RICHMOND
THE AMERICAN INTERNATIONAL
UNIVERSITY
IN LONDON

Richmond Business School

Course: **MTH 3111A Functions and Applications**
Semester: **Spring 2020**
Instructor: **Saad Tahir**
Class Location: **Richmond Campus, Taylor Library Building, LEC2**
Class Meeting Times: **Monday and Wednesday: 10:30 am – 11:50 am**
Office: **Adjunct Office, Taylor Library Building**
Office Hours: **By Appointment**
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Email: **tahirs@richmond.ac.uk**
VLE (Virtual Learning Environment): Blackboard is accessed via the portal (https://my.richmond.ac.uk)

This syllabus should be read in conjunction with the Course Specification Document from which it is derived; the *University Catalogue*; and the relevant Programme Specification (all accessed via the admitted students section of the University's website http://www.richmond.ac.uk)

Course Description:
This course is designed to provide students with the necessary mathematical background for calculus courses and its applications to some business and economics courses. It covers the fundamentals of real-valued functions, including polynomial, rational, exponential and logarithmic functions and introduces students to the concepts of derivative and integral calculus with its applications to specific concepts in micro- and macro-economics

Prerequisites:
MTH 3000 (or mathematics assessment exemption)

Aims and Objectives:
The aim of this course is to provide the necessary mathematical skills for more advanced mathematics courses as well as some business and economics courses and to give students the opportunity to investigate a range mathematical applications, including business, economics, and the social and life sciences.

Learning Outcomes:

- Understand the fundamental concepts of algebra including exponents and radicals; factorising polynomials and solving inequalities
  ***Threshold criteria*:** can simplify algebraic expressions involving exponents and radicals and factorize polynomials using a range of techniques and solve linear and non-linear inequalities
  Assessment method: To be assessed in in-class quizzes, Mid-Term Assessment and Final exam
- Understand functions and can solve standard problems using a library of functions
  ***Threshold criteria*:** can find the composite and the inverse of functions; be able to analyze linear, quadratic, rational, exponential and logarithmic functions
  Assessment method: To be assessed in in-class quizzes, Mid-Term Assessment and Final exam

- Understand graph of functions and can graph different types of functions
  ***Threshold criteria*:** Be able sketch the graph of a variety of functions, from linear to higher degree polynomial, exponential and logarithmic
  Assessment method: To be assessed in in-class quizzes, Mid-Term Assessment and Final exam
- Understand simple derivatives and integration and its applications
  ***Threshold criteria*:** can calculate derivatives and simple integrals of a range of functions and apply these concepts to solve examples
  Assessment method: To be assessed in in-class quizzes, Mid-Term Assessment and Final exam
- Understand how the concepts of functions apply in a Business and Economic context
  ***Threshold criteria*:** Use mathematical frameworks to correctly solve problems in Business and Economics
  Assessment method: To be assessed in in-class quizzes, Mid-Term Assessment and Final exam

Programme Outcomes: Ai, Bi, Ci

Programme outcomes are listed in the programme specifications found at
http://www.richmond.ac.uk/admitted-students/programme-and-course-specifications/

Course Schedule Summary (optional):

- Exponents and radicals; factoring polynomials
- Solving linear and non-linear inequalities
- Functions: transformation; combination; composition and inverse
- Graphing of functions
- Quadratic, rational, exponential and logarithmic functions
- Exponential and logarithmic equation and models
- Derivatives and integration with applications to Business and Economics

Teaching Methods:
Course material is presented and analysed in the following ways:
a) Formal presentation of topics and worked exercises.
b) Self-learning assignments and directed mathematical exercises.
c) Participation in individual and group investigations.
d) Where appropriate, students will be introduced to solution aids, such as hand-held calculators, mathematical tables and computer software.

Assessment Criteria:
The module is evaluated as follows:

Summative Assessment Items	**Weighting**
8 In class Quizzes	40%
Mid-Term Exam	20%
Final Exam	40%

All assessment criteria conform with Math Assessment Norms found at
https://my.richmond.ac.uk/myacademics/default.aspx).

This class follows the Late Submission of Coursework Policy and Feedback Norms outlined below and found at https://my.richmond.ac.uk/myacademics/default.aspx

Marking Scheme:

There will be variations within the grade band that will be recorded using +/- qualifiers.

Descriptor	Grade	GPA	Detailed Descriptor
Excellent	A A-	4.0 3.7	**Grade A applies only to work which:** • is of excellent to exceptional standard • demonstrates in-depth knowledge and understanding • demonstrates substantial work and original thought has been involved • makes use of very high quality analysis, synthesis, evaluation and critical appraisal • is organised and structured to a high standard
Good	B+ B B-	3.3 3.0 2.7	**Grade B applies to work which:** • is of good to very good standard • demonstrates sound and good quality of knowledge and understanding • demonstrates good quality analysis, synthesis, evaluation and critical appraisal • indicates an increasing ability to incorporate meaning into the work and understand key theories, debates and criticisms • is well organised and structured
Satisfactory C ----------	C+ --------	2.3 2.0 -----	**Grade C applies to work which:** • is adequate although undeveloped • fulfils the requirements of the project at a foundation level in terms of its quality, analysis and expression • limited level of research and understanding of key theories and debates • is organised and presented in a satisfactory form ----------
Below Average	C-	1.7	• falls below the threshold criteria • demonstrates limited knowledge and understanding • demonstrates minimal attention to quality, range, and appropriateness of research • normally passing grade at course level
Minimal Achievement D D-	D+ 	1.3 1.0 0.7	**Grade D applies to work which:** • is of a poor standard • has been produced without a proper understanding of the brief demonstrating confusion • is weak in content and shows little evidence of thought or application • relies on weak or superficial technique • incorporates insufficient research and/or inappropriate sources • is organised and presented poorly • normally passing grade at course level
Fail	F	0	**Grade F applies to work which:** • is of very poor standard • has not been submitted or has been submitted beyond the project deadline • shows a complete lack of content, thought or application • makes no or insufficient use of analysis and relevant skills • is the product of academic misconduct • does not fulfil the brief • failing grade at all levels

There will be variations within the grade band that will be recorded using +/- qualifiers.

Other Academic information:

The Math Workshop is available to all students who need help with mathematics. Venues and times are posted towards the end of the first week of the semester in course outline and in Blackboard.

Required Texts:

1. Larson, R., Falvo, D.C., "Precalculus" CENGAGE Learning, 8th Edition, 2011.
2. Hoffmann, L., Bradley, G., Sobecki, D and Price, M., "Applied Calculus for Business, Economics and the Social and Life Sciences" McGraw-Hill, Eleventh Edition, 2013.

Recommended Reading:

Other occasional hand-outs will be distributed in class and made available through blackboard

Full Course Schedule

Week 1: **Fundamental Concepts of Algebra:** Real numbers and their properties; Exponents and Radicals; Polynomials and Factoring; Rational expressions; Introduction to solving equations; and Linear inequalities of one variable.

Week 2: **Introduction to Functions:** Definition of Functions; Representation of Functions and Function Notations; Vertical Line Rule, Piecewise Defined Functions and Domain of Functions.

Week 3: **Analyzing Functions:** Transformation of Functions, Combination of Functions; Composite and Inverse Functions; Horizontal Line Rule. **(Quiz 1)**

Week 4: **Graphing Functions**: Graphing the Linear and Quadratic functions. Rational Functions **(Quiz 2)**

Week 5: **Library of Functions:** Exponential Functions and Graphs; Logarithmic Functions and Graphs; Properties of Logarithms; Connection Between Exponential & Logarithmic Functions. **(Quiz 3)**

Week 6: **Nonlinear Inequalities**: Solving Polynomial Inequalities; Rational Inequalities**. (Quiz 4)**

Week 7: **Revision and Mid-Term Assessment.**

Week 8: **Fall Break/ Tutorial week.**

Week 9: **Exponential and Logarithmic Equations:** Solving Exponential Equations; Solving Logarithmic Equations; Exponential and Logarithmic Models. **(Quiz 5)**

Week 10: **The Derivative:** Definition of Derivative as Gradient; Derivative as a Rate of Change; Techniques of Differentiation (Power Rule, Chain Rule, Product and Quotient Rule). **(Quiz 6)**

Week 11: **Applications of Derivatives:** Applications of Derivatives in: Supply and Demand; Marginal Analysis; Price Elasticity; Marginal Utility Functions and Marginal Propensity. ***(Quiz 7)***

Week 12: **Integration**: The Indefinite and Definite Integral and its Applications to Economics: Future Value and Present Value of an Income Flow; Consumers' Willingness to Spend; Consumers Surplus; Producers Surplus. **(Quiz 8)**

Week 13: Applications to Business & Economics. Further applications to Business & Economics

Week 14: **Revision**

Week 15: **Final Examination**

REASONABLE CHANGES MAY BE MADE TO THE CONTENT OF THE SYLLABUS. STUDENTS WILL BE INFORMED IN WRITING OF ANY SUCH CHANGES.

All grades are subject to confirmation at the University Examination Board.

Academic Policies (see also the *University Catalogue* and the policies detailed at:
https://my.richmond.ac.uk/Uniorg/policies_and_procedures/default.aspx**)**

Students must read and comply with all the requirements of the regulations and policies listed at the web links below. Students are expected to make themselves aware of the requirements of the Attendance Policy, the Lateness to Classes, Examinations Policy, the Late Submission of Coursework Policy and Exceeding Word Limit and Question Choice policy at the beginning of the semester.

Academic Dishonesty:

Academic dishonesty is *any action by which a student in any academic exercise seeks to: claim credit for the intellectual or artistic work of another person; or uses unauthorized materials or fabricated information; or engages in an unauthorized editing process.*

You can find a list of the actions that might lead to you committing academic dishonesty on the web pages. If you are not sure about what would constitute dishonesty after reading the full policy details you should ask for more information from the course instructor, your academic advisor, another member of academic staff, the Writing Centre, or Student Affairs.

Full details of Richmond's Academic Dishonesty policy are found at:
https://my.richmond.ac.uk/myacademics/default.aspx

Students who are academically dishonest will receive a penalty for the work in question or the course (which may in turn impact upon their degree classification), depending on the importance of the work to the overall course grade and the judgment of the instructor and the relevant exam board.

Contract Cheating
Contract cheating is defined as the submission of course work written on behalf of the student by a third party, or the taking of an exam for a student by a third party, and is taken very seriously by the University. Students proven to have engaged in such practices will be dealt with according to the strongest possible penalty, which may include expulsion from the University.

The Richmond Attendance Policy
Full details of Richmond's attendance and lateness policies are found at:
https://my.richmond.ac.uk/myacademics/default.aspx

Absence Recording:
Attendance is taken by instructors in on-line registers within the University's student records system during each course session and entered into the Self-Service record within 24 hours of each class.

Registers are updated as students add and drop courses, and attendance in all courses is taken from the first day the student registers for that course, including Add/Drop week.

Attendance is recorded at the beginning of the class session (see the University policy on Lateness to Classes). Any student not present in the class when attendance is taken is officially late for the session and must be marked as absent.

A student who enters within the first 20 minutes of a teaching session, but after attendance has been taken and an absence has been registered, is responsible for alerting the lecturer to their presence and negotiating a change to an attendance entry. Changing an entry is entirely at the discretion of the instructor.

Students may review their attendance record for their courses at any time in their Self-Service accounts and are expected to remain alert to the number of their absences.

Every absence from class, regardless of reason, is recorded as Unexcused.

The University is obliged to report to UK Visas and Immigration (UKVI) any student who is in the UK on a Tier 4 visa but who is not attending classes.

Late submission of academic work:
Any item of work submitted late will be subject to an automatic deduction of one increment on the letter grade scale (e.g. the grade will be reduced from B to B-, or from C- to D+) per day. Any coursework submitted more than one week (seven days) after the original deadline will receive a grade of F. Where there may be mitigating circumstances for the late submission the instructor must be informed in advance, by email, and evidence provided to the instructor *in writing* when the course work is submitted.
See the full late submission policy at: **https://my.richmond.ac.uk/myacademics/default.aspx**

Exceeding Word Limit and Question Choice:
The word limit is defined as the uppermost word limit in a range given to an assignment. Assessments are designed to enable the student to answer the assignment without going over the word limit. Penalties will be given for work that excessively exceeds the word limit. There is a 10% leeway before penalties apply.

See penalties and full policy at: **https://my.richmond.ac.uk/myacademics/default.aspx**

Feedback Norms:
The university has defined expectations as to the nature and timeliness of feedback on assigned work. Students should make themselves aware of these norms, and they are located on the portal at: **https://my.richmond.ac.uk/myacademics/default.aspx**

Examination Regulations:
Guidance on examination regulations and expected behavior for students is on the Academic Registry page of the Student Portal **(https://my.richmond.ac.uk/registration/exams/default.aspx).** However, please note particularly the following University Policies:

Midterm exams are normally held during the designated weeks published in the academic calendar found in the relevant ***University Catalogue*.** Any faculty member wishing to hold a midterm on a different date requires the approval of the Dean, and will inform students accordingly.

Final exams are held over a five-day period following the last day of classes in the Fall and Spring semesters. Exams are not held in the same timeslots as class sessions. The dates of the official exam period are published in advance in the official academic calendar (see link above). Students are responsible for remaining in London until the end of the official examination period – the university reserves the right to make any necessary changes to the schedule. Any such changes to the schedule will be centrally-administered by the Academic Registry and reported to students.

Students and instructors may not make private arrangements to reschedule any University exams. Requests for an opportunity to re-sit must be made by petitioning the Academic Progress Committee **https://my.richmond.ac.uk/registration/forms/default.aspx .**

Final examinations in summer sessions take place on a single day following the last day of classes. Students must bring their Richmond student ID card to every examination.

Academic support for studies:
The University Writing Center and Language Workshop are available to all students who want help with academic tasks. The University Mathematics Workshop is available to all students who need help with academic mathematics. Venues and times for these workshops are posted towards the end of the first week of the semester, and can be found under "Support for your studies" at **https://my.richmond.ac.uk/registration/procedures/SitePages/Home.aspx**

Library staff can help students with questions about research and/or accessing information. Book an appointment with a librarian **(librarian@richmond.ac.uk).**

Students with Additional needs:
The University makes a variety of special provisions in exams and assessment for students with a diagnosed learning disability. Students must follow the requirements outlined at **http://www.richmond.ac.uk/student-life/support-for-students-with-disabilities/** for these arrangements to be made, and it is important that this is done in good time. The student and their instructors are informed of the provisions after they are approved, and reminders are sent to students and invigilators shortly before the examinations.