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**Department of Mathematics**

**College of Education**

**University of Salahaddin**

**Subject: Advance programming C++**

**Course Book – 4th Year – first semester**

**Lecturer's name: Rebaz Yaseen Taha**

**Academic Year: 2023-2024**

**Course Book**

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| 1. Course name | Advance Programming /C++ |
| 2. Lecturer in charge | Rebaz Y. Taha |
| 3. Department/ College | Mathematic/Education |
| 4. Contact | e-mail: rebaz.taha@su.edu.krdTel: |
| 5. Time (in hours) per week  | Theory: 2 and Practical: 2 |
| 6. Office hours | Monday(10:30-12:30) , Thursday (10:30-12:30)  |
| 7. Course code |  |
| 8. Teacher's academic profile  | <https://academics.su.edu.krd/rebaz.taha> |
| **9. Keywords** | Flowchart, If, elseif, for loop, while loop and function |
| **10. Course overview:** This is a second course for Computer Scientists, following on from the second-year course MATLAB. Students will study in this course C++ language. Experience with more than one language is necessary. The aim of the course is to provide students a thorough grounding in those programming languages. It provides the candidates with a very good foundation that will help the student to use the previous skills that they have gained in many upcoming courses. I have produced useful handouts that it contains all the information on the work that it has been covered in the lecture. The handouts will also include step-by-step worked examples and exercises to help the students to understand the basic principles and concepts of C++. At the end of the course students will be expected to be able to use and write programs using C++ in different areas of application. During this part of the course there will be two hours of practical session every week. This will encourage the student to put their theory that they have learnt in the previous lessons into practice to write meaningful programs. This will aid them to understand the concept of the language in the theoretical way. |
| **11. Course objective:** The aim of the course is to provide students a thorough grounding in those programming languages. Experience with more than one language is necessary. Application domains; Levels of language; Different philosophies to solve problem; Language improvement. At the end of the course students will be expected to be able to use and write programs using C++ in different areas of application like, applied statistic, graph theory, Security, differential equation, and Numerical analysis |
| **12. Student's obligation**The students are required to do three theoretical tests on 15 marks and practical test every week in the lab on 35 marks. The final grad will be the mean of three tests (15%) plus mean of lab test (35%), so together 50% and the final exam 50% (50 theoretical)  |
| **13. Forms of teaching**I have needed a blackboard and computer lab to explain the examples of the programs, step-by-step with the command of students. That will help the students to understand the concepts of C++.  |
| **14. Assessment scheme**The student must provide the following quizzes and exams during the course:

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| Annual Effort (50 %) | Final Exam (50 %) | Total |
| Lab Practices | Midterm Exam (Theoretical) | Practical | Theoretical |
| **70%** | **30%** | **0%** | **100%** | **100%** |

As we mentioned above the students are required to do practical tests every week in the lab on 35 marks and in Midterm Exam (Theoretical) on 15. This will encourage the student to put their theory that they have learnt in the previous lessons into practice to write meaningful programs, with new idea. The structures of the subject require writing a C++ program as in worked examples and exercises. |
| **15. Student learning outcome:**This is a second course for Computer Scientists, following on from the second year course Matlab. Experience with more than one language is necessary. The aim of the course is to provide students a thorough grounding in those programming languages. It provides the candidates with a very good foundation that will help the student to use the previous skills that they have gained in different areas of application, like, applied statistic, graph theory, Security and Numerical analysis. |
| **16. Course Reading List and References‌:**Cross references in the course study allow the student to fill any gaps that might arise. Nassir, H.S.2009. C++ programming with 469 solved problems. Stanley, B.L. 1998. C++ Primer. Deitel, H.M. 2005. C++ How to program. Malik, D.S. C++ programming from problem analysis to program design. Note: C++ programming for any other authors. |
| **17. The Topics:** | **Lecturer's name** |
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| **First semester** |
| Date  | Subjects |
| Week 1 | Introduction: what is a programming language, overviews of the history of programming languages. |
| Week 2 | The programming process: Flowchart, Algorithms, worked examples. |
| Week 3 |  Input, output statements, data types, variables, expressions. |
| Week 4 | Programming in C ++, program structure, character string, worked examples  |
| Week 5-6 | Relational expressions, the if statement, if-else statement, examples. |
| Week 7-10 | Training |
| Week 11 | For loop. |
| Week 12 | while loop, do…while loop, worked examples |
| Week 13 | Continue, break, goto statement |
| Week 14 | Final exam. |

 | Rebaz Yaseen Taha  |
| **18. Practical Topics (If there is any)** |  |
| As above but in the lab |  |
| 19. Examinations:Write a C++ program to find maximum number between three numbers.Draw a flow chart to find solution of quadratic equation.Write a C++ program to read and printout the vector $B\_{m}$, then find all primes with indexes.Write a C++ program to read and printout the matrix $A\_{nxn}$, thenFind maximum element of second diagonal. Swap first row with last row.If I is an odd, then find average of all element $a\_{iJ}$ of $A\_{nxn}$.What is the output of the below program ? input $n=3$.#include <iostream>#include <iomanip>using namespace std;int main(){int n;cout <<"Input a positive integer " << endl;cin>>n; for(int m=1;m<=n;m++){ for(int p=1;p<=n;p++) { if(p!=m) cout<<setw(2)<<p; else cout<<setw(2)<<"m"; } cout<<"\n";}return 0;} |
| **20. Extra notes:**Here the lecturer shall write any note or comment that is not covered in this template and he/she wishes to enrich the course book with his/her valuable remarks. |
| **21. Peer review** This course book has to be reviewed and signed by a peer. The peer approves the contents of your course book by writing few sentences in this section.*(A peer is person who has enough knowledge about the subject you are teaching, he/she has to be a professor, assistant professor, a lecturer or an expert in the field of your subject).* |