Stuart Bathurst Catholic High School

Mathematics Department

Long-term sequencing Year 12 Decision 1

HALF TERM 1:
STUDENTS MUST KNOW:

Chapter 1: Algorithms

- know how to apply a bubble sort algorithm to a list of numbers or words;
- know how to apply the quick sort algorithm to a list of numbers or words, clearly identifying the pivots used for each pass;
- be able to identify the number of comparisons and swaps used in a given pass;
- be able to identify size, efficiency and order of an algorithm and use them to make predictions;
- know how to solve bin packing problems using full bin, first fit, and first fit decreasing algorithms, and understand their strengths and weaknesses.

Chapter 2: Graphs and network

- be familiar with basic terminology used in graph theory
- be familiar with different types of graph
- understand graphs represented in matrix form;
- be familiar with k notation; know the definition of a tree;

Chapter 3: Algorithms on graphs

- use Kruskal's algorithm to find minimum spanning tree
- use Prim's algorithm on a network to find a minimum spanning tree; apply Prim's algorithm to a distance matrix
- use Dijkstra's algorithm to find the shortest path between two vertices in a network.

Chapter 4: Route Inspection

- be able to determine whether a graph is traversable;
- be able to apply an algorithm to solve the route inspection problem;
- find a route by inspection;
- understand the importance of the order of vertices of the graph in finding a route.

HOW THIS WILL BE ASSESSED:
Recall and Retrieval tasks
End of unit assessments

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HALF TERM 2:
STUDENTS MUST KNOW:

Chapter 6: Linear programming

- know how to formulate a linear programming problem from a real-life problem (write inequalities from worded questions);
- Illustrate a two-variable linear programming problem graphically.
- Locate the optimal point in feasible region using the objective line (ruler) method.
- Use the vertex testing method to locate the optimal point.
- Determine solutions that need integer values.

Chapter 8: Critical path analysis

- be able to model a project by an activity network from a precedence table;
- be able to complete a precedence table from a given network;
- understand the use of dummies.
- know how to carry out a forward pass and backward pass using early and late event times;
- be able to interpret and use dummies;
- be able to identify critical activities and critical paths.
- know how to determine the total float of activities;
- be able to construct and interpret Gantt (cascade) charts.

HOW THIS WILL BE ASSESSED:
Recall and Retrieval tasks
End of unit assessments

HALF TERM 3 &4:
STUDENTS MUST KNOW:

- Revision & Review

HOW THIS WILL BE ASSESSED:
Recall and Retrieval tasks
End of unit assessments

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HALF TERM 5:
STUDENTS MUST KNOW:

Start Year 13 D1 content

Chapter 2.5 Planarity algorithm

- be able to apply the planarity algorithm for planar graphs;
- be able to determine if a graph contains a Hamiltonian cycle.

Chapter 3.5 Floyd's algorithm

- be able to find all the shortest paths between all the pairs of vertices using Floyd's algorithm.

Chapter 4.3 Route Inspection

- use the route inspection algorithm in networks with more than four odd nodes.

Chapter 5: The travelling salesman problem

- understand the travelling salesman problem and that there is no simple algorithm to solve it for complex networks;
- be able to use the nearest neighbour algorithm to find upper bounds for the problem;
- be able to find lower bounds for a problem;
- understand that not all upper and lower bounds give a solution to the problem;
- know how to identify the best upper and lower bounds;
- be able to solve the travelling salesman problem and interpret this solution in the context of the problem.

HOW THIS WILL BE ASSESSED:
Recall and Retrieval tasks
End of unit assessments

HALF TERM 6:
STUDENTS MUST KNOW:

- Revision & Review

HOW THIS WILL BE ASSESSED:
Recall and Retrieval tasks
End of unit assessments