Vesalius College
Brussels

VESALIUS COLLEGE
Spring 2016

MTH140G: Mathematics for Business and Economics

Number of ECTS credits: 6

One ECTS credit represents about 27.5 hours of work, so the workload for a 6 ECTS credits course is about 165 hours, or - spread over 15 weeks - 11 hours per week. This includes the class meetings (three hours per week), so I expect you to work for this class eight hours per week outside class.

Contact Details for Professor:

Instructor: ir. Philippe Leliaert, MSc MBA

Office:	Pleinlaan 5	
Class Hours:	Tuesday	16:30-18:00
	Thursday	16:30-18:00
Office Hours:	Tuesday	18:00-19:00 (by appointment)
	Thursday	18:00-19:00 (by appointment)

Email: philippe.leliaert@telenet.be
please put "MTH140" in the subject line
Telephone: +32 475 713 823 (only if urgent)

Course Prerequisites

Familiarity with algebraic notation: adding, subtracting, multiplying, and dividing fractions. Basic use of MS Excel or other spreadsheet program. Use of a handheld calculator (with LOG or LN, and EXP or e^x function).

Attendance is mandatory.

Classes are interactive in the sense that students will be required to complete exercises and solve problems during class, either individually or in small groups, and present their results or solutions. If you are not prepared to commit to the functioning of the course, you are advised see your advisor immediately.

Learning Objectives

After completing this course, students should have the minimal mathematical skills required for solving problems in a wide range of business disciplines including economics, finance, operations management. Specifically, this course lays the mathematical foundation for Finance and Economics courses, including ECN201 Intermediate Macroeconomics and ECN311 Intermediate Microeconomics, BUS221G Corporate Finance.

Excluded from this course are descriptive and inferential statistics, which are covered in a separate course.

Below are the exact learning objectives, and an illustration of how they are achieved and evaluated.

Major Learning Objectives	Course Learning objectives addressing the Major Objectives (choose the most important ones that your course actually addresses)	Methods used to Teach Course Objectives	Methods (and numbers/types of assignments) used to test these learning objectives	Type, Timing and Numbers of Feedback given to Student
The bachelor is able to work in a multi-cultural team.	Project teams to complete the client-based research project.	A small team of 5 students will be compiled of multicultural members.	Students will research their given topic to a high standard, which includes project, defense, and project presentations. This future can be seen through group work. Midterm and final reflection report.	Students receive feedback from the instructor, the defense committee, and the client. Feedback will be provided.
The bachelor recognizes the importance of life-long learning.	There will be multi-disciplinary perspective in his analysis of Business.	All concepts are revisited during course lectures to ensure comprehensive knowledge base.	There is a final reflection paper due, for self reflection and evaluation. This future can be seen through group work. Midterm and final reflection report.	The reflection report on their academic career and how they will progress in their future. Feedback will be provided.
The bachelor is able to communicate clearly, fluently and accurately; as well in a written report as in an oral presentation.	How to structure and compose an academic essay, based on alternative and oft-conflicting theoretical approaches.	Preparation for their project defense, and presentation exercise.	This class assesses both oral and written expression, through a variety of written and oral assignments, which include final project defense, and client presentation. There will be three formal presentations, and weekly classroom discussion This future can be seen through group work. Midterm and final reflection report.	. Feedback will be provided.
The bachelor knows and is able to apply common qualitative and quantitative research methods and is able to apply these in the field of business studies.	The leaner will gain a better understanding of the use of research methodology through the utilization of research knowledge.	Students will work together to establish and deliver a research project that illustrates the foundation of research knowledge and comprehension.	Students will research their given topic to a high standard, which includes project, defense, and project presentations. This future can be seen through group work. Midterm and final reflection report.	Students receive feedback from the instructor, the defense committee, and the client. Feedback will be provided.
The bachelor has an open and academic attitude characterized by accuracy, critical reflection and academic curiosity.	Students will engage in understanding the need to critically evaluate their personal behavior. This will be reflected in critical thinking, inquiry, and reflection.	All concepts are revisited during course lectures to ensure comprehensive knowledge base.	There is a final reflection paper due, for self reflection and evaluation. This future can be seen through group work. Midterm and final reflection report.	The reflection report on their academic career and how they will progress in their future. Feedback will be provided.

Course Description

This course teaches the mathematical skills required for problem solving and decision making in the business world through the use of mathematical models and specialised techniques. Topics include: functions as mathematical models, equation-solving techniques, differential and integral calculus, exponential growth and time-value of money, partial derivatives and their applications in economic functions, and (time permitting) simple matrix algebra.

Students will also learn how best to present data and numerical information.

Course Textbook (Required):

Jacques, I (2010) Mathematics for Economics and Business, 6th ed.
ISBN-10 0273743295, ISBN-13 978-0273743293

Note: this is not the latest edition of this particular book, but as such you should be able to buy this (e.g. on Amazon.co.uk or Amazon.de) at a substantially lower price (around GBP27) than later editions (which cost GBP50 or more). Whichever edition you buy, the core text will be substantially the same, and I will post all exercises online.

Grading Scale of Vesalius College

Vesalius College grading policy, in line with the Flemish Educational norms, is now as stated follows:

Grade	Scale of 20	Scale of 100
A	17.0-20.0	85-100
A-	16.1-16.9	81-84
B+	15.3-16.0	77-80
B	14.5-15.2	73-76
B-	13.7-14.4	69-72
C+	13.1-13.6	66-68
C	12.3-13.0	62-65
C-	11.5-12.2	58-61
D+	10.7-11.4	54-57
D	10.0-10.6	50-53
F	Below 50	0-49

Letter grade	Scale of 20	Scale of 100	Rationale of grading
A	17.0-20.0	85-100	An excellent work, which demonstrates advanced knowledge of empirical background and theoretical/conceptual frameworks. The work is underpinned by an outstanding capacity for learning, mastering of relevant literature and ability to gather and independently assess relevant sources beyond required levels of reading. The proposed analysis draws on solid, critical and original analytical skills and ability to relate theoretical knowledge to empirical cases. The work is well communicated and demonstrates a pertinent and original ability to communicate complex dynamics. The bibliographic and referencing systems are correct.
A-	16.1-16.9	81-84	A refined piece of work, which demonstrates advanced knowledge of both empirical background and theoretical and conceptual frameworks. The work is underpinned by a good learning attitude; ability to master relevant theoretical literature and coherent attempt to apply this literature to empirical phenomena. Strong critical ability and successful attempt to pursue an original analysis. Adequate reading levels and ability to communicate key findings in an effective way. However, weaknesses can be identified in terms of language, referencing, depth of sources, profundity of analysis and/or organisational structure.
B+	15.3-16.0	77-80	A good piece of work, sustained by adequate analytical skills. It demonstrates good level of understanding of the relevant theoretical literature and critical ability to apply these frameworks to the topic at hand. Written and oral expression is overall correct, the referencing and bibliographic systems are overall correct. The work could be further improved (minor flaws in the structure of the argument; minor theoretical lacuna), but it remains nonetheless a good piece of work.
B	14.5-15.2	73-76	An adequate work, which overall meets the requirement of the assignment. It demonstrates a fairly good level of knowledge of both empirical background information and provides some analytical framework. The work meets the requirements of the assignment in terms of mastery of the literature and learning outcomes. Language, reference and bibliographic systems are generally correct although perhaps with some weaknesses. The work could be significantly improved (e.g. flaws in the organisational structure; limited number of sources; clarity and accuracy of language; theoretical/conceptual lacuna; sub-optimal focus/coherence of argument).
B-	13.7-14.4	69-72	The work meets the basic requirements specifically demanded for the assignment. It shows the attempt to relate with relevant theoretical literature and to apply theoretical frameworks to the analysis of real-life cases. The work, however, does not adequately engage with the critical assessment of either relevant theoretical frameworks or the topic at hand. The work is marked by some combination of flaws in the organisational structure of the paper; theoretical/conceptual lacuna; sub-optimal focus or coherence of the argument; clarity and accuracy of language and/or inappropriate selection of sources.
C+	13.1-13.6	66-68	The work meets the requirements of the assignment in a sufficient way, but does so in an imprecise and incomplete manner. It shows basic knowledge of both theoretical frameworks and the topic at hand. The proposed analysis is marked by some flaws (e.g. poor structure, theoretical or conceptual coherence; limited analysis; basic engagement with the literature).
C	12.3-13.0	62-65	The work engages with the assignment and meets the requirements in a somehow satisfactory, but it is marked by several pitfalls. The work lacks focus, it is poorly structured; it is not sufficiently embedded in the literature; it uncritically tackles the topic at hand. The argument is hard to follow and the referencing and bibliographic systems are overall incorrect.
C-	11.5-12.2	58-61	The work does not meet the requirements of the assignment. It engages with the question, but does so in a basic and inadequate way. The work is undermined by several pitfalls. It shows a basic understanding of the module requirements and is jeopardised by major flaws including (but not confined to) a lack of coherence, loose expression, poor coverage of the literature; poor referencing; scant ability to critically assess the topic at hand.
D+	10.7-11.4	54-57	The work does not meet the requirements of the assignment. It attempts to address the question, but it remains unfocused and loosely structured. There is an evident lack of reading and scant ability to relate to relevant literature and to engage critically with the topic at hand. Language is poor; the referencing and bibliographic system is incorrect or incomplete.
D	10.0-10.6	50-53	The work is marked by serious flaws and below an acceptable level. The rationale of the assignment is not understood nor addressed. The work demonstrates insufficient understanding of the topic at hand and learning outcomes below the required level. The answer is unfocused; expression is unclear; there are severe flaws in the coherence of the argument; engagement with the literature is minimal, referencing is often poor.
F	0-9.9	0-49	The work does not meet any of the requirements and learning objectives of the course and the Major. The argument is loose, language is poor, no knowledge of relevant theoretical and empirical dynamics. Incorrect or incomplete reference systems and/or likely instances of plagiarism.

Course Assessment

Students will be evaluated on the basis of their performance in the following areas:

- spot tests/exercises 10%
- 4 assignments 4 x 5% = 20%
- Midterm Exam 30%
- Final Exam 40%

Spot tests/exercises ("pop-quizzes"):

At my discretion, I will ask the students a short spot test/exercise typically at the start of a session, which will cover the textbook material that students were required to prepare (read) prior to class OR the material covered in the preceding session.

These spot tests will in aggregate account for **10%** of your final grade.

Assignments:

There will be 2 assignments in each half of the course, i.e. 2 assignments before and 2 after the midterm exam. These will either be individual or group assignments depending on the nature of the task. Selected students will be asked to present their results or solutions at the start of the next session.

Each assignment carries **5%** of your final grade. The four assignments together account for **20%** of your final grade.

Late Assignments are not accepted! They will be graded F.

Midterm Exam:

The midterm exam will cover all the topics covered in class during the first six (6) weeks of the term. The exam consist of a number exercises, similar to those discussed in class or given as assignments.
The Midterm Exam accounts for **30%** of the final grade. Rubrics can be found in the appendix section of this syllabus.

Final Exam:

The final exam will cover all the topics covered in class during the last six (6) weeks of the term. The exam consist of a number exercises, similar to those discussed in class or given as assignments.
The Final Exam accounts for **40%** of the final grade. Rubrics can be found in the appendix section of this syllabus.

Exam & Assignment Grading Criteria - Rubrics

description	Excellent (A)	Good (B)	Fair (C)	Poor (D-F)
Understanding	• The solution shows a deep understanding of the problem including the ability to identify the appropriate mathematical concepts and the information necessary for its solution. • The solution completely addresses all mathematical components presented in the task. • The solution puts to use the underlying mathematical concepts upon which the task is designed.	• The solution shows that the Student has a broad understanding of the problem and the major concepts necessary for its solution. • The solution addresses all of the mathematical components presented in the task.	• The solution is not complete indicating that parts of the problem are not understood. • The solution addresses some, but not all of the mathematical components presented in the task.	• There is no solution, or the solution has no relationship to the task. • Inappropriate concepts are applied and/or procedures are used. • The solution addresses none of the mathematical components presented in the task.
Strategies, Reasoning, Procedures	• Uses a very efficient and sophisticated strategy leading directly to a solution. • Employs refined and complex reasoning. • Applies procedures accurately to correctly solve the problem and verify the results. • Verifies solution and/or evaluates the reasonableness of the solution. • Makes mathematically relevant observations and/or connections.	• Uses a strategy that leads to a solution of the problem. • Uses effective mathematical reasoning. • Mathematical procedures used. • All parts are correct and a correct answer is achieved	• Uses a strategy that is partially useful, leading some way toward a solution, but not to a full solution of the problem. • Some evidence of mathematical reasoning. • Could not completely carry out mathematical procedures. • Some parts may be correct, but a correct answer is not achieved.	•No evidence of a strategy or procedure, or uses a strategy that does not help solve the problem. • No evidence of mathematical reasoning. • There were so many errors in mathematical procedures that the problem could not be solved.
Communication	• There is a clear, effective explanation detailing how the problem is solved. All of the steps are included so that the reader does not need to infer how and why decisions were made. • Mathematical representation is actively used as a means of communicating ideas related to the solution of the problem. • There is precise and appropriate use of mathematical terminology and notation	• There is a clear explanation. • There is appropriate use of accurate mathematical representation. • There is effective use of mathematical terminology and notation.	• There is an incomplete explanation; it may not be clearly presented. • There is some use of appropriate mathematical representation. • There is some use of mathematical terminology and notation appropriate of the problem.	• There is no explanation of the solution, the explanation cannot be understood or it is unrelated to the problem. • There is no use or inappropriate use of mathematical representations (e.g. figures diagrams, graphs, tables, etc.). • There is no use, or mostly inappropriate use, of mathematical terminology and notation.

Pop-Quiz Grading Criteria - Rubrics

Points	If…
5	The student clearly understands how to solve the problem. Minor mistakes and careless errors can appear insofar as they do not indicate a conceptual misunderstanding.
4	The student understands the main concepts and problem-solving techniques, but has some minor yet non-trivial gaps in their reasoning.
3	The student has partially understood the problem. The student is not completely lost, but requires tutoring in some of the basic concepts. The student may have started out correctly, but gone on a tangent or not finished the problem.
2	The student has a poor understanding of the problem. The student may have gone in a not-entirely-wrong but unproductive direction, or attempted to solve the problem using pattern matching or by rote.
1	The student did not understand the problem. They may have written some appropriate formulas or diagrams, but nothing further. Or, they may have done something entirely wrong.
0	The student wrote nothing or almost nothing.

Additional Course Policies

1. Use of Electronics:

A. This course, due to its nature, heavily relies on the use of a **calculator**. Students should bring to all classes a calculator that is capable of logarithmic (LOG or LN buttons) and exponential (EXP or e^x button) functions. Students must be able to use their calculators, as there is no time during the course to learn how to use these.

Note: The use of calculators is permitted and in fact essential during both midterm and final exams. Make sure to bring spare batteries. Students must not rely on using the calculator function on their mobile phones since the latter are not permitted during exams.

B. Given the nature of the course, certain exercises require the use of **computers**. Students that do not have a computer will be paired with others that do. However, the use of computers (incl. tablets, smartphones) is prohibited for any purposes other than solving exercises. Specifically, all email and social media applications must be switched off. Any offenders will be asked to leave the class immediately and lose all points for the day (including spot tests).

Note that the use of computers will <u>not</u> be allowed during midterm & final exams.

C. **Mobile phones** are to be turned <u>off</u> (not: silent mode). If your mobile phone rings in class please turn it off immediately. If you are caught talking on your mobile or texting during class you will be asked to leave the class immediately and lose all points for the day (including spot tests).

2. Attendance

Class attendance will be checked at the start of each session. Students are not allowed to enter class as soon as the door is closed. No students will be admitted later than 15 minutes after the start of the session.

3. Exams

Midterm and Final Exams will be "*closed book*". Students may use a calculator. Students may not use mobile phones or tablets (in lieu of calculator). Students are not allowed to pass materials (incl. calculators) to others during the exam.

Students are not allowed to leave the classroom during the exam. In case of an emergency, another member of faculty or administration must escort the student out of the classroom.

If students finish their exam before the final 15 minutes of the exam session, they will be permitted to leave. If not, students must remain seated during the last 15 minutes of the exam and wait until the completion of the exam session.

If a student if found to be cheating, the result is an immediate F grade, and the instructor is required to report the student to the Student Conduct Committee.

Academic Honesty Statement

1. Academic dishonesty is **NOT** tolerated in this course.

2. Academic honesty is not only an ethical issue but also the foundation of scholarship. Cheating and plagiarism are therefore serious breaches of academic integrity.

3. Following the College policy, cheating and plagiarism cases will be communicated in writing to the Associate Dean for Students and submitted to the Student Conduct Committee for disciplinary action.

4. If you refer to someone else's work, appropriate references and citations must be provided. Grammar, spelling and punctuation count, so use the tools necessary to correct before handing in assignments.

Course Schedule

Week 1 January 19&21
Introduction to the Course
Introduction to Mathematics for Business and Economics
Repetition of basic algebra, linear equations, slopes
Course Textbook: Pages 18-39

Week 2 January 26&28
Linear equations, multiple equations
Supply-Demand Curves, Market Equilibrium
Course Textbook: Pages 39-98

Week 3 February ~~2&4~~
Non-linear equations, Parabolic functions
Course Textbook: Pages 129-158

Week 4 February 9&11
Exponential and logarithmic functions
Course Textbook: Pages 159-193

Week 5 February 16&18
Mathematics of Finance
percentages, compound interest
geometric and arithmetic series
Course Textbook: Pages 195-258

Week 6 February 23&25
Effectively presenting data and quantitative information

Gene Zelazny (1985), Say it with Charts, Library of Congress

Week 7 March 1 Tutorial
March 3 **Mid Term Exam**

Week 8 March 8&10
Differential calculus: first and second derivatives
Course Textbook: Pages 261-298, 357-368

Week 9 March ~~15&17~~
Differential calculus: chain rule
Course Textbook: Pages 299-356

Week 10 March 22&24
Partial differentiation
Course Textbook: Pages 369-414

Spring Break March 28- April 8

Week 11 April 12&14
Optimisation problems
Course Textbook: Pages 415-441

Week 12 April 19&21
Method of Lagrange
Course Textbook: Pages 442-454

Week 13 April 26&28
Integration
Course Textbook: Pages 455-486

Week 14 May 3 Tutorial
May 5 **No Class Public Holiday**

Week 15 **May 10 or 12** Final Exam