**Sample Course Outline**

Mathematics Methods

ATAR Year 12

**Copyright**

© School Curriculum and Standards Authority, 2017

This document – apart from any third party copyright material contained in it – may be freely copied, or communicated on an intranet, for non-commercial purposes in educational institutions, provided that the School Curriculum and Standards Authority is acknowledged as the copyright owner, and that the Authority’s moral rights are not infringed.

Copying or communication for any other purpose can be done only within the terms of the *Copyright Act 1968* or with prior written permission of the School Curriculum and Standards Authority. Copying or communication of any third party copyright material can be done only within the terms of the *Copyright Act 1968* or with permission of the copyright owners.

Any content in this document that has been derived from the Australian Curriculum may be used under the terms of the Creative Commons [Attribution 4.0 International (CC BY)](https://creativecommons.org/licenses/by/4.0/)licence.

**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 Methods – ATAR Year 12

Unit 3 and Unit 4

Semester 1

| **Week** | **Topic/Syllabus content** | **Assessment** |
| --- | --- | --- |
| 1–2 | **Further differentiation and applications (3.1.1–3.1.16)**Exponential functions – estimate and identify *e* and establish its derivative, use the exponential growth function and its derivative to solve problemsTrigonometric functions – use geometric constructions, graphical and numerical methods to establish the derivative of sin *x* and cos *x* and use them to solve practical problems |  |
| 3 | Differentiation rules – examine, apply and use the product, quotient and chain rule to differentiate a range of functions | **Task 1** (Week 3) |
| 4–5 | The second derivative and applications of differentiation – identify and apply differentiation techniques and concepts to optimisation problems, rates of change and graph sketching | **Task 2** (Week 5) |
| 6 | **Integrals (3.2.1–3.2.22)**Anti-differentiation – identify anti-differentiation as a process that reverses differentiation, establish and use notation and formulas and use linearity of anti-differentiation |  |
| 7–8 | Definite integrals and the Fundamental theorem – estimate the area under a curve, link and interpret the limit of sums to area using integrals, examine develop and apply the Fundamental theorem as a link between differentiating and integrating |  |
| 9–10 | Applications of integration – apply techniques of integration to rates of change, area and motion problems | **Task 3** (Week 10) |
| 11–12 | **Discrete random variables (3.3.1–3.3.16)**General discrete random variables – identify and develop discrete random variables and their associated probability functions, identify parameters and use DRVs to model and solve practical problems |  |
| 13 | Bernoulli distributions – identify and use Bernoulli random variables and associated probabilities, determine parameters and model and solve problems | **Task 4** (Week 13) |
| 14 | Binomial distributions – examine the concept of a binomial random variable, determine associated parameters and probabilities and solve practical problems |  |
| 15 | **Semester 1 examination** | **Task 5**(Examination week) |

Semester 2

| **Week** | **Topic/Syllabus content** | **Assessment** |
| --- | --- | --- |
| 1–2 | **The logarithmic function (4.1.1–4.1.14)**Logarithmic functions – define logarithms, establish and use algebraic properties, solve equations and examine features of graphs, interpret and use logarithmic scales and identify suitable contexts to model by logarithmic functions |  |
| 3–5 | Calculus of the natural logarithmic functions – define the natural logarithm and its inverse relationship to *e*, establish and use integrals and derivatives related to the natural logarithm and use them to solve practical problems | **Task 6** (Week 3)**Task 7** (Week 5) |
| 6–7 | **Continuous random variables and the normal distribution (4.2.1–4.2.7)**General continuous random variables – examine and use the concepts of a continuous random variable and associated parameters and probabilities in appropriate contexts |  |
| 8–9 | Normal distributions – identify the features of the graph of a normal distribution, calculate probabilities and use these to solve practical problems that are suitable for modelling by normal random variables | **Task 8** (Week 9) |
| 10 | **Interval estimates for proportions (4.3.1–4.3.10)**Random sampling – examine the concept of randomness and bias and investigate variability of random samples from various distributions |  |
| 11–12 | Sample proportions – examine the concept of the sample proportion and simulate repeated random sampling to illustrate the approximate normality of the distribution of sample proportions for large numbers of samples | **Task 9** (Week 13) |
| 13–14 | Confidence intervals for proportions – examine and use the concept of an interval estimate, define confidence intervals and margins of error and their relationship and use simulation to illustrate variations between samples | **Task 10** (Week 14) |
| 15 | **Semester 2 examination** | **Task 11**(Examination week) |