**Video Game Topics**

1. Introduction  
2. Drawing a surface with SDL  
3. Blitting  
4. Data-driven programming with XML  
5. L-Systems  
6. Colorkeys and transparency  
7. Loading image formats  
8. Inkscape: vector graphics  
9. Sprite animation  
10. Sprite clipping  
11. Backgrounds & virtual worlds  
12. Bouncing sprites  
13. Game levels  
14. Sound & Music  
15. Parallax scrolling  
16. Painter’s Algorithm  
17. Explosions & memory management  
18. Artificial intelligence  
19. Processing input: mouse, keyboard, joystick  
20. Adding sound  
21. Collisions, collision detection  
22. Particle Systems  
23. Game time and timers  
24. Adding text  
25. Pausing the game

**Language Topics**

1. **Basics**: I/O, data types, iteration: for, while; control structures: if/else and switch; short-circuit evaluation, functions, The 3 parameter transmission modes, C-strings, command-line parameters, intro to files.  
2. **The C++ Class**: Constructors: default, conversion and copy. Class instantiation, constructor initialization vs assignment, when are constructors called, which one! destructors and when they are required. Also, the class members that are supplied by default, those that you should supply. Shallow vs deep copy, orthodox canonical class form, functions that C++ silently writes, overloading functions, overloading operators, overloadly assignment, the output operator and others. friend functions (functions that are members of a class vs part of a class), nomenclature and programming style, overloading a class for binary arithmetic, make files, dynamic vs static storage, Writing a string class. Deep copy vs shallow copy. Dynamic memory allocation. Comparing C string with C++ strings.  
4. **Inheritance**: What are the kinds of inheritance, what are the kinds of functions that can be involved in inheritance (virtual, purely virtual, non-virtual), public inheritance vs private inheritance, when should inheritance be used, what are the problems with inheritance, casting down the inheritance hierarchy, the 4 kinds of cast in C++, passing parameters to a base class.  
1. Intro to \( C++ \)
2. Static variables
3. The \( C++ \) Class
   - Types of constructors
   - Canonical form: James Coplien
   - Managing memory: Valgrind
   - Overloading assignment
   - Static class variables
   - Why classes fail
4. Makefiles
5. Writing a string class
6. References vs pointers
7. Introduction to Simple Directmedia Layer (SDL)
   - Drawing with SDL
   - How BLIT works
8. Introduction to \( C++ \) containers:
   - vector
   - list
   - map
9. Introduction to inheritance in \( C++ \)
   - 3 Types of functions in a base class
   - Virtual functions
   - Virtual destructors
   - Overload vs Override
10. The Singleton Design Pattern
11. Introduction to XML
12. A Basic Game Engine
13. Project #1: Animating sprites