<table>
<thead>
<tr>
<th><strong>Module Code</strong></th>
<th>STU22006</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Module Name</strong></td>
<td>Management Science Methods</td>
</tr>
<tr>
<td><strong>ECTS Weighting</strong>&lt;sup&gt;1&lt;/sup&gt;</td>
<td>10 ECTS</td>
</tr>
<tr>
<td><strong>Semester taught</strong></td>
<td>Semester 1 &amp; 2</td>
</tr>
<tr>
<td><strong>Module Coordinator/s</strong></td>
<td>Paula Roberts</td>
</tr>
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**Module Learning Outcomes**

On successful completion of this module, students will be able to:

- LO1. Identify an infeasible problem, a problem with multiple solutions or the presence of degeneracy
- LO2. Describe how to find an initial basic feasible solution to a linear program
- LO3. Conduct a parametric analysis on a coefficient in the objective function
- LO4. Define and formulate a balanced transportation problem
- LO5. Describe how to solve integer programs with a branch and bound algorithm
- LO6. Formulate a 0–1 integer program, put into standard form and solve with a branch and bound algorithm
- LO7. Identify the concepts and terminology involved in Simulation
- LO8. Describe different kinds of simulation techniques and be familiar with a range of application examples
- LO9. Apply a simulation using appropriate software
- LO10. Describe the limitations of Simulation

**Module Content**

**Semester 1**

- Formulate and solve Linear and Goal Programming problems using the Simplex Method
- Perform Sensitivity Analysis on the output from a Linear and Goal Programming problem
- Formulate and solve Transportation, Transhipment and Assignment problems
- Formulate a 0 – 1 Linear Programming problem and solve using the Cutting Plane and Branch and Bound Methods
- Analyse networks for the Chinese Postman and Travelling Salesman Problems
- Other relevant mathematical models

**Semester 2**

- Entities, attributes and variables
- Events
- Resources
- Queues
- Steady-state models and transients
- Software for simulation
- Statistical analysis of output

<sup>1</sup> TEP Glossary
Teaching and Learning Methods

- 2 hours lectures in both Semester 1 and 2
- Weekly assignments in Semester 1
- 1 hour lab per week for Semester 2

Assessment Details

<table>
<thead>
<tr>
<th>Assessment Component</th>
<th>Brief Description</th>
<th>Learning Outcomes Addressed</th>
<th>% of total</th>
<th>Week set</th>
<th>Week due</th>
</tr>
</thead>
<tbody>
<tr>
<td>Examination</td>
<td>3 hour written examination</td>
<td>All</td>
<td>80%</td>
<td>n/a</td>
<td>n/a</td>
</tr>
<tr>
<td>Test</td>
<td>In-Class Test</td>
<td>LO1,2,3</td>
<td>5%</td>
<td>6</td>
<td>n/a</td>
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<tr>
<td>Test</td>
<td>In-Class Test</td>
<td>LO4,5,6</td>
<td>5%</td>
<td>12</td>
<td>n/a</td>
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<tr>
<td>Assignment</td>
<td>Statistical Software (R) Assignment</td>
<td>LO7,8,9,10</td>
<td>10%</td>
<td>18</td>
<td>22</td>
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</table>

Reassessment Details

- Examination (3 hours, 100%)

Contact Hours and Indicative Student Workload

<table>
<thead>
<tr>
<th>Contact Hours (scheduled hours per student over full module), broken down by:</th>
<th>60 hours</th>
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<tbody>
<tr>
<td>lecture</td>
<td>44 hours</td>
</tr>
<tr>
<td>laboratory</td>
<td>11 hours</td>
</tr>
<tr>
<td>tutorial or seminar</td>
<td>5 hours</td>
</tr>
<tr>
<td>other</td>
<td>0 hours</td>
</tr>
</tbody>
</table>

Independent study (outside scheduled contact hours), broken down by:

| preparation for classes and review of material (including preparation for examination, if applicable) | 36 hours |
| completion of assessments (including examination, if applicable) | 36 hours |
| Total Hours                                                                      | 132 hours |

Recommended Reading List


Module Pre-requisites

- Prerequisite modules: ST1004

Module Co-requisites

Module Website

http://mymodule.tcd.ie

Last Update

08/07/2019 by Paula Roberts

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2 TEP Guidelines on Workload and Assessment