



Lahore University of Management Sciences

CS 100 – Computational Problem Solving

Fall 2020-2021

Instructor	Shafay Shamail
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Secretary/Coordinator/TA	Mr. Afaq Butt/Ms Asma Khalil/ TAs to be decided
TA Office Hours	To be decided
Course URL (if any)	lms.lums.edu.pk
Lecture	Programming Studio (Online in Fall 2020)
Lab	Programming Studio (Online in Fall 2020)

Course Teaching Methodology

- **Teaching Methodology:** Mostly synchronous, however students will be guided to supplementary reading material.
- **Lecture Details:** Since teaching methodology is going to be synchronous, therefore there will be no pre-recorded lectures. However, links to related reference material available online from different sources will be provided from time to time.

Course Basics

Credit Hours	3			
Lecture(s)	Nbr of Lec(s)	28-30	Duration	50 min each, twice a week
Recitation/Lab	Nbr of Lec(s)	0/14	Duration	2 hrs 50 min each, once a week
Tutorial	Nbr of Lec(s)	As per need	Duration	

Course Distribution

Core	Yes (for SBASSE students, CS Majors, CS minors)
Elective	Yes, can be taken as an elective
Open for Student Category	Freshmen, Sophomore
Close for Student Category	None

COURSE DESCRIPTION

This course provides a conceptual and practical introduction to programming. The focus is on programming rather than the particular choice of programming language, with general principles being brought out through the study of 'C/C++'. This course will equip students with tools and techniques to implement a given problem programmatically.

COURSE PREREQUISITE(S)

None

PROGRAM OBJECTIVES

PO-01	Impart an understanding of the basics of Computer Science discipline.
PO-02	Develop proficiency in the practice of computing.
PO-03	Prepare for continued professional development.

COURSE OBJECTIVES

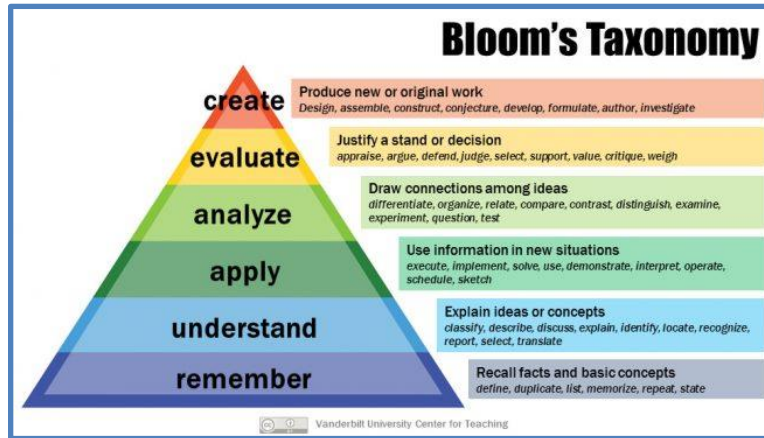
CO-01	To teach programming fundamentals to students.
CO-02	To help students analyze and solve programming problems.
CO-03	To prepare students in programming for later courses with programming intensive content.



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BLOOM'S TAXONOMY*	
<ul style="list-style-type: none"> (C1) Remember (C2) Understand (C3) Apply (C4) Analyze (C5) Evaluate (C6) Create 	<ul style="list-style-type: none"> Recognizing, Recalling Interpreting, Exemplifying, Classifying, Summarizing, Inferring, Comparing, Explaining Executing, Implementing Differentiating, Organizing, Attributing Checking, Critiquing Generating, Planning, Producing

*(<https://cft.vanderbilt.edu/guides-sub-pages/blooms-taxonomy/>)



<https://cft.vanderbilt.edu/guides-sub-pages/blooms-taxonomy/>

Learning Outcomes	
LO-01	At the successful completion of the course students will be able to: (Compare, Develop, Engage, Analyze, Discuss, Demonstrate...)
LO-02	<ul style="list-style-type: none"> Enabling Knowledge: (C1) use C++ syntax and control structures to code algorithmic solutions using standard coding conventions.
LO-03	<ul style="list-style-type: none"> Critical Thinking and Analysis: (C4) analyze the requirements for solving simple algorithmic problems. Problem Solving: (C6) design and implement programs to solve simple algorithmic computing problems, based on analysis of the requirements.
LO-04	(C5) evaluate the correctness of the proposed solution.
LO-05	<ul style="list-style-type: none"> Communication: (C2) explain key concepts of algorithmic design in written form. Responsibility: (C3) apply relevant standards and ethical considerations to writing computer programs.

Academic Honesty
<p>The principles of truth and honesty are recognized as fundamental to a community of teachers and students. This means that all academic work will be done by the student to whom it is assigned without unauthorized aid of any kind. Plagiarism, cheating and other forms of academic dishonesty are prohibited. Any instances of academic dishonesty in this course (intentional or unintentional) will be dealt with swiftly and severely. Potential penalties include receiving a failing grade on the assignment in question or in the course overall. For further information, students should make themselves familiar with the relevant section of the LUMS student handbook.</p>



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Harassment Policy
<p>SSE, LUMS and particularly this class, is a harassment free zone. There is absolutely zero tolerance for any behaviour that is intended, or has the expected result of making anyone uncomfortable and negatively impacts the class environment, or any individual's ability to work to the best of their potential.</p> <p>In case a differently-abled student requires accommodations for fully participating in the course, students are advised to contact the instructor so that they can be facilitated accordingly.</p> <p>If you think that you may be a victim of harassment, or if you have observed any harassment occurring in the purview of this class, please reach out and speak to me. If you are a victim, I strongly encourage you to reach out to the Office of Accessibility and Inclusion at oai@lums.edu.pk or the sexual harassment inquiry committee at harassment@lums.edu.pk for any queries, clarifications, or advice. You may choose to file an informal or a formal complaint to put an end of offending behavior. You can find more details regarding the LUMS sexual harassment policy here.</p> <p>To file a complaint, please write to harassment@lums.edu.pk.</p>
SSE Council on Equity and Belonging
<p>In addition to LUMS resources, SSE's Council on Belonging and Equity is committed to devising ways to provide a safe, inclusive and respectful learning environment for students, faculty and staff. To seek counsel related to any issues, please feel free to approach either a member of the council or email at cbe.sse@lums.edu.pk</p>
Rights and Code of Conduct for Online Teaching
<p>A misuse of online modes of communication is unacceptable. TAs and Faculty will seek consent before the recording of live online lectures or tutorials. Please ensure if you do not wish to be recorded during a session to inform the faculty member. Please also ensure that you prioritize formal means of communication (email, lms) over informal means to communicate with course staff.</p>

Grading Breakup and Policy			
Assessment	Description	Weight (%)	LO
Quizzes	There will be 8 to 10 quizzes. Two will be dropped	20%	LO-01, LO-02
Labs	There are 14 lab sessions. Out of these first 2 to 4 labs will be conducted as guided labs. Next 10 to 12 labs will be evaluated. Two labs will be dropped	25%	LO-02, LO-03, LO-05
Project	A programming project will be assigned in the last month of the semester.	15%	LO-04
Mid Term Exam	Two mid-term exams will be conducted. None will be dropped. Duration: 50~90 mins (May vary if taken online) Preferred Date: Mid-term 1: expected in the 5th week Mid-term 2: expected in the 10th week Exam Specifications: Closed book, No calculator. No cell phones.	20%	LO-01, LO-02, LO-03



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Final Exam	Final exam will cover whole course content. It will be conducted in two parts. Part one will include MCQs Part two will be a programming exercise. Duration: 120~180 mins (May vary if taken online) Exam Specifications: Closed book, No calculator. No cell phones.	20%	LO-01, LO-02, LO-03
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Examination Detail	
Midterm Exam	Yes/No: Yes Duration: 50~90 mins (May vary if taken online) Preferred Date: Mid-term 1: expected in the fifth week; Mid-term 2: expected in the 10 th week Exam Specifications: Closed Book, No Calculator. No cell phones.
Final Exam	Yes/No: Yes Duration: 120~180 mins (May vary if taken online) Exam Specifications: Closed Book, No Calculator. No cell phones.

Makeup Policy	
<ul style="list-style-type: none">• Please refer to Student Handbook 2019-20, page 37, article 25, titled "Makeup Policy for Graded Instruments".• <i>"In case N-X policy is implemented for an instrument having multiple sub instruments then petitions will not be accepted for that instrument"</i>.	

Code of Conduct	
<ol style="list-style-type: none">1. Students are required show up in class fully prepared for the lecture, ensure their videos and mic's are muted.2. Quiz's will be announced ahead of time, students must ensure their devices are charged and they have a stable internet connection (including smartphones).3. All assessments including quizzes, labs and tests will be timed. Make sure that you are able to start them on time.	



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COURSE OVERVIEW (TENTATIVE)			
Module	Recommended Readings - CFE	Objectives/ Application	Objectives/ Application (LO, CO, PO)
1	1.5 2.1-2.2	<ul style="list-style-type: none"> Intro to the IDE. Edit-(preprocess)-compile-link-run cycle. Tokens (keywords, identifiers, literals, operators, punctuation, and white-space). Hello World program. Statements, expressions, values and types. Variables, operators, assignment operator, precedence. 	LO1-LO5 CO1-CO3 PO1-PO3
2	2.5	<ul style="list-style-type: none"> Strings 	LO1-LO5 CO1-CO3 PO1-PO3
3	3.1, 3.3, 3.4, 3.7	<ul style="list-style-type: none"> Control: if, blocks. Program formatting, comments. Relational and Logic operators. Nesting ifs. Else. Variable scoping I/O, error messages, types of errors, debugging using print. 	LO1-LO5 CO1-CO3 PO1-PO3
4	4.1, 4.2	<ul style="list-style-type: none"> Repeating by using copy-paste. Programming to reduce redundancy Loops: <i>While</i>. Counting using while. Debugger: Stepping through a loop. 	LO1-LO5 CO1-CO3 PO1-PO3
5	4.3-4.8	<ul style="list-style-type: none"> Loops: <i>For</i>. Converting <i>for</i> to <i>while</i> and back. Unrolling loops to understand, and for speed. Creating loops where there are differences in what is to be done using if. Nesting loops. Nesting other control structures. 	LO1-LO5 CO1-CO3 PO1-PO3
	4.3-4.8	<ul style="list-style-type: none"> Loops: More practice. <i>break, continue</i>. 	LO1-LO5 CO1-CO3 PO1-PO3
6	5.1-5.5	<ul style="list-style-type: none"> Functions. More types, <i>return, void</i> Functions. Recursion (if time permits) 	LO1-LO5 CO1-CO3 PO1-PO3
7	6.1-6.3	<ul style="list-style-type: none"> Arrays, pointers Pass by value, pass by reference, pass by address. 	LO1-LO5 CO1-CO3 PO1-PO3
8	7.7	<ul style="list-style-type: none"> Structures – <i>Struct</i> (If time permits) 	LO1-LO5 CO1-CO3 PO1-PO3

COURSE OVERVIEW (TENTATIVE)				
Module	Week	Lecture	Topic	Recommended Readings - CFE
1.	1	1.	Introduction	Ch-01
		2.	ASCII Code	Ch-01
2.	2	3.	Programming Environment	Ch-01
		4.	Fundamental Data Types	Ch-02
		5.	Operators	Ch-03
3.	3	6.	Operators	Ch-03
		7.	Operators	Ch-03
4.	4	8.	Strings	Ch-02, 03, 07
		9.	Strings	
5.	5	10.	Decision Statements	Ch-03
		11.	Decision Statements	Ch-03
		12.	Switch Statement	Ch-03
6.	6	13.	Mid Term 1	
		14.	Loops – while, do..while	Ch-04



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	8	15.	Loops – for	Ch-04
		16.	Loops – Nested for	Ch-04
6.	9	17.	Functions	Ch-05
		18.	Functions	Ch-05
	10	19.	Functions – Reference Parameters	Ch-05
		20.	Functions – Recursion (if time permits)	Ch-05
	11	21.	Mid Term 2	
7.		22.	Arrays	Ch-06
	12	23.	Arrays – 2D	Ch-06
		24.	Arrays – 2D	Ch-06
7.	13	25.	Pointers	Ch-07
		26.	Pointers	Ch-07
	14	27.	Pointers	Ch-07
8.		28.	Structures (if time permits)	Ch-07
	15	29.	Structures (if time permits)	Ch-07
		30.	Recap	

Textbook

The textbook with which we will be covering most of the topics will be:

- **[CFE] C++ for Everyone, (2nd Edition), Cay Horstmann, San Jose State University,**
- <http://bcs.wiley.com/he-bcs/Books?action=index&bcsId=6146&itemId=0470927135>
- http://www.ebooksbucket.com/uploads/itprogramming/cplus/Cplusplus_for_Everyone_2nd_Edition.pdf
- <http://horstmann.com/cpp4everyone.html>
- <http://www.chegg.com/homework-help/c-for-everyone-2nd-edition-solutions-9780470927137>

Reference/Supplementary Readings

Reference Material:

- Problem Solving with C++, (6th – 9th Edition), Walter Savitch, Addison-Wesley ISBN 0321531345. ©2009.

These reference resources are available online and are free to download.

- C++ Language Tutorial, <http://www.cplusplus.com/doc/tutorial/>
- C++ Made Easy, <http://www.cprogramming.com/tutorial.html>
- Thinking in C++, <http://www.mindview.net/Books/TICPP/ThinkingInCPP2e.html>

Other supplemental readings will be provided by the instructor