

# UNL32 Senior Mathematics

## Course Outline

### **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 and discussion forums within the online classroom.

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 Methods). 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 all ten (10) progress tests to be eligible to sit 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.

### **Practice Examination**

The practice exam is available once you have completed approximately 80% of the course. The practice exam 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 practice exam are designed to help students prepare for the final examination for UNL32 Senior Mathematics, which is held in two parts each two hours long and must be sat on the same day. Examinations are prepared and assessed by the UNL32 Senior Mathematics teacher.

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. Students who fail to obtain the minimum mark required for a Pass grade, after submitting a reasonable attempt, may then be eligible to sit a second examination at the teacher's discretion.

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%
Overall Result	100%

The final grading scale is as follows:

<b>Grade</b>	<b>% required</b>
High Distinction (HD)	85% and above
Distinction (D)	75- 84 %
Credit (C)	65 – 74 %
Pass (P)	50-64%
Fail	0 – 49%

## **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.*