

CS2311: COMPUTER PROGRAMMING

Effective Term

Semester A 2025/26

Part I Course Overview

Course Title

Computer Programming

Subject Code

CS - Computer Science

Course Number

2311

Academic Unit

Computer Science (CS)

College/School

College of Computing (CC)

Course Duration

One Semester

Credit Units

3

Level

B1, B2, B3, B4 - Bachelor's Degree

Medium of Instruction

English

Medium of Assessment

English

Prerequisites

Nil

Precursors

CS1102 Introduction to Computer Studies or CS1302 Introduction to Computer Programming or equivalent

Equivalent Courses

CS2310 Computer Programming

CS2315 Computer Programming

Exclusive Courses

CS1315 Introduction to Computer Programming

CS2313 Computer Programming

CS2360 Java Programming

Part II Course Details

Abstract

This course aims to equip the students with in-depth concepts and techniques of programming using a high-level object-oriented programming language and to develop practical skills in producing quality programs.

Course Intended Learning Outcomes (CILOs)

CILOs		Weighting (if app.)	DEC-A1	DEC-A2	DEC-A3
1	Explain the structure of an object-oriented computer program.	10	x	x	
2	Analyze, test and debug computer programs.	15	x	x	
3	Solve a task by applying effective programming techniques, which involve advanced skills like using recursion and dynamic data structures.	60		x	
4	Design and construct well-structured programs with good programming practices.	15		x	x

A1: Attitude

Develop an attitude of discovery/innovation/creativity, as demonstrated by students possessing a strong sense of curiosity, asking questions actively, challenging assumptions or engaging in inquiry together with teachers.

A2: Ability

Develop the ability/skill needed to discover/innovate/create, as demonstrated by students possessing critical thinking skills to assess ideas, acquiring research skills, synthesizing knowledge across disciplines or applying academic knowledge to real-life problems.

A3: Accomplishments

Demonstrate accomplishment of discovery/innovation/creativity through producing /constructing creative works/new artefacts, effective solutions to real-life problems or new processes.

Learning and Teaching Activities (LTAs)

LTAs		Brief Description	CILO No.	Hours/week (if applicable)
1	Lecture	Students will learn various programming concepts and techniques, which will be introduced, explained and demonstrated with examples.	1, 2, 3, 4	

2	Lab	Students will attend laboratory sessions designed to enable the students to put theory into practice and be proficient in a programming language. The laboratory exercises consist of programming tasks and students can try out their programs using a common integrated development environment. Feedback will be given to students on their work.	1, 2, 3, 4	
3	Assignment	Students will work on assignments designed to be more challenging compared with laboratory exercises. The students need to analyze the requirements and design programming solutions by applying and combining various techniques learnt from lectures and laboratory exercises. They are also required to implement their solutions as practical computer programs, and to explain their ideas/ algorithms using suitable presentation methods (e.g. a report, flowchart, etc.).	2, 3, 4	

Assessment Tasks / Activities (ATs)

ATs		CILO No.	Weighting (%)	Remarks ("- for nil entry)	Allow Use of GenAI?
1	Quiz	1, 3, 4	20	Correctly explain the structure of an object-oriented computer program	No

2	Assignment	2, 3, 4	20	Select proper test cases to assess the correctness of a program Students are required to work on assignments at least once every four weeks	No
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Continuous Assessment (%)

40

Examination (%)

60

Examination Duration (Hours)

2

Minimum Examination Passing Requirement (%)

30

Additional Information for ATs

For a student to pass the course, at least 30% of the maximum mark for the examination must be obtained.

Assessment Rubrics (AR)**Assessment Task**

Quiz

Criterion

ABILITY to explain, analyse and debug the structure of a computer program

Excellent (A+, A, A-)

High

Good (B+, B, B-)

Significant

Fair (C+, C, C-)

Moderate

Marginal (D)

Basic

Failure (F)

Not even reaching marginal levels

Assessment Task

Assignment

Criterion

CAPACITY for applying programming techniques

Excellent (A+, A, A-)

High

Good (B+, B, B-)

Significant

Fair (C+, C, C-)

Moderate

Marginal (D)

Basic

Failure (F)

Not even reaching marginal levels

Assessment Task

Examination

Criterion

CAPACITY for analyzing and writing effective computer programs

Excellent (A+, A, A-)

High

Good (B+, B, B-)

Significant

Fair (C+, C, C-)

Moderate

Marginal (D)

Basic

Failure (F)

Not even reaching marginal levels

Part III Other Information

Keyword Syllabus

Program design, development of algorithms, programming language, control structures, data types, multidimensional arrays, file I-O, recursion, pointers and dynamic data structures, object-based programming: data abstraction, classes, and the class library; programming style, program testing, exception handling.

Syllabus:

- Computers and programming
Hardware/software hierarchy, the computer as a multi-level language machine. The software development process. Program development environments.
- Programming techniques and the development of algorithms
Algorithms, programming language, modular decomposition and procedural abstraction, automatic and dynamic variables, parameter-passing by reference and by value for atomic data, objects, and arrays, control structures, iteration, recursion, exception handling.
- Data structures

The concept of data types. Simple data types. Arrays. Strings. Files. Data abstraction: encapsulation, information hiding. Defining and using classes. The class library. Pointers. Dynamic data structures (eg. dynamic array, linked list).

- Program development practice
- Professional programming styles. Program testing. Program documentation.

Reading List

Compulsory Readings

Title	
1	Walter Savitc (2010). Absolute C++. Addison-Wesley, 4th edition.

Additional Readings

Title	
1	S.B. Lippman, J. Lajoie and B. Moo (2012). C++ Primer. Addison Wesley, 5th edition.
2	H.M. Deitel & P.J. Deitel (2011). C++ How to Program. Pearson Int. Edition, 8th edition.