

COURSE DESCRIPTION FORM

INSTITUTION National University of Computer and Emerging Sciences (NUCES-FAST)

PROGRAM (S) TO BE EVALUATED BS(CS), BS(CY), BS(SE), BS(AI)

A. Course Description

Course Code	CS-1004
Course Title	Object-oriented Programming
Credit Hours	3+1
Prerequisites by Course(s) and Topics	Programming Fundamentals (CS-1002)
Assessment Instruments with Weights (homework, quizzes, midterms, final, programming assignments, lab work, etc.)	Mid-1: 15 Mid-2: 15 Quizzes: 10 (4 total) Participation: 3 Assignments: 5 (2 total) Final: 52
Course Coordinator	Dr. Farooque Hassan Kumbhar
URL (if any)	-
Current Catalog Description	-
Textbook (or Laboratory Manual for Laboratory Courses)	<u>Textbook:</u> 1. JAVA How to program By Deitel & Deitel. <u>Reference books:</u> 1. The C++ Programming Language by Bjarne Stroustrup. 2. Object Oriented Software Engineering by Jacobson. 3. C# 4.0: The Complete Reference by Herbert Schildt

Reference Material	Uploaded on Google Classroom link for the course: [Code: tlhqqc5]		
Course Goals	A. Course Learning Outcomes (CLOs) with Bloom's Taxonomy Levels		
	1. Discuss knowledge of underlying concepts of object-oriented paradigm like abstraction, encapsulation, polymorphism, inheritance etc. (C-2)		
	2. Identify real world problems in terms of objects rather than procedure. (C-4)		
	3. Illustrate Object-Oriented design artifacts and their mapping to Object-Oriented Programming using C++. (C-3)		
	4. Design and assess small and medium scale C++ / C# programs using object-oriented programming principles. (C-6)		
	5. Synthesize programs using Generic Programming and exception handling. (C-6)		
	B. 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 Team Work	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 or a team.																																																																																														
	12. Life Long 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.																																																																																														
	C. Relation between CLOs and PLOs (CLO: Course Learning Outcome, PLOs: Program Learning Outcomes)																																																																																															
<table border="1"> <thead> <tr> <th colspan="2" rowspan="2"></th> <th colspan="12">PLOs</th> </tr> <tr> <th>1</th> <th>2</th> <th>3</th> <th>4</th> <th>5</th> <th>6</th> <th>7</th> <th>8</th> <th>9</th> <th>10</th> <th>11</th> <th>12</th> </tr> </thead> <tbody> <tr> <td rowspan="5">CLOs</td> <td>1</td> <td>✓</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>2</td> <td>✓</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>3</td> <td></td> <td>✓</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>4</td> <td></td> <td></td> <td>✓</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>5</td> <td></td> <td>✓</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> </tbody> </table>					PLOs												1	2	3	4	5	6	7	8	9	10	11	12	CLOs	1	✓													2	✓												3		✓											4			✓										5		✓											
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Topics Covered in the Course, with Number of Lectures on Each Topic (assume 15-week instruction and one-hour lectures)	Week	Topic	CLO	Lab Topic	Assessment																																																																																											
	1	Introduction to OO paradigm	1	Introduction to IDE, skeleton of JAVA program, array, basic I/O in JAVA	Assignment 1 Quiz 1 Week 3																																																																																											
		Comparison from sequential & procedural paradigms	1																																																																																													
		Data Abstraction	1																																																																																													
	2	Encapsulation	1,2	Java data types, functions,																																																																																												
		Introduction to Objects in real world	1,2																																																																																													
	3	Introduction to classes and objects	1,2,3	Classes & Objects																																																																																												
		Access Control	1,2,3																																																																																													
		Constructors & its types	1,3,4																																																																																													

	4		1,3,4	Working with classes and constructors	
			1,3		
		Final keyword	1,3		
	5	Static data and member functions,	1,3	Working with access modifiers, static and final keywords, some examples to revise concepts of classes and objects, constructors & destructors	
		Inheritance concept and syntax	1,3		
	6	Mid I Exam			
	7	Types of inheritance	1,2,3,4	Working with Static functions, final keyword	Assignment 2 Quiz 2 Week 7 Quiz 3 Week 10
		Data and code hiding	1,2,3,4		
		Polymorphism in OOP	1,2,3,4		
	8	Function overloading	1,2,3,4	Inheritance	
		Function overriding	1,2,3,4		
			1,2,3,4		
	9	Nested Classes	1,2,3,4	Polymorphism, Function overloading and overriding	
			1,2,3,4		
	10	Multiple inheritance & its issues (Diamond Problem)	1,2,3,4	Nested Classes	
			1,2,3,4		
			1,2,3,4		
	11	Abstract classes & Interfaces	1,2,3,4	Abstract Classes and virtual functions	
	12	Mid II Exam			
	13	Introduction to filing, File modes, Writing objects to the files	1,2,3,4	Multiple inheritance, abstract class	
	14	Generics, Generics Functions	5	Project Submission & Project demo	Quiz 4 w13
		Generics Classes, Exception Handling	5		
	15	User defined exceptions	1,2	Filing and I/O stream Working with Generic functions and Generic classes	
		Revision	1,2		
	16	GUI	1,2,4	Final lab exam	
		Final Exam			
Laboratory Projects/Experiments Done in the Course	1				
Programming Assignments Done in the Course	2 Assignments				
Class Time Spent on (in credit hours)	Theory	Problem Analysis	Solution Design	Social and Ethical Issues	
	15	15	13	0	
Oral and Written	Every student is required to submit at least <u>1</u> written report of typically <u>2</u> pages and				



Communications	to make <u> 1 </u> oral presentations of typically <u> 10 </u> minute's duration. Include only material that is graded for grammar, spelling, style, and so forth, as well as for technical content, completeness, and accuracy.
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Instructor Name: Abeer Gauher

Instructor Signature: Abeer

Date: 25th January 2023