**Sample Course Outline**

Mathematics Applications

ATAR Year 12

**Acknowledgement of Country**

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# Sample course outline

# Mathematics Applications – ATAR Year 12

## Unit 3 and Unit 4

## Semester 1

| **Week** | **Syllabus content** | **Assessment** |
| --- | --- | --- |
| 1–2 | **Bivariate data analysis (3.1.1–3.1.19)**Identifying and describing associations in categorical and numerical data – model and analyse associations using the framework of the data investigation process |  |
| 3–5 | Fitting a linear model to numerical data, association and causation – model and analyse linear associations using the framework of the statistical investigation process | **Task 1** (Weeks 4–5) |
| 6 | **Growth and decay in sequences (3.2.1–3.2.11)**The arithmetic sequence – generate, display and use sequences and their rules to model and analyse practical situations involving linear growth and decay |  |
| 7 | The geometric sequence – generate, display and use sequences and their rules to model and analyse practical situations involving geometric growth and decay | **Task 2** (Week 7) |
| 8–9 | First order linear recurrence relations – generate, display and use sequences and their rules to model and analyse practical situations involving increasing, decreasing and steady-state solutions |  |
| 10–11 | **Graphs and networks (3.3.1–3.3.9)**The definition of a graph and associated terminology – demonstrate and use associated terminology, identify/construct networks and adjacency matrices to model and analyse everyday situations |  |
| 12–14 | Planar graphs, paths and cycles – demonstrate and use associated terminology, use concepts to investigate and solve practical problems involving shortest path, Eulerian and Hamiltonian graphs | **Task 3** (Week 14) |
| 15 | **Semester 1 examination** | **Task 4**(Examination week) |

## Semester 2

| **Week** | **Topic/Syllabus content** | **Assessment** |
| --- | --- | --- |
| 1–2 | **Time series analysis (4.1.1–4.1.8)**Describing and interpreting patterns in time series data – construct time series plots, identify and describe features |  |
| 3–4 | Analysing time series data – examine and use concepts and techniques of time series analysis, including smoothing data, calculating seasonal indices, deseasonalising a time series, modelling long-term trends and making predictions |  |
| 5 | **Loans, investments and annuities (4.2.1–4.2.7)**Compound interest loans and investments – model, investigate and solve practical problems to compare compound interest loans, investments and depreciating assets | **Task 5** (Week 5) |
| 6–7 | Reducing balance loans – model, investigate and solve practical problems involving loans with periodic repayments using a recurrence relation and with the aid of a financial calculator |  |
| 8–9 | Annuities and perpetuities – investigate, model and solve practical problems associated with compound interest investments and loans with periodic payments made from the investment using a recurrence relation and with the aid of a financial calculator | **Task 6** (Weeks 8–9) |
| 10 | **Networks and decision mathematics (4.3.1–4.3.11)**Trees and minimum connector problems – identify minimal spanning trees and solve minimal connector problems using practical examples that can be represented by trees |  |
| 11 | Flow networks – solve small-scale network flow problems in practical situations, including use of the ‘maximum flow-minimum cut’ theorem |  |
| 12–13 | Assignment problems – use graphs, tabular and/or matrix form to determine optimum assignment/s by inspection or by using the Hungarian algorithm | **Task 7** (Week 13) |
| 14 | Project planning and scheduling using critical path analysis (CPA) – construct a network to represent a project and use a network to determine minimum time for completion, represent interdependencies and identify EST/LST and float times |  |
| 15 | **Semester 2 examination** | **Task 8** (Examination week) |