

## Summary

### Unit 5 Abstract data structures

Subject	Year	Start date	Duration
Computer Science	IB1	Week 1, December	<b>12 weeks</b> 23 hours

#### Course Part

#### Description

Students should be able to describe the most common data structures (arrays, stacks, queues, linked lists, binary trees) and the most common data processing operations on each of the basic data structures (addition, deletion and retrieval of data, traversal, searching for a given data, sorting of data into some order).

## Curriculum

### Aims

Provide a body of knowledge, methods and techniques that characterize computer science

Develop logical and critical thinking as well as experimental, investigative and problem-solving skills

### Objectives

#### Know and understand

relevant facts and concepts

appropriate methods and techniques

computer science terminology

#### Apply and use

relevant facts and concepts

relevant design methods and techniques

#### Construct, analyse, evaluate and formulate

success criteria, solution specifications including task outlines, designs and test plans

### Syllabus Content

#### Additional higher level

Topic 5 - Abstract data structures

5.1 Abstract data structures

Thinking recursively

5.1.1 Identify a situation that requires the use of recursive thinking.

5.1.2 Identify recursive thinking in a specified problem solution.

5.1.3 Trace a recursive algorithm to express a solution to a problem.

#### Abstract data structures

5.1.4 Describe the characteristics of a two-dimensional array.

5.1.5 Construct algorithms using two-dimensional arrays.

5.1.6 Describe the characteristics and applications of a stack.

5.1.7 Construct algorithms using the access methods of a stack.

5.1.8 Describe the characteristics and applications of a queue.

5.1.9 Construct algorithms using the access methods of a queue.

5.1.10 Explain the use of arrays as static stacks and queues.

#### Linked lists

5.1.11 Describe the features and characteristics of a dynamic data structure

5.1.12 Describe how linked lists operate logically.

5.1.13 Sketch linked lists (single, double and circular).

#### Trees

5.1.14 Describe how trees operate logically (both binary and non-binary).

5.1.15 Define the terms: parent, left-child, right-child, subtree, root and leaf.

5.1.16 State the result of inorder, postorder and preorder tree traversal.

5.1.17 Sketch binary trees.

#### Applications

5.1.18 Define the term dynamic data structure.

5.1.19 Compare the use of static and dynamic data structures.

5.1.20 Suggest a suitable structure for a given situation.

## ATL Skills

### Approaches to Learning



#### Thinking

- In this unit, we will
  - ask students to formulate a reasoned argument to support their opinion or conclusion
  - reward a new personal understanding, solution or approach to an issue
  - set students a task which required higher-order thinking skills (such as analysis or evaluation)
  - build on a specific prior task
  - ask questions that required the use of knowledge from a different subject from the one you are teaching



#### Research

- In this unit, we will
  - reward or encourage correct citing and referencing
  - assign a task that required students to use the library
  - require students to practise effective online search skills (for example, use of Booleans and search limiters)
  - give students advice on (or provide an opportunity for students to practise) narrowing the scope of a task to make it more manageable



## Developing IB Learners

### Learner Profile



Inquirers



Knowledgeable



Open-minded



Risk-takers (Courageous)



Reflective

IB DP IB1 CS\_KAA HL (IB1)



## Assessment



### Assessment criteria

#### External Assessment

##### Paper 1

A: Short answer questions

B: Structured questions

Description