CS-224: Object Oriented Programming & Design Methodologies

Summer 2018

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Research Assistants: Abdullah, Nadia Nasir

Office Hours: To be Announced

I. Course Objectives/Description:

- Motivation for using C/C++; as opposed to other languages like Java, C# and Python.
- The logistics of memory manipulation in C++ (pointers, structs).
- Basic introduction of Objects and how they can help in defining new programming methodologies.
- We will start from defining a simple linked list and slowly make it more complex. We'll show double linked-list insert in place, inserting into a linked list using a double pointer, corner cases of using memory (when we actually need heap allocation), etc.
- Data encapsulation: classes, namespaces, constructors and destructors; virtual functions and destructors; operator overloading and standard input/output.
- Inheritance and polymorphism; templates; standard library containers.
- We will use these topics in creating a working game to give a visual feel of all the programming techniques that we will study in class. Designing will be a major part of the entire activity; hence we will learn UML 2.0 and learn to design our software.

II. Specific Learning Outcomes: By the end of this course, students will be able to: -

- Understand the concept of Object Oriented Programming and apply that into creating their own games and other applications.
- Students will go through rigorous programing assignments and a final semester project to understand how the different modules come together in creating a complete project.
- Usage of header and source files will be learned in order to learn the proper usage of IDEs.
- UML 2.0 will be used in designing the individual projects so that the students put into practice the designs that they have created in a working game.

III. Course Requirements:

(a) Required text: *Bruce Eckel's Thinking in C++ 2nd Edition.*

(b) XCode and SDL 2.0 will be used (You can also use Code::Blocks with MinGW, Dev C++ or Visual Studio at your home PCs if you like).

IV. Grading Procedures:

Assignments (24%) 6 Assignments total

Mid Terms (24%) 1 Mid Term (In Week 5)

Project (32%) Completeness will dictate the final score (Scoring will be based on Viva)

Final (20%) Will have MCQs and Questions

Grade Allocation:

A+	96 - 100	Object Oriented Programming & Design Methodologies course is composed of intense programing exercises and assignments. This means that you will not be put under undue stress of quizzes, but you will need to create your skills and understanding through rigorous practical application of concepts.
A	92 - 95	
A-	88 - 91	
B+	82 - 87	The assignments will be given as a group activity only to help with the checking. Every person of the group is required to do the assignments on their own. They can however take help from their colleagues, friends and peer tutors provided they write their own code.
B	78 - 81	
B-	72 - 77	
C+	66 - 71	It is strongly recommended that you start working on the assignment the very day you get it. Assignments WILL take time, so the sooner you start the better.
C	60 - 65	
F	0 - 59	

V. Format and Procedures: - Students will be given an assignment every week that they need to submit by 11:59 pm on the day before next assignment. A total of 6 assignments will be given where the weightage of each assignment will be 4% (Rubric will be given to help in evaluating the assignments). Students will create group projects and they will need to show periodic advancement to verify their progress and to ask questions if they are stuck. The project will be distributed in parts and every part will hold separate marks. A rubric will be provided for the evaluation of each part.

VI. Attendance Policy: Habib University requires that all first and second year students must maintain at least 85% attendance for each class in which they are registered. Non-compliance with minimum attendance requirements will result in automatic failure of the course and may require the student to repeat the course when next offered.

VII. Academic Integrity Each student in this course is expected to abide by the Habib University Student Honor Code of Academic Integrity. Any work submitted by a student in this course for academic credit will be the student's own work. Scholastic dishonesty shall be considered a serious violation of these rules and regulations and is subject to strict disciplinary action as prescribed by Habib University regulations and policies. Scholastic dishonesty includes, but is not limited to, cheating on exams, plagiarism on assignments, and collusion.

VIII. Tentative Course Schedule

Week 1	Introduction to C++, variables, conditionals and loops
Week 1	Functions, Pointers and debugging
Week 2	Arrays, Structures, Classes and Arrays of Objects
Week 2	Introduction to UML 2.0 (Class Diagrams), Objects, data encapsulation, pointers
Week 3	Dynamic object creation and deletion, Simple Stack and Queue Implementation
Week 3	Inheritance, constructors and destructors
Week 4	Virtual functions, Pure Virtual functions and Virtual destructors
Week 4	Polymorphism, functions overloading and overriding
Week 5	Double Linked List for storing child objects using a base pointer **(Mid Week)**
Week 5	Copy Constructor, shallow and deep copying, Friend Classes
Week 6	Design Patterns
Week 6	Design Patterns
Week 7	Project Implementation using OOP techniques
Week 8	Project Evaluation and Final Assessment