



## THEORY COURSE OUTLINE

1	<b>Program</b>	B.Sc. Engg. in CSE									
2	<b>Course Code</b>	CSE 121									
3	<b>Course Title</b>	Object Oriented Programming Language									
4	<b>Course Type</b>	Core Course									
5	<b>Academic Session</b>	Spring 2021									
6	<b>Credit Hour</b>	3.0									
7	<b>Intake</b>	46									
8	<b>Section</b>	2									
9	<b>Pre-requisites</b>	CSE 111- Structured Programming Language									
10	<b>Campus</b>	Permanent Campus									
11	<b>Course Teacher</b>	<table border="1"><tr><td><b>Name:</b> Md. Ashraful Islam</td><td><b>Designation:</b> Lecturer</td></tr><tr><td colspan="2"><b>Specialization:</b> Artificial Intelligence, IoT, Data Mining, Network Security, Algorithm, Block chain, Optical Character Recognition (OCR)</td></tr><tr><td><b>Room No. 314/B1</b></td><td><b>Email:</b> ashraful@bubt.edu.bd</td><td><b>Mobile:</b> 01723777711</td></tr></table>	<b>Name:</b> Md. Ashraful Islam	<b>Designation:</b> Lecturer	<b>Specialization:</b> Artificial Intelligence, IoT, Data Mining, Network Security, Algorithm, Block chain, Optical Character Recognition (OCR)		<b>Room No. 314/B1</b>	<b>Email:</b> ashraful@bubt.edu.bd	<b>Mobile:</b> 01723777711		
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12	<b>Class Schedule</b>	<table border="1"><thead><tr><th><b>Class Day</b></th><th><b>Class Hours</b></th><th><b>Class Room</b></th></tr></thead><tbody><tr><td>Sunday</td><td>11:30 AM – 01.00 PM</td><td>R-218</td></tr><tr><td>Monday</td><td>02:50 PM – 04:20 PM</td><td>R-706</td></tr></tbody></table>	<b>Class Day</b>	<b>Class Hours</b>	<b>Class Room</b>	Sunday	11:30 AM – 01.00 PM	R-218	Monday	02:50 PM – 04:20 PM	R-706
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14	<b>Course Objectives</b>	<p>The Course- “Object Oriented Programming Language” provides in-depth coverage of object-oriented programming principles and techniques using C++. The course is designed to perform object oriented programming to develop solutions to problems demonstrating usage of control structures, modularity, I/O and other standard language constructs. Also to demonstrate adeptness of object oriented programming in developing solutions to problems demonstrating usage of data abstraction, encapsulation and inheritance.</p> <p>It is expected that by the end of the course the students will be able to prepare object-oriented design for small/medium scale problems, demonstrate the differences between traditional imperative design and object oriented design, explain class structures as fundamental modular building blocks, understand the role of inheritance, polymorphism, dynamic binding and generic structures in building reusable code.</p>									
15	<b>Course Synopsis</b>	Philosophy of object oriented programming (OOP); advantages of OOP over structured									

		programming; encapsulation, classes and objects, access specifiers, static and non-static members; constructors, destructors and copy constructors, in-line functions; array of objects, object pointers and object references, new and delete, friend function; polymorphism: overloading, default arguments; operator overloading : overloading binary, relational, logical, unary operator; inheritance: single and multiple inheritance, abstract classes, virtual functions and overriding; exceptions; object oriented I/O; template functions and classes; multi-threaded programming; class libraries; I/O systems; string handling; exception handling; run-time type identification and the casting operators; namespaces, conversion functions; standard template library: container classes, vectors, lists, string class.																																																																	
16	<b>Text Book</b>	1. Teach Yourself C++ - Herbert Schildt																																																																	
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18	<b>Course Outcomes (COs)</b>	<p>After completion of this course students will be able to:</p> <p><b>CO1:</b> <b>Describe</b> Object Oriented Programming concepts and its features.</p> <p><b>CO2:</b> <b>Understand</b> how object oriented programming concepts are used to solve a problem.</p> <p><b>CO3:</b> <b>Apply</b> OOP concepts (inheritance, interface, polymorphism, encapsulation, function overloading, operator overloading etc.) to solve different problems.</p> <p><b>CO4:</b> <b>Analyze</b> real life problem scenarios to design a solution using key features (abstraction, inheritance, polymorphism, encapsulation, exception handling, and template, multi-threading) of OOP using C++.</p>																																																																	
	<b>Mapping of COs to POs</b>	<table border="1"> <thead> <tr> <th>CO</th><th>PO1</th><th>PO2</th><th>PO3</th><th>PO4</th><th>PO5</th><th>PO6</th><th>PO7</th><th>PO8</th><th>PO9</th><th>PO10</th><th>PO11</th><th>PO12</th></tr> </thead> <tbody> <tr> <td>CO1</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>CO2</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>CO3</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>CO4</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>	CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	CO1	√												CO2	√												CO3			√										CO4		√										
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19	<b>Teaching Strategy</b>	Maximum topics will be covered from the textbook. For the rest of the topics, reference books will be followed. Some class notes will be uploaded on the web. White board will be used for most of the time. Multimedia projector and a PC will be used for the convenience of the students to understand codes practically. Students must participate in classroom discussions for case studies, problems solving and project developments.																																																																	

20	<b>Assessment and Marks Distribution:</b>	Class Participation : 10% Assignment/Presentation : 10% Class Test : 10% Midterm Examination : 30% Final Examination : 40%																																																																																																												
21	<b>Lecture Plan (Weekly Schedule)</b>	<table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="text-align: center; width: 10%;">Week</th> <th style="text-align: center; width: 10%;">Lecture #</th> <th style="text-align: center; width: 60%;">Selected Topics</th> <th style="text-align: center; width: 10%;">Chapter #</th> <th style="text-align: center; width: 10%;">COs</th> <th style="text-align: center; width: 10%;">Assessment</th> </tr> </thead> <tbody> <tr> <td style="text-align: center;">1</td><td style="text-align: center;">1</td><td>Introduction to Object-Oriented Programming, Features of OOP.</td><td style="text-align: center;">01</td><td style="text-align: center;">CO1</td><td></td></tr> <tr> <td style="text-align: center;">1</td><td style="text-align: center;">2</td><td>Two versions of C++, C++ console I/O and Difference between C and C++, C++ comments, Classes a first look.</td><td style="text-align: center;">01</td><td style="text-align: center;">CO1</td><td></td></tr> <tr> <td></td><td style="text-align: center;">3</td><td>Class and Objects: Constructor and Destructor Functions and Relation of Classes, Structures and Unions.</td><td style="text-align: center;">02</td><td style="text-align: center;">CO1</td><td></td></tr> <tr> <td style="text-align: center;">2</td><td style="text-align: center;">4</td><td>Functions, Automatic inline functions and Constructor that take parameters, Object Pointers.</td><td style="text-align: center;">02</td><td style="text-align: center;">CO1</td><td></td></tr> <tr> <td></td><td style="text-align: center;">5</td><td>A closer look to classes, Assigning objects</td><td style="text-align: center;">03</td><td style="text-align: center;">CO1</td><td></td></tr> <tr> <td style="text-align: center;">3</td><td style="text-align: center;">6</td><td>Passing and Returning objects to and from a function and An introduction to Friend Function.</td><td style="text-align: center;">03</td><td style="text-align: center;">CO2</td><td></td></tr> <tr> <td></td><td style="text-align: center;">7</td><td>Arrays of objects, Using Pointers to objects</td><td style="text-align: center;">CT-1</td><td style="text-align: center;">CO1</td><td style="vertical-align: bottom; 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	10	17	Using protected members, Constructor, Destructor and inheritance	07	CO3			
		18	Multiple inheritance	07	CO3			
	11	19	Virtual Base Class, Pointers to derived classes	07 & 10	CO2			
		20	Introduction to Virtual Functions	10	CO2			
	12	21	Pure virtual function, Abstract class, Applying run time polymorphism	10	CO3			
		22	Generic Function, Generic class	11	CO2			
	13	23	Exception specification	11	CO2			
		24	Exception Handling	11	CO4			
	14	25	Real world problem solving	Web	CO4			
		26	Final Exam Review Class					
	15			<b>Final Exam</b>				
22	<b>Overall CO Assessment Criteria</b>	Assessment methods of COs are given below:						
		<b>Assessment Area</b>	<b>CO</b>					
			<b>CO1</b>	<b>CO2</b>	<b>CO3</b>			
		Class Participation						
		Assignment/Presentation						
		Class Test						
		Midterm Exam	10	20	30			
		Final Exam		10	40			
		<b>Total Mark</b>	<b>10</b>	<b>30</b>	<b>20</b>			
				<b>10</b>	<b>70</b>			
23	<b>Rubrics</b>	<b>COs (Bloom's Level)</b>	<b>Excellent (80%-100%)</b>	<b>Good (70%-79%)</b>	<b>Satisfactory (60%-69%)</b>	<b>Poor (40%-59%)</b>	<b>Unsatisfactory (0-39%)</b>	<b>Mark s (70)</b>
		CO1 (Understanding )	Answer is complete and sufficient detail provided to support issues related to the question. And also deals fully with the entire question.	Answer is brief with sufficient detail provided to support issues introduced. And most of the basic details are included but some are missing.	Answer is brief with insufficient detail provided to support issues introduced.	Answer is incomplete and excessive discussion of unrelated issues.	None of the relevant details were included or didn't answer.  And serious gaps in the basic details.	
		CO2 (Understanding )	Answer is complete and sufficient detail provided to support issues related to the	Answer is brief with sufficient detail provided to support issues introduced. And most of the basic details are	Answer is brief with insufficient detail provided to support issues introduced.	Answer is incomplete and excessive discussion of unrelated issues.	None of the relevant details were included or didn't answer.	

		<p>question. And also deals fully with the entire question.</p> <p><b>CO3 (Applying)</b></p> <p>The question is answered appropriately by applying the suggested method in the question.</p> <p><b>CO4 (Analyzing)</b></p> <p>A clear, complete, and properly ordered chain of analyzing steps (i.e. proper explanation of the procedure) is followed to answer the question.</p>	<p>included but some are missing.</p> <p>The question is answered briefly by applying the suggested method in the question.</p> <p>The chain of analyzing steps is complete and correctly ordered but lacks expected explanation.</p>	<p>The question is answered correctly by applying the suggested method in the question but some steps are missing.</p> <p>One or more intermediate analyzing steps are missing or unclear, but the correctness of the analysis is not compromised.</p>	<p>And serious gaps in the basic details.</p> <p>The question is answered incompletely by applying the suggested method in the question but some steps are correct.</p> <p>One or more intermediate analyzing steps are missing or unclear to answer the question.</p>	<p>No attempt to implement the suggested method.</p> <p>The stated chain of analysis does not lead to the stated question.</p>																																	
24	<b>Grading Policy</b>	<p>The following chart will be followed for grading. This has been customized from the guideline provided by the <u>School of Engineering and Computer Science</u>.</p> <table border="1"> <tr> <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>A+</td><td>A</td><td>A-</td><td>B+</td><td>B</td><td>B-</td><td>C+</td><td>C</td><td>D</td><td>F</td><td></td></tr> <tr> <td>≥ 80</td><td>&lt;80</td><td>&lt;75</td><td>&lt;70</td><td>&lt;65</td><td>&lt;60</td><td>&lt;55</td><td>&lt;50</td><td>&lt;45</td><td>&lt;40</td><td>&lt;40</td></tr> </table>																A+	A	A-	B+	B	B-	C+	C	D	F		≥ 80	<80	<75	<70	<65	<60	<55	<50	<45	<40	<40
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25	<b>Additional Course Policies</b>	<p>Assignments</p> <p>There will be at least two assignments. Average marks of the assignments will be counted. No late homework will be accepted.</p> <p style="color: red;"><i>Any kind of copy/manipulation in assignment will carry a zero mark.</i></p> <p>Two or more copied assignments will carry zero mark in all assignments. <b>Zero tolerance will be shown in this regard.</b> Solutions to assignment problems will be provided through the web and on hand.</p>	<p>Class Test</p> <p>There will be at least three class tests (CT). Best two of three or best three of four CTs will be counted. Both regular and surprise CTs can be conducted.</p>	<p>Exams</p> <p>CT, Mid-term and final exam will be closed book, closed notes. Mobile phones are strictly prohibited in exam halls. Students are insisted to carry their own watch and synchronize time during exam hours.</p>	<p>Test Policy</p> <p>If a student is absent from a class test anyway and makes no report to the class teacher personally beforehand, his/her score for that test will be zero. No make-up for the class test will be allowed as 2 of 3 or 3 of 4 CTs are being considered. No make-up for Mid-exam will be entertained without physical presence and recommendation of the guardian along with written permission of the department. Make-up of Mid-exam may be much harder than the regular one.</p>																																		
26	<b>Additional</b>	<p>a. Academic Calendar Summer 2020: <a href="http://www.bubt.edu.bd/academics/academic-calendar">http://www.bubt.edu.bd/academics/academic-calendar</a>.</p> <p>b. Academic Policies: <a href="http://www.bubt.edu.bd/academics/academic-rules-a-regulations">http://www.bubt.edu.bd/academics/academic-rules-a-regulations</a>.</p>																																					

	<b>Information</b>	c. Grading & Evaluation: <a href="http://www.bubt.edu.bd/academics/academic-rules-a-regulations">http://www.bubt.edu.bd/academics/academic-rules-a-regulations</a> . d. Proctorial Rules: <a href="http://www.bubt.edu.bd/administrator/proctors-office">http://www.bubt.edu.bd/administrator/proctors-office</a> .																								
27	<b>Bloom's Taxonomy for Teaching-Learning</b>																									
	<p>Bloom's Taxonomy is a set of three hierarchical models used to classify educational learning objectives into levels of complexity and specificity. The three lists cover the learning objectives in Cognitive, Affective and Psychomotor domains. The Cognitive domain list has been the primary focus of most education and is frequently used to structure curriculum learning objectives, assessments and activities. The three domains and respective levels are illustrated below.</p> <table border="1"> <thead> <tr> <th>Cognitive [C] (Knowledge-based)</th> <th>Affective [A] (Emotion-based)</th> <th>Psychomotor [P] (Action-based)</th> </tr> </thead> <tbody> <tr> <td>1. Remembering</td> <td>1. Receiving</td> <td>1. Imitating</td> </tr> <tr> <td>2. Understanding</td> <td>2. Responding</td> <td>2. Manipulating</td> </tr> <tr> <td>3. Applying</td> <td>3. Valuing</td> <td>3. Précising</td> </tr> <tr> <td>4. Analyzing</td> <td>4. Organizing</td> <td>4. Articulating</td> </tr> <tr> <td>5. Evaluating</td> <td>5. Characterizing</td> <td>5. Naturalizing</td> </tr> <tr> <td>6. Creating</td> <td>--- --- ---</td> <td>--- --- ---</td> </tr> </tbody> </table>		Cognitive [C] (Knowledge-based)	Affective [A] (Emotion-based)	Psychomotor [P] (Action-based)	1. Remembering	1. Receiving	1. Imitating	2. Understanding	2. Responding	2. Manipulating	3. Applying	3. Valuing	3. Précising	4. Analyzing	4. Organizing	4. Articulating	5. Evaluating	5. Characterizing	5. Naturalizing	6. Creating	--- --- ---	--- --- ---			
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	C6 Creating	Putting elements together to form a coherent or functional whole ;reorganizing elements into a new pattern or structure through generating, planning, or producing. Creating requires users to put parts together in a new way, or synthesize parts into something new and different creating a new form or product. This process is the most difficult mental function.	Construct, design, develop, generate, hypothesize, invent, plan, produce, compose, create, make, perform, plan, produce			
29	<b>Graduate Attributes (Program Outcomes) for B.Sc. in Engineering Program based on Washington Accord</b>					
	<p>Program Outcomes (POs) are narrower statements that describe what students are expected to know and be able to do by the Time of graduation. These relate to the knowledge skills and attitudes that students acquire while progressing through the program. The students of the B.Sc. in CSE program are expected to achieve the following graduate attributes or program outcomes at the time of graduation.</p> <p><b>PO1–Engineering knowledge (Cognitive):</b> Apply the knowledge of mathematics, science, engineering fundamentals and an engineering specialization to the solution of complex engineering problems.</p> <p><b>PO2–Problem analysis (Cognitive):</b> Identify, formulate, research the literature and analyze complex engineering problems and reach substantiated conclusions using first principles of mathematics, the natural sciences and the engineering sciences.</p> <p><b>PO3–Design/development of solutions (Cognitive, Affective):</b> Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for public health and safety as well as cultural, societal and environmental concerns.</p> <p><b>PO4–Investigation (Cognitive, Psychomotor):</b> Conduct investigations of complex problems, considering design of experiments, analysis and interpretation of data and synthesis of information to provide valid conclusions.</p> <p><b>PO5–Modern tool usage (Psychomotor, Cognitive):</b> Create, select and apply appropriate techniques, resources and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.</p> <p><b>PO6–The engineer and society (Affective):</b> Apply reasoning informed by contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to professional engineering practice.</p> <p><b>PO7–Environment and sustainability (Affective, Cognitive):</b> Understand the impact of professional engineering solutions in societal and environmental contexts and demonstrate the knowledge of, and need for sustainable development.</p> <p><b>PO8–Ethics (Affective):</b> Apply ethical principles and commit to professional ethics, responsibilities and the norms of the engineering practice.</p> <p><b>PO9–Individual work and teamwork (Psychomotor, Affective):</b> Function effectively as an individual and as a member or leader of diverse teams as well as in multidisciplinary settings.</p> <p><b>PO10–Communication (Psychomotor, Affective):</b> Communicate effectively about complex engineering activities with the engineering community and with society at large. Be able to comprehend and write effective reports, design documentation, make effective presentations and give and receive clear instructions.</p> <p><b>PO11–Project management and finance (Cognitive, Psychomotor):</b> Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work as a member or a leader of a team to manage projects in multidisciplinary environments.</p> <p><b>PO12–Life-long learning (Affective, Psychomotor):</b> Recognize the need for and have the preparation and ability to engage in independent, life-long learning in the broadest context of technological change.</p>					
30	<b>Social &amp; Moral Capital</b>					
	<p>Our promises are based on the three cardinal principles:</p> <p>(a) What we do believe (b) What we do practice, and (c) What we will promote</p> <p>However, students are advised to undertake the following commitments for moral development.</p> <table border="1"> <tr> <td style="vertical-align: top;">           1. To be punctual and attentive in class            2. To maintain inclusive learning environment            3. To ensure mutual respect            4. To be cooperative in group learning.            5. To be innovative and Creative            6. To follow dress code and wearing         </td><td style="vertical-align: top;">           8. Try to follow and review day to day class            9. To avoid conspiracy            10. To prioritize honesty &amp; faith            11. To be motivated for asking question and encourage feedback            12. To develop attitude for speaking in         </td><td style="vertical-align: top;">           15. To be sincere for class preparation            16. Do not forget to switch-off the cell phone in class            17. Do not forget to carry course pack and learning stuffs in class            18. To maintain loyalty and trust to the university         </td></tr> </table>			1. To be punctual and attentive in class 2. To maintain inclusive learning environment 3. To ensure mutual respect 4. To be cooperative in group learning. 5. To be innovative and Creative 6. To follow dress code and wearing	8. Try to follow and review day to day class 9. To avoid conspiracy 10. To prioritize honesty & faith 11. To be motivated for asking question and encourage feedback 12. To develop attitude for speaking in	15. To be sincere for class preparation 16. Do not forget to switch-off the cell phone in class 17. Do not forget to carry course pack and learning stuffs in class 18. To maintain loyalty and trust to the university
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	ID card <b>7.</b> To be always proactive	English <b>13.</b> Do not ignore to carry out any assignments or commitments <b>14.</b> To be clean and decent on all levels.	<b>19.</b> Must avoid unfair means and plagiarism in exam, reports and assignments <b>20.</b> Must maintain an eco-friendly environment in the campus.
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**Prepared by:**

**Checked by:**

**Approved by:**