

Course Number: CSC-213
Course Title: Fundamentals of Computer Science
Number of Credits: 3
Schedule: 3 hours of lecture/discussion per week.
Prerequisite: A grade of C or better in MATH-227 and CSC-210

Catalog Description

Fundamental algorithm concepts, computer organization, data structures and abstractions, programming methodologies, distributed and parallel computation, areas of application; artificial intelligence and database systems.

Course Topics

- Course Introduction & Philosophy, Review basic C++
 - This is not just a programming class or a class in C++
 - This course teaches about the fundamentals of computer science while learning object oriented programming with C++
- Pointers and Parameters (-> vs. .)
 - Computer organization
 - Memory layout and utilization
- Breaking a problem down - Encapsulation – Classes
 - Programming methodologies
 - Data Abstraction
 - Object Oriented programming
- Classes, Constructors, Overloading, Call-by-Reference vs. Call-by-Value
 - Data structures and abstraction
 - Distributed computing, transactions and objects on remote computers
 - Object Oriented programming
- Classes and constructors
- Using Classes, Const keyword, operator overloading
 - Areas of application, how classes make drawing primitives easier
 - Reusability of code for future applications
- Linked Lists
 - Fundamental data structures
- Recursion, friends, const, enum, static
 - Fundamental algorithm concepts
- Strings
- Constructors and Destructors
- The use of new and delete
- File I/O
- Automatic Variables
 - Stacks
 - Computer organization
- Separate Compilation
- Inheritance
- Virtual Functions & Polymorphism

- Algorithm concepts – designing classes
- Namespaces & Templates
 - Algorithm concepts
- Debugging
 - Computer Organization
- Standard Template Library
 - Fundamental data structures
- Exception Handling
 - More of distributed computing, handling remote errors
 - Errors you can not check for and vary at runtime
- Parallel computing
 - How Encapsulation helps
- Database systems
 - Tuples encapsulate an "object"
- Artificial Intelligence
 - Dynamic objects and dynamic classes

Course Objectives and Role in Program

The objectives of this course include:

1. To teach how to approach a programming task by breaking the task down. They will be able to see how the choice of various programming methodologies affects how to divide the problem.
2. Provide a more in-depth understanding of C++.
3. Learn and utilize encapsulation through classes in C++ and thus understand the importance of data abstraction and object oriented programming.
4. An in-depth understanding of pointers and their usage and computer organization.
5. How many of the things they are learning fit into the "real world"
6. Provide overview of various aspects of Computer Science including programming methodologies, parallel and distributed computing, database systems, and artificial intelligence.

This course leads the students into CSC-313 (Data Structures), which is the "gateway" course into the program. Students completing this course must have the ability to understand pointers, classes, and a general ability to complete programming tasks to succeed in Data Structures.

Learning Outcomes

At the end of this course students will be able to:

- Write an object oriented program and describe the programming methodology
- Manipulate linked lists and understand basic data structures
- Perform operations on and with pointers with an understanding of the computer organization
- Understand encapsulation and data abstraction
- Break a large task down into simple steps and use and devise algorithms to complete the task
- Describe databases, parallel and distributed computing, and artificial intelligence
- Recognize how concepts fit into various applications

Method of Evaluation

Student learning will be evaluated on the basis of a series of quizzes, programming assignments, midterm(s) and a final exam.

The instructor of the course will determine the weight assigned to each element of evaluation on the first day of the class.

Required Textbooks

Absolute C++ 2nd edition, Savitch, W., Addison Wesley, 2006

Recommended Reference

The C++ Programming Language, Stroustrup, B.,

Modified by: Dr. Barry Levine

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