**Phil Feain** - Hello and welcome to the VCE Algorithmics Implementation on-demand video on the new Algorithmics Study Design for 2023-2026. The purpose of this video is to introduce the background to the Unit 3 Outcome 2 School-assessed Coursework task for Algorithmics. My name is Phil Feain and I'm the Curriculum Manager for Digital Technologies with the VCAA. Purpose of this presentation is such that it will cover: the study design, the area of study statement, the outcome statement, the assessment task, key knowledge, key skills, the draught performance descriptors and the Advice for teachers. This is the new 2023-2026 study design. This is available on the Algorithmics study page right now. Unit 3 Outcome 2 is now a School-assessed Coursework task. If you're planning on teaching this study next year, it'd be good to have a look at this now and to become familiar with the new study. The second area of study is Unit 3 Area of Study 2 Algorithm design. In this area of study, students learn how to formalise processes as algorithms and to execute them automatically. They use the language of algorithms to describe general approaches to problem-solving and to give precise descriptions of how specific problems can be solved. Students learn how to decompose problems into smaller parts that can be solved independently.

This forms the basis of modularisation. Students explore a variety of problem-solving strategies and algorithm design patterns. Students explore example applications of these design patterns and learn about their implications for efficiently solving problems. They learn about recursion as a method for constructing solutions to problems by drawing on solutions to smaller instances of the same problem. Students are required to implement algorithms as computer programmes. The programming language used must explicitly support the ADTs listed in the key knowledge in Area of Study 1 either directly or by using a library. Let's have a look at the Unit 3 Outcome 2 statement. On completion of this unit the student should be able to define and explain algorithmic design principles, design algorithms to solve information problems using basic algorithm design patterns and implement the algorithms. This slide shows the assessment task for Unit 3 Outcome 2. This task is a School-assessed Coursework task. The task for Unit 3 Outcome 2 is: In response to given stimulus material:

- create one or more designs of algorithms that apply algorithm design patterns or select appropriate graph algorithms to solve information problems

- implement an algorithm. And this is worth 50 marks. Here's the key knowledge for Unit 3 Outcome 2:

- basic structure of algorithms

- pseudocode concepts, including variables and assignment, sequence, iteration, conditionals and functions.

- programming language constructs that directly correspond to pseudocode concepts

- conditional expressions using the logical operations of AND, OR, NOT

- recursion and iteration and their uses in algorithm design

- modular design of algorithms and ADTs

- characteristics and suitability of the brute-force search and greedy algorithm design patterns

- graph traversal techniques, including breadth-first search and depth-first search

- specification, correctness and limitations of the following graph algorithms:

- Prim's algorithm for computing the minimal spanning tree of a graph

- Dijkstra's algorithm and the Bellman-Ford algorithm for the single-source shortest path problem

- the Floyd-Warshall algorithm for the all-pairs shortest path problem and its application to the transitive closure problem

- the PageRank algorithm for estimating the importance of a node based on its links

- induction and contradiction as methods for demonstrating the correctness of simple iterative and recursive algorithms. And here are the key skills:

- interpret pseudocode and execute it manually on given input

- write pseudocode

- identify and describe recursive, iterative, brute-force search and greedy design patterns within algorithms

- design recursive and iterative algorithms

- design algorithms by applying the brute-force search or greedy algorithm design pattern

- write modular algorithms using ADTs and functional abstractions

- select appropriate graph algorithms and justify the choice based on their properties and limitations

- explain the correctness of the specified graph algorithms

- use search methods on decision trees and graphs to solve planning problems

- implement algorithms, including graph algorithms, as computer programmes in a very high-level programming language that directly supports a graph ADT

- demonstrate the correctness of simple iterative or recursive algorithms using structured arguments that apply the methods of induction or contradiction. We are currently developing the VCAA Performance descriptors in the Advice for teachers for Unit 3 Outcome 2. This is a draught of the performance descriptors as they currently look to provide some idea of how the assessment task can be assessed. Just be aware that this may change. The Advice for teachers will be published, hopefully later this year. To help you prepare for 2023 and to support teachers during the lifetime of the next study design, there'll be a new Advice for teachers on the Algorithmics study page. This advice has been written by several experienced teachers of the study. The Advice for teachers will include the following support for Unit 3 Outcome 2:

- An overview of Unit 3: Algorithmic problem solving.

- Unit 3 outcome 2:

- Teaching and learning activities These are based on the key knowledge.

- Detailed examples that relate to one of the teaching learning activities

- Sample approaches to developing an assessment task This provides guidance in the development of an assessment task.

- Performance descriptors to help you develop a rubric to assess the task

- And a Unit 3 Sample weekly planner. The weekly planner is a sample course outline to help new or inexperienced teachers of the study to plan their course for Unit 3. Thank you for following this presentation. If you have any questions regarding this presentation, you can contact Phil Feain, the Digital Technologies Curriculum Manager, at the contact details below.

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