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| <b>Identification</b>                          | <b>Subject</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | <b>MATH 225, Business Mathematics – 6 ECTS</b> |
|                                                | <b>Department</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | Mathematics                                    |
|                                                | <b>Program</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | Undergraduate                                  |
|                                                | <b>Term</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | Fall, 2026                                     |
|                                                | <b>Instructor</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | Yetar Ferhadova                                |
|                                                | <b>E-mail:</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | yeter.ferhadova2@gmail.com                     |
|                                                | <b>Classroom/hours</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | Thursday 08:30-10:00, 10:10-11:40              |
| <b>Prerequisites</b>                           | The prerequisites are high school algebra and geometry. Prior experience with calculus is helpful but not necessary.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |                                                |
| <b>Language</b>                                | English                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |                                                |
| <b>Compulsory/Elective</b>                     | Compulsory                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |                                                |
| <b>Required textbooks and course materials</b> | <p>1. George B. Thomas', Calculus 13th edition. 2014, 536 p.</p> <p>2. Linear Algebra and Its applications David C. Lay 12th Edition, Pearson, 2021</p> <p>Additional materials:</p> <ol style="list-style-type: none"> <li>1. James Stewart. Calculus (8<sup>th</sup> edition.). Brooks Cole, 2015, 1368 p.</li> <li>2. Ron Larson and Bruce Edwards. Calculus (10<sup>th</sup> edition). Cengage Learning, 2013, 1280 p.</li> <li>3. Introduction to Linear Algebra, 6th Edition. Gilbert Strang, 2021.</li> <li>4. "Calculus: A Complete Course" by Robert Adams and Christopher Essex, 10th Edition, 2021.</li> </ol>                                                                                                                                                                                           |                                                |
| <b>Course outline</b>                          | <p>This course explores the application of mathematical reasoning and quantitative techniques to business, management, and economic decision-making. Students will begin with the study of algebraic and transcendental functions, limits, and differentiation, followed by real-world applications such as marginal analysis, elasticity, and optimization. The second half of the course focuses on linear algebra, emphasizing systems of equations, matrices, determinants, and their use in business models, forecasting, and economic planning. Practical problem-solving, case-based examples, and business-oriented modeling are integrated throughout the semester to develop both theoretical understanding and applied skills. Numerous applications of mathematics are given throughout the course.</p> |                                                |
| <b>Course objectives</b>                       | <p>This course aims to:</p> <ul style="list-style-type: none"> <li>● Introduce students to fundamental concepts of calculus and linear algebra with a strong emphasis on business applications.</li> <li>● Equip students with analytical tools for understanding and solving real-world business and economic problems.</li> <li>● Build competence in using mathematical models to support decision-making in finance, management, and economics.</li> </ul>                                                                                                                                                                                                                                                                                                                                                      |                                                |

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| <b>Learning outcomes</b> | <p>Students successfully completing this course should be able to</p> <ul style="list-style-type: none"> <li>Identify and represent business problems using mathematical models.</li> <li>Apply calculus concepts (limits, derivatives, optimization) to analyze costs, revenues, and demand functions.</li> <li>Use matrix methods and determinants to solve business-related systems of equations.</li> <li>Apply linear algebra techniques to input–output analysis and resource allocation problems.</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |                       |                       |
| <b>Teaching methods</b>  | <b>Lecture</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |                       | x                     |
|                          | <b>Group discussion</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |                       | x                     |
|                          | <b>Problem Solving</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |                       | x                     |
|                          | <b>Homework assignments</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |                       | x                     |
|                          | <b>Simulation</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |                       |                       |
|                          | <b>Course paper</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |                       |                       |
|                          | <b>Others</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |                       |                       |
| <b>Evaluation</b>        | <b>Methods</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | <b>Date/deadlines</b> | <b>Percentage (%)</b> |
|                          | <b>Midterm Exam</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |                       | 30                    |
|                          | <b>Case studies</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |                       |                       |
|                          | <b>Class attendance</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |                       | 5                     |
|                          | <b>Class activity</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |                       | 5                     |
|                          | <b>Quizzes (4 quizzes with equal weight)</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |                       | 20 (4 quizzes)        |
|                          | <b>Final Exam</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |                       | 40                    |
|                          | <b>Others</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |                       |                       |
|                          | <b>Total</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |                       | 100                   |
| <b>Policy</b>            | <p><b>Use of Generative AI Tools</b></p> <p>The use of generative artificial intelligence (GAI) tools is strictly prohibited in this course. The primary aim of the course is to develop students' independent mathematical reasoning, problem-solving skills, and creative thinking. Students are therefore expected to complete all assignments and assessments independently without the use of GAI tools. If it is determined that a student has used generative artificial intelligence (GenAI) tools while completing assignments, one of the following measures may be applied:</p> <ul style="list-style-type: none"> <li>Issuing an oral or written warning;</li> <li>Requiring the resubmission of the assignment;</li> <li>Reducing the grade for the assignment or assigning a zero (0).</li> </ul> <p><b>Attendance and activity</b></p> <p>The students are required to attend all classes as part of their studies and those having legitimate reasons for absence (illness, family bereavement etc.) are required to inform the instructor. However, this student is able to enter the second double hours without delay. The attendance and participation will account for 5% of the total course grade, which depends on students' good class attendance and active participation in class discussions.</p> <p><b>Withdrawal (pass/fail)</b></p> <p>This course strictly follows grading policy of the School of Economics and</p> |                       |                       |

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|  | <p>Management. Thus, a student is normally expected to achieve a mark of at least 60% to pass. In case of failure, he/she will be referred to or required to repeat the course the following term or year.</p> <p><b>Assignments/quizzes</b><br/>The overall course will consist of 2 quizzes, one of them before midterm exam and the two after midterm exam. Total score for all quizzes is 20% with 10% for each.</p> <p><b>Cheating/plagiarism</b><br/>Cheating or other plagiarism during the Quizzes, Mid-term and Final Examination will lead to paper cancellation. In this case, the student will automatically get zero (0), without any consideration.</p> <p><b>Professional behavior guidelines</b><br/>The students shall behave in the way to create favorable academic and professional environment during the class hours. Unauthorized discussions and unethical behavior are strictly prohibited.</p> |
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| Tentative Schedule |                          |                                                                                                                               |                          |
|--------------------|--------------------------|-------------------------------------------------------------------------------------------------------------------------------|--------------------------|
| Week               | Date/Day (tentative)     | Topics                                                                                                                        | Textbook/Assignments     |
| 1                  | 17.09.2026<br>17.09.2026 | Functions and their graphs. Combining functions: Shifting and Scaling Graphs. Trigonometric functions. Exponential functions. | [1], p. 1-28, 34-39      |
| 2                  | 24.09.2026<br>24.09.2026 | Limit of function and limit laws. One-Sided limits. Continuity.                                                               | [1], p. 65-73, 85-101    |
| 3                  | 01.10.2026<br>01.10.2026 | Tangents and the derivative at a point. The derivative as a function. Differentiation rules.                                  | [1], p. 122-143          |
| 4                  | 08.10.2026<br>08.10.2026 | Derivatives of trigonometric functions. The chain rule.<br><b>QUIZ 1 (5pts.)</b>                                              | [1], p. 155-167          |
| 5                  | 15.10.2026<br>15.10.2026 | Implicit differentiation. Linearization and differentials                                                                     | [1], p. 170-174, 201-210 |
| 6                  | 22.10.2026<br>22.10.2026 | Extreme values of functions. The mean value theorem.                                                                          | [1], p. 222-235          |
| 7                  | 29.10.2026<br>29.10.2026 | Monotonic functions and the first derivative test.<br><b>QUIZ 2 (5pts.)</b>                                                   | [1], p. 238-241          |
| 8                  | 05.11.2026<br>05.11.2026 | Indeterminate forms and L'Hopital's rule. Practice                                                                            | [1], p. 254-260          |
| 9                  | 12.11.2026<br>12.11.2026 | Linear models in Economics. Systems of linear equations. <b>Midterm exam</b>                                                  | [2], p. 1-9              |
| 10                 | 19.11.2026<br>19.11.2026 | Row reduction and echelon forms. Vector equations.                                                                            | [2], p. 12-31            |

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| 11 | 26.11.2026<br>26.11.2026 | The matrix equation $Ax=b$ . Solution sets of Linear systems. Applications of linear systems. Linear independence.                                        | [2], p. 34-60   |
| 12 | 03.12.2026<br>03.12.2026 | Introduction to linear transformations. The matrix of a linear transformation. Linear models in business, science, and engineering. <b>QUIZ 3 (5pts.)</b> | [2], p. 62-85   |
| 13 | 10.12.2026<br>10.12.2026 | Computer models in aircraft design. Matrix operations. The inverse of a matrix.                                                                           | [2], p. 91-109  |
| 14 | 17.12.2026<br>17.12.2026 | Introduction to determinants.<br>Properties of determinants.                                                                                              | [2], p. 163-175 |
| 15 | 24.12.2026<br>24.12.2026 | Cramer's rule, volume, and linear transformations<br><b>QUIZ 4 (5pts.)</b>                                                                                | [2], p. 177-184 |
|    | <b>TBA</b>               | <b>Final exam</b>                                                                                                                                         |                 |

This syllabus is a guide for the course and any modifications to it will be announced in advance

