

**Course Prefix/Number:** CPT 244  
**Course Title:** Data Structures  
**Lec Hours/Week:** 3.0  
**Lab Hour/Week:** 0.0  
**Credit Hours/Semester:** 3.0

[Distance Learning Attendance/VA Statement](#)  
[Textbook Information](#)

### **COURSE DESCRIPTION**

This course examines data structures widely used in programming. Topics include linked lists, stacks, queues, trees, and sorting and searching techniques.

### **COURSE COMPETENCIES**

Upon successful completion of this course, the student should be competent to complete the following tasks:

#### **Module 1 - Algorithm Analysis Tools**

- Compare growth rates of logarithmic, polynomial, and exponential functions
- Construct proofs (using mathematical induction and proof by contradiction)
- Use Sigma notation for sums, and determine the closed-form solution for a summation
- Use big-Oh, big-Omega, and big-Theta notation to describe the relative performance of algorithms
- Determine the worst case and best case time and space complexities for algorithms
- Explain the importance of average case analysis

#### **Module 2 - Classic Data Structures**

- Explain the uses and functionality of linked lists
- Discuss the costs and benefits of linked list implementations
- Explain the uses and functionality of doubly-linked lists
- Discuss the costs and benefits of doubly-linked lists
- Explain the uses and functionality of stacks
- Discuss the costs and benefits of stack implementations
- Explain the uses and functionality of queues
- Discuss the costs and benefits of queue implementations
- Explain the uses and functionality of binary and non-binary trees
- Discuss the costs and benefits of tree implementations
- Explain and execute preorder, postorder, and inorder tree traversals
- Implement at least two of the following data structures: linked list, doubly-linked list, stack, queue, binary tree
- Maintain a binary search tree: including insertion and removal of nodes
- Build and maintain heaps

#### **Module 3 - Searching Methods**

- Describe and implement a linear search
- Describe and implement a binary search
- Describe and implement hashing methods

## Module 4 - Sorting Methods

- Describe the following n-squared algorithms: insertion, bubble, and selection sort
- Discuss the relative advantages and disadvantages of the insertion, bubble, and selection sort algorithms
- Describe the following sorting algorithms: shellsort, quicksort, mergesort, heapsort, binsort, radix sort
- Discuss the relative advantages and disadvantages of the shellsort, quicksort, mergesort, heapsort, binsort, radix sort algorithms

## MINIMAL STANDARDS

Minimal standards of performance on all course competencies for receiving credit for the course and indicated by 60% overall accuracy on evaluation instruments that address the course competencies listed above. Required standards of performance on all course competencies for enrollment in subsequent higher-level computer technology courses are indicated by 70% overall accuracy on evaluation instruments that address the course competencies listed above.

## COURSE REQUIREMENTS

Students are responsible for attending all schedule class meetings until they have completed all course requirements. Students are responsible for all material covered and for all assignments made in all classes. Any student caught cheating or involved in other academic dishonesty will be given a grade of zero and will be subject to further disciplinary action.

## ATTENDANCE POLICY

The attendance policy as stated in the York Technical College Handbook will be enforced. Make-up tests will not be given for theory tests. If a student must miss a theory test, he/she will get a zero for that test. However, students have the option of taking the comprehensive final. The student's grade on the comprehensive final will replace his/her lowest theory test grade. It is the student's responsibility to schedule a time for a make-up hands-on test with his/her instructor.

## EVALUATION STRATEGIES/GRADING

Module 1 (25% total)	Module 2 (25% total)	Grading Scale	
		90-100	A
Tests – 10% of final average Program(s) – 10% of final average Homework – 5% of final average	Tests – 10% of final average Program(s) – 10% of final average Homework – 5% of final average	89-89	B
Module 3 (25% total)	Module 4 (25% total)	70-79	C
		60-69	D
		Below 60	F

**ENTRY-LEVEL SKILLS:** None required

**PREREQUISITE:** CPT 232 with a minimum grade of "C" and MAT 110

**CO-REQUISITE:** CPT 233

**Disabilities Statement:** Any student who feels s/he may need an accommodation based on the impact of a disability should contact the Special Resources Office (SRO) at 803-327-8007 in the 300 area of Student Services. The SRO coordinates reasonable accommodations for students with documented disabilities.