Course Outline

Course Title	Object Oriented Programming
Course Code	CMP-244
Course Webpage	✓ Class Webpage: https://piazza.com/pucit.edu.pk/fall2019/cmp244 ✓ Teacher Notes @ Intranet: \\printsrv\\Teacher Data\\Fareed ul Hassan ✓ CMS: online.pucit.edu.pk
Instructor Name	Fareed Ul Hassan Baig
Instructor Email	fareed@pucit.edu.pk
Teacher Assistant(s) (T.A)	TBA
Credit Hours	3 *Theory/week:* Weight 3 Cr. hrs. Lectures: 2 Duration 1.5 hrs.
Prerequisite Course	CMP-140 Programming Fundamentals CMP-141 Programming Fundamentals Lab
Prerequisite Skill/Knowledge/Understanding	○ Strong understanding of how to attack a bigger task by dividing it into smaller tasks. ○ Student should know the concept of passing/returning objects (struct) to/from functions by knowing the pitfalls that come across while doing that. ○ Understanding the real spirit/cause of data driven programming. ○ Good concepts of Type Casting. ○ Student should be familiar with debugging process.
Follow Up	CMP-210 Data Structures and Algorithms CMP-211 Data Structures and Algorithms Lab
Program Name	BS Software Engineering/Computer Science/Information Technology
Aims and Objectives	○ To equip the learner with the philosophy and necessary skills to formulate solutions of real world problems using object oriented paradigm. ○ Justify the philosophy of object-oriented design and the concepts of encapsulation, abstraction, inheritance, and polymorphism. ○ Strong concepts of object manipulation and dynamic memory allocation within classes
Syllabus	**Topics:** Object Oriented Concepts, Terminology and Features, Class/ADT/UDT, Data Abstraction and Encapsulation, Special Methods, Constructor and Destructor; Modifier const; Array and Pointer of ADT, Composition; this Pointer, friend Function and Class, Modifier static, Operator Overloading, Class Templates, Inheritance, its types, and related Terminology, static & dynamic/Polymorphism; Stream I/O, File Processing; Exception Handling
Text Book(s)	A. H. M. Deitel "C++ How to Program", 5th Ed., Prentice Hall, 2005. ISBN 0-13-185757-6
Reference Material	R1. Handouts/Web-Links. R2. Victor Shtern, "Core C++ A Software Engineering Approach", 1st Ed., Prentice Hall PTR, 2000. ISBN: 0-13-085729-7, R3. Stephen Parata, "C++ Primer Plus", 5th Ed., Sams Publishing, 2005. ISBN 0-672-32697-3 R4. Bjarne Stroustrup, "The C++ Programming Language", 4th Ed., Addison Wesley, 2013. ISBN-10 0-321-56384-0 R5. Tony Gaddis, "Starting out with C++: from control structures through objects", 7th Ed., Addison-Wesley, 2012. ISBN 978-0-13-257625-3

Assessment Criteria

Sessional ……………… 25%		Mid ……… 35%	Final ……… 40%
Quizzes, Assignment, Tests	15	Written Exam …………………35	Written Exam …………………40
Term Paper	0		
Project	10		
Total	25	35	40
	100		

- ○ Sessional Marks will be updated online on the Google Docs.
  https://docs.google.com/spreadsheets/d/1_UYahtqIufcyLTypnICZzy2qkS8Zdsgx9M-KFckdz0o/edit?usp=sharing

Lecture Breakdown

Week	Lec #	Topic	Source
1	1	Course Introduction Overview/Extension of/to PF • Pointer/Alias Quick Jolt ○ memcpy, memmov, etc • C structs: Data Driven Programming ○ Use/Benefits of Data Driven Programming ○ struct keyword ○ Passing/Returning struct object by value/Reference	Your PF Textbook: Tony Gaddis: Chapter 11
	2	Overview/Extension of/to PF Cont... • C structs: Data Driven Programming ○ Array/Pointer as member ○ Shallow/Deep Copy ○ struct objects on heap • Distributing code in header/cpp files.	Your PF Textbook: Tony Gaddis: Chapter 11
2	3	Overview/Extension of/to PF Cont... • C structs: Data Driven Programming ○ Struct as other struct members ○ Array of structs • PF constructs: enum, union	Your PF Textbook: Tony Gaddis: Chapter 11

	4	Overview/Extension of/to PF Cont...
		• namespace
		Introduction to Object Oriented Concepts and Terminology: Real world examples
			R2-(Ch-1 – Remedy-3)
			R2-(Ch-8)

3	5	Intro to Object Oriented Programming Define the keyword 'class' Access modifiers: private and public only; First Member function; Data Abstraction through Encapsulation; ○ Setter/Mutator and Getter/Accessor methods;	A-(Ch-3 (3.1~3.6))

	6	Two Special Method: Constructor & Destructor;
		Constructor with No argument (Default Constructor);
		Constructor with Default arguments
		Constructor Delegation
			A-(Ch-3 (3.7~3.11))
			A-(Ch-9 (9.1 ~ 9.6))

4	7	Pointer as data member
		Pointer/Reference to objects,
		Passing objects to functions by reference
		Pointer this
		Importance of destructor
		Calling sequence of Constructor & Destructor for multiple objects
			A-(Ch-9 (9.7 ~ 9.12))
			A-(Chapter-10.5, 10.6)

	8	Passing objects to functions by value, Default Member-wise copy (Assignment & Initialization), Problem of Member-wise copy & its solution: Copy Constructor, Calling sequence of Constructor & Destructor: when objects are passed by value/reference	R1
5	9	Preventing changes in data members from a method: const method; Constant data members Static functions Static data members constant and static objects Calling sequence of Constructor & Destructor for constant and static objects	A-(Chapter 10.2, 10.7)

	10	Object as data member (Composition), Aggregation;
		Cascading calls with and without this pointer.
			A-(Chapter 10.3)
			R2-(Chapter 12)

6	11	Composition/Aggregation Cont...
		Nameless objects
		Array of objects;
			A-(Chapter 10.3)
			R2-(Chapter 12)

	12	Operator Overloading; Binary Operator receiving Instance of class as 1st operand	A-(Chapter 11.7)
7	13	Overloading Unary Operator: as member, as non-member Unusual Operators: ++, --,	A-(Chapter 11.11)
	14	[ ] (set & get, both versions), type-cast, Parentheses	A-(Chapter 11.8, 11.9)
8	15	Friend functions (efficient but shake the concept of encapsulation); Declaring a global function as friend of a class; Declaring member function of a class as friend of another class Friend class (an easy but more un-secure way);	A-(Chapter 10.4)
	16	Operator NOT receiving Instance of class as 1st operand Overloading Binary Operators (Stream Insertion/Extraction) for I/O stream	A-(Chapter 11.5)
Mid Term Examination			

9	17	In theory what is inheritance
		is-A Relationship: Public Inheritance
		Protected data member
		protected, private inheritance
			A-(Chapter 12.1~12.4)
			R2-(Chapter 14)

	18	Multilevel Inheritance: Direct and Indirect Base Class Calling of Constructor and Destructor for Derived Class Objects; Explicit call to the constructor of Base class from Derived class;	A-(Chapter 12.5, 12.6) Case Study-A
10	19	Review of Simple Inheritance, Multi Level Inheritance, Multiple Inheritance A review of OO relationships terminologies: Aggregation, composition, generalization (is-A), knows-a.	A-(Chapter 12) Case Study-B
	20	Polymorphism: Overriding base-class members in derived class; Virtual functions and Dynamic binding; Concept of v-Pointer and v-Table	A-(Chapter 13) R1-Reading Material Case Study-B
11	21	Pure virtual functions and abstract class; Defining a pure virtual destructor	R1-Reading Material
	22	Detail discussion on v-table structure, virtual constructor, object cloning	R1-Reading Material

12	23	Some tricky things in pointer type casting and applying them on different topics studied so far.	R1-Reading Material
	24	Diamond inheritance Virtual inheritance	R1-Reading Material
13	25	C++ Streams, Members and Manipulators of Streams; File Handling using Streams	R1-Reading Material A-(Chapter Chapter-15)

	26	Access Techniques: Sequential, Direct, and Random-Access Files;
		Input/output of Object from/to File (binary/ text mode);
			R1-Reading Material
			A-(Chapter Chapter-17)

14	27	Streams Continue…	R1-Reading Material

	28	Function Template;
		Overloading of Function Template;
		Specialized of Template Function
			A-(Chapter 14.2,14.3)

15	29	Class Template;
		Specialized method of Template Class;
		Complete Specialized Template Class
			A-(Chapter 14.4, 14.5)

	30	Friendship and Inheritance with Templates	A-(Chapter 14.6, 14.7, 14.8)
16	31	What is Exception? Error vs. Exception; Evolution of Exception Handling: exit, abort, assert, new-keywords; try, catch, throw Unhandled Exception; Propagation of Exception and its advantage	A-(Chapter 16)
	32	Exception Handing continue…	A-(Chapter 16)
Final Term Examination			

Web Sites:

- References/Links/Pointers for C/C++ related stuff:
  - http://www.cplusplus.com/
  - https://isocpp.org/faq
  - http://c-faq.com
  - The homepage of Bjarne Stroustrup, the inventor of C++: http://www.stroustrup.com

Code of Conduct

- In Quizzes/Tests, you are allowed to use any helping material available at that time unless specified otherwise. Neighbors and machines are exception.

- Big NOs
  - Any sort of communication with your peers/seniors/internet/books on assigned tasks may lead you to Grade 'F' in the course/Lab.
  - Violation of coding convention.
  - Late Submissions.

- Once the marks are published on Google docs for any graded task (sessional), You can question about any discrepancy about the marks within *five* working days otherwise grading will be considered final.

- Mobile Phones must be switched off during the class and laboratory.

- How to Approach Me:
  - Observe the counseling hours!
    When: (Tue, Thu): (1100 ~ 1300 & 1400 ~ 1600)
    Where: Graduate Block - 1st Floor - Office#1.

  OR
  - Send Post/E-mail
    - Send/post all the course related messages to https://piazza.com class page
    - For any other information/query, you may send the email at fareed@pucit.edu.pk, but send it through your PUCIT Email-ID.