Government of **Western Australia**
**School Curriculum and Standards Authority**

# SAMPLE COURSE OUTLINE

## MATHEMATICS APPLICATIONS
## ATAR YEAR 12

**Acknowledgement of Country**

Kaya. The School Curriculum and Standards Authority (the Authority) acknowledges that our offices are on Whadjuk Noongar boodjar and that we deliver our services on the country of many traditional custodians and language groups throughout Western Australia. The Authority acknowledges the traditional custodians throughout Western Australia and their continuing connection to land, waters and community. We offer our respect to Elders past and present.



**Disclaimer**

Any resources such as texts, websites and so on that may be referred to in this document are provided as examples of resources that teachers can use to support their learning programs. Their inclusion does not imply that they are mandatory or that they are the only resources relevant to the course.

# 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)**<br>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**<br>(Weeks 4–5) |
| 6 | **Growth and decay in sequences (3.2.1–3.2.11)**<br>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**<br>(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)**<br>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**<br>(Week 14) |
| 15 | **Semester 1 examination** | **Task 4**<br>(Examination week) |

Semester 2

| Week | Topic/Syllabus content | Assessment |
|---|---|---|
| 1–2 | **Time series analysis (4.1.1–4.1.8)**<br>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)**<br>Compound interest loans and investments – model, investigate and solve practical problems to compare compound interest loans, investments and depreciating assets | **Task 5**<br>(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**<br>(Weeks 8–9) |
| 10 | **Networks and decision mathematics (4.3.1–4.3.11)**<br>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**<br>(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**<br>(Examination week) |