COURSE DESCRIPTION FORM: CL-1002: Programming Fundamentals - Lab

INSTITUTION FAST School of Computing, National University of Computer and Emerging Sciences, Islamabad Campus

BS-CS: **Fall-2023**

PROGRAM TO BE EVALUATED

Course Description

Lab Course Code	CL-1002
Lab Course Title	Programming Fundamentals – Lab
Credit Hours	1
Lab Course Instructors	Ms. Mubrra Asma
Grading Policy	Absolute Grading
Policy about missed assessment items in the course	Retake of missed assessment items (other than sessional/ final exam) will not be held. Student who misses an assessment item (other than sessional / final exam) is awarded zero marks in that assessment item i.e. late submission will not be accepted. For missed sessional/ final exam, exam retake/ pretake application along with necessary evidence are required to be submitted to the department secretary. The examination assessment and retake committee decides the exam retake/ pretake cases.
Course Plagiarism Policy	Plagiarism in project or midterm/final exam will result in F grade in the course. Plagiarism in a lab task will result in zero marks in the whole Lab Tasks category.
Prerequisites by Course(s) or Topics	
Assessment Instruments with Weights (Sessional exam, final exam, lab tasks, lab project, etc.)	Assessment with the weight.

Assessment Item	Number	Weight (%)
Lab Tasks	>=14	25
Sessional	1	15
Lab Quiz	5	10
Assignments (same as theory)	>=4	5
Project (same as theory)	1	10
Final Exam	1	35

Lab Course Coordinator	Ms. Mubrra Asma
URL (if any)	

Course Catalog Description	The course aims to equip students with the basic computing concepts and to provide them the ability to analyze the given requirements for solving problems in different domains while implementing the solutions on a computer system. It emphasizes on developing an algorithm and applying the basic programming constructs like control structures, arrays, functions, pointers, dynamic memory allocation, etc. for its development. The students will learn the syntax of the C++ programming language for the implementation.
Laboratory Manual	Uploaded on LMS
Course Goals	

A. Course Learning Outcomes (CLOs)

After completion of the course, the students shall be able to:

1. **Understand** basic problem-solving steps and logic constructs.
2. **Apply** basic programming concepts.
3. Design and implement algorithms to **solve** real-world problems.

Program Learning Outcomes		
1. Computing Knowledge:	Apply knowledge of mathematics, natural sciences, computing fundamentals, and a computing specialization to the solution of complex computing problems	✔
2. Problem Analysis:	Identify, formulate, research literature, and analyze complex computing problems, reaching substantiated conclusions using first principles of mathematics, natural sciences, and computing sciences.	✔
3 Design/Develop Solutions:	Design solutions for complex computing problems and design systems, components, and processes that meet specified needs with appropriate consideration for public health and safety, cultural, societal, and environmental considerations.	✔
4. Investigation & Experimentation:	Conduct investigation of complex computing problems using research based knowledge and research based methods.	
5. Modern Tool Usage:	Create, select, and apply appropriate techniques, resources and modern computing tools, including prediction and modelling for complex computing problems.	
6. Society Responsibility:	Apply reasoning informed by contextual knowledge to assess societal, health, safety, legal, and cultural issues relevant to context of complex computing problems.	

7. Environment and Sustainability	Understand and evaluate sustainability and impact of professional computing work in the solution of complex computing problems.	
8. Ethics	Apply ethical principles and commit to professional ethics and responsibilities and norms of computing practice.	
9. Individual and Teamwork:	Function effectively as an individual, and as a member or leader in diverse teams and in multi-disciplinary settings.	✔
10. Communication	Communicate effectively on complex computing activities with the computing community and with society at large	
11. Project Management and Finance	Demonstrate knowledge and understanding of management principles and economic decision making and apply these to one's own work as a member of a team.	
12. Lifelong Learning	Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological changes.	

Mapping of CLOs on PLOs
(CLO: Course Learning Outcome, PLOs: Program Learning Outcomes)

		PLOs											
		1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**
CLOs	1	✔	✔										
	2		✔	✔									
	3			✔						✔			

Topics covered in the course
(assume 15-week instruction and 3 contact hours of lab per week)

1. Topics to be covered:

List of Topics	No. of Weeks	Contact Hours	CLO(s)
Ubuntu installation, Shell commands	1	3	
Pseudo Code And Scratch	1	3	
Basic program writing in C++ and stream insertion/extraction operators and data Types	1	3	

	Operators (arithmetic)	1	3	
	Operators (arithmetic, Bitwise etc.)	1	3	
	Conditional structures-I (if-else, ternary operator)	1	3	
	Conditional structures-II (switch-case)	1	3	
	Repetitions-I (while loop, for loop)	1	3	
	Repetitions-II (do-while loop, nested while loop, nested for loop)	1	3	
	Functions (definition, calling, forward declaration)	1	3	
	Arrays-I (1D arrays)	1	3	
	Arrays-II (char and multi-dimensional arrays)	1	3	
	Functions (parameter passing by value/reference)	1	3	
	Recursion	1	3	
	Introduction to pointers and dynamic memory allocation (for 1D)	1	3	
	Total	**15**	**45**	

Practical/ Programming Work/ Tools	Ubuntu, Ubuntu shell, Text Editor, g++			
Lab Time Spent (in percentage)	**Theory**	**Problem Analysis & Design**	**Implementation**	**Social and Ethical Issues**
	5	15	70	10