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| **Course Code and Title** | |
| **MLI34A040 Business Mathematics with Excel Applications** | **6 cr** |
| **Learning Outcomes and Content** | |
| Learning outcomes for this course, upon successful completion, include the ability to: 1) solve simultaneous equations, 2) understand linear and nonlinear functions and utilizing graphical methods for visualizing such functions, 3) understand the core principles of financial mathematics, including simple and compound interest, internal rate of return, depreciation and net present value, 4) understand the rate of change of functions and the core principles behind differential calculus (including applications), 5) understand optimization in the presence of constraints, 6) understand linear programming concepts, including the use of graphical methods, 7) utilize the different concepts learned to model and solve some practical business problems, including problems in business finance, economics and operations management and 8) use Microsoft Excel throughout the course to show how these principles can be creatively applied in real life problems.  Content:  A fundamental course in business mathematics emphasizing concepts and interpretation, which develops the core mathematical foundations for specialized business and economics courses. Given the widespread use of Microsoft Excel in business today, the course will also spend time on applying those mathematical concepts using the functional and programming capabilities of Excel. | |

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| **InstructorName and Profile** |
| Roman Stepanov worked at Newcastle Business School from 2005 until 2022. First, Roman held the position of graduate tutor. In 2009 Roman successfully defended his PhD thesis entitled ‘Institutional Change in Russian Corporate Governance: An Analysis of Corporate Disputes’. Since then, Roman was promoted to the position of senior lecturer in the Accounting and Finance subject group. Recently Roman relocated to Finland and jointed Lappeenranta University of Technology as a lecturer in quantitative finance.  Roman teaches finance, mathematics and statistics at undergraduate, corporate as well as postgraduate levels. In addition to this, Roman developed and delivered methodological workshops for staff and PhD students at Newcastle Business School and beyond. He has also delivered courses at overseas partner institutions in Hong Kong, Singapore, Qatar and Germany. Roman has considerable experience in standard, block and distance learning modes of delivery of academic content.  Roman’s research interests are in the area of quantitative analysis covering topics such as reported corporate disputes, corporate cash holdings, composition of UK boards, event studies and Asset Pricing Models. Roman currently works on a book chapter dedicated to sensitivity analysis in investment appraisal.  Roman is also active in thesis supervisions at both undergraduate and postgraduate levels in a variety of international universities. |

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| **Email Address** |
| roman.stepanov@lut.fi |

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| **Office Hours** |
| My office hours are after 13:00 on weekdays (except for Monday). Additionally, you can request a meeting by email at a mutually convenient time. |

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| **Required Reading** |
| Please read the assigned chapter prior to the taught class!  REQUIRED TEXTBOOK:  Author: Teresa Bradley  Title: Essential Mathematics for Economics and Business  Edition: 4th  Publisher: John Wiley & Sons Ltd.  Year: 2013  ISBN: 978-1-118-35829-0  Note: Earlier editions (3rd and 2nd) are acceptable. |

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| **Deduction due to an absence on the first day of the course:** 5 points (on a 100-point scale) will be deducted from the student’s final raw score before converting it to the final grade. If a student is absent on the first day due to illness, and provides the Manager of Academic Operations with a medical certificate, the 5-point deduction will be waived. The Manager of Academic Operations will then inform the instructor of the waived deduction. | | | |
| Session # and date | Topics | Tasks | Assignments and reading |
| Session 1: Oct. 9th | *Introduction:*  - Outline of the course  - Assessment strategy  *Introduction to equations:* | **DIAGNOSTIC TEST**  *Excel:*  - Review of essential skills | **Homework handed out** |
| Session 2: Oct. 10th | *Linear functions (1):*  - Definition and properties  - Equations  - Modelling | Supply - demand  Elasticity of linear functions  *Excel:*  - building linear function  - XY scatter plot  - Linear approximation | Chapter 2 |
| Session 3: Oct. 11th | *Linear functions (2):*  - Solving systems of linear equations | Price - Quantity equilibrium  Tax distribution  Break-even point  *Excel:*  - XY scatter plot  - Goal Seek | Chapter 3 |
| Session 4: Oct. 12th | *Matrix mathematics (1):*  - Definition  - Addition/subtraction  - Multiplication | Guided practice tasks on the subject of the lecture  *Excel:*  - Building arrays  - Matrix operations | Chapter 9 |
| Session 5: Oct. 13th | *Matrix mathematics (2):*  - Elimination  - Inverse  - Determinant  - Cramer’s rule | Guided practice tasks on the subject of the lecture  *Excel:*  - Matrix inverse  - Determinant | Chapter 9  **TERM TEST 1**\* |
| Session 6: Oct. 16th | *Non-linear functions definitions and properties (1):*  - Quadratic  - Polynomial | Derivation of quadratic formula  *Excel:*  - building quadratic function  - linear approximation of “curvy” functions | Chapter 4 |
| Session 7: Oct. 17th | *Non-linear functions definitions and properties (2):*  - Exponential  - Logarithmic | Guided practice tasks on the subject of the lecture  *Excel:*  - building polynomial functions  - non-linear approximation  - error estimation | Chapter 4 |
| Session 8: Oct. 18th | *Introduction to financial mathematics:*  *-* Arithmetic sequences and series  -Geometric sequences and series | Simple interest  Compounding  Discounting  *Excel:*  - Built in financial functions | Chapter 5 |
| Session 9: Oct. 19th | *Financial mathematics continued:*  - Annuity  - Perpetuity | Group work activity:  Derivation of annuity formula  *Excel:*  - Building annuity table | Chapter 5 |
| Session 10: Oct. 20th | *Financial mathematics continued:*  - Internal rate of return  - Net present value | Basic financial instruments:  10-year government bonds  Yield calculations  *Excel:*  - Goal seek  - IRR and NPV functions | Chapter 5  **TERM TEST 2** |
| Session 11: Oct. 23rd | *Introduction to calculus:*  - Limits  - Rate of change  - Slope of tangent line | Guided practice tasks on the subject of the lecture  *Excel:*  - Drawing tangent line | Chapter 6  **Homework handed in** |
| Session 12: Oct. 24th | *Differentiation (1):*  - Key derivatives  - Product rule  - Chain rule | Guided practice tasks on the subject of the lecture  *Excel:*  - Solver | Chapter 6,7 |
| Session 13: Oct. 25th | *Differentiation (2):*  - Maximum and minimum of functions  - Optimization without constraints | Group work activity:  Derivation of power rule  *Excel:*  - Solver  - Linear programming | Chapter 6,7 |
| Session 14: Oct. 26th | *Differentiation (3):*  - Optimization with constraints  - Further applications  - Wrap-up | Questions and answers  Review |  |
| Session 15: Oct. 27th | **FINAL EXAM** | | |

\* Please note that the first point of assessment is on the first Friday of the course.

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| **Grading** | | | |
| **Course Requirements** | | | Weighting (%) or maximum points |
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| **Term test 1 (Friday October 13th)** | | | **20%** |
| **Term test 2 (Friday October 20th)** | | | **30%** |
| **Homework (October 23rd)** | | | **10%** |
| **Final exam (Friday October 27th)** | | | **40%** |
| Total | | | 100 |
| |  |  | | --- | --- | | **Conversion scale** | **Final grade**  **(official scale)** | | 90 - 100 | 5 | | 80 - 89 | 4 | | 70 - 79 | 3 | | 60 - 69 | 2 | | 50 - 59 | 1 | | 0 - 49 | 0 | |  | | | | | |
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| **ECTS STUDENT WORKLOAD** | | | | |
| This course is a 6 ECTS unit course, following the ECTS (European Credit Transfer System) guidelines of Aalto University School of Business. The number of hours the average student is expected to work in the course is 160 (including in-class and out-of-class work). | | | | |
| **Types of Hours** | | **Number of Hours** | | |
| **Contact hours (on- and off-campus):** | | **45** | | |
| **Out-of-class hours:** | | **115** | | |
| Work with course materials, eg required reading | | **45** | | |
| Exam preparation | | **30** | | |
| Individual research & writing | | **20** | | |
| Team projects (meetings, research, preparation, etc.) | |  | | |
| Other (guided practice) | | **20** | | |
| **Total of all student workload (contact and out-of-class) hours:** | | **160** | | |

**ACADEMIC POLICY STATEMENTS**

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| **CODES OF CONDUCT** |
| Academic excellence and high achievement levels are only possible in an environment where the highest standards of academic honesty and integrity are maintained. Students are expected to abide by the Aalto University Code of Academic Integrity, other relevant codes and regulations, as well as the canons of ethical conduct within the disciplines of business and management education.  In addition, the BScBA Program has strict exam regulations in force which must be followed in all test-taking situations. |

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| **TEXTBOOK POLICY** |
| All required textbooks and other course materials are the responsibility of the student. It is the expectation of faculty that all students will have access to the textbooks and other reading material. If a student is not able to purchase his/her own copy of the textbook or other required reading materials, it is nonetheless the student’s responsibility to find a way to complete the reading for the course. |

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| **CLASS ATTENDANCE AND PARTICIPATION** |
| Class attendance and participation are considered integral parts of teaching and learning at the BScBA program in Mikkeli. Therefore, regular class attendance is required of all students and attendance records are kept for each class. Students are also expected to be in class on time.  If the student participates in the final exam/assessment, it will be graded and counted towards the final grade.  The attendance policy of the BScBA program provides that:     1. **A maximum of three absences of any kind** is allowed for a 3-week, 6-credit course. Four or more absences will result in being dropped from the course. 2. Whenever taking an absence, **the student bears the risk of missing class**, and the consequences, which may include a lower participation grade, missing a graded activity, etc. It is up to the course instructor to decide whether or not a graded activity can be completed later. 3. **An absence on the first day of the course** will result in 5 points (on a 100-point scale) being deducted from the student’s final raw score before converting it to the final grade. If a student is absent on the first day due to illness, and provides the Manager of Academic Operations with a medical certificate, the 5-point deduction will be waived. The Manager of Academic Operations will then inform the instructor of the waived deduction. 4. **A student getting to class after the session has started** will not be able to enter the classroom until the first break and will get an absence for the day. 5. It is expected that **students marked present for the day are in class the entire time.** Students leaving class early may be marked absent. 6. **The instructor may include class participation as a component of the grade;** up to 15% of the total points that can be earned toward the final grade. 7. **The instructor may identify up to three days of the course (in addition to the first day) as mandatory,** ie taking an absence on those days would have a direct impact on the course grade.   The instructor for the course will take attendance in classes. The decision to drop a student from a course will be made by the instructor, who will inform Mari Syväoja, Manager of Academic Operations: [mari.syvaoja@aalto.fi](mailto:mari.syvaoja@aalto.fi).  **Addition to the attendance policy of the BScBA Program, Mikkeli Campus:**   * This addition concerns absences in addition to the normal maximum of three that would fall under a category called **Medical and Family Emergency cases**. * Students who want to use this option to complete a course must fulfil these criteria:   + The total absences of the student will exceed the normally allowed three absences due to a major medical problem or family emergency.   + The student will be absent no more than 5 days; exceeding that number of days will result in dropping the course.   + Documentation or a detailed explanation concerning the entire period of the emergency (such as a medical certificate) is provided to the Manager of Academic Operations. * The case-by-case solution will be coordinated by the Manager of Academic Operations, who will deal with the documentation and discuss with the instructor to find a pedagogical solution enabling the student to continue in the course. In case the MAO is on leave, the student should contact the other study office staff. * The solution must not cause a significant increase in the instructor’s workload. The grading elements for the course may be reviewed, and additional assignments may be arranged if feasible. However, a shifting of grading proportions may occur. The course grade might be affected due to the student missing some in-class activities. |
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| **Additional Information** |
| Because of the wide diversity in pre-requisite knowledge of our students, a “diagnostic test” will be administered in the first class. The scores will NOT be used for grading purposes. Based upon the test results, some students will be identified as needing extra assistance with the course. We strongly recommend that those students take full advantage of office hours and extra online tutorials and practice exercises which will be uploaded to the course site. |