



Course Outline

ICT Year 8

Inspiring excellence, empowering global minds

Overview

The ICT Syllabus at GEMS Wesgreen International Secondary School is designed to expand student's computational & logical thinking skills in programming. To achieve this, students will be using Python as their programming language. Throughout the course, students will learn the fundamentals of programming and how they can be used together to create a diverse and complex program - basics of Python programming including syntax, inputs, concatenation and if statements.

Learning Outcomes

The aims of all subjects state what a teacher may expect to teach and what a student may expect to experience and learn. These aims suggest how the student may be changed by the learning experience.

The aims of the ICT Syllabus are to encourage and enable students to:

- Define the structure and components of a Python program.
- Learn how to write loops and decision statements in Python.
- Learn how to write functions and pass arguments in Python.
- Gain a better understanding of the uses of programming.
- Acquire knowledge on how different programming techniques work.
- Become fluent in the basics of programming.
- To gain experience in a programming language
- Become competent in creating simple programs.
- Learn how logical thinking works.
- Become accustomed to debugging programs.
- Use research to expand on programming knowledge.
- Carry out discussions to express their thoughts on specific programming techniques.

Ongoing Objectives

There are objectives that are covered and built upon throughout each unit of work.

Theoretical concepts

- To listen and respond appropriately to adults and their peers
- To ask relevant questions to extend their understanding and knowledge
- To articulate and justify answers, arguments and opinions
- To learn advantages and disadvantages of different programming techniques

- To maintain attention and participate actively in collaborative conversations, staying on topic and initiating and responding to comments
- Continue to grow and expand on the use of key terminology.
- Learn why different programming skills may be used.
- Understand when to use different programming aspects such as variables, lists, loops or user defined function etc.

Programming

- To use relevant strategies to build their practical skills
- Expand knowledge and competence in using python
- Learn how to create variable, lists, function, statements, loops, user defined functions etc.
- Select appropriate techniques needed for a certain task
- To learn how different techniques can be combined to simplify code
- Learn how to structure code in a more efficient manner
- Debug programs and getting rid of redundant code and errors
- Understand the benefit of creating user defined functions and the benefits of learning programming in the real world.

Unit Overviews

Term 1

Robot Programs

Approximate length: 2 weeks

In the first section of this syllabus, students will be taught to break a problem down into simple steps. Students will learn how to combine simple commands to complete complex tasks. Using a robot they design an algorithm to solve tasks.

Specific National Curriculum Objectives Covered:

- To design, use and evaluate computational abstractions that model the state and behaviour of real-world problems and physical systems
- To use logical reasoning to compare the utility of alternative algorithms for the same problem
- To start thinking with computational logic in mind

Turtle graphics**Approximate length: 2 weeks**

In the section, students will be taught what turtle graphics are and how to write simple turtle robot control commands in Python. Students will draw shapes with Python's turtle and will tryout the programs on a computer.

Specific National Curriculum Objectives Covered:

- To design, use and evaluate computational abstractions that model the state and behaviour of real-world problems and physical systems
- To use logical reasoning to compare the utility of alternative algorithms for the same problem
- To start thinking with computational logic in mind

Variables**Approximate length: 3 weeks**

In this section, students will be taught about variables. They will be taught the skills required to create an effective variable along with why and how they may be used. Skills taught are defining a variable, assigning value to a variable, copying and changing a variable, printing a variable, using numbers.

Specific National Curriculum Objectives Covered:

- To learn the basic fundamentals of programming
- To start thinking with computational logic in mind
- To have an understanding of the use and importance of using variables in every program
- To understand the versatility of variables and how they can be used with other functions such as strings, numbers and lists etc.

Using numbers**Approximate length: 2 weeks**

This section focuses on expressions and operators and how students can perform sums in Python. They learn the proper use of the brackets to ensure the correct order of the calculations and experiment with mixing up sums and variables. They learn about two data types for Python numbers - int & float.

Specific National Curriculum Objectives Covered:

- To learn the basic fundamentals of programming
- To start thinking with computational logic in mind
- To have an understanding of the use and importance of using variables in every program
- To use sequence, selection, and repetition in programs, work with variables and various forms of input and output
- To understand the versatility of variables and how they can be used with other functions such as strings, numbers and lists etc.

Strings and inputs**Approximate length: 3 weeks**

From this part of the syllabus onwards students will be learning about other data types like strings where they will deal with letters, words and symbols. Students will learn how the program can get strings from the keyboard. String manipulation by adding strings and removing bits of strings will be covered.

Specific National Curriculum Objectives Covered:

- To use technology purposefully to create, organise, store, manipulate and retrieve digital content.
- To know how to create if and else statements and use Boolean logic within them.
- To use sequence, selection, and repetition in programs, work with variables and various forms of input and output
- To understand the versatility of variables and how they can be used with other functions such as strings, numbers and lists etc.
- To structure code appropriate to avoid any issues
- To design, write and debug programs that accomplish specific goals, including controlling or simulating physical systems; solve problems by decomposing them into smaller parts

Term 2**In the loop****Approximate length: 1 weeks**

The loops part of the syllabus will allow students to learn what loops are in Python & the need for loops. Students learn how to create for-loops and use the loop counter/range to print number sequence. They will manipulate the loop to print in patterns using the step size.

Specific National Curriculum Objectives Covered:

- To learn the fundamentals of programming
- To start thinking with computational logic in mind
- To use sequence, selection, and repetition in programs, work with variables and various forms of input and output
- To design, write and debug programs that accomplish specific goals, including controlling or simulating physical systems; solve problems by decomposing them into smaller parts.

Tricks with print**Approximate length: 1 weeks**

This section will focus on teaching the skill of using print statements to change what's printed between items using separators and ending lines. Students will print tricky characters, such as '\n', and start a new line and make output appear on one line.

Specific National Curriculum Objectives Covered:

- To understand how to debug a program.
- To learn why certain errors come up when programming.
- To be able to figure out where an issue may reside in a program so it can be fixed.
- To learn how to restructure programs in a logical manner.
- To design, write and debug programs that accomplish specific goals, including controlling or simulating physical systems; solve problems by decomposing them into smaller parts.

List**Approximate length: 2 weeks**

This unit will focus on the data type lists and how to define them and use simple commands to work with lists.

Specific National Curriculum Objectives Covered:

- To understand the versatility of variables and how they can be used with other functions such as strings, numbers and lists etc.
- To use sequence, selection, and repetition in programs, work with variables and various forms of input and output
- To design, write and debug programs that accomplish specific goals, including controlling or simulating physical systems; solve problems by decomposing them into smaller parts.
- To create and debug simple programs

Branches**Approximate length: 2 weeks**

This section focuses on how students can use if and else statements to allow the program to make predefined decisions in the program. Students will be learning skills that show them how to use Boolean values, Boolean expressions and how they can use branches to branch different if and else statements.

Specific National Curriculum Objectives Covered:

- To create and debug simple programs
- To use logical reasoning to predict the behaviour of simple programs
- To design, write and debug programs that accomplish specific goals, including controlling or simulating physical systems; solve problems by decomposing them into smaller parts
- To use sequence, selection, and repetition in programs; work with variables and various forms of input and output
- To use logical reasoning to explain how some simple algorithms work and to detect and correct errors in algorithms and programs
- To design, use and evaluate computational abstractions that model the state and behaviour of real-world problems and physical systems
- To understand several key algorithms that reflect computational thinking [for example, ones for sorting and searching]; use logical reasoning to compare the utility of alternative algorithms for the same problem

Functions**Approximate length: 1 weeks**

Students will be taught about the two different types of functions: Built in function and user defined functions. Students will be shown different types of built in functions that they have been using and then be shown why it's important to create their own functions to carry out different tasks as this will reduce redundant code.

Specific National Curriculum Objectives Covered:

- To create and debug simple programs
- To use logical reasoning to predict the behaviour of simple programs
- To design, write and debug programs that accomplish specific goals, including controlling or simulating physical systems; solve problems by decomposing them into smaller parts
- To use sequence, selection, and repetition in programs; work with variables and various forms of input and output
- To use logical reasoning to explain how some simple algorithms work and to detect and correct errors in algorithms and programs
- To design, use and evaluate computational abstractions that model the state and behaviour of real-world problems and physical systems
- To understand several key algorithms that reflect computational thinking [for example, ones for sorting and searching]; use logical reasoning to compare the utility of alternative algorithms for the same problem

Assessment

Formative: Throughout the units, the children will complete graded work, quizzes and programming activities which allows the teacher to assess the student's attainment and inform their planning.

For each unit the students complete a pre and post quiz. This allows us to see progress across the units.

Summative: At the end of each term we complete internal and standardized tests. This allows us to measure the students' progress throughout the term and year. At the end of the academic year, the students complete an open book project where their programming skills and use of different techniques will be tested.

Remote Learning: Students will be using MS Teams for live classes and all materials will be provided online along with instructional videos for additional assistance.