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

SAMPLE COURSE OUTLINE

MATHEMATICS SPECIALIST

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. Teachers must exercise their professional judgement as to the appropriateness of any they may wish to use.

Sample course outline

Mathematics Specialist – ATAR Year 12

Unit 3 and Unit 4

Semester 1

Week	Topic/Syllabus content	Assessment
1–2	**Complex numbers (3.1.1–3.1.15)** Cartesian forms and complex arithmetic using polar form – review the concepts of complex numbers in Cartesian form; extend understanding to include modulus, argument and conversion to polar form; use and interpret results from operations with complex numbers in polar form including proofs of basic identities and de Moivre's theorem	
3	The complex plane – examine and use addition and multiplication of complex numbers in the complex plane; identify subsets of the complex plane	
4–5	Roots of complex numbers and factorisation of polynomials – determine roots of unity/complex numbers and examine their location in the complex plane; prove and apply the factor and remainder theorem to locate conjugate roots and solve simple polynomial equations	**Task 1** (Week 5)
6–7	**Functions and sketching graphs (3.2.1–3.2.8)** Functions – determine the existence and composition of two functions; identify and find the inverse and examine the graphical properties of a one-to-one function	
8–9	Sketching graphs – use and apply absolute value to the graph of its function; examine relationships between graphs of other functions, their reciprocal and the absolute value of the functions; sketch graphs of simple rational functions	**Task 2** (Week 9)
10	**Vectors in three dimensions (3.3.1–3.3.15)** The algebra of vectors in three dimensions – extend the concepts of vectors to three dimensions and construct simple proofs	
11–13	Vector and Cartesian equations and vector calculus – determine and use vector and Cartesian equations and related concepts to represent curves, spheres, position of particles and planes; differentiate, integrate and use vector functions to solve problems involving motion	**Task 3** (Week 13)
14	Systems of linear equations – recognise systems of linear equations and use techniques of elimination to solve; examine the three cases for solutions and examine the geometric interpretation of solutions of systems of linear equations with three variables	
15	**Semester 1 examination**	**Task 4** (Examination week)

Semester 2

Week	Topic/Syllabus content	Assessment
1–2	**Statistical inference (4.3.1–4.3.7)** Sample means – examine the concept of the sample mean and simulate repeated random sampling from a variety of distributions to illustrate properties of the distribution of sample means including the approximate normality for large samples	
3–4	Confidence intervals for means – examine and use the concept of an interval estimate for the population mean; use simulation to illustrate variations between samples and use known parameters to approximate intervals covering desired proportions	**Task 5** (Week 4)
5–6	**Integration and applications of integration (4.1.1–4.1.7)** Integration techniques – establish and use trigonometric identities, substitutions and partial fractions to integrate, establish and use integration to obtain a natural logarithm	
7–9	Applications of integral calculus – use integration techniques and technology with numerical integration to solve problems including areas between curves and volumes of solids	**Task 6** (Weeks 8/9)
10–12	**Rates of change and differential equations (4.2.1–4.2.7)** Applications of differentiation – examine and apply implicit differentiation, related rates, differential equations including the logistic equation and slope fields to solve problems	**Task 7** (Week 12)
13–14	Modelling motion – consider and solve problems involving straight line motion including simple harmonic motion	
15	**Semester 2 examination**	**Task 8** (Examination week)