

## **COURSE SPECIFICATION DOCUMENT**

**NOTE:** ANY CHANGES TO A CSD MUST GO THROUGH ALL OF THE RELEVANT APPROVAL PROCESSES, INCLUDING LTPC.

<b>Academic School/Department:</b>	Business and Economics
<b>Programme:</b>	Combined Studies
<b>FHEQ Level:</b>	5
<b>Course Title:</b>	Calculus with Analytic Geometry
<b>Course Code:</b>	MTH 5110
<b>Course Leader:</b>	David M Munyinyi
<b>Student Engagement Hours:</b>	160
Lectures:	45
Seminar / Tutorials:	15
Independent / Guided Learning :	100
<b>Semester:</b>	Spring
<b>Credits Points:</b>	16 UK CATS credits 8 ECTS credits 4 US credits

### **Course Description:**

This Course provides a detailed coverage of the analytical and geometrical properties of exponential functions, logarithmic functions, hyperbolic functions; complex numbers; Taylor-MacLaurin expansion; methods of integration; infinite series; and co-ordinate geometry of the conic sections and calculus of functions of several variables to include partial derivatives, solving linear differential equations of first order; multiple integrals, Jacobians, line and surface integrals and the theorems of Green and Stokes; and continuity and analyticity of functions of complex variables.

**Prerequisites:** MTH4110

### **Aims and Objectives:**

This Course aims to provide students with an understanding of the fundamentals of calculus, their applicability and historical developments. A primary aim of this course is to lay a broad and solid foundation for various aspects of functions, limits, derivatives and integrals. This course will also deal with solving linear differential equations of first order and the calculus of functions of

several variables to include partial derivatives, multiple integrals, Jacobians, line and surface integrals and the theorems of Green and Stokes, continuity and analyticity of functions of complex variables.

### **Programme Outcomes:**

Combined Studies: Aii, Aiii, Bi, Ci, Cii, Ciii, Di, Dii

A detailed list of the programme outcomes are found in the Programme Specification. This is located at the Departmental/Schools page of the portal.

### **Learning Outcomes:**

- Has a detailed knowledge of the theoretical foundations of functions, differentiation and integration and demonstrate evidence of basic competence in solving theoretical problems based on analytical properties.
- Apply the theoretical knowledge to specific applications and demonstrate ability to solve application-oriented problems and obtain optimal solutions in continuous systems.
- Be able apply differential and integral calculus to explore more complex ideas such as applying the principles of the Jacobians to line and surface integrals and Green's and Stokes' theorems.

### **Indicative Content:**

- Inverse functions (algebraic, exponential, logarithmic and trigonometric).
- Derivatives of inverse functions.
- Hyperbolic functions and their derivatives.
- Methods of integration.
- Applications of integration to area and solids of revolutions.
- Applications of integration to solve simple differential equations.
- Geometry of conic sections and polar coordinates.
- Infinite series and sequences.
- Functions of several variables and partial derivatives.
- Line integrals, Green's theorem, surface integrals, the divergence theorem, and Stokes's theorem.
- Algebra of complex numbers, geometrical representation and Euler identity.
- Complex roots of quadratic equations, cube roots of unity, Argand diagram. Complex-valued functions and applications.

### **Assessment:**

This course conforms to the Richmond University Special Programme Assessment Norms for Mathematics approved by Academic Council on 28 June 2012.

