COMP 2404 Midterm Review – Winter 2019

- Section 1 -- Basics of C++ development
    - Linux platform
        - Types of shells
        - Basic shell commands
        - Program building:
            - Makefile: what are they, what are they used for, commands
            - Compiling, linking: what are they, what commands are used
            - Source files, object files, executables
    - Basic language features
        - Variables
        - Functions:
            - Global vs member functions
            - Function declaration vs implementation
            - Function design
        - Types of parameters
            - Input, output, input-output parameters
        - Parameter passing: pass by value, pass by reference by pointer, pass by reference by reference
        - Operators: operands, arity, precedence, associativity
        - Expressions, statements, blocks, scope (local vs global)
        - References: what they are, what they are not
    - Programming conventions
        - Naming conventions: constants, variables, functions, data types
        - Indentation
        - commenting

- Section 2 -- Basics of C++ classes
    - Class definition
        - Binary scope resolution operator
        - Access specifiers (public, protected, private)
        - Code organization: header files vs source files
        - Class interface: set of public members of a class
        - Include guards
    - Constructor and destructors
        - Default arguments
        - Default constructor: what are they, order of invocation
        - Destructors: what are they, order of invocation
        - Copy constructors: what are they, when are they called

- Memory management
  - Stack vs heap
  - Pointers:
    - What are they, why are they used, how are they used
    - Pointer operations: address-of (&), dereferencing (*), arrow (->)
      - stuPtr->age == (*stuPtr).age
    - Differences with references
    - Parameter passing with pointers
    - Memory allocation: static vs dynamic
    - Memory leak
    - Dynamic memory allocation: new, delete
    - Arrays:
      - Dynamically allocated array vs statically allocated
      - Arrays of objects vs arrays of object pointers
      - How to allocate and deallocate all 4 kinds of arrays

- Section 3 -- Basics of object-oriented design

  - Software engineering overview
    - Life cycle
    - OO design principles

  - Information hiding
    - Data abstraction: making interfaces simple, separating interfaces from implementation
    - Encapsulation: grouping together data and behaviour that belongs together
    - Principle of least privilege

  - Object design categories:
    - NOT MVC (model-view-controller)
    - Types of object categories: entity, control, boundary (view, UI), collection classes
    - What are they, why do we separate them

  - Documenting design
    - **UML class diagrams:**
      - Classes: attributes, operations (parameters and type – in/out/in-out)
      - association, relationships: inheritance, composition
      - composition: directionality, multiplicity
      - don’t show: collection classes, getters/setters (simple), ctor, dtor, other objects as attributes, friendship

- Section 4 -- Essential object-oriented techniques
    - Encapsulation
        - Composition: member initializer syntax, ctor & dtor order
        - Constants (objects, data members, member functions)
        - Friendship
        - Static class members
        - **Linked lists:** singly linked, doubly linked, with/without tail
    - **Inheritance**
        - Terminology: base class vs derived
        - Member access
        - Base class initializer syntax
        - Ctor & dtor order of invocation

Midterm:

- Up to and including section 4.2 (inheritance), slide #10
- 80 minutes
- Out of 50 marks
- Multiple choice (5 questions, no Scantron): 10 marks
- Concept exercise: 20 marks
- Programming (2 questions): 20 marks
- NO QUESTIONS !!!

BRING:

- Campus card
- Pencils, erasers, ruler