**CSC2720 - Midterm Exam Syllabus and Policies**

**Exam Schedule:**

Tue, Oct 15, 2024, 2:15pm-3:30pm

Langdale Hall Room 200

**General Policies for the Exam:**

* The exam is closed book. Laptops/cellphones/headphones etc. are not allowed during the exam.
* You can bring one A4-size (copy paper size) **handwritten** double-sided note for the exam. PRINTED NOTES WILL NOT BE ALLOWED.
* Please bring your **Panther ID card** (or your driver's license) for identity verification. When you submit the exam, please show your ID.
* Please arrive at least 5 minutes before the exam starts to avoid any delay.

**Exam Syllabus:**

**Big O**

* What is Big-O notation? Rules for calculating Big-O notation.
* Algorithm Runtime Analysis for simple algorithms:
  + Best case
  + Average case
  + Worst case
* Exercise 2,4, 6, 8, 9 from BigO lecture slide.

**Python List**

* Properties of Python list
* Anagram detection
  + Sort and Compare
  + Count and Compare

**Array-Based Sequences**

* Referential Arrays vs Compact Arrays
* Compact arrays in Python (‘array’ module)

**Dynamic Arrays**

* What is a dynamic array?
* Amortized analysis of dynamic arrays.

**Stacks**

* What is Stack ADT?
* A series of stack operations and their effects
* Array-Based Implementation; time complexity of stack operations (push, pop, etc.)
* Write a recursive method for removing all the elements from a stack.
* Reverse a Python list using a stack
* Evaluating Postfix Expressions / String of Symbols using a Stack.

**Queue**

* What is the Queue ADT?
* Array-Based Implementation in Python; and time complexity of queue operations (enqueue, dequeue, etc.)
* A series of queue operations and their effects.

**Deque**

* What is the Deque ADT?
* Array-Based Implementation; and time complexity of deque operations (enqueue, dequeue, etc.)

**Linked List**

* What is a linked list?
* List vs Linked List - study the differences.
* Linked Lists Implementation in Python
  + addFirst
  + addLast
  + isEmpty
  + IndexOf
  + DeleteFirst
  + DeleteLast
  + Insert at kth position
  + Delete the kth node
* Given a singly linked list, determine if it has a cycle.
* Merge two sorted singly linked list.

**Circularly Linked List**

* Concept of Circularly Linked List
* Implementing a LinkedCircularQueue

**Doubly Linked Lists**

* Concept and structure of a Doubly Linked list
* Inserting a node into a double linked list
* Deleting a node from a double-linked list
* Basic Implementation of a Doubly Linked List class

**Hash Tables**

* Concept of Hash Tables
* Hash Functions (hash code, Compression function)
* Hash code
  + Treating the bit representation as the hash code
  + Types whose bit representation is > the desired hash code length (H)
  + XOR the high and low-order bits
  + Hash Codes of Variable-length objects
  + Hash code in Python
* Compression function
  + The Division Method
  + Multiply-Add-and-Divide (MAD) Method
* Collision
  + Collision handling - Separate chaining
  + Collision handling – Open Addressing
    - Linear Probing
    - Quadratic Probing