EE 1520 計算機概論二（一一三學年下學期）
“[M]” mandatory – the instructor expects students to know these concepts during the oral exams. “[O]” optional – if time allows. “[O2]” unlikely optional – I will cover those topics only if it is related to some of the projects.

+1. OS and the Unix Environment (weeks 1-3)
[M] Basic OS concepts: System Calls, Memory Layout (VM), File Systems, I/O
[O] WSL (Window Subsystem for Linux) installation
[M] Unix Development Environment: Terminal and Shell, Unix Commands, Utilities (files, man, gcc, g++, gdb, make, editors, IO redirections, top/htop)
[M] C Pointers, Call-by-Value, Call-by-Reference
[M] Run-time vs. Compiler-time errors, Interrupt versus Trap
[M, Prog 01 - 10%] Programming Exercise about Files (Large Files), myBreak and myHeal
[O] Exploring the Calling Stack and Heap, Registers
[O2] Two paths to files: File I/O versus Memory-Map I/O (+ a.out format)
[O2] Unix File Systems (UFS + FFS, i-node, VFS, v-node)

+2. Object-Oriented Programming in C++ (weeks 4-11)
[M] JSON (JavaScript Object Notation), OO Data Representation
[M] C++ Classes and Objects, Linearization of Data/Memory model
[M] Encapsulation, C++ References versus Pointers
[M] Operator Overloading, Casting Intro (1), JSONCPP
[M, Prog 02 – 15%] Inheritance, Polymorphism, Casting, C++ to JSON
[O] Multiple Inheritance, Casting revisit (2)
[M] Exception Handling, Exception versus Signal
[M] RPC (Remote Procedure Call), JSONRPC, JSONRPCCPP, Distributed Objects
[M] Object Mobility
[O2] OpenAI C++ API (Restful API via C++)
[M] Pointers, Arrays, Smart Pointers, Function Pointers, Lamda, Function Templates
[M, Prog 03 – 15%] Class Template, STL, JSON to C++
[O2] Distributed File System (e.g., NFS) implementation via JSONRPCCPP

+3. GPU Programming in C++ (weeks 12-13)
[O] Threads
[O] CUDA
[O] ROCm/HIP

+4. Final Project (weeks 14-18)
[M, Prog 04 – 10%] Extending the basic Search Engine and Social Media System in C++
[M, Recording -- 10%] Final Project Idea Brainstorming (with the instructor)
[M, Proposal – 10%] Final Project Proposal
[M, Demo – 5%] Final Project demo (to the instructor only)
[M, Revised Proposal – 5%] Revised Project Proposal (probably team proposal)
[M, Final Implementation and Public Demo – 10%] Final Project Demo (in public)

Grading –
Participation – 10%, you are allowed to miss eight hourly classes during the semester without any penalty. After those 8 classes, 0.5% deduction for each miss. We will take attendance, starting the third week.
Programming – 50% (10%, 15%, 15%, 10%) with interactive grading
Final Project – 40% (10%, 10%, 5%, 5%, 10%)
No written exam