

# CS2313: COMPUTER PROGRAMMING

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## Effective Term

Semester A 2025/26

## Part I Course Overview

### Course Title

Computer Programming

### Subject Code

CS - Computer Science

### Course Number

2313

### 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

CS1103B Media Computing or CS1303 Introduction to Internet and Programming or equivalent

### Precursors

Nil

### Equivalent Courses

Nil

### Exclusive Courses

CS1315 Introduction to Computer Programming  
CS2310 Computer Programming  
CS2311 Computer Programming  
CS2315 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      | x      | x      |
| 4     | Design and construct well-structured programs with good programming practices.                                                             | 15                  | x      | 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 engage with various programming concepts and techniques which will be introduced, explained and demonstrated with examples. | 1, 2, 3, 4 | 3 hours/week               |

|   |             |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |            |              |
|---|-------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------|--------------|
| 2 | Lab         | Students will attend the laboratory sessions which are 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 | 1 hours/week |
| 3 | Assignments | Students will implement the assignments which are more challenging tasks 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    |              |
| 4 | Quiz        | Students will attend the quiz which provides the students opportunities to reflect on their understanding of various programming concepts and problem-solving techniques. They are required to predict and explain the behaviour of programs involving various programming concepts and techniques, and develop and implement programs or program segments to solve problems.                                                                                                            | 1, 2, 3, 4 |              |

**Assessment Tasks / Activities (ATs)**

|   | ATs         | CILO No.   | Weighting (%) | Remarks ("- " for nil entry) | Allow Use of GenAI? |
|---|-------------|------------|---------------|------------------------------|---------------------|
| 1 | Quiz        | 1, 2, 3, 4 | 20            | -                            | No                  |
| 2 | Assignments | 2, 3, 4    | 20            | -                            | Yes                 |

**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**

Lab

**Criterion**

ABILITY to UNDERSTAND and APPLY object-oriented programming concepts and techniques by designing, analyzing, testing, and debugging 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

**Assessment Task**

Quiz

**Criterion**

ABILITY to EXPLAIN object-oriented programming concepts and 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

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**Assessment Task**

Quiz

**Criterion**

APPLY learnt knowledge to solve a simple programming task

**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

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**Assessment Task**

Assignment

**Criterion**

ABILITY to APPLY learnt knowledge to solve a task by designing, analyzing, testing, and debugging 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

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## 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     | C.K. Poon & Matthew Chang (2007). Concepts and Techniques in C++ Programming. McGraw Hill. |

#### Additional Readings

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