CSCE 110
PROGRAMMING FUNDAMENTALS
WITH C++

Dr. Amr Goneid

Spring 2015
CSCE 110
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WITH C++
(Dr. Amr Goneid, Spring 2015)

Course Resources

- Instructor: Prof. Amr Goneid
- E-mail: goneid@aucegypt.edu
- Office: Rm 2152 SSE
- Reference: Microsoft Visual C++ Documentation
- Lab: To be Assigned
- Compiler: Microsoft Visual C++
- Web Site: www.cse.aucegypt.edu/~csci110/

Course Goals

- To introduce problem solving and structured program design in the process of Software Development.
- To stress the use of modular programming in solving problems of varying complexity.
- To gain a starting experience in developing Abstract Data Types (ADT’s).
- To gain a starting experience in Object Oriented Programming as an efficient software development methodology.

Course Contents

Introductory Material (mainly revision of CSCE 106 material)
1. Problem Solving, S/W Design, Algorithms and Structured Programming
2. Overview of C++ language: C++ basics, library functions, operators, expressions and assignment, simple I/O
3. Sequential constructs, selection constructs (if, ternary op., switch construct)
4. Repetition Constructs (for, while, do..while), various types of loops
5. Functions, parameter passing
6. Simple Data Types, User Defined data types: type casting, typedef and enumerated data types
7. 1-D & 2-D Arrays
8. Strings
- Characters & their Operations
- The String Class: String Objects
- Declaration
- Input and Output
- Member Functions: Length & Indexing
- Copying, Concatenation & Comparison
- Other Member Functions
- Passing String Objects
- Arrays of Strings
- Conversions

9. Streams & Files
- What are Streams and Files?
- Standard I/O Streams
- I/O Manipulators
- External Files
- Structure of Text Files
- Declaration
- Opening & Closing
- One-Character I/O
- String & Data I/O
- Passing Files as Parameters

10. Pointers and Dynamic Data Structures
- Static Data Structures
- The Address of a Variable: Pointers
- Dereferencing
- Pointers to Arrays
- Dynamic Data Structures
- Run-Time Arrays

10.a The Vector Class
- The Standard Template Library (STL)
- What is a Vector
- Declaring a Vector
- Size and Accessing Elements
- Adding and removing Elements
- Emptying a Vector
- Other Member Functions
- Iterators
- Vectors as Function Parameters or Types
- Vectors of Vectors
- Some Matrix Operations using Vectors of Vectors
11. Structs
- What are Structs?
- Definition & Declaration
- Accessing Members of a Struct
- Compound Structs
- Structs as Operands & Arguments
- Pointers to Structs

12. Recursion
- Definitions
- Examples from Math Functions
- Why Recursion
- Rules for Recursion
- General Recursive Structures
- Famous Methods
- The Role of the Stack
- Recursive Array processing using Exclude & Conquer
- Recursive Array processing using Divide & Conquer
- More Examples
- Iterative VS Recursive Algorithms

13. Abstract Data Types (ADT’s)
- Data Modeling
- Abstract Data types (ADTs)
- A Classification of Abstract Structures
- Another Classification
- Special Data Structures
- Examples on Modeling
- Example ADT’s

14. User Defined Classes
- OOP & Classes
- Data Encapsulation, Classes and objects
- Class Definition: Private & Public Members
- Constructors & Destructors
- Data and Function Members
- Accessors & Mutators
- Polymorphism and Overloading
- Example: Rational Numbers Class
- Example: Simple String Class
15. Dictionaries (1): A Key Table Class
- The Key Table as a Dictionary
- ADT Key Table
- Key Table Data Members
- Key Table Operations
- Class Template
- Element Specification
- Key Table Class Definition
- Key Table Class Implementation
- Example Application

16. Linked Lists
- The Linked List Structure
- Some Linked List Operations
- Variations on Linked Lists
- ADT Linked List
- A Linked List Class Definition
- Linked List Class implementation
- Example Application

Introduction to Stacks and Queues
- The Stack ADT
- The Queue ADT
**Lab Assignments:**

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<td>Assignment (7): Application on ADT’s and Classes</td>
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**Coursework Grading**

- 30% Programming Assignments.
- 20% Midterm Exam (1)
- 20% Midterm Exam (2)
- 30% Final Exam
The web page: http://www.cse.aucegypt.edu/~csci110/ contains the current material for the course. The recommended text book is:


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The parts given in the slides correspond roughly to the book chapters shown in the table. The highlighted parts represent material expanding on what is basically covered in CSCE 106.