Module D1.1 Algorithms. Topic 1 D1. 3 hours.	**Content & Page Reference D1 textbook** • Understand the definition of an algorithm. • Appreciate why an algorithmic approach to problem solving is generally preferable to *ad hoc* methods, and understand the limitations of algorithmic methods. • Show familiarity with simple algorithms concerning sorting and packing, including bubble and shuttle sorts and first-fit methods (first-fit and first-fit decreasing). • Understand the meaning of the order of an algorithm, and determine the order of a given algorithm in simple cases, including the algorithms for standard network problems. ***Ex 1A p5-6 & Ex 1B p8-9.*** • Interpret and apply simple algorithms defined by flow diagrams or given as a listing in words. ***Misc Ex 1 Q1,2,4.***	**Time** 2 hours. 1 hour.

Module D1.2 Graph Theory. Topic 2 D1. 3 hours.	• Understand the meaning of the terms ‘arc/edge’, ‘node/vertex’, ‘path’, ‘tree’ and ‘cycle’. • Use the orders of the nodes in a graph to determine whether the graph is Eulerian or semi-Eulerian or neither. ***Ex 2A p21-22.*** • Solve simple problems involving planar graphs both directed and undirected. ***Ex 2B p25 & Ex 2C p28.***	 1 hour. 2 hours.

Module D1.3 Networks. Topic 3 D1. Topic 6 D1. Topic 4 D1. Topic 5 D1. 11 hours.	• Recall that a network is a graph in which each arc is assigned a 'weight', and use networks as mathematical models. • Apply Prim's and Kruskal's algorithms in solving the minimum connector problem to find a minimum spanning tree (including the use of a matrix representation for Prim's algorithm). ***Ex 3A p35 & Ex 3B p39-40.*** • Find a solution to the travelling salesperson problem in simple cases, and in other cases determine an upper bound using the nearest neighbour method, use short cuts where possible to improve on an upper bound and use minimum connector methods on a reduced network to determine a lower bound. ***Ex 6 p73-74 & Misc Ex 6.*** • Use Dijkstra's algorithm to determine the shortest path between two nodes. ***Ex 4 p51-52*** • Solve simple cases of the route inspection problem for at most six odd nodes by consideration of all possible pairings of odd nodes. ***Ex 5 p61-62 & Ex 5B p63-65.***	2.5 hours. 3 hours. 1.5 hours. 4 hours.

Module D1.4 Linear Programming. Topic 7 D1. Topic 8 D1. 8 hours.	• Formulate in algebraic terms a real-world problem posed in words, including the identification of relevant variables, constraints and objective function. • Set up a linear programming formulation in the form 'maximise (or minimise) objective, subject to inequality constraints and trivial constraints of the form *variable* ≥ 0' and use slack variables to convert inequality constraints into equations together with trivial constraints. • Carry out a graphical solution for 2-variable problems, including the cases where integer solutions are required. ***Ex 7A p86 & Ex 7B p91-92.*** • Use the Simplex method for maximising an objective function, interpret the values of the variables and the objective function at any stage in the Simplex method. ***Ex 8A p103 & Ex 8B p105-106.***	4 hours. · 4 hours.