



# THE UNIVERSITY OF THE WEST INDIES

ST. AUGUSTINE, TRINIDAD AND TOBAGO, WEST INDIES

FACULTY OF SOCIAL SCIENCES

DEPARTMENT OF ECONOMICS

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**Course Title: MATHEMATICS FOR ECONOMICS I**

**Course Code: ECON 1003**

**Course Type: Core**

**Level: 1**

**Semester: 1 and 2**

**No. of credits: 3**

**Prerequisites: ECON0001 or PASS in the Mathematics Proficiency Test (MPT)**

**Department: ECONOMICS**

## **LECTURER/INSTRUCTOR INFORMATION**

<b>Name</b>	<b>Office address</b>	<b>Email address</b>	<b>Office hours</b>
Dr Regan Deonanan (Coordinator)	FSS 107 – Room 10	<a href="mailto:Regan.Deonanan@sta.uwi.edu">Regan.Deonanan@sta.uwi.edu</a>	Virtual, via email appointment
Dr Ricardo Lalloo	FSS Room 222	<a href="mailto:Ricardo.Lalloo@sta.uwi.edu">Ricardo.Lalloo@sta.uwi.edu</a>	Virtual, via email appointment

## **COURSE DESCRIPTION**

The course is organized around three (3) areas of Introductory Mathematics for the Social Sciences: Functions, Matrices and Calculus. Significant linkages exist among these core areas and understanding both the application of underlying theory and how they are linked are critical for acquiring introductory Social Science quantitative skills. Accordingly, this course systematically presents the underlying theory in each of these core areas, at an introductory level. Presentation of the theory is supported with several examples on their application to problem solving. Assessment will take the form of Coursework and a Final Examination. The Coursework Component is comprised of Graded Pre-test Exercises, a Graded Midterm Exam and a Graded Online Exam. This course is intended to prepare students to read level 2 quantitative courses in the Social Sciences.

## **COURSE RATIONALE**

Economics is a Social Science. As such, an effective appreciation and application of Economic theory, as with other Sciences, requires a quantitative background. This course comprises one of several quantitative courses in Economics aimed at developing a sufficient quantitative grounding, and emphasizes the acquisition of introductory quantitative skills required for ongoing training within Economics, and other areas in the Social Sciences.

Mathematics for Economics I builds on students' understanding of elementary mathematics (as gained at CXC Mathematics (General Proficiency) or G.C.E. 'O' Level Mathematics) and exposes them to mathematical concepts that underpin the mathematical models that will be encountered in the Level II/III courses in the following programs: B. Sc. Economics, B. Sc. Management Studies, B.Sc. Accounting, B. Sc. Banking & Finance, B.Sc. Hotel Management, B.Sc. Hotel Management, B.Sc. International Tourism, B.Sc. Hospitality & Tourism Management and B.Sc. Sports Management.

## **COURSE LEARNING OUTCOMES**

Upon successful completion of this course, students will be able to:

1. Describe the link among functions, equations and inequalities
2. Distinguish among different types of functions, equations and inequalities
3. Identify appropriate methods to solve different types of equations and inequalities
4. Defend methods utilized to solve different types of equations and inequalities
5. Solve equations and inequalities algebraically, graphically or with the use of matrices
6. Interpret solutions to equations and inequalities
7. Set up worded problems in terms of functions
8. Solve problems requiring the application of calculus methods

## **COURSE ASSESSMENT**

**To Be Determined**

## **TEACHING STRATEGIES**

The course will be delivered by way of online lectures and tutorials, MyeLearning resources and consultations during virtual office hours.

Attendance at Online Lectures and Tutorial Classes will be treated as **compulsory**. University Regulation #19 allows for the Course Lecturer to debar from the Final Examination students who did not attend at least 75% of tutorials. This continues to apply to online classes. The Course Lecturers will be enforcing this **regulation**.

## **IMPORTANT NOTICE TO STUDENTS**

**You are hereby prohibited from reproducing, re-publishing, re-broadcasting, re-posting, re-transmitting or transferring in whole or in part any Course Outlines, Course Materials or Lectures which have been provided to you as part of your course of study at The University of the West Indies (The UWI), without the prior permission of The UWI its authorised agents or copyright holders.**

## COURSE SCHEDULE

Week	Content	Resources	Assignments Due
1	Self-review of ECON0001 Final Exam past paper;  Live Introduction Session	ECON0001 Final Exam past paper (from the semester prior to that of enrolment in this course)	
2	Functions	Course textbook and myeLearning notes/videos	ECON0001 Final Exam past paper
3	Functions (continued)	Course textbook and myeLearning notes/videos; Tutorial session 1	Tutorial Sheet 1; Pre-Test 1
4	Solutions of Inequalities	Course textbook and myeLearning notes/videos; Tutorial session 2	Tutorial Sheet 1; Pre-Test 2
5	Exponential and Logarithmic Functions	Course textbook and myeLearning notes/videos; Tutorial session 3	Tutorial Sheet 2; Pre-Test 3
6	Sequences and Series; Complex Numbers	Course textbook and myeLearning notes/videos; Tutorial session 4	Tutorial Sheet 3; Pre-Test 4
7	Limits and Continuity	Course textbook and myeLearning notes/videos; Tutorial session 5	Tutorial Sheet 4
8	Differentiation	Course textbook and myeLearning notes/videos; Tutorial session 6	Tutorial Sheet 5; Pre-Test 5
9	Applications of Differentiation	Course textbook and myeLearning notes/videos; Tutorial session 7	Tutorial Sheet 6; Pre-Test 6
10	Matrix Algebra	Course textbook and myeLearning notes/videos; Tutorial session 8	Tutorial Sheet 7; Pre-Test 7

11	Matrix Algebra (continued)	Course textbook and myeLearning notes/videos; Tutorial session 9	Tutorial Sheet 8
12	Course Wrap Up and Review	Course textbook and myeLearning notes/videos; Tutorial session 10	Tutorial Sheet 8

## **ASSIGNMENTS**

Students are required to attempt all questions on tutorial sheets prior to the tutorial session.

## **CONTENT**

### **Functions**

#### **Readings:**

*Haeussler, Paul & Wood Chapter 0 pg 27 – 43; Chapter 2 pg 75 – 102; Chapter 3 pg 117 – 147; Chapter 4 pg 163 – 193 or*

*Tan Chapter 1 pg 03 – 55; Chapter 10 pg 529 – 556; Chapter 13 pg 810 – 832*

- Definition of a function
- Function Notation and Evaluating Functions
- Domain and Range of Functions
- Composition of Functions
- Inverse Functions
- Special Functions (Constant, Polynomial, Rational, Absolute Value)
- The Remainder and Factor Theorem and Solution of Cubic Equations
- Application of Functions (Depreciation, Demand and Supply Curves, Production Levels)
- Sketching Graphs of Functions (Constant, Linear, Quadratic, Square Root, Absolute Value)
- Transforming Graphs (Horizontal and Vertical Shifts, Reflection in the X-axis)
- Solution of equations (Linear, Quadratic, Absolute Value, Cubic, Rational)
- Solutions of system of equations (Linear and Non-Linear)

### **Solutions of Inequalities**

#### **Readings:**

*Haeussler, Paul & Wood Chapter 1 pg 47 - 60 or*

*Tan Chapter 3 pg 171 – 179; Chapter 9 pg 520 – 525*

- Systems of Linear Inequalities
- Solving Linear, Absolute Value and Quadratic Inequalities
- Graphs of Systems of Inequalities
- Applications of Inequalities (Profits, Sales Allocation, Investment)

### **Complex Numbers**

- The Definition of Imaginary Numbers
- The Definition of Complex Numbers
- Addition, Multiplication and Division of Complex Numbers

### **Exponential and Logarithmic Functions**

- Graphs of Exponential and Logarithmic Function
- The Natural Exponential and Natural Logarithmic Function
- Basic Properties of Logarithm
- Solving Exponential and Logarithmic Functions
- Applications

### **Matrix Algebra**

#### **Readings:**

*Haeussler, Paul & Wood Chapter 6 pg 227 -*

*270 or*

*Tan Chapter 2 pg 73 – 155*

- Definition of a Matrix
- Matrix Addition, Multiplication and Transposition
- The Determinant of a 2X2 and 3X3 Matrix
- The inverse 2X2 and 3X3 Matrix
- Solving 2X2 and 3X3 Systems of Linear Equations Using Matrix Inversion (Adjoint Method) and Cramer's Rule
- Equivalent Matrices

### **Sequences and Series**

- Definition of a Sequence
- Types of Sequences (Arithmetic and Geometric )
- Sigma Notation
- Arithmetic and Geometric Series
- Sums of Arithmetic and Geometric Series including sums to infinity

### **Limits and Continuity**

#### **Readings:**

*Haeussler, Paul & Wood Chapter 10 pg 449 – 465 or*

*Tan Chapter 10 pg 576 – 614*

- Concepts of a Limit
- Limits of Sequences
- Limits of Polynomial and Rational Functions
- One-Sided Limits
- Limits to Infinity
- Distinguish between Continuous and Discontinuous Functions
- Finding Points of Discontinuity of Rational Functions

### **Differentiation of Single Variable Functions**

#### **Readings:**

*Haeussler, Paul & Wood Chapter 11 pg 481 – 523 or  
Tan Chapter 10 pg 615 – 629; Chapter 11 pg 640 - 700*

- The Concept of a Derivative
- Differentiation from First Principles
- Rules of Differentiation (Power, Sum/Difference, Chain, Product, Quotient Rules)
- Differentiation of Exponential and Logarithmic Functions

### **Applications of Differentiation**

#### **Readings:**

*Haeussler, Paul & Wood Chapter 12 pg 529 – 538;  
Chapter 13 pg 567 – 579, 587 – 588 & 599 – 610 or  
Tan Chapter 12 pg 729 – 765, pg 781 – 795; Chapter 13 pg 833 - 851*

- Determination of Gradients
- Increasing and Decreasing Functions
- Relative Extrema (Maxima and Minima) using the First and Second Derivative Tests
- Concavity and Points of Inflection
- Vertical and Horizontal Asymptotes
- Derivative as a Rate of Change

### **EVALUATIONS**

At the end of each unit and at the mid-point of the course, the lecturer will solicit feedback on how the information is being processed and the course in general. The feedback will be used to make improvements, correct errors, and try to address the students' needs. Additionally, at the end of the course, the CETL will evaluate the course, so it is important that you are in attendance during that time.

## **RESOURCES**

Students should obtain a copy of the following required text:

- **Haeussler, E., Paul, R. and Wood, R.**, Introductory Mathematical Analysis for Business, Economics and the Life and Social Sciences, Twelfth Edition Prentice Hall. 2008 (or most recent edition).

## **READINGS**

The following are suggested texts:

- **Tan, S. T.**, College Mathematics for the Managerial, Life and Social Sciences, Sixth Edition, Thomson Brooks/Cole. 2005 (or most recent edition).
- **Dowling, Edward T.**, Calculus for Business, Economics, and the Social Sciences, Schaum's Outline Series, McGraw-Hill.
- **Hoffman, L. D.** Calculus for Business, Economics, and the Social Sciences, McGraw-Hill.
- **Ayres, Frank** Calculus, 2nd Edition, New York, McGraw-Hill, 1964
- **Lewis J Parry** An Introduction to Mathematics for Students of Economics. Macmillan 197

## **ADDITIONAL INFORMATION**

- **CLASS ATTENDANCE POLICY**

Regular class attendance is essential. A student who misses a class will be held responsible for the class content and for securing material distributed. Attendance is the responsibility of the student and consequently nonattendance will be recorded. Students would be reminded of the implications of non-responsible attendance.

- **POLICY REGARDING CHEATING**

Academic dishonesty including cheating is not permitted. For more information, read Section V (b) Cheating in the *Examination Regulations for First Degrees, Associate Degrees, Diplomas, and Certificates* online via the Intranet.

- **STATEMENT ON DISABILITY PROCEDURE**

The University of the West Indies at St. Augustine is committed to providing an educational environment that is accessible to all students, while maintaining academic standards. In accordance with this policy, students in need of accommodations due to a



disability should contact the Academic Advising/Disabilities Liaison Unit (AADLU) for verification and determination as soon as possible after admission to the University, or at the beginning of each semester.

- **POLICY REGARDING INCOMPLETE GRADES**

Incomplete grades will only be designated in accordance with the University's Incomplete Grade Policy.

### **HOW TO STUDY FOR THIS COURSE**

Prior to each lecture, students should pre-read the material to be covered as indicated in the course schedule. Students **must** attend every lecture. If a student cannot attend their regular lecture period in any given week, they should attend an alternative section that same week. Post the formal lecture, students should complete the weekly tutorial sheet and attend the weekly tutorial session to re-enforce material previously covered.

Tutorial assignments are designed to help students flesh out concepts and practice the application of the logic and concepts to a range of problem situations. These are important in this course since they provide the basis for formal practice and assist in reinforcing the concepts introduced in lectures. It is expected that students will also use the texts and recommended references. Every effort should be made to complete each tutorial sheet within the time period indicated on the sheet.

Students are advised to read through each tutorial assignment to identify the concepts required for its solution prior to revising the concepts so identified; it is only after such revision that you should proceed to attempt the solutions. Some questions in an assignment sheet will be solved in one attempt; others will require more than one attempt. Students are encouraged to adopt co-operative learning approaches (i.e. working with another student or students) to solve the more challenging questions in the tutorial sheet.

If after the individual effort and the co-operative learning effort, the student feels challenged by a question(s), he/she owes it to himself/herself to seek out the Course Lecturer or Tutor for guidance or Adjunct for guidance and assistance.

Under no condition should a student come to a tutorial class unprepared to contribute to the class proceedings.

Overall students should invest a minimum of **seven (7) hours per week** apart from lectures, tutorial classes and office hours to this course.

## **GRADING SYSTEM**

<b>2014/2015 Grading Policy</b>		
<b>Grade</b>	<b>Quality Points</b>	<b>Mark%</b>
<b>A+</b>	<b>4.3</b>	<b>90-100</b>
<b>A</b>	<b>4.0</b>	<b>80-89</b>
<b>A-</b>	<b>3.7</b>	<b>75-79</b>
<b>B+</b>	<b>3.3</b>	<b>70-74</b>
<b>B</b>	<b>3.0</b>	<b>65-69</b>
<b>B-</b>	<b>2.7</b>	<b>60-64</b>
<b>C+</b>	<b>2.3</b>	<b>55-59</b>
<b>C</b>	<b>2.0</b>	<b>50-54</b>
<b>F1</b>	<b>1.7</b>	<b>45-49</b>
<b>F2</b>	<b>1.3</b>	<b>40-44</b>
<b>F3</b>	<b>0.0</b>	<b>0-39</b>

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