

## UNL32 Senior Mathematics

### About the Course

The unit is a preparatory mathematics unit designed to help you gain the necessary knowledge to enter into a tertiary study. This unit consists of 4 modules. The modules explore coordinate geometry of the straight line, the circle and other conics, the basic functions and their inverses, exponential functions, logarithmic and periodic functions. Differential and integral calculus is introduced with emphasis on graphical, numerical and analytical interpretations. The process of mathematical modelling is developed through applications involving optimisation, rate of change problems and growth phenomena. Data analysis and probability distributions are introduced.

This unit includes individual tutorial support with an experienced high school mathematics teacher. Tutorial support is via email, phone and an online classroom with discussion forums. There is also a Unilearn Student Support Officer available to help you throughout your study.

The unit has flexible enrolment dates to meet your needs. Start your study when you want and complete the unit any time within the 12 month enrolment window. This unit is equivalent to year 11/12 Mathematics (Mathematics B). This unit requires a minimum of 220 hours or 18 weeks to complete.

### Aim

The main aim of this course is to assist the learner to obtain skills and competence in mathematics suitable for commencing studies in tertiary programs with a substantial mathematical component.

At the end of this course the learner should

- Demonstrate a sound knowledge of functions, functional notation and graph interpretation, coordinate geometry of the straight line and conics, trigonometry and periodic functions, calculus and its applications, basic probability concepts and distributions and the mathematics of finance
- Demonstrate confidence and competence in applying the mathematical concepts and techniques learned to problem solving situations with particular emphasis on the process of simple mathematical modelling
- Have acquired prerequisite knowledge and confidence to undertake studies which require a higher level of mathematical competence
- Be motivated to continue with lifelong learning where mathematical skills are required.

### Structure

UNL32 Senior Mathematics consists of 4 Modules. Questions and Exercises are included within each Module so that the learner can work through them to develop experience in problem solving. Worked Solutions for the questions and exercises are provided at the back of each Module.

Progress Tests are also provided at appropriate points in the course. Students are required to successfully complete ten (10) of these progress tests to be eligible to sit for the final examination.

Tutorial Support is available from the UNL32 Senior Mathematics Teacher. This support, which can be accessed by the online classroom (discussion board) or email, is designed to help students clarify understanding of concepts, to provide details of solutions to exercises, and to answer other relevant queries.

## Pre-requisite knowledge

Normally, candidates for UNL32 Senior Mathematics should be competent in mathematics including algebraic manipulation, solutions of linear and quadratic equations, properties including (graphs) of linear quadratic trigonometrically and exponential functions and knowledge of the theory of logarithms is also desirable. Students who feel they need to develop their mathematical skills are referred to UNL31 Introductory Mathematics.

## Specimen Examination

The specimen exam or practice final exam is available once you have completed approximately 80% of the course. The Practice test allows students to work through similar problems under exam conditions which allow them to see if they are pacing themselves appropriately to be successful on the final exam. Most students who are successful on the practice exam find they are successful on the final exam as they are prepared for the type of questions and the exam format they will have during the final exam.

## Hours of Study

In general, the course should be completed in a minimum of 220 hours of study. The actual time required by an individual student to receive a successful result, however, will depend on the background, time available and needs of the learner. Most students take 540 hours to complete the course over the 12 months.

## Assessment

The chapter questions, the end-of–chapter exercises, the progress tests and the Specimen Examination are designed to help students prepare for the final examination for UNL32 Senior Mathematics, which is held in two parts which are both two hours long and must be sat on the same day. Examinations are prepared and assessed by the UNL32 Senior Mathematics Teacher and monitored by the Unilearn Examinations Committee.

To be eligible to sit for the final, closed book examination, students are required to achieve a mark of 60% or higher on each of the 10 progress tests. The formal supervised examination covers the content of Modules 1 to 4. Candidates, who successfully complete the course, are awarded a Statement of Achievement, which lists the percentage mark gained and a grade of Pass, Credit, Distinction or High Distinction. Any candidate who fails to achieve at least 50%, which is required for a Pass grade in the examination, will be eligible to sit for a second examination.

Examinations are not held at set times. Rather, they are arranged through the Unilearn office after the student has successfully completed all ten (10) progress tests with a score of 60% or higher on each.

## Grading Scheme

To pass overall, a student must achieve at least 50% on the Final Exam. A student's final grade is an accumulation of all required content and will be weighted as follows:

Progress Tests - 10%

Final Exam - 90%

The final grading scale is as follows:

Pass (P) - 50-64%

Credit (C) - 65-74%

Distinction (D) - 75-84%

High Distinction (HD) - 85% and above

## Content

### Module 1 – Introduction to Functions - Four Topics

Special algebraic forms, laws of indices, the concept of function, domain and range, special functions (polynomial, absolute value, rational), inverses of functions, continuity, growth and decay functions, exponential functions, laws of logarithms. Two Progress Tests.

### Module 2 – Coordinate Geometry and Trigonometry – Four Topics

Coordinate geometry of the straight line and the circle, ellipse, parabola and hyperbola, tangent and normal lines, the trigonometrical functions and their inverses, trigonometrical identities, radian measure, the sine and cosine rules, periodic functions their graphs and applications. Two Progress Tests.

### Module 3 – Calculus and Its Applications – Five Topics

Rates of change and the derivative, differentiability, rules of differentiation, derivatives of trigonometrical, exponential and logarithmic functions, optimisation problems using derivatives, rates of change and mathematical models, Newtons Method for solving equations, indefinite integrals, rules for integration, trigonometrical and exponential functions and their integrals, the definite integral, areas, numerical integration (trapezoidal rule). Four Progress Tests.

### Module 4 – Financial Mathematics and Statistics – Four Topics

Sequences and series, compound interest, ordinary annuities, amortisation, permutations and combinations, probability of independent events, mutually exclusive events, tree diagrams, discrete and continuous variables, binomial, uniform and normal distributions, lines of best fit, linear regression. Two Progress Tests.