UNIVERSITI TEKNOLOGI MARA

CSC126: FUNDAMENTALS OF ALGORITHMS AND COMPUTER PROBLEM SOLVING

Course Name (English)	FUNDAMENTALS OF ALGORITHMS AND COMPUTER PROBLEM SOLVING APPROVED
Course Code	CSC126
MQF Credit	3
Course Description	This course is an introduction to problem solving using a computer programming language. It emphasizes on algorithm development and writing computer programs, as well as common good practices in writing programs. Students will be taught to solve problems involving the 5 basic algorithms of summation, average, counting, as well as determining the minimum and maximum values of a set of data. Teaching methods will involve, lectures, tutorials and practical computer lab work. Students will be assessed through written assessments as well as programing assignments. In the end they are expected to develop the ability to analyze simple problems, organize effective algorithmic solutions for the problems and write computer programs to solve them.
Transferable Skills	Programming
Teaching Methodologies	Lectures, Lab Work
CLO	CLO1 Apply basic concepts and algorithms in computer programming. CLO2 Build complete programs involving five basic algorithms (summation, average, counting, minimum, and maximum) using a programming language. CLO3 Demonstrate good programming practices and ethics in writing programs according to the task scopes.
Pre-Requisite Courses	No course recommendations

Topics
1. Introduction to Programming 1.1) Introduction to computer programs 1.2) Program development life cycle : Problem analysis, Algorithm design, Algorithm implementation, Program testing and debugging, Program maintenance and documentation 1.3) Details of problem analysis: Input, Process and Output 1.4) Algorithm Design and representation 1.5) Basic Control Structures: Sequence, Selection, Repetition
2. Sequence structure 2.1) Data and data types (integers, floating point data, character, string, boolean) 2.2) Variable declarations 2.3) Assignment statements 2.4) Constant declarations 2.5) Output statements 2.6) Input statements 2.7) The Sequence of a complete program 2.8) Mathematical operators, operands and expressions 2.9) Operator precedence 2.10) The difference between syntax and logic error 2.11) Good programming practices: Proper indentations, proper identifiers, comments, user-friendliness
3. Selection Control Structure 3.1) Example of problems requiring selection structure 3.2) Boolean values, relational operators and expressions 3.3) Logical operators 3.4) Operator precedence 3.5) One-way selection 3.6) Two-way selection 3.7) Multiple selection: Linear selection structures, Nested selection structures

4. Repetition Control Structure 4.1) Example of problems requiring repetition control structure 4.2) Three requirements of a repetition structure: initialization, condition and updating 4.3) while statement : Sentinel loop, Counter-controlled loop 4.4) Basic iterative problems (summation, average, counting, minimum, maximum) 4.5) for statement 4.6) Nested loops
5. Functions 5.1) Introduction to functions 5.2) Library functions and function calls 5.3) User-defined functions 5.4) Function header, function body and function call 5.5) The concept of parameters 5.6) Parameter passing: pass-by-value 5.7) return statement 5.8) Parameter passing: pass-by-reference 5.9) void functions
6. Arrays 6.1) Declaration and initialisation of arrays for integers and floating point data 6.2) Array input / output 6.3) Basic algorithms to process arrays: summation, average, counting, minimum, maximum 6.4) The type of problems that require the use of arrays

Assessment Breakdown	%
Continuous Assessment	100.00%

Details of Continuous Assessment

Assessment Type	Assessment Description	% of Total Mark	CLO
Assignment	Assignment Covering chapters 2 & 3	25%	CLO2
Group Project	Group Project covers Topic 1 until 6	35%	CLO3
Quiz	Quiz covers Topic 1 & 2	10%	CLO1
Test	Test 1 covering Chapters 3 - 5	30%	CLO1

Reading List

Recommended Text

- **D. S. Malik 2017, *C++ Programming: From Problem Analysis to Program Design*, 8th Ed., Cengage Learning [ISBN: 9781337102087]**

Reference Book Resources

- **Walter J. Savitch,Kenrick Mock 2018, *Problem Solving with C++*, 10th Ed. [ISBN: 0134448286]**
- **Bjarne Stroustrup 2018, *A Tour of C++*, 2nd Ed., Addison-Wesley Professional [ISBN: 0134997832]**
- **Walter Savitch,Kenrick Mock 2015, *Absolute C++*, 6th Ed., Addison-Wesley [ISBN: 0133970787]**
- **Y. Daniel Liang 2014, *Introduction to Programming with C++*, 3rd Ed., Pearson College Division [ISBN: 0133252817]**

Article/Paper List: This Course does not have any article/paper resources

Other References: This Course does not have any other resources