هيئة تقويم التعليم والتدريب
Education & Training Evaluation Commission

2023
TP-153

Course Specification
(Bachelor)

Course Title:	**Problem Solving in Computing**
Course Code:	**CSC 1102**
Program:	**Bachelor in Computer Science**
Department:	**Department of Computer Science**
College:	**Computers and Information Technology**
Institution:	**University of Tabuk**
Version:	**1.0**
Last Revision Date:	**27 July 2022**

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A. General information about the course:

1. Course Identification

1. Credit hours: (3)					
2. Course type					
A.	☐ University	☒ College	☐Department	☐Track	☐Others
B.	☒ Required		☐ Elective		
3. Level/year at which this course is offered: (First Semester / First Year)					
4. Course general Description:					
This course will present basic concepts of problem solving and how problems are analyzed and solved on computers. The course describes logical concepts required for ordering and creating solutions that can be effectively implemented as algorithms running on computers and designing appropriate solutions.					
5. Pre-requirements for this course (if any)**:**					
NA					
6. Co-requisites for this course (if any)**:**					
NA					
7. Course Main Objective(s):					
After completing this course, the students will be able to: **1) Understand the problem-solving concepts in computing.** **2) Describe the problem-solving steps to solve general computational problems.** **3) Set up and evaluate expressions and equations using variables, constants, operators, and the hierarchy of operations.** **4) Use abstraction, decomposition, sorting and searching techniques for analyzing and solving computational problems.** **5) Use algorithms, flowcharts, and pseudocode to develop the instructions for modularized computational solution.** **6) Explain and apply the logic and control structures (sequential, decision, and loops).**					

2. Teaching mode (mark all that apply)

No	Mode of Instruction	Contact Hours	Percentage
1	Traditional classroom		

No	Mode of Instruction	Contact Hours	Percentage
2	E-learning	45	100%
3	Hybrid • Traditional classroom • E-learning		
4	Distance learning		

3. Contact Hours (based on the academic semester)

No	Activity	Contact Hours
1.	**Lectures**	45
2.	**Laboratory/Studio**	
3.	**Field**	
4.	**Tutorial**	
5.	**Others (specify)**	
Total		45

B. Course Learning Outcomes (CLOs), Teaching Strategies and Assessment Methods

Code	Course Learning Outcomes	Code of PLOs aligned with program	Teaching Strategies	Assessment Methods
1.0	**Knowledge and understanding**			
1.1	Identify problem solving and computational thinking as a concept of computing	ILO1, ILO 2	Lectures Class Discussions	Exams Assignments
1.2	Describe different control structures used in solving problems related to computer programs	ILO1, ILO 2	Lectures Class Discussions	Exams Assignments
1.3	Interpret problem in terms of a planned solution	ILO1, ILO 2	Lectures Class Discussions	Exams Assignments

Code	Course Learning Outcomes	Code of PLOs aligned with program	Teaching Strategies	Assessment Methods
1.4	Classify notions and definitions in program modularization	ILO1, ILO 2	Lectures Class Discussions	Exams Assignments
2.0	**Skills**			
2.1	Implement analytical solutions to solve problems	ILO 2	Lectures Class Discussions Case Study	Exams Assignments Projects
2.2	Appraise the importance of logic, decisions, and loops in solving problems	ILO 2	Lectures Class Discussions Case Study	Exams Assignments Projects
2.3	Demonstrate Skills To to implement solutions using suitable data types and constructs	ILO 2	Lectures Class Discussions	Exams Assignments
2.4	Develop thought skills such as sorting, searching and pattern recognition for solving computer problems	ILO 2	Lectures Class Discussions Case Study	Exams Assignments Projects
2.5	Utilize abstraction, decomposition and modularization as a computational thinking practice	ILO 2	Lectures Class Discussions	Exams Assignments Projects
3.0	**Values, autonomy, and responsibility**			
3.1	Demonstrate self-learning and continuing professional development	ILO9	Class Discussions Case Study	Presentations
3.2	Use communication and teamwork skills	ILO9, ILO10	Class Discussions Case Study	Presentations
3.3	Practice computer ethics effectively and professionally	ILO2	Class Discussions Case Study	Presentations

C. Course Content

No	List of Topics	Contact Hours

1	General Problem-Solving Concepts: Problem Solving in Everyday Life, Types of Problems, Problem Solving in Computing, Challenges in Problem Solving	3
2	Abstraction: expressing ideas in specific contexts while suppressing irrelevant details	3
3	Decomposition and Pattern recognition: Decomposition (Breaking a complex problem into smaller and more manageable parts/steps) and Pattern Recognition (Looking for similarities among and within problems)	3
4	Solution Planning: Communicating with Computer, Organizing Solution, Testing Solution, Coding Solution and Algorithms, Software Development Cycle	3
5	Solution Planning: Flowchart Symbols, Pseudocode, UML Overview Practical: Use algorithms, flowchart and pseudocode to solve simple problems and convert pseudocode into an algorithm	3
6	Introduction to Programming Languages (1): Constants and Variables, Data Types, Operators, Mathematical Functions, Expressions and Data Structure	3
7	Introduction to Programming Languages (2): Pointers for Structuring Solution, Modules and Methods, Local and Global Variables, Parameters and Return Values	3
8	Problem Solving with Decisions (1): Decision Logic Structure, Multiple If/Then/Else Instructions	3
9	Problem Solving with Decisions (2): Using Straight-Through Logic, Using Positive and Negative Logic, Logic Conversion	3
10	Problem Solving with Loops (1): Loop Logic Structure, While/While End	3
11	Problem Solving with Loops (2): Repeat/Until loops	
12	Problem Solving Loops (3): Automatic-Counter Loop, Nested Loops, Indicators, Recursion	3
13	Arrays: One-Dimensional Arrays, Two-Dimensional Arrays, Multidimensional Arrays	3
14	Types of Searching: Linear and Brute Force Search, Binary Search	3
15	Sorting, Stacks and Queues: Overview of Sorting Algorithms, Stack and Queue data structures	3
Total		45

D. Students Assessment Activities

No	Assessment Activities *	Assessment timing (in week no)	Percentage of Total Assessment Score
1.	Assignments	2-14	20%
2.	Project and presentations	9,10	10%
3.	Mid-Exam	6 or 7	30%
4.	Final Exam	16 or 17	40%

*Assessment Activities (i.e., Written test, oral test, oral presentation, group project, essay, etc.).

E. Learning Resources and Facilities

1. References and Learning Resources

Essential References	Maureen Sprankle, Jim Hubbard, 2011. Problem Solving and Programming Concepts 9th Edition. ISBN-10 : 0273752219, ISBN-13 : 978-0273752219 Karl Beecher, 2017, Computational Thinking - A beginner's guide to problem-solving and programming, 1st Edition, BCS Learning & Development Limited, ISBN: 9781780173641
Supportive References	Walter Savitch, 2017. Java An Introduction to Problem Solving & Programming, 8th Edition. ISBN-10 : 0134462033, ISBN-13 : 978-0134462035 Walter Savitch & Kenrick Mock, 2017 "Problem Solving with C++", Pearson; 10th edition, ISBN-10 : 0134448286, ISBN-13 : 978-0134448282
Electronic Materials	
Other Learning Materials	

2. Required Facilities and equipment

Items	Resources
facilities (Classrooms, laboratories, exhibition rooms, simulation rooms, etc.)	Fully equipped computer Lab
Technology equipment (projector, smart board, software)	- Projector with HDMI port - Operating System: Windows - Software: Java, C++, Python, C#

Items	Resources
Other equipment (depending on the nature of the specialty)	

F. Assessment of Course Quality

Assessment Areas/Issues	Assessor	Assessment Methods
Effectiveness of Teaching	Faculty, Program Leaders, and Advisory Board	Both Direct and Indirect
	Students	Indirect
Effectiveness of Students Assessment	Faculty, Program Leaders, Advisory Board, and Independent Opinion	Both Direct and Indirect
Quality of Learning Resources	Faculty, Students, and Advisory Board	Indirect
The Extent to which CLOs have been Achieved	Faculty, Program Leaders, Advisory Board, and Independent Opinion	Direct (as in section B) and Indirect/Surveys
	Students	Indirect
Other	-	-

Assessors (Students, Faculty, Program Leaders, Peer Reviewer, Others (specify)

Assessment Methods (Direct, Indirect)

G. Specification Approval

COUNCIL /COMMITTEE	
REFERENCE NO.	
DATE	