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

Name	Office address	Email address	Office hours
Dr Regan Deonanan (Coordinator)	FSS 107 – Room 10	Regan.Deonanan@sta.uwi.edu	Mon. & Tues. 9:30–11:00am
Dr Ricardo Lalloo	FSS Room 222	Ricardo.Lalloo@sta.uwi.edu	Tues. & Thurs. 9:00-10:00am and 1:00-2:00pm

COURSE DESCRIPTION

The course is organized around three (3) areas of Introductory Mathematics for the Social Sciences: Functions, Matrices and Calculus. Significant linkages exists 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

Assessment Type	Course Learning Outcomes								Weight %	Details	Duration
	1	2	3	4	5	6	7	8			
Pre-tests	X	X			X			X	6%		20 minutes
Midterm Exam	X	X	X	X	X	X	X	X	30%		1.5 hours
Online Quiz	X	X	X	X	X	X	X	X	4%		1 - 2 hours
Final Examination	X	X	X	X	X	X	X	X	60%		2 hours

Each student is required to complete a **Diagnostic Exercise** prior to the start of **Week #2**. This exercise will provide students with an opportunity to revisit concepts and methods captured in the MPT and/or ECON0001 as listed below. Each student is required to complete the ECON0001 final exam past paper (from the semester prior to that of enrolment in this course) before the first lecture. This exercise will provide students with an opportunity to revisit fundamental concepts and methods needed for the smooth delivery of ECON1003. These key areas are as follows:

1. Positive and Negative Integers
2. Fractions, Positive and Negative Real numbers
3. Powers and Indices
4. Addition, Subtraction, Multiplication & Division of Integers, Real Numbers, Fractions & Powers
5. Order of Operations – Brackets, Powers, Multiplication, Division, Addition & Subtraction
6. Cross Multiplication of Fractions
7. Inequality Signs
8. Algebraic Expressions
9. Substitution into an algebraic expression
10. Addition, Subtraction, Multiplication and Division of Algebraic Expressions
11. Solution of Simple Equations in one variable
12. Construction of a Graph.

Students will be required to complete **Pre-tests** for each topic covered in the course. These exams will be administered via MyElearning and will be issued before the topic is formally introduced in lectures. These exams will require that the student read the relevant material prior to attempting them.

Students will be continuously assessed by way of a **Midterm Exam** which will be administered

during the semester (see course schedule for dates). The questions that comprise the exam will be based on the topics covered in the lectures over the previous weeks and the corresponding tutorial assignments. Solutions will be posted on the course website following the return of graded scripts.

Students who are absent from any of these Exams will only be afforded a Make-Up exam if that student has a valid medical reason/event for their absence. The excuse must be validated via a Medical Certificate or Police Report which the student must present to their relevant lecturer. *A student who desires to write a Make-Up exam must inform their lecturer of their absence within 24 hours of missing the exam*.

Students are reminded that they must sit for In-Class Tests in the section to which they are registered. Any attempt to sit for these exams in another section (without the prior documented approval of a member of the ECON 1003 Team) will be treated as an act of academic dishonesty and dealt with according to University policy. Please review the handbook on *Examination Regulations for First Degrees, Associate Degrees, Diplomas, and Certificates* available via the Intranet.

We continue to encourage students to make use of all resources provided by the department for this course. As such, students may attend alternative lectures on in -class exam days but must leave the exam room prior to the start of the exam and remain outside the exam room for the duration of the in-class exam.

Students must be prepared for an **online quiz** to be done on Myelearning during Week #12 of the semester; it will be based on Differentiation and the Applications of Differentiation. Any technical glitches experienced by students during an online quiz must be reported to the CITS helpdesk for investigation and confirmation.

TEACHING STRATEGIES

The course will be delivered by way of lectures, in-class problem solving activities, tutorials, myeLearning resources and consultations during office hours.

Attendance at all 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. The Course Lecturers will be enforcing this **regulation**.

COURSE SCHEDULE

During Weeks 11 and 13, students registered for the Monday lecture session are required to attend either the Tuesday or Saturday lecture, due to the public holidays.

Week	Content	Resources	Assignments Due
1	Self-review of ECON0001 Final Exam past paper; (No Classes)	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	Exponential and Logarithmic Functions (Carnival Monday and Tuesday - No Classes)	Course textbook and myeLearning notes/videos; Tutorial session 4	Tutorial Sheet 3
7	Sequences and Series	Course textbook and myeLearning notes/videos; Tutorial session 5	Tutorial Sheet 3; Pre-Test 4
8	Complex Numbers; Limits and Continuity Midterm Exam (to be held outside of class time – see note at end of table)	Course textbook and myeLearning notes/videos; Tutorial session 6	Tutorial Sheet 4
9	Differentiation	Course textbook and myeLearning notes/videos; Tutorial session 7	Tutorial Sheet 5; Pre-Test 5

10	Applications of Differentiation	Course textbook and myeLearning notes/videos; Tutorial session 8	Tutorial Sheet 6; Pre-Test 6
11	Matrix Algebra (Students of the Monday class are required to attend either the Tuesday or Saturday lecture)	Course textbook and myeLearning notes/videos; Tutorial session 9	Tutorial Sheet 7; Pre-Test 7
12	Matrix Algebra (continued); Graded Online Quiz	Course textbook and myeLearning notes/videos; Tutorial session 10	Tutorial Sheet 8
13	Course Wrap Up – Review of Past Paper (Students of the Monday class are required to attend either the Tuesday or Saturday lecture)	Course textbook and myeLearning notes/videos; Tutorial session 11	Tutorial Sheet 8

The Midterm Exam will be held during Week 8 of the course calendar. The Exam will be held outside of class, during an evening period from 5:00pm or later. The venue will be announced during the semester and posted on MyElearning. The Exam will be 1.5 hours long.

ASSIGNMENTS

Students are required to attempt all questions on tutorial sheets prior to attending 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
T*an 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
T*an 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.

- **EXAMINATION POLICY**

Students are required to submit coursework by the prescribed date. Coursework will only be accepted after the deadline, in extenuating circumstances, with the specific written authority of the course lecturer and in any event, not later than the day before the start of the relevant end of semester examinations of the semester in which the particular course is being offered.
Please review the handbook on *Examination Regulations for First Degrees, Associate Degrees, Diplomas, and Certificates* available via the Intranet.

- **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 and actively take notes and attempt in-class problems. 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

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