Department of Geomatics

College of Engineering

Salahaddin University-Erbil

Subject: Computer Programming & Numerical Analysis

Course Book for 2nd Year

First Semester

Lecturer's name: Dr. Muhammad Ismail Omer

Academic Year: 2021/2022

Course Book

1. Course name	Computer Programming & Numerical Analysis I
2. Lecturer in charge	Muhammad Ismaiel Omer
3. Department/ College	Geomatics / College of Engineering
4. Contact	e-mail: muhammad.omer@su.edu.krd
5. Time (in hours) per week	Theory: 2 Practical: 2
6. Office hours	According to the time table
7. Course code	
8. Teacher's academic profile	Muhammad Ismaiel Omer was born in Erbil, Iraq. He received B.Sc. degree in Civil Engineering and M.Sc. degree in Structural Engineering from Salahaddin University-Erbil, Iraq, in 2002 and 2008, respectively. From 2009 till now he is working in the civil engineering department as academic staff teaching Civil Drawing to fourth level students and computer programming subject to the second level students and supervisor for some students of their final eng. Projects. From 2013-2015 he was the deputy of Civil engineering department. He received Ph.D. degree in Structural Engineering from Salahaddin University-Erbil, Iraq, in 2021.
9. Keywords	C++, Numerical Analysis

10. Course overview:

This course introduces the student to object-oriented programming through a study of the concepts of program specification and design, algorithm development, and coding and testing using a modern software development environment. Students learn how to write programs in an object-oriented high-level programming language. Topics covered include fundamentals of, flowcharts, problem- solving, programming concepts, classes and methods, control structures, arrays, and strings. Throughout the semester, problem-solving skills will be stressed and applied to solve computing problems. Weekly laboratory experiments will provide hands-on experience in topics covered in this course.

11. Course objective:

The course will give students understanding how to write a computer program in Visual C++ languages.

At the end of this course, the students should be able to:

- Understand and use the basic programming constructs of C++.
- Manipulate various C++ datatypes, such as arrays and strings.

- Isolate and fix common errors in C++ programs.
- Use memory appropriately, including proper allocation/deallocation procedures.
- Apply object-oriented approaches to software problems in C++.
- Write small-scale C++ programs using the above skills.

12. Student's obligation

The student should be attending the lectures, and the allowable absence percent is 10%, this means 5 hours throughout the year. The official number of lecture hours per year =45 hours.

13. Forms of teaching

Different forms of teaching will be used to reach the objects of the course.

1-Notes to be written on the board especially procedure of writing program, head titles, definitions and summary of conclusions, and any other illustration, there will be classroom discussions, and the lecture will give enough background to write program.

2-Lecture Notes about will be handled to the student at beginning of course to facilitate easier understanding of books, but they will not replace the use of reference books.

2-The PowerPoints presentation will be used to show the lectures; Students should read the lectures notes regularly and participate the classroom discussions.

14. Assessment scheme

Students are required to the semester exam in January, classroom activities, quizzes, home works and final exam in January. So that the final grade will be based upon the following criteria:

A-Annual Effort 50%

Consist of :

Semester exam ----------25 %

Theory Quizzes---------- 5 %

Practical Quizzes & activity-------- 20%

B-Final Exam 50 %

Consist of:

Theoretical part ---------- 30 %

Practical part ---------- 20 %

15. Student learning outcome:

The students are expected at the end of the year will have the abilities:

1- Write a C++ program mainly how to input data and output data, to control structure program, repeat some statements of the program, jump through the program, and secondary program inside main program and also be able to input and output to another program like Microsoft Word.

16. Course Reading List and References:

1. ***The C++ Programming Language,*** 4th edition by Bjarne Stroustrup (2013).
2. ***An introduction to C++ and Numerical Methods*** **,**by:James M.Ortega & Andrew S.Grimshaw
3. ***A Laboratory Course C++,*** 4th edition by:Nell Dale
4. ***Standard Version of starting out with C++ ,*** 4th edition by Tony Gaddis
5. ***How to program C++ ,***8th edition , by Deitel.(2012)
6. ***Teach yourself C++ in 21 days,*** Second edition by Jesse Liberty. SAMA publishing 2000.
7. ***Programming in C++ an Applied Approach***, by : Habib T. Kashani.
8. ***C++ for Engineers & Scientists,*** by Gary J. Bronson
9. ***http://www.cplusplus.com***
10. ***http://www.arachnoid.com/cpptutor***
11. ***www.cpptutor.com***

17. The Topics:	**Lecturer's name**
Coursebook	Muhammad I. Omer (1 hrs) Week 1 14/10/2021
Introduction	Muhammad I. Omer (1 hrs) Week 2 21/10/2021
Variables & Literals	Muhammad I. Omer (1 hrs) Week 3 28/10/2021
Variables & Literals-part2	Muhammad I. Omer (1 hrs) Week 4 4/11/2021
Basic Input/output	Muhammad I. Omer (1 hrs) Week 5 11/11/2021

Control Structures	Muhammad I. Omer (1 hrs) Week 6 18/11/2021
Control Structures-part2	Muhammad I. Omer (1 hrs) Week 7 25/11/2021
Operators	Muhammad I. Omer (1 hrs) Week 8 19/11/2021
Operators-part2	Muhammad I. Omer (1 hrs) Week 9 2/12/2021
Arrays	Muhammad I. Omer (1 hrs) Week 10 9/12/2021
Arrays part 2	Muhammad I. Omer (1 hrs) Week 11 16/12/2021
Functions	Muhammad I. Omer (1 hrs) Week 12 23/12/2021
New Year holiday	(1 hrs) Week 13 30/12/2021
New Year holiday	(1 hrs) Week 14 6/1/2022
Input/output with files	Muhammad I. Omer (1 hrs) Week 15 13/1/2022
Review all Subjects	Muhammad I. Omer (1 hrs) Week 16 20/1/2022
First Semester Exam	Week 17 27/1/2022

18. Practical Topics (If there is any)	Lecturer's name
The examples taken from theoretical lectures will be apply in the Computer laboratory on a computer.	Muhammad I. Omer (2 hrs)

19. Examinations:

Q1- Write a C++ program to input the elements of the array A[5][5] by using cin statement the print :

1-Maximum number in each column.
2-Summation of the two diagonals separately.
3- Array A[5][5] after multiplying each element by 3.

Q2- Write a C++ program to find the value of B for any value of x, y and for any number of term. Note (don't use function for finding factorial)

$$B = -\frac{(x^2 + y^3)^5}{5!} + \frac{(x^6 - y^8)^{14}}{7!} - \frac{(x^{12} + y^{13})^{25}}{9!} + \frac{(x^{20} - y^{18})^{38}}{11!} - \frac{(x^{30} + y^{23})^{53}}{13!} + .. \text{n term}$$

20. Extra notes: Regulation in class & lab.

1-Students should come to the lecture in time, if any students are late due to any reason, should not be repeated for next time and ask for permission and come in quietly.
2-Students should have lecture notes when they in a class or a laboratory.
3-Try to stay in a class, but if any student needs to leave the class due to right reason, leave the class quietly after permission.
4-The Final exam includes all subjects.
5- Mobile phones should be turned off.
6-We are not allowed to use flash memory and CD, DVD in Lab.
7-Students are responsible for any damage occur to computers in the lab.
8- Student should apply all examples in lab, because the students give marks for applying examples.

21. Peer review