

**Saint Louis University- Madrid Campus**  
**Division of Sciences, Engineering and Nursing**

**CSCI-180 Data Structures**

**Fairouz Medjahed**

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Credits: 4

Semester: Fall 2011

Office Hours: Wednesdays from 15:00 to 16:00 and **upon request**

Prerequisite: A grade of “C” or better in CSCI-150, MATH-135

Curriculum: general elective, A&S/B&A, core requirement, computer science and engineering

### **I Course Description and Objectives**

Relevant issues in writing a “good” program is the choice of the data structure. Design, analysis and implementation of “efficient” and “adaptable” programs, with emphasis on data structure and data representation are the main objective of this course.

The course will reinforce concepts of Object Oriented Programming like abstraction, encapsulation, modularity, and reusability using C++ Programming Language. Since the majority of students will enter this course having used Python in CSCI 150, we do not assume any familiarity with C++ at the onset of this course.

### **II Learning Outcomes**

On successful completion of this module, students should:

- Be able to design and implement significant programs in C++.
- Be able to understand the key concept of abstraction, encapsulation, modularity, efficiency in programming.
- Be able to evaluate and choose appropriate data structures and algorithms for a range of programming problems.

### **III Textbook**

- “Data Structures in C++” by Angela Shiflet.
- “Problem Solving with C++, The Object of Programming” by Walter Savitch. Addison-Wesley.

The following books could be consulted for different approaches or for further information (Available in the library).

- “C++ How to Program” by Harvey M. Deitel and Paul J. Deitel. Prentice Hall Computer Books, 2000.

– “Data Structures & Algorithm Analysis in C++ “ by Mark Allen Weiss. Addison-Wesley, 1998.

#### **IV Grading System**

The grade will be obtained from the following areas:

Projects, Homework and class Participation: 20%

First Mid-Term Exam: 20%

Second Mid-Term Exam: 20%

Final exam: 40%

Exams Dates:

1<sup>st</sup> Mid Term Exam: Oct, 13<sup>th</sup> from 10:00 to 10:50

2<sup>nd</sup> Mid Term Exam: Nov 17<sup>th</sup> from 10:00 to 10:50

Final Exam: Dec, 14<sup>st</sup> from 9:00 to 11:30

Grading scale

A	90-100%
A-	87-89% :
B+	84-86% :
B	80-83% :
B-	77-79% :
C+	74-76% :
C	70-73% :
C-	66-69% :
D	60-65% :
F	< 60%

#### **V Academic Honesty**

Cheating in class on quizzes, homework and tests is a serious offense. Any student caught cheating will receive an F for the course. A student may also be suspended for one semester. For more information concerning academic dishonesty, refer to the Code of Student Academic Responsibility: <http://www.slu.edu/x23303.xml>

#### **VI Policies**

- (1) Students are encouraged to participate in class discussions and to ask questions.
- (2) Announcements may be made during the semester.
- (4) Syllabus, reading and homework problems are subject to change.
- (5) Students are responsible for all lecture material, handouts, homework and assigned reading.
- (6) It is mandatory to attend all classes unless a reasonable excuse is given.
- (7) Make up exams are not given. Students who legitimately miss an exam, due to a doctor's visit or family emergency must provide written documentation of the circumstances. A letter from the university counselor is accepted. Exams that are missed illegitimately result in a score of F. Grades for these students will be based on the

remaining exams. Missing more than one exam results in an F grade.

## **VII Students with Disabilities**

Any student who qualifies for special accommodations, due to presence of a disability, and feels it necessary to utilize them in order to meet the requirements of this course as outlined in the syllabus, should contact Counseling/Disability Services. Please phone the office at 91 554-5858 (Ext. 230), or send an e-mail to [disabilityservices-madrid@slu.edu](mailto:disabilityservices-madrid@slu.edu). Students may also stop by the Counseling/Disabilities Services Office. Confidentiality will be observed in all inquiries.

## **VII Course Outline**

Week 1: Introduction to C++ Environment

- C++ compiler
- C++ main, variables, input/output
- Simple variables, Arrays, C-string
- Variable lifespan and scope.
- Pointers and Dynamic Memory

Week 2: Control Structure

- Expressions, operators, evaluation, precedence.
- if, for, while, do while statements

Week 3 : Functions

- Defining and calling functions
- Function Overloading
- Recursive Functions
- Function Template
- Programs Organization & Generic Programming (Separate compilation)

Week 4: Introduction to Abstract Data Types (ADT)

- Structures
- Classes
- Programming with classes in C++

Week 5&6 : Linear Structure: specification, representation and implementation

- Lists
- Stacks
- Queues
- Linked Representation.

Week 7: Priority Queue Trees

- Heap Representation and implementation

Week 7&8: Tree Abstract Data Type

- Properties
- Traversal
- Representation
- Applications

Week 9&10: Search Trees

- Properties
- Adding and deleting items
- Implementation
- Applications

Week 10&11: Graphs & Their applications

Week 12: Sets

Week 13&14: Revision, Final Project