Course Outline			
School / Department	School of Systems and Technology – SST / Department of Software Engineering		
Course Code	CC-112		
Course Title	Object Oriented Programming		
Theory / Lab / FYP	Theory		
Degree Program	BS-CS / BS-SE / BS-AI / BS - IT		
Credit Hours	3	**Contact Hours**	3
Pre-requisite	Programming Fundamentals		
Teaching Methodology	Classroom Lectures, Assignments, Assessments, Case Studies, Semester Project		
Methods of Assessment (Can be changed as per course requirement)	**Assignment(s)**	15%	
	Quizzes	15%	
	Class Ex	10%	
	Mid-Term Examination	20%	
	Final Examination	40%	
	Total	100%	
Course Moderator / Coordinator	Dr. Syed Farooq Ali		
Contact	farooq.ali@umt.edu.pk		
Counseling Hours	TBA		
Semester Offered	2th		
Course Synopsis	This course teaches object-oriented programming to those who have learnt basic programming concepts and are ready to learn in-depth programming. It focuses on object-oriented programming using C++.		
Course Objectives	This course aims at in depth knowledge of Object Oriented Programming. The main concepts of this course include Classes, Inheritance, Data Abstraction and Information Hiding and Polymorphism. The programming language C++ is used that has programming language constructs including Classes, Overloaded Operators, Overridden Methods, Friend Functions, Virtual Functions and Templates etc., to implement these concepts. The language C++ is being widely used in compiler construction, embedded systems, image processing, image and video coding, mobile programming etc., This course might also include Design Patterns, Iterators, Containers and Namespaces.		

Course Learning Outcomes (CLOs)	Domain & BT* Level
After the successful completion of course, the students will be able to:	
CLO-1: Understand principles of object-oriented paradigm.	Cognitive, (2)
CLO-2: Identify the objects & their relationships to build object-oriented solution	Cognitive, (3)
CLO-3: Model a solution for a given problem using object-oriented principles	Cognitive, (3)
CLO-4: Examine an object-oriented solution	Cognitive, (4)
* BT= Bloom's Taxonomy, C=Cognitive domain, P=Psychomotor domain, A= Affective domain	

CLOs / PLOs	CLO 1	CLO 2	CLO 3	CLO4
PLO1: Academic Education				
PLO2: Knowledge for Solving Computing Problems				
PLO3: Problem Analysis	✓	✓		
PLO4: Design/ Development of Solutions				
PLO5: Modern Tool Usage			✓	
PLO6: Individual and Team Work				
PLO7: Communication				
PLO8: Computing Professionalism and Society				
PLO9: Ethics				
PLO10: Life-long Learning				✓

Tentative Week-wise list of topics

Week	Topics	Reference	Sessional Assessment	CLOs
Week 1	**Introduction** • Fundamental's refresher especially functions • Arrays, loops, • Functions	Chapter 1	Class Assessment	CLO 1
Week 2	• Functions as code abstraction • Variables as data abstraction • int abstraction • float abstraction • char abstraction	Chapter 2	Class Assessment	CLO 1,2
Week 3	**OOP Overview** • Abstraction and Philosophy • Reduces bugs, Readability • Debugging • Incremental development • Maintenance **Data Abstraction and Information Hiding** **Class Examples: Student, Pen etc.,**	Chapter 2	Quiz 1	CLO 1,2

Tentative Week-wise list of topics				
Week	**Topics**	**Reference**	**Sessional Assessment**	**CLOs**
Week 4	**Class vs Object** • Constructor • Access Specifier and Relation with Abstraction • Getters and Setters • Destructor, Copy Constructor • Static Members	Chapter 4	Assignment 1	CLO 2 CLO 3
Week 5	**Relations between objects** • Association	Chapter 10	Quiz 2	CLO 2 CLO 3
Week 6	**Aggregation** **Composition**	Chapter 12	Quiz 2	CLO 2 CLO 3
Week 7	**Inheritance,** • Syntax and Meaning • Function Overriding • Examples	Chapter 14	Assignment 2	CLO 2 CLO 3
Week 8	**Types of Inheritance** • Single inheritance • Multilevel Inheritance • Multiple Inheritance • Hierarchical Inheritance • Hybrid Inheritance **Diamond Problem**	Chapter 14	Assignment 2	CLO 2 CLO 3
Week 9	**MID TERM EXAM**			CLO 1,2,3
Week 10	**Functions Overloading** **Operator Overloading**	Chapter 11	Assignment 3	CLO 2 CLO 3
Week 11	**Friend Classes, Friend Function**	Chapter 6	Assignment 3	CLO 2 CLO 3
Week 12	**Friend Functions with Operator Overloading**	Chapter 7	Quiz 3	CLO 2 CLO 3
Week 13	**Polymorphism** • Virtual Functions • Pure Virtual Functions • Abstract Class	Chapter 16, 17	Quiz 4	CLO 2 CLO 3
Week 14	**Stream I/O in C++**	Chapter 18	Assignment 4	CLO 2
Week 15	**Advance Topics (O)** • Templates • Introductory STL • Iterators and Containers	Chapter 20	Assignment 4	CLO 5
Week 16	**Advance Topics (O)** • Namespace • Exception Handling	Chapter 22	Assignment 4	CLO 5
Week 17	• **Revision**			
Week 18	• **FINAL TERM EXAM**			CLO 1,2,3,4

Tentative Week-wise list of topics				
Week	**Topics**	**Reference**	**Sessional Assessment**	**CLOs**
Textbook	• Deitel & Deitel, 'C++ How to Program', 2nd Edition (or any latest edition available), PRENTICE HALL, Upper Saddle 07458			
Other References	• Thinking in C++, Bruce Eckel, 2nd Edition (Free Online Version Available at http://www.mindview.net/Books/TICPP/ThinkingInCPP2e.html			

	Mapping of CLOs to Direct Assessments									
CLOs	**Quiz 1**	**Quiz 2**	**Quiz 3**	**Quiz 4**	**Assignment 1**	**Assignment 2**	**Assignment 3**	**Assignment 4**	**Mid Term**	**Final Term**
1	✓								✓	✓
2									✓	✓
3		✓	✓	✓	✓	✓	✓	✓	✓	✓
4										✓

Course Moderator Name: _____

Course Moderator Sign.: _____