CS107 Course Outline

Rough Outline of What To Expect:

Lower-level C constructs

- Data types and representation, binary math galore.
- Pointers, references. dynamic memory allocation, the heap and its implementation, C-style strings.
- Computer architecture, the stack frame, function/method call and return, the compilation and linking processes.
- Why C fails at generic programming, polymorphism, and runtime type identification.
- What C++ learned from C's mistakes.

High-level C++ Constructs

- Memory management, constructors, destructors, assignment operators.
- Templates, template specializations. custom STL-like iterators.
- Operator overloading, function objects.

Concurrent Programming

- How multiple executables appear to run simultaneously.
- How multiple functions appear to run simultaneously within the same executable.
- Synchronization issues that arise when concurrently running functions access shared resources.
- How to overcome these synchronization issues using locks and semaphores.

Better Type Safety and Type Identification in Scheme

- Mechanics of Scheme.
- Programming without side effects
- Functions as data, lambda expressions, and Scheme's ability to build functions (and programs!) on the fly.
- Run-time environments and its implementation, Scheme memory management.

Web Programming with Python

- Scripting languages, what they're good for, and what they're not good for.
- Basic syntax, lists, dictionaries, functions, classes.
- Imperative, object-oriented, and functional language features.
- Client-server paradigm, basics of web programming, HTTP protocol, cookies, sessions, database access.
- Python library support for processing HTML and XML.