

MATHEMATICS FOR STATISTICS

UNIT CODE: MATH/CU/AS/CC/01/6/A

Relationship to Occupational Standards

This unit addresses the unit of competency: Apply mathematics for statistics

Duration of Unit: 200 hours

Unit Description

This unit describes the competencies required by a technician in order to apply algebra apply trigonometry and hyperbolic functions, apply complex numbers, apply coordinate geometry, carry out binomial expansion, apply calculus, solve ordinary differential equations, apply power series, apply statistics, apply numerical methods, apply vector theory, apply matrix and apply quantitative techniques

Summary of Learning Outcomes

1. Apply Algebra
2. Apply Trigonometry and hyperbolic functions
3. Apply complex numbers
4. Apply Coordinate Geometry
5. Carry out Binomial Expansion
6. Apply Calculus
7. Solve Ordinary differential equations
8. Apply Power Series
9. Apply Numerical methods
10. Apply Vector theory
11. Apply Matrix
12. Apply quantitative techniques

Learning Outcomes, Content and Suggested Assessment Methods

Learning outcome	Content	Suggested assessment methods
1. Apply Algebra	<ul style="list-style-type: none">• Base and Index• Law of indices• Indicial equations• Laws of logarithm• Logarithmic equations• Conversion of bases• Use of calculator• Reduction of equations	<ul style="list-style-type: none">• Written tests• Oral questioning• Assignments• Supervised exercises

Learning outcome	Content	Suggested assessment methods
	<ul style="list-style-type: none"> • Solutions to quadratic equations • Solution of equations reduced to quadratic form • Solutions of system of linear equations in three unknowns • Solutions of problems involving sequence and series 	
<p>2. Apply Trigonometry and hyperbolic functions</p>	<ul style="list-style-type: none"> • Half -angle formula • Factor formula • Trigonometric functions • Parametric equations • Relative and absolute measures • Measures calculation • Definition of hyperbolic equations • Properties of hyperbolic functions • Evaluations of hyperbolic functions • Hyperbolic identities • Osborne’s Rule • Ash + bush = C equation • One-to-one relationship in functions • Onto relationships in functions • Inverse functions for one-to-one relationship • Inverse functions for onto relationships • Inverse functions for trigonometric functions • Graph of inverse functions • Inverse hyperbolic functions • Application of trigonometry to obtain area and perimeter of shapes and solids 	<ul style="list-style-type: none"> • Written tests • Oral questioning • Assignments • Supervised exercises

Learning outcome	Content	Suggested assessment methods
3. Apply complex numbers	<ul style="list-style-type: none"> • Definition of complex numbers • Stating complex numbers in numbers in terms of conjugate argument and Modulus • Representation of complex numbers on the Argand diagram • Arithmetic operation of complex numbers Application of De Moiré's theorem • Application of complex numbers to applied statistics 	<ul style="list-style-type: none"> • Assignments • Oral questioning • Supervised exercises • Written tests
4. Apply Coordinate Geometry	<ul style="list-style-type: none"> • Polar equations • Cartesian equation • Graphs of polar equations • Normal and tangents • Definition of a point • Locus of a point in relation to a circle • Loci of points for given conditions 	<ul style="list-style-type: none"> • Written tests • Oral questioning • Assignments • Supervised exercises
5. Carry out Binomial Expansion	<ul style="list-style-type: none"> • Binomial theorem • Power series using binomial theorem • Roots of numbers using binomial theorem. • Estimation of errors of small changes using binomial theorem. 	<ul style="list-style-type: none"> • Written tests • Oral questioning • Assignments • Supervised exercises
6. Apply Calculus	<ul style="list-style-type: none"> • Definition of derivatives of a function • Differentiation from first principle • Tables of some common derivatives • Rules of differentiation • Introduction to second derivative and its application • Rate of change and small change • Stationery points of functions of two variables and partial derivatives • Definition of integration • Indefinite and definite integral • Methods of integration application of integration. • Integrals of hyperbolic and inverse functions 	<ul style="list-style-type: none"> • Written tests • Oral questioning • Assignments • Supervised exercises

Learning outcome	Content	Suggested assessment methods
7. Solve Ordinary differential equations	<ul style="list-style-type: none"> • Types of first order differential equations • Formation of first order differential equation • Solution of first order differential equations • Application of first order differential equations • Formation of second order differential equations for various systems • Solution of second order differential equations • Application of second order differential equations 	<ul style="list-style-type: none"> • Written tests • Oral questioning • Assignments • Supervised exercises
8. Apply Power Series	<ul style="list-style-type: none"> • Definition of the term power series • Taylor's theorem • Deduction of McLaurin's theorem to obtain power series • Application of Taylor's theorem and McLaurin's theorems in numerical work 	<ul style="list-style-type: none"> • Written tests • Oral questioning • Assignments • Supervised exercises
9. Apply Numerical methods	<ul style="list-style-type: none"> • Definition of interpolation and extrapolation • Application of interpolation • Application of interactive methods to solve equations • Application of interactive methods to areas and volumes 	<ul style="list-style-type: none"> • Assignments • Oral questioning • Supervised exercises • Written tests
10. Apply Vector theory	<ul style="list-style-type: none"> • Vectors and scalar in two and three dimensions • Operations on vectors: Addition and Subtraction • Position vectors • Resolution of vectors 	<ul style="list-style-type: none"> • Assignments • Oral questioning • Supervised exercises • Written tests
11. Apply Matrix methods	<ul style="list-style-type: none"> • Matrix operation • Determinant of 3x3 matrix • Inverse of 3x3 matrix • Solution of linear simultaneous equations in 3 unknowns 	<ul style="list-style-type: none"> • Assignments • Oral questioning • Supervised exercises • Written tests

Learning outcome	Content	Suggested assessment methods
	<ul style="list-style-type: none"> • Application of matrices 	
12. Apply quantitative techniques	<ul style="list-style-type: none"> • solving linear programming models <ul style="list-style-type: none"> • graphical methods • simplex method <ul style="list-style-type: none"> ✓ row reduction • profit maximisation and cost minimisation 	<ul style="list-style-type: none"> • Assignments • Oral questioning • Supervised exercises • Written tests

Suggested Methods Instructions

- Group discussions
- Demonstration by trainer
- Exercises by trainee

Recommended Resources

- Scientific Calculators
- Rulers, pencils, erasers
- Charts with presentations of data
- Graph books
- Dice
- Computers with internet connection