



College of Engineering, Construction & Living Sciences  
Bachelor of Information Technology  
ID511001: Programming 2  
Level 5, Credits 15  
**Project 2 (C# Windows Forms App): Pong**

## Assessment Overview

In this assessment, you will design & develop a pong **Windows Forms App** using **C#**.

## Learning Outcomes

At the successful completion of this course, learners will be able to:

1. Build interactive, event-driven GUI applications using pre-built components.
2. Declare & implement user-defined classes using encapsulation, inheritance & polymorphism.

## Assessments

Assessment	Weighting	Due Date	Learning Outcomes
Project 1 (C# Console App): Learner Gradebook	25%	26-04-2023 (Wednesday at 4.59 PM)	1 & 2
Project 2 (C# Windows Forms App): Pong	35%	14-06-2023 (Wednesday at 4.59 PM)	1 & 2
Theory Examination	30%	21-06-2023 (Wednesday at 4.45 PM)	1 & 2
Classroom Tasks	10%	07-06-2023 (Wednesday at 4.59 PM)	1 & 2

## Conditions of Assessment

You will complete this assessment during your learner-managed time. However, there will be time during class to discuss the requirements & your progress on this assessment. This assessment will need to be completed by **Wednesday, 14 June 2022 at 4.59 PM**.

## Pass Criteria

This assessment is criterion-referenced (CRA) with a cumulative pass mark of **50%** over all assessments in **ID511001: Programming 2**.

## Authenticity

All parts of your submitted assessment **must** be completely your work. Do your best to complete this assessment without **ChatGPT**. You need to demonstrate to the course lecturer that you can meet the learning outcome for this assessment.

However, if you get stuck, you can use **ChatGPT** to help you get unstuck, permitting you acknowledge that you have used **ChatGPT**. In the assessment's repository **README.md** file, please include what prompt(s) you provided to **ChatGPT** & how you used the response(s) to help you with your work. It also applies to code snippets retrieved from **StackOverflow** & **GitHub**. Failure to do this will result in a mark of **zero** for this assessment.

## Policy on Submissions, Extensions, Resubmissions & Resits

The school's process concerning submissions, extensions, resubmissions & resits complies with **Te Pūkenga** policies. Learners can view policies on the **Te Pūkenga** website located at <https://www.op.ac.nz/about-us/governance-and-management/policies>.

## Submission

You **must** submit all app files via **GitHub Classroom**. Here is the URL to the repository you will use for your submission – <https://classroom.github.com/a/eFe1Oh97>. Create a **.gitignore** & add the ignored files in this resource - <https://raw.githubusercontent.com/github/gitignore/main/VisualStudio.gitignore>. The latest app files in the **master** or **main** branch will be used to mark against the **Functionality** criterion. Please test before you submit. Partial marks **will not** be given for incomplete functionality. Late submissions will incur a **10% penalty per day**, rolling over at **5:00 PM**.

## Extensions

Familiarise yourself with the assessment due date. Contact the course lecturer before the due date if you need an extension. If you require more than a week's extension, you will need to provide a medical certificate or support letter from your manager.

## Resubmissions

Learners may be requested to resubmit an assessment following a rework of part/s of the original assessment. Resubmissions are to be completed within a negotiable short time frame & usually **must** be completed within the timing of the course to which the assessment relates. Resubmissions will be available to learners who have made a genuine attempt at the first assessment opportunity & achieved a **D grade (40-49%)**. The maximum grade awarded for resubmission will be **C-**.

## Resits

Resits & reassessments **are not** applicable in **ID511001: Programming 2**.

## Instructions

You will need to submit an app & documentation that meet the following requirements:

### Functionality - Learning Outcomes 1 & 2 (40%)

- The app **must** open without code or file structure modification in **Visual Studio**.
  - The game **must** be driven by one **Timer** & begins when the user presses the **space bar** key.
  - The ball & two paddles **must** be created using the **Graphics** class.
  - The ball **must** bounce/collide off the top & bottom of the screen, & paddles.
  - The paddles **must** move vertically but not exceed the top & bottom of the screen.
  - The user controls the left paddle via the **up** & **down** keys. The computer controls the right paddle. It is acceptable for the right paddle to follow the ball's position. However, other solutions are encouraged.
  - Double buffering to prevent the ball & paddles from flickering.
  - A scoring system. When the ball collides with the left & right-hand side of the screen, one point is given to either the user or computer. The game is over when either score is 10.
  - Display the user & computer's score using the **DrawString** method.
  - A highscore system. When the game is over, appropriate feedback **must** be displayed to the user, i.e., **"You win!"** or **"You lose!"**, the user & computer's scores are saved, i.e., written to a text file. Read the scores from the text file & display the last five to the user.
  - Play a sound when:
    - The ball bounces off the paddle, & top & bottom of the screen.
    - The user wins.
    - The user loses.
- Note:** These sounds **must** be unique.
- An ability to restart & pause a game.
  - Randomise the colour of the ball & paddles.

### Code Elegance - Learning Outcomes 1 & 2 (45%)

- Adhere to the four principles of **OO**.
- Use of intermediate variables, constants & enumerations.
- Idiomatic use of control flow, data structures & in-built functions.
- Efficient algorithmic approach.
- Sufficient modularity.
- Each method & class **must** have a header comment located immediately before its declaration.
- In-line comments where required.
- Project files, i.e., **.cs** files are formatted.
- No dead or unused code.

## Documentation & Git Usage - Learning Outcomes 1 & 2 (15%)

- Provide the following in your repository **README.md** file:
  - The app's class diagram created in **Visual Studio**.
  - Known bugs if applicable.
- Commit at least **20** times per week.
- Commit messages **must** be formatted using the recommended conventions & reflect the context of each functional requirement change.

## Additional Information

- **Do not** rewrite your **Git** history. It is important that the course lecturer can see how you worked on your assessment over time.
- When the user presses a key, i.e., up or down, a **KeyDown** event is generated. For the **Form1's KeyDown** event, the method signature is:

```
private void Form1_KeyDown(object sender, KeyEventArgs e) {}
```

The argument you will be interested in is **KeyEventArgs e** which is the value of the pressed key. The arrow key values are **Keys.Left**, **Keys.Right**, **Keys.Up** & **Keys.Down**. In the **Form1\_KeyDown** method, you can use a **switch** statement. For example:

```
switch (e.KeyCode)
{
    case Keys.Left:
        // Do something
        break;
    case Keys.Right:
        // Do something
        break;
    case Keys.Up:
        // Do something
        break;
    case Keys.Down:
        // Do something
        break;
    default:
        // Do something
        break;
}
```

**Note:** The **Form1's KeyPreview** event **must** be set to **True**. Otherwise, **Form1** will not respond to the **KeyDown** event.