COURSE SPECIFICATION DOCUMENT

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

Academic School/Department:	Business and Economics
Programme:	Combined Studies
***FHEQ* Level:**	4
Course Title:	The Art of Mathematics
Course Code:	MTH 4150
Course Leader:	David M Munyinyi
Student Engagement Hours:	**120**
Lectures:	35
Projects / Tutorials:	10
Independent / Guided Learning:	75
Semester:	Fall/Spring
Credits Points:	12 UK CATS Credits 3 US Credits 6 ECTS Credits

Course Description:

This Course explores the nature and diversity of modern mathematics through examination of mathematical themes such as numbers, infinity, axioms, symmetry and space. The topics studied are placed in their historical and cultural context. Various philosophical questions may also be considered.

Prerequisites: MTH3000 or MTH3111.

Aims and Objectives:

This Course aims to build on a presumed familiarity with the basic ideas of the central mathematical disciplines: arithmetic and geometry. Readings, lectures, discussions, and student projects will explore some of the broad issues surrounding the creation, understanding, and manipulation of mathematical concepts. Is mathematics a science? Or is it an art? Are mathematical axioms and theorems true? What exactly is proof? What is the nature of numbers, infinity and space? Why does mathematics apply to the physical world? Does mathematics have applications to the fine arts and music? How do mathematicians practice their science/art?

Programme Outcomes:

Combined Studies: Aii, Bii, Ci, Di, Dii

A detailed list of the programme outcomes are found in the Programme Specification.

This is located at the archive maintained by the Academic Registry and found at:
http://www.richmond.ac.uk/programme-and-course-specifications/

Learning Outcomes:

- Act under supervision on guided learning on various projects selected; perform literature review and selection of relevant projects and an ability to carry out an online selection of relevant and appropriate material for use in the projects with proper citations.
- Demonstrate a broad understanding of how major milestones in the development of mathematics have evolved across different civilizations, the personalities involved and how the importance of solving practical human problems has advanced mathematical knowledge over time.
- Develop familiarity with the vast and growing literature on mathematical theory, development, recreation and applications from a variety of perspectives and understand the importance rigour and precision in the development of core mathematical skills of problem synthesis and solving in arithmetic, algebra, geometry and analysis.
- Be able to test and judge the reliability of different mathematical concepts in applications and to identify examples in nature or the environment cases of patterns and shapes that can be described mathematically.

Indicative Content:

- The mathematics from 5000-1000 BC to include Babylonians, Chinese, Egyptian and Greek mathematics.
- Early personalities involved in development of mathematics such as Euclid, Apollonius, Archimedes, Pythagoras, Al Jibril and Al Khwarizmi.
- Development of counting, numerals and the number systems.
- The golden era of mathematics: The Renaissance period in Europe.
- The advent and nature of modern mathematics and mathematical proofs.
- Evolution of special numbers and their applications: Magic squares; Pi (π); Golden ratio (ϕ), Fibonacci sequence and Pascal triangle; Imaginary numbers (i); Base to natural logarithm (e) and Prime numbers.
- Geometry, formal proofs and exploration of shapes, symmetry and patterns.
- Modern mathematics in: computing, chaos theory, game theory, cellular automata and fractals.

Assessment:

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

Teaching Methodology:

The Course will consist of interactive learning sessions of material presented using PowerPoint slides, small group discussions, and individual project presentations in class.

Bibliography:

IndicativeText(s):

Alex Bellos, "*Alex's Adventures in Numberland: Dispatches from the wonderful world of mathematics*", Bloomsbury Publishing Plc, 2010

Journals

Journal of Mathematics and the Arts,
Mathematical Imagery – American Mathematical Society,
The Math Journal.

Web Sites

- Mathematics and the Arts
  http://www.tandf.co.uk/journals/titles/17513472.asp
- The American Mathematical Society
  http://www.ams.org/mathimagery/
- The Art of Mathematics
  http://plus.maths.org/content/art-mathematics
- Plus magazine
  http://plus.maths.org/content/

Please Note: The core and the reference texts will be reviewed at the time of designing the semester syllabus

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Change Log for this CSD:

Major or Minor Change	Nature of Change	Date Approved & Approval Body (School or AB)	Change Actioned by Academic Registry