# VCE Algorithmics (HESS) 2023-2026 Implementation on-demand video

## Video 2
## Background to the Unit 3 Outcome 1 SAC

VICTORIAN CURRICULUM AND ASSESSMENT AUTHORITY
VICTORIA State Government

# Acknowledgement of Country

**The VCAA respectfully acknowledges the Traditional Owners of Country throughout Victoria and pays respect to the ongoing living cultures of First Peoples.**

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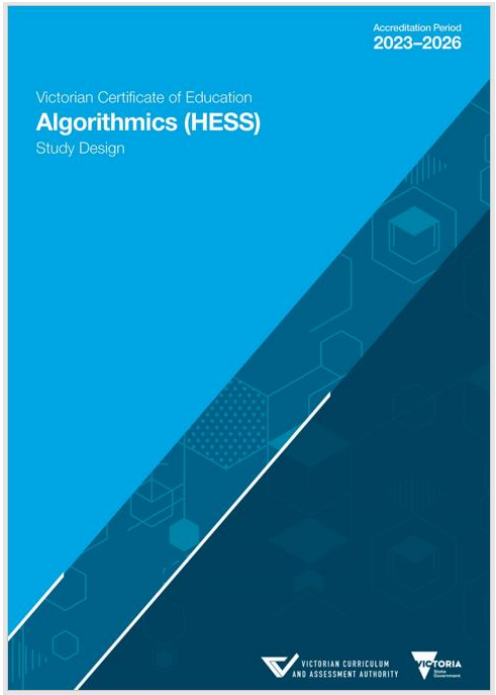
# Purpose of this presentation

This presentation will cover:

- The study design
- Area of Study statement
- Outcome statement
- The assessment task
- Key knowledge
- Key skills
- Performance descriptors
- Advice for teachers

# The 2023–2026 study design




- This is the new study design.
- It will be accredited for 2023–2026.
- This is available on the Algorithmics (HESS) study page right now.
- Unit 3 Outcome 1 is now a School-assessed Coursework (SAC) task.

# Unit 3 Area of Study 1

## Data modelling with abstract data types

In this area of study, students develop and apply knowledge and skills in data abstraction. Students consider the structure of information through a study of the definition and properties of abstract data types (ADTs). They select appropriate ADTs and use them to model salient aspects of real-world problems. Students study a variety of collection-based data types, with a particular focus on the graph ADT, which encapsulates a set of nodes along with their interconnections. Students explore how graph ADTs can be applied to network problems, such as social or transport network problems, and planning problems.

# Unit 3 Outcome 1 – The outcome

On completion of this unit the student should be able to define and explain the representation of information using abstract data types, and devise formal representations for modelling various kinds of real-world information problems using appropriate abstract data types.

# Unit 3 Outcome 1 – The assessment task

## Contribution to final assessment

School-assessed Coursework for Unit 3 will contribute 12 per cent to the study score.

| Outcomes | Marks allocated | Assessment tasks |
|---|---|---|
| **Outcome 1**<br>Define and explain the representation of information using abstract data types, and devise formal representations for modelling various kinds of real-world information problems using appropriate abstract data types. | 50 | In response to given stimulus material, create one or more designs of a data model using abstract data types to capture the salient aspects of a real-world information problem. |
| **Outcome 2**<br>Define and explain algorithmic design principles, design algorithms to solve information problems using basic algorithm design patterns, and implement the algorithms. | 50 | In response to given stimulus material:<br>• create one or more designs of algorithms that apply algorithm design patterns or select appropriate graph algorithms to solve information problems<br>• implement an algorithm. |
| **Total marks** | **100** | |

# Key knowledge

## Key knowledge

- the motivation for using ADTs
- signature specifications of ADTs using operator names, argument types and result types
- specification and uses of the following ADTs:
  - set, list, array, dictionary (associative array)
  - stack, queue, priority queue
  - graphs, including undirected and directed graphs and unweighted and weighted graphs
- features of graphs, including paths, weighted path lengths, cycles and subgraphs
- categories of graphs, including complete graphs, connected graphs, directed acyclic graphs and trees, and their properties
- modularisation and abstraction of information representation with ADTs
- the structure of decision trees and state graphs

# Key skills

## Key skills

- explain the role of ADTs for data modelling
- read and write ADT signature specifications
- use ADTs in accordance with their specifications
- identify and describe properties of graphs
- apply ADTs to model real-world problems by selecting an appropriate ADT and justifying its suitability
- model basic network and planning problems with graphs, including the use of decision trees and state graphs

# VCAA Performance descriptors

| ALGORITHMICS (HESS) UNIT 3 OUTCOME 1<br>SCHOOL-ASSESSED COURSEWORK | | | | | |
|---|---|---|---|---|---|
| **Performance descriptors** | | | | | |
| | **DESCRIPTOR: typical performance in each range** | | | | |
| | **Very low** | **Low** | **Medium** | **High** | **Very high** |
| *Unit 3*<br>*Outcome 1*<br><br>**On completion of this unit the student should be able to define and explain the representation of information using abstract data types, and devise formal representations for modelling various kinds of real-world information problems using appropriate abstract data types.** | Identifies some motivations for the abstraction of data. | Discusses how an ADT property could be used to model an aspect of a particular problem. Little discrimination is demonstrated when identifying features of the problem. | Explains the role of ADTs for data modelling. | Describes in detail the suitability of appropriate ADTs for creating a model in a given problem context. | Compares and justifies the selection of appropriate ADTs for creating a model and outlines limitations of different representations. |
| | Uses limited metalanguage when describing ADTs. | Executes a sequence of ADT operations to a given ADT instance. | Reads, writes and uses ADTs. | Writes complete signature specifications for several ADTs, fully in appropriate metalanguage. | Specifies a non-trivial new operation for one of the standard ADTs to meet requirements that cannot be satisfied by the standard definition. |
| | Limited use of terminology in describing graph properties. | Confirms or rejects the properties of a graph given as a diagram. | Identifies and describe the properties of graphs. | Analyses the interconnections between the properties of graphs using correct terminology. | Analyses the properties satisfied by a given graph and derives another graph property using as evidence the existing specified properties of graphs. |
| | Identifies an example problem attribute that could be modelled by a graph node or edge. | Discusses some aspects of a problem, including planning problems from a given data model instance. | Applies ADTs to real-world problems. The full range of problem instances can be represented. | Models and fully represents a specific problem instance as a data model using a combination of ADT representations. | Models fully a specific problem instance as a data model with a combination of ADTs, and appropriately justifies the assigned priority of several aspects of the problem to the specific context of the problem. |
| | Scaffolding is required to create a basic model. | Some aspects of the problem are modelled. | Models basic network and planning problems with graphs. | Models and fully represents planning problems using the graph ADT in combination with other ADTs where appropriate. | Models fully and justifies the priorities used in the representation of the planning problem using graph and other ADTs. |

# Advice for teachers

- Overview of Unit 3: Algorithmic problem solving
- Unit 3 Outcome 1
  - Teaching and learning activities
  - Detailed examples
  - Sample approaches to developing an assessment task
  - Performance descriptors
- Unit 3 Sample weekly planner

# Contact

- **Phil Feain – Digital Technologies Curriculum Manager (VCAA)**
- **Ph: (03) 9059 5146**
- **Philip.Feain@education.vic.gov.au**

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