CS 570 Introduction to Programming, Data Structures, and Algorithms Syllabus

The syllabus below describes a recent offering of the course, but it may not be completely up to date. For current details about this course, please contact the course coordinator. Course coordinators are listed on the course listing for undergraduate courses and graduate courses.

Text Books

Required
, , No textbook. Extensive instructor-produced course notes.

Week-by-Week Schedule

Week	Topics Covered	Reading	Assignments
1	variables and assignments, input and output, data types and expressions, simple flow of control, use and definition of classes, use and definition of functions, creation of simple classes, using the debugger, scalar data types, and casting	Lecture notes topic 1	Get the compiler operational, build a simple application that casts numbers between data types
2	Multi-way branching, loop statements, designing loops, definition of a stream, file I/O, the freestore and the stack, variable scoping, basic const	Lecture notes topic 2	REPL lab
3	call-by-value vs call-by-reference, name overloading, function templates	Lecture notes topic 3	Write several functions that work together
4	Template classes, the C++ string class, abstraction, use of vectors, iterators, STL algorithms, lambda functions, exception handling	Lecture notes topic 4	Tic-tac-toe part 1 assignment -- build a rudimentary tic-tac-toe game, due in one week
5	Use of linked list, stacks, queues	Lecture notes topic 5	Tic-tac-toe part 2, extend part 1 to handle a variable size board, number of players, change board geometry, or other changes, due in one week
6	Smart pointers, custom classes, inheritance and polymorphism, copy and move constructors, operator overloading	Lecture notes topic 6	Date and time class lab; create a series of related types that contain information about dates and times and can be added together and otherwise manipulated
7	Implementation of linked list, stacks, and queues	Lecture notes topic 7	Build an RPN calculator based on a stack, due in one week. Early milestone for RPN calculator -- one operator and two operands.
8	Implementation of trees and binary trees	Lecture notes topic 8	
9	Raw pointers, C arrays, C strings, pointer math, advanced const, heaps	Lecture notes topic 9	Array class lab -- build a wrapper around an array. Implementation of a vector class, due in two weeks.
10	Search trees, sorted sets vs hash sets	Lecture notes topic 10	

Week	Topics Covered	Reading	Assignments
11	Definition of graph, terminology, use cases, shortest path	Lecture notes topic 11	Calculate shortest path between two nodes via code. Read in a digraph from a file, determine attributes of the graph (such as cyclic).
12	Graph search techniques such as mark and sweep	Lecture notes topic 12	Implement mark and sweep to create a virtual reference counted environment, due in two weeks
13	Applications of graphs	Lecture notes topic 13	
14	Survey of remaining STL, formal introduction of recursion	Lecture notes topic 14	Final assignment, due in 4-6 weeks depending on semester finals schedule, covering all materials