities.

ATTENDANCE
Attendance will be taken daily. The basic expectation for this discussion-based class is that all students will attend every class (once they are enrolled). You are, however, permitted one absence.

Beyond the one ‘free’ absence, only absences documented by a certified notice of athletic travel, medical illness, religious observance, or death or serious illness of a close family member qualify as ‘excused’ absences. Unexcused absences therefore will result in deductions from your final grade as follows:

2nd unexcused absence = 2.5% deduction
3rd unexcused absence = 5% deduction
4th unexcused absence = 7.5% deduction
Five or more unexcused absences will result in failure of the course

If you expect to be late or absent from a class, please let me know by e-mail or some other suitable method.
EXCUSED ABSENCES
Students have the right to miss class for religious observances. Students wishing for time off for this reason should let the instructor know within the first two weeks of class. Sometimes absences from class are unavoidable because of illness. Emergencies, other than illness, could cause absence from class. In these cases, students are expected to meet with the instructor as soon as possible after the crisis has passed and arrange to make up any missed work. However, a written document that proves your absence was unavoidable must be submitted, and the instructor reserves the right to determine whether or not to excuse such an absence.

ACADEMIC HONESTY
For complete information about the University’s policies on academic honesty, please see: http://www.gmu.edu/cte/Teaching/Getting_Started/Designing_Syllabus/academic_honesty.html

GMU HONOR CODE
http://www.gmu.edu/catalog/apolicies/index.html#Anchor12
Honor Code: To promote a stronger sense of mutual responsibility, respect, trust, and fairness among all members of the George Mason University community and with the desire for greater academic and personal achievement, we, the student members of the university community, have set forth this honor code: Student members of the George Mason University community pledge not to cheat, plagiarize, steal, or lie in matters related to academic work.

ADDITIONAL RESOURCES
GMU Student information and resources: http://www.gmu.edu/mlstudents/.

There will be a good amount of writing expected throughout the class. Please make use of GMU’s Writing Center (http://writingcenter.gmu.edu) if you feel you are struggling.

If you are a student with a disability and you need academic accommodations, please see me and contact the Disability Resource Center (DRC) at 703-993-2474. All academic accommodations must be arranged through that office. Students must inform the instructor at the beginning of the semester, and the specific accommodation will be arranged through the Disability Resource Center.

DISCLAIMER
In this class, I reserve the right to show a broad range of course materials, some of which assume the audience to be adult in age and demeanor. Should you at any time in the course of the class feel offended by something you have seen or heard, we would appreciate you staying to be part of a dialogue. If you feel that you cannot stay, remove yourself from the classroom as discretely as possible. You may be asked to report on your response.

PRIVACY
Students must use their MasonLIVE email account to receive important University information, including messages related to this class. See http://masonlive.gmu.edu for more information.

COURSE SCHEDULE
Please, refer to the class Blackboard for the course schedule as well as important dates, such as assignment due dates, exam dates, and so on.

ASSIGNMENTS
The graded assignments that make up this course are listed in the following table.
Extra credit is awarded for perfect attendance and to students who consistently push beyond the bounds of the assigned projects to add features that weren’t taught in class (sound effects, gamepad support, extra enemy types, etc.)

<table>
<thead>
<tr>
<th>Assignment</th>
<th>Grade Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>1      Hello, World! Project</td>
<td>5</td>
</tr>
<tr>
<td>2      Text Dungeon Project</td>
<td>15</td>
</tr>
<tr>
<td>3      ASCII Dungeon Project</td>
<td>15</td>
</tr>
<tr>
<td>4      Graphical ASCII Dungeon Project</td>
<td>15</td>
</tr>
<tr>
<td>5      Final Project (Graphical Dungeon) Checkpoint</td>
<td>15</td>
</tr>
<tr>
<td>6      Final Project – Graphical Dungeon</td>
<td>30</td>
</tr>
<tr>
<td>7      Class Participation &amp; Attendance</td>
<td>5</td>
</tr>
<tr>
<td>ex     Perfect Attendance</td>
<td>2.5</td>
</tr>
<tr>
<td>ex     Beyond the Bounds Bonus</td>
<td>10</td>
</tr>
</tbody>
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GAME399 - Tentative Schedule

**Week 01 (08/29)**

08/30  Course Overview, Intro to Visual Studio 2015 and command-line basics
09/01  C Fundamentals illustrated by modifying a “Hello, World!” program (variables, loops, arrays, branches)

* First day of classes – Mon 08/29/16

**Week 02 (09/05)**

09/06  C Fundamentals illustrated by modifying a “Hello, World!” program (functions, strings, structs), explanation of Assignment 1
09/08  Intro to Source Control, Intro to Debugging w/ Visual Studio 2015

* Labor Day (University closed) – Mon 09/05/16
* Last Day to Add – Tues 09/06/16

**Week 03 (09/12)**

09/13  Programming Fundamentals & OOP, Object-oriented Programming
09/15  Programming Fundamentals & OOP, Object-oriented Programming (cont’d)

**Week 04 (09/19)**

09/20  Standard Game Loop Elements: Input(), Update() and Draw(), Intro to Text Games, explanation of Assignment 2, Assignment 1 DUE
09/22  Tokenizing Text Input, Intro to enums, Designing a GameState structure

**Week 05 (09/26)**
09/27  Intro to reference parameters and const, Modifying GameState via Input() and Update(), Rendering GameState in Draw()
09/29  Loading data from an external file, parsing CSVs

* Last Day to Drop: Fri 09/30/16

Week 06 (10/03)

10/04  Modifying GameState to support rooms made of blocks, Modifying Draw() to create ASCII art, explanation of Assignment 3, Assignment 2 DUE
10/06  Modifying Input() to change Hero position, Modifying Update() to create exit blocks

Week 07 (10/10)

10/11  No class: Mon classes meet instead of Tues classes this day only
10/13  Loading room data from multiple files (CSVs and String array files)

* Columbus Day Recess - Mon 10/10/16

Week 08 (10/17)

10/18  Intro to SDL, SDL Hello World with Text Output, explanation of Assignment 4, Assignment 3 DUE
10/20  Modifying Assignment 3 to use SDL

* Mid-term evaluation period for full-semester 100-200 level classes – Mon 09/26/16 ~ Fri 10/21/16

Week 09 (10/24)

10/25  Modifying Update() to update per player turn, implementing player death
10/27  Implementing moving hazards (monsters)

Week 10 (10/31)

11/01  Implementing Hero weapon (projectile / trap), implementing ammo pickup in dungeon
11/03  Implementing Hero HP, Implementing HP HUD

Week 11 (11/07)

11/09  Loading/disposing of bitmaps in Startup()/Cleanup(), Drawing dungeon w/ tiles instead of ASCII, explanation of Final Project, Assignment 4 DUE
11/11  Intro to C++ classes, Modifying Hero and Monster to use classes

Week 12 (11/14)

11/15  Intro to C++ class inheritance, Modifying Hero and Monster to use same base class
11/17  Modifying game to work in real-time

Week 13 (11/21) – Thanksgiving Week

11/22  Implementing Pause, Implementing a HUD
11/24  No class

* Thanksgiving (No classes Wed; Recess Thurs – Sun) – Wed 11/23/16 ~ Sun 11/27/16
### Week 14 (11/28)

- **11/29**: Implementing a sprite animation class, Final Project Checkpoint DUE  
- **12/01**: Intro to State Machines, adding states to Hero and Monster to support animation

### Week 15 (12/05)

- **12/06**: Implementing a melee weapon for the Hero, randomizing dungeon room order  
- **12/08**: Last Day of Class, work on Final Projects in class

* Last Day of Class – Sat 12/10/16

### Week 16 (12/12) Final Week

- Final Project DUE  
- Final Exam Day (Presentation) Tues 12/13 1:30 pm – 4:15 pm

* Reading Day – Mon 12/10/16  
* Final Examination Period – Tues 12/13/16 ~ Tues 12/20/16