UNIVERSITI TEKNOLOGI MARA
SCHEME OF WORK
SEM MARCH – AUGUST 2023

Course Code	:	**CSC128**
Course Name	:	**FUNDAMENTALS OF COMPUTER PROBLEM SOLVING**
Level	:	**Diploma**
Credit Hours	:	**3**
Contact Hours	:	**4**
Lecturer	:	**Mohd Saifulnizam Abu Bakar**

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COURSE DESCRIPTION

This course is an introduction to problem solving using computers. It emphasizes various aspects of problem solving, mainly consisting of the problem domain, phases of problem solving and basic techniques in designing a solution. The approach to problem solving is via top-down design, structured and modular programming. The emphasis is on solving problems using computer rather than the syntactical aspects of the chosen programming language.

COURSE LEARNING OUTCOMES

At the end of the course, students should be able to:
1. Describe the steps and requirements of given problems using a systematic problem-solving approach. (C2)
2. Construct complete programs using a structural and modular approach. (C3)
3. Construct basic programs to solve the daily problems using designated programming control structures (selection, repetition, function, and array). (P3)

RECOMMENDED TEXT

1. Malik, D. S. (2014). C++ programming: Program design including data structures. Cengage Learning.
2. Wan Anisha Wan Mohammad & Azlina Mohd Mydin, C++ Programming for Beginners,1st Edition, MAXUNION PUBLICATION, 2022, ISBN 978-967-26051-5-7

REFERENCES

1. Erick Myers, C++ For Beginners: The C++ Book is the Ultimate Beginner's Guide to Programming C++ Easily and Fastly, Amazon Digital Services, 2019, ISBN 1689887990, 9781689887991
2. Will Briggs, C++ for Lazy Programmers: Quick, Easy, and Fun C++ for Beginners, Apress, 2019, ISBN 9781484251874,9781484251867
3. Ivan Cukic, Functional Programming in C++: How To Improve Your C++ Programs Using Functional Techniques, Manning Publications, 2018, ISBN 1617293814, 9781617293818
4. Sam Key, C++ Programming Professional Made Easy, CreateSpace Independent Publishing Platform, 2015, ISBN: 1508429081
5. Y. Daniel Liang, Introduction to Programming with C++, 3, Prentice Hall, 2014, ISBN: 0133252817
6. Bjarne Stroustrup, Programming: principles and practice using C++., Pearson Education, 2014, ISBN: 0321563840

7. Jamal Othman, Fundamentals of Programming: With Examples in C, C++ and Java, 1st Edition, UPENA, 2010, ISBN:9789673631100

TEACHING METHODOLOGY
A combination of following methods:
● Interactive Lecture (Lecture and Lab Work)
● Group Work

ASSESSMENTS:

Continuous Assessment: 60.00%

● *Quiz - 15% out of 100 on Week 4. Passing Mark(s): 50*
Short answer questions on topic 1 and 2
CLO: 1

● *Test - 25% out of 100 on Week 11. Passing Mark(s): 50*
Short and long answer questions on topic 3, 4 and 5
CLO: 2

● *Group Project - 20% out of 100 on Week 14. Passing Mark(s): 50*
Project Report and Presentation
CLO: 3

Final Assessment: 40.00%

● *Final Exam - 40% out of 100 on Week 17. Passing Mark(s): 50*
Short and long answer questions on topic 3, 4, 5 and 6
CLO: 2

COURSE OUTLINES:

	Week	Hour(s)	Topic	Activity
	WEEK 1 20/3-26/3	2	**Topic 1: Introduction** ● Introduction to Programming ● Introduction to Basic Program Structure ● Debugging and Error Handling *Details Description:* - *Definition of computer and computer program.* - *Importance of computer programming.* - *Importance of good programs.* - *Relationship between compilers, interpreters, assemblers, and programs.*	▪ Briefing of Group Project ▪ Entrance Survey
		2	**Lab Session** ● Introduction to C++ Integrated Development Environment (IDE) i.e: ***Dev-C++*** ● Compiling, executing, and executing a given program.	
	WEEK 2 27/3-2/4	2	**Topic 1: Introduction(cont'd)** ● Program Development Life Cycle (PDLC) *Details Description:* - *Program Development Life Cycle – Analysis, Design, Implementation, Testing, Maintenance* - *Documentation*	
		2	**Lab Session** ● Given a simple problem situation where students need to solve the problem by applying PDLC to solve a program. ● Introducing a general form of C++ programming.	
	WEEK 3 3/4-9/4	2	**Topic 2: Basic Elements of Computer Program** ● Introduction to algorithm (pseudocode and flowchart) ● Identifier, variable, constant, reserved word ● Basic data types ● Arithmetic operators, precedence, and mathematical expression *Details Description:* - *Keywords and their meaning for pseudocode* - *Standard symbols and their meaning for flowchart.* - *Definition of Identifier, variable, constant, reserved word.* - *Rules for naming identifiers.* - *Basic data types – integer, float, double, bool, char, string.* - *Declaring variables and constants.* - *Arithmetic operators and expression – addition, subtraction, multiplication, division, modulus (**excluding** pre-increment operator and pre-decrement operators)*	

	Week	Hour(s)	Topic	Activity
			- *Arithmetic expression – unary and binary operators* - *Precedence of Operators*	
		2	**Lab Session** ● Convert a flowchart and pseudocode to a program to get the appropriate output. ● Write a declaration statement. ● Convert mathematical expression to C++ statement. ● Evaluate arithmetic expressions.	

	WEEK 4
	10/4-16/4
		2	**Topic 2: Basic Elements of Computer Program (cont'd)**
			● Assignment statement
			● Input/output statement
			● Introduction to predefined function
			● Introduction to type of control structure
			
			Details Description:
			- *Assignment statement (**including** compound assignment statements such as += etc.)*
			- *Input and output statement for numbers, words, symbols, and characters.*
			- *Predefined function*
			   ● *Mathematical functions - sqrt(), abs(), pow(), setw(), setprecision(), etc.*
			   ● *Assign (copy) a string - strcpy().*
			   ● *Formatting output – display decimal places.*
			- *Four types of control structure – sequential, selection, repetition/looping, modular*
				▪ QUIZ **(15%)**
				Chapter 1 & 2

		2	**Lab Session** ● Write a complete program applying declaration, assignment and input/output statement base on problem that is being discussed. ● Debug and execute a given program (arithmetic expression) ● Solve a given problem by applying arithmetic expressions	
	WEEK 5 17/4-23/4	2	**Topic 3: Selection Control Structure** ● Pseudocode and flowchart for Selection Control Structure ● Boolean values and expression ● Relational and logical operators *Details Description:* - *Write pseudocode and draw flowchart for selection structure.* - *Construct Boolean expression using relational and logical operators* - *Evaluate Boolean expression.* - *String compare - strcmp()*	

	Week	Hour(s)	Topic	Activity
		2	**Lab Session** ● Convert a flowchart and pseudocode to a selection statement. ● Debug and execute a given program (selection control structures) ● Apply selection statement in decision making problem ● Solve problem using strcmp() function	
			MID-SEMESTER BREAK **24-30 April 2023** **(Raya Aidil-Fitri: 22-24 April 2023)**	
	WEEK 6 2/5-7/5	2	**Topic 3: Selection Control Structure (cont'd)** ● Types of selection control structure (one-way, two-ways, multi-ways) ● Nested selection control structure (nested-if) *Details Description:* - *One way selection, Two-ways selection, Multiple selection* - *Nested selection* - *Switch statement*	▪ Submission of Group Project Proposal – 5% 1/5 Labor Day
		2	**Lab Session** ● Debug and execute a given program (nested selection) ● Explain the output based on the various input from the user ● Apply the nested selection to a given problem	
	WEEK 7 8/5-14/5	2	**Topic 4: Repetition Control Structure** ● Pseudocode and flowchart for Repetition Control Structure ● Types of repetition control structure (for, while and do-while) *Details Description:* - *Write pseudocode and draw flowchart for repetition structure.* - *Elements Requirement – initialization, evaluation (condition) and updating* - *Types of repetition structure* - *Counter controlled loop (while, do..while,for)*	PROJECT DEVELOPMENT TALK BY RP ▪ Group Project progress
		2	**Lab Session** ● Convert a flowchart and pseudocode to a repetition statement. ● Debug and execute a given program (repetition control structures) ● Explain the output from the source code given ● Solve repetition problem using counter structure	

	Week	Hour(s)	Topic	Activity
	WEEK 8 15/5-21/5	2	**Topic 4: Repetition Control Structure (cont'd)** ● Nested loop *Details Description:* - *Sentinel controlled loop (while, do..while)* - *Flag controlled loop (Boolean variables) (while, do..while,for)* - *nested loop (for statement)* - ***continue*** *and* ***break*** *statement*	
		2	**Lab Session** ● Debug and execute a given program (repetition control structures) ● Solve iteration problems using sentinel and flag structures ● Debug and execute a given program (repetition control structures) ● Solve nested loop problems using for loop statements only	
	WEEK 9 22/5-28/5	2	**Topic 5: Function** ● Pseudocode and flowchart for functions (module) ● Introduction to programmer-defined functions *Details Description:* - *Introduction to function* - *Write pseudocode and draw flowchart for function structure.* - *Types of variables and its scope – block, local & global* - *User-defined function - Function prototype, Function definition (header and body), Function call/invocation.*	
		2	**Lab Session** ● Debug and execute sample program using predefined function ● Solve a problem using predefined function	
			SPECIAL BREAK **29 May-04 June 2023** **(Pesta Menuai: 30-31 May 2023)** **(Gawai: 01-02 June 2023)**	
	WEEK 10 5/6-11/6	2	**Topic 5: Function (cont'd)** ● Introduction to programmer-defined functions *Details Description:* - *Types of parameters – actual and formal* - *Parameter passing - Without parameter (no value) and With parameter (with value(s))*	▪ Group Project progress

	Week	Hour(s)	Topic	Activity
		2	**Lab Session** ● Debug and execute sample program using user-defined function ● Solve a problem using user-defined function with parameter passing by value	
	WEEK 11 12/6-18/6	2	**Topic 5: Function (cont'd)** ● Elements of programmer-defined functions *Details Description:* - *Parameter passing (cont'd) - With parameter (by reference)* - *Return value - By value & By reference*	▪ TEST (25%) Chapter 3,4 & 5
		2	**Lab Session** ● Debug and execute sample program using user-defined function ● Solve a problem using user-defined function with parameter passing by reference ● Debug and execute sample program using user-defined function ● Solve a problem using user-defined function return by value and by reference	
	WEEK 12 19/6-25/6	2	**Topic: Array** ● Introduction to array ● Declaration and initialization of array	▪ Group Project progress
		2	**Lab Session** ● Declaring array, setting size of array, reading from an array, storing values into array, comparing values in array.	
	SPECIAL BREAK **26 June-02 July 2023** **(Raya Aidil-Adha: 28 June 2023)**			
	WEEK 13 3/7-9/7	2	**Topic: Array** ● Input and output of array ● Operations on array (summation, average, minimum, maximum)	
		2	**Lab Session** ● Solve problem using related array processing integrated with functions and control structure	
	WEEK 14 10/7-16/7	4	**Group Project Presentation**	▪ Group Project Presentation and Report Submission (15%)

	Week	Hour(s)	Topic	Activity
			REVISION WEEK (17/7-23/7)	
			FINAL ASSESSMENT / EXAMINATION (24/7-13/8) **SEMESTER BREAK (14/8 - 1/10)**	