# Scheme of Work 2012–2013
## Decision Mathematics 1 [EDEXCEL SYLLABUS]

<table>
<thead>
<tr>
<th>Week/Date</th>
<th>Learning Outcomes [Can be differentiated]</th>
<th>Teaching &amp; Learning Activities (All resources here are hyperlinked to the MEI website)</th>
<th>HW and/or Assessments</th>
</tr>
</thead>
<tbody>
<tr>
<td>1-2</td>
<td>Algorithms 1: Sorting algorithms</td>
<td><img src="#" alt="Study plan" /> <img src="#" alt="Notes and examples" /> <img src="#" alt="Crucial points" /> <img src="#" alt="Interactive resources" /> <img src="#" alt="Other resources" /></td>
<td><img src="#" alt="Multiple choice section test questions" /> <img src="#" alt="Section test solutions" /></td>
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<tr>
<td></td>
<td>· Be able to interpret and apply algorithms presented in written English or flowcharts</td>
<td><img src="#" alt="Interactive resources" /> <img src="#" alt="Other resources" /></td>
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<td></td>
<td>· Be able to develop and adapt simple algorithms.</td>
<td><img src="#" alt="Other resources" /></td>
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<td>· Know the bubble sort and quick sort algorithms</td>
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<tr>
<td>Algorithms 2: Packing and Searching Algorithms</td>
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<tr>
<td>- Know and be able to apply the first-fit algorithm, the first-fit decreasing algorithm and the full-bin algorithm to bin packing problems</td>
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<td>- Know the binary search algorithm</td>
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**Other resources**
- Bin packing - first fit algorithm Powerpoint presentation
- Bin packing - first fit decreasing algorithm Powerpoint presentation
- Binary search
### Graphs 1: Definitions and Problem solving

- Understand notation and terminology: *vertices/nodes; edges/arcs; trees; subgraphs; node degree/valency; simple graphs, complete graphs, connected graphs and bipartite graphs; paths, cycles; digraphs*.
- Be able to model appropriate problems by using graphs.
- Be able to draw a network from a given matrix and to write down the matrix associated with a network.

### Graphs 2: Matchings

- Be able to model *matchings* using a *bipartite graph*.
- Be able to use the *matching improvement algorithm* to improve a *matching* by finding *alternating paths*.

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**Study plan**

**Notes and examples**

**Crucial points**

**Teaching resources**

**Interactive resources**

**Other resources**
### Networks 1: Minimal Spanning Trees

- Know and be able to use Kruskal's algorithm from a network.
- Know and be able to use Prim's algorithm from a network or from a matrix.

#### Study plan
- [Study plan](#) PDF document
- [Notes and examples](#) PDF document
- [Crucial points](#) PDF document

#### Teaching resources
- [Minimum connector activities](#) PDF document

#### Active learning resources
- [Networks definitions activity](#) PDF document
- [Networks definitions activity solutions](#) PDF document

#### Other resources
- [Kruskal's and Prim's algorithms](#) Powerpoint presentation
- [Prim's algorithm from a table](#)

#### Multiple choice section test questions
- [Section test solutions](#)
<table>
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<tr>
<th>Networks 2: Shortest Paths</th>
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<tbody>
<tr>
<td>• Know and be able to apply Dijkstra's <a href="#">algorithm</a>.</td>
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</tbody>
</table>

**Other resources**

- [Study plan](#).PDF document
- [Notes and examples](#).PDF document
- [Crucial points](#).PDF document
- [Multiple choice section test questions](#).
- [Section test solutions](#).
- [Dijkstra's algorithm](#).
Networks 3: The Route Inspection Problem

- Be able to solve the route inspection problem

Active learning resources

- Traversable graphs PDF document
- Traversable graphs solutions PDF document

Other resources

- Route inspection 1 Powerpoint presentation
- Route inspection 2

Study plan PDF document

Notes and examples PDF document

Crucial points PDF document

Multiple choice section test questions

Section test solutions
### Critical path analysis 1: Activity Networks

- Be able to construct a **precedence network**.
- Be able to use a **precedence network** to find earliest **event** times, latest **event** times and **critical activities**.

### Other resources

- **Study plan**
- **Notes and examples**
- **Crucial points**

### Multiple choice section test questions

- **Section test solutions**
<table>
<thead>
<tr>
<th>Critical path analysis 2: Scheduling Activities</th>
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<tbody>
<tr>
<td>● Be able to find earliest and latest start and finish times for activities</td>
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<tr>
<td>● Be able to construct and interpret a cascade chart (Gantt chart).</td>
</tr>
<tr>
<td>● Be able to schedule activities efficiently.</td>
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</tbody>
</table>

### Other resources
- [Study plan](#) PDF document
- [Notes and examples](#) PDF document
- [Crucial points](#) PDF document
- [Cascade diagrams example 1](#) Powerpoint presentation
- [Cascade diagrams example 2](#)

### Multiple choice section test questions
- [Section test solutions](#)
Linear Programming: Formulating and Solving Graphically

- Be able to illustrate linear inequalities in two variables graphically.
- Be able to formulate simple maximisation and minimisation problems.
- Be able to use graphs to solve 2-D linear programming problems.
- Be able to use graphs to solve 2-D integer programming problems.
- Be able to interpret the solution to a linear programming problem.

Teaching resources

- Linear programming activities PDF document
- Crucial points PDF document

Interactive resources

- Linear programming file
- Integer programming file
- Linear programming Excel spreadsheet

Active learning resources

- Inequality regions PDF document
- Inequality regions solutions PDF document
- Linear programming matching activity PDF document
- Linear programming matching activity solutions

Study plan PDF document
Notes and examples PDF document
Multiple choice section test questions
Section test solutions
Cont’d

- LP Formulating Powerpoint presentation
- LP Graph Powerpoint presentation
- LP Solution - objective line method Powerpoint presentation
- LP Solution - vertex method Powerpoint presentation
- Autograph and LP