

MATHEMATICS FOR BUSINESS & ECONOMICS

Academic Year: **2017/2018**

1st Semester

Instructor(s): Pedro Encarnação

Course Description:

The Mathematics for Business and Economics course aims at providing students the basic mathematical tools necessary to solve business and economics problems. It includes topics on linear algebra and differential and integral calculus of functions of a single variable. Applications of the mathematical tools to business and economics problems are provided throughout the course to help students bridging the gap between theory and practice.

Course Content:

Part I – Linear Algebra

1. Systems of linear equations
2. Matrices
3. Determinants
4. Eigenvalues and eigenvectors

Part II – Differential Calculus in R

1. Real functions
2. Derivatives and their applications

Part III – Integral Calculus in R

1. Antiderivatives. Integration by parts and substitution.
 2. Definite integrals
 3. Plane areas
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Course Objectives:

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

1. Master linear algebra tools to solve business and economics problems;
2. Understand the behavior of typical functions of a single variable;
3. Master the main differential and integral calculus tools for functions of a single variable, applying them in business and economics problems.

Grading:

The student is obliged to follow a continuous evaluation scheme, which may allow him/her to skip the final exam. During the semester, there will be two mini-tests (MT1 and MT2) and two tests (F1 and F2). The final grade of the **continuous evaluation (CE)** is the weighted average of this four evaluation moments, rounded to two decimal places, according to the weights in the following table:

	MT1	MT2	F1	F2	CE
All evaluations	10%	10%	40%	40%	100%
Missing one mini-test	15%		40%	40%	95%
Missing both mini-tests	-		42.5%	42.5%	85%
Missing one test*	10%	10%	50%		70%
Missing one mini-test and one test*	15%		50%		65%

*The student cannot be dismissed from the final exam; the final grade for this course will be the final exam grade.

The student can be dismissed from the final exam if the grade of the continuous evaluation is greater or equal to 9.50 (out of 20) and if none of the tests grades was inferior to 6.00 (out of 20).

If the continuous evaluation grade is greater or equal to 9.50 (out of 20) but one of the test grades was inferior to 6.00 (out of 20), then the final grade for this course will be the final exam grade.

In the case that the continuous evaluation grade is greater or equal to 6.50 (out of 20) and less than 9.50 (out of 20), the student still may attend the final exam and the final grade of the course will be the final exam grade.

If the grade of the continuous evaluation is less than 6.50 (out of 20), the student will fail at this course and therefore will not be allowed to attend the final exam.

If a student wishes to improve his continuous evaluation grade, the student may do so attending the final exam. The final grade for the course will then be the maximum between the following two components:

- Exam grade;
- Continuous evaluation grade minus 1 (out of 20)

If a student obtains a final grade of 17 (out of 20) or higher, be it from the continuous evaluation or from the final exam, the student must undertake an oral examination to defend that mark. In case the student misses the oral examination or fails to defend the mark, the final course grade will be 16 (out of 20).

The use of a calculator is not allowed, nor the use of tables of formulas. Leaving a test after its beginning without submitting the test is equivalent to have a zero grade in the test.

Written tests corrected will be available for students for consultation.

The student is required to attend the classes. The maximum number of missing classes is 1/3 of the total number of classes. If this threshold is achieved, the student will have to attend the final exam even if he/she fills the above criteria. The final grade of the course will be the final exam grade.

Bibliography:

Recommended

- P. Encarnação, Lecture Notes, UCP 2017
- Mathematics for Business & Economics Workbook, UCP, 2017

Complementary

- T. Bradley, Essential Mathematics for Economics and Business, 4th Edition, Wiley 2013
- K. Sydsaeter and P. J. Hammond, Mathematics for Economic Analysis, 3rd Edition, Prentice Hall, 2008
- Michael Hoy, John Livernois, Chris McKenna, Ray Rees and Thanasis Stengos, Mathematics for Economics, 3rd Edition, The MIT Press 2011
- C. Simon and L. Blume, Mathematics for Economists, W. W. Norton & Company 1994

- H. Anton, I. Bivens and S. Davis, Calculus Early Transcendentals, 10th Edition International Student Version, Wiley, 2013 [chapters 1 to 7]
- R. Larson and B. Edwards, Calculus, 10th Edition, Cengage Learning, 2013 [chapters 1 to 5, 7 and 8]
- J. Stewart, Single Variable Calculus, 8th Edition, International metric version, CENGAGE Learning, 2016 [chapters 1 to 6]
- F. Ayres and E. Mendelson, Calculus, 6th Edition, McGraw-Hill, 2013
- J. Stewart, L. Redlin and S. Watson, Precalculus, Mathematics for Calculus, 7th Edition, CENGAGE Learning, 2017

- H. Anton and C. Rorres, Elementary Linear Algebra with Supplemental Applications, 11th Edition International Student Version, Wiley, 2014 [chapters 1, 2, 5 and part of 7]
- R. Larson, Elementary Linear Algebra, 8th International Metric Edition, CENGAGE Learning, 2017 [chapters 1 to 3 and 7]
- David C. Lay, Linear Algebra and its Applications, 4th Edition, Pearson, 2012 [chapters 1 to 3, 5, and part of 7]
- S. Lipschutz and M. Lipson, Linear Algebra, 5th Edition, McGraw-Hill, 2013

Biography:

Pedro Encarnação is an Adjunct Assistant Professor at the Católica Lisbon School of Business and Economics. He has received the 'Licenciatura' degree in 1994, the M.Sc. degree in 1998, and the Ph.D. degree in 2002, all in Electrical and Computers Engineering from the Instituto Superior Técnico, Lisbon, Portugal. He was Associate Dean of the Faculty of Engineering of Catholic University of Portugal between 2002 and 2008 and the coordinator of the subject area of Mathematics between 2001 and 2013. His current research interests include Rehabilitation Engineering, namely the use of robotic systems in the rehabilitation of persons with disabilities, and nonlinear control of autonomous vehicles.

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