

# Syllabus

## *Descrizione corso*

|   |   |
|---|---|
| <b>Titolo insegnamento</b>              | Matematica per le applicazioni economiche   |
| <b>Codice insegnamento</b>              | 27356   |
| <b>Titolo aggiuntivo</b>                |   |
| <b>Settore Scientifico-Disciplinare</b> |   |
| <b>Lingua</b>                           | Inglese   |
| <b>Corso di Studio</b>                  | Corso di laurea in Economia e Management  |
| <b>Altri Corsi di Studio (mutuati)</b>  |   |
| <b>Docenti</b>                          | prof. dr. Martin Meier,<br>Martin.Meier@unibz.it<br><a href="https://www.unibz.it/en/faculties/economics-management/academic-staff/person/50913">https://www.unibz.it/en/faculties/economics-management/academic-staff/person/50913</a>   |
| <b>Assistente</b>                       |   |
| <b>Semestre</b>                         | Tutti i semestri  |
| <b>Anno/i di corso</b>                  | 1   |
| <b>CFU</b>                              | 12  |
| <b>Ore didattica frontale</b>           | 36+36   |
| <b>Ore di laboratorio</b>               | 60+60   |
| <b>Ore di studio individuale</b>        | -   |
| <b>Ore di ricevimento previste</b>      | 36  |
| <b>Sintesi contenuti</b>                | <p>M1: The course "Mathematics for Economists M1" deals with basic mathematical concepts like sets, relations, functions, numbers, limits and absolute values. Moreover we will introduce functions of one variable by studying their basic properties, derivatives and their calculus, Taylor approximations and the Newton's method. We will also address the single-variable optimization (Fermat's rule and sufficient optimality conditions) and the elements of integration.</p> <p>M2: In this course we study linear algebra and functions of several</p> |

|  |   |
|--|---|
|  | variables.  |
| <b>Argomenti dell'insegnamento</b>                                       | <p>M1: Sets, relations, functions. Basic algebra, numbers, approximations, sequences and their limits, series, geometric series. Real functions (polynomial, rational, irrational, exponential and logarithmic functions), limits of functions, differentiation, Taylor approximations, Newton's method, convexity, single variable optimization, integration.</p> <p>M2: 1. Matrix calculus, rank and linear independence, systems of linear equations, Gaussian elimination, applications.<br/> 2. Functions of several variables: gradients, Hesse matrices, Taylor approximation, convexity.<br/> 3. Multivariable optimization, Lagrange method and economic applications. Simple least square regression.<br/> 4. If enough time remains: Basics of probability theory.</p> |
| <b>Parole chiave</b>   | mathematics for economists, sets, relations, functions, linear algebra, optimization  |
| <b>Prerequisiti</b>  | none  |
| <b>Insegnamenti propedeutici</b>   | none  |
| <b>Modalità di insegnamento</b>  | Lectures and exercise sessions  |
| <b>Obbligo di frequenza</b>  |   |
| <b>Obiettivi formativi specifici e risultati di apprendimento attesi</b> | <p>ILO 1 Knowledge and understanding<br/> ILO 1.1 knowledge of basic and intermediate level mathematical tools for understanding and analysing economic mechanisms through theoretical models and empirical applications</p> <p>ILO 2 Apply knowledge and understanding<br/> ILO 2.1 know how to analyse (unconstrained) optimisation problems and mathematically interpret models of social and economic dynamics<br/> ILO2.2 knowing how to work with basic and intermediate level mathematical and basic level statistical tools to study the behaviour of economic subjects, from a theoretical and empirical point of view</p> <p>ILO 3 Making judgements<br/> ILO 3.1 choose the most appropriate quantitative and qualitative methods of analysis</p>                      |

|  |   |
|--|---|
|  | <p>ILO 4 Learning skills</p> <p>ILO 4.1 analyse, critically process and integrate data, information and future experience, also using advanced software</p>   |
| <b>Obiettivi formativi specifici e risultati di apprendimento attesi (ulteriori info.)</b> |   |
| <b>Modalità di esame</b>   | <p>M1: A written final exam (questions and problems to solve) which counts 100% for the M1 partial grade. ILO 1.1, ILO 2.1, ILO 3.1, ILO 4.1.</p> <p>M2: A written final exam (questions and problems to solve) which counts 100% for the M2 partial grade. ILO 1.1, ILO 2.1, ILO 3.1, ILO 4.1.</p> <p>The final mark is the average of the marks of M1 and M2 -</p> <p>There is no different assessment for attending and non-attending students.</p>  |
| <b>Criteri di valutazione</b>  | <p>Final grade: 50% grade for M1 partial grade, 50% for M2 partial grade. The results of assignments and partial exams are only valid for the academic year in question. They cannot be carried over beyond that time frame.</p>  |
| <b>Bibliografia obbligatoria</b>   | <p>Lecture Slides that will be uploaded in the reserve collection.</p>  |
| <b>Bibliografia facoltativa</b>  | <p>None.</p>  |
| <b>Altre informazioni</b>  |   |
| <b>Obiettivi di Sviluppo Sostenibile (SDGs)</b>  | <p>Sconfiggere la povertà, Partnership per gli obiettivi, Buona salute, Istruzione di qualità, Parità di genere, Acqua pulita e servizi igienico-sanitari, Energia rinnovabile e accessibile, Buona occupazione e crescita economica, Innovazione e infrastrutture, Ridurre le disuguaglianze, Città e comunità sostenibili, Utilizzo responsabile delle risorse, Lotta contro il cambiamento climatico, Utilizzo sostenibile del mare, Utilizzo sostenibile della terra, Pace e giustizia, Sconfiggere la fame</p> |

|   |  |
|---|--|
| <b>Titolo della parte costituente del corso</b> | Mathematics for Economists 1   |
| <b>Codice insegnamento</b>                      | 27356A   |
| <b>Settore Scientifico-Disciplinare</b>         | STAT-04/A  |
| <b>Lingua</b>                                   | Inglese  |
| <b>Docenti</b>                                  | prof. dr. Martin Meier,<br>Martin.Meier@unibz.it<br><a href="https://www.unibz.it/en/faculties/economics-management/academic-staff/person/50913">https://www.unibz.it/en/faculties/economics-management/academic-staff/person/50913</a>  |
| <b>Assistente</b>                               |  |
| <b>Semestre</b>                                 | Primo semestre   |
| <b>CFU</b>                                      | 6  |
| <b>Docente responsabile</b>                     |  |
| <b>Ore didattica frontale</b>                   | 36   |
| <b>Ore di laboratorio</b>                       | 60   |
| <b>Ore di studio individuale</b>                |  |
| <b>Ore di ricevimento previste</b>              | 18   |
| <b>Sintesi contenuti</b>                        | <p>The course "Mathematics for Economists M1" deals with basic mathematical concepts like sets, relations, functions, numbers, limits and absolute values. Moreover we will introduce functions of one variable by studying their basic properties, derivatives and their calculus, Taylor approximations and the Newton's method. We will also address the single-variable optimization (Fermat's rule and sufficient optimality conditions) and the elements of integration.</p> |
| <b>Argomenti dell'insegnamento</b>              | <p>Sets, relations, functions. Basic algebra, numbers, approximations, sequences and their limits, series, geometric series. Real functions (polynomial, rational, irrational, exponential and logarithmic functions), limits of functions, differentiation, Taylor approximations, Newton's method, convexity, single variable optimization, integration.</p>   |
| <b>Modalità di insegnamento</b>                 | Lectures and exercise sessions.  |
| <b>Bibliografia obbligatoria</b>                | Lecture notes provided in due course (available in the Reserve Collection).  |

|                          |  |
|--------------------------|--|
| Bibliografia facoltativa |  |
|--------------------------|--|

## *Modulo del corso*

|   |   |
|---|---|
| <b>Titolo della parte costituente del corso</b> | Mathematics for Economists 2  |
| <b>Codice insegnamento</b>                      | 27356B  |
| <b>Settore Scientifico-Disciplinare</b>         | STAT-04/A   |
| <b>Lingua</b>                                   | Inglese   |
| <b>Docenti</b>                                  | prof. dr. Martin Meier,<br>Martin.Meier@unibz.it<br><a href="https://www.unibz.it/en/faculties/economics-management/academic-staff/person/50913">https://www.unibz.it/en/faculties/economics-management/academic-staff/person/50913</a>   |
| <b>Assistente</b>                               |   |
| <b>Semestre</b>                                 | Secondo semestre  |
| <b>CFU</b>                                      | 6   |
| <b>Docente responsabile</b>                     |   |
| <b>Ore didattica frontale</b>                   | 36  |
| <b>Ore di laboratorio</b>                       | 60  |
| <b>Ore di studio individuale</b>                |   |
| <b>Ore di ricevimento previste</b>              | 18  |
| <b>Sintesi contenuti</b>                        | In this course we study linear algebra and functions of several variables.  |
| <b>Argomenti dell'insegnamento</b>              | <ol style="list-style-type: none"> <li>1. Matrix calculus, rank and linear independence, systems of linear equations, Gaussian elimination, applications.</li> <li>2. Functions of several variables: gradients, Hesse matrices, Taylor approximation, convexity.</li> <li>3. Multivariable optimization, Lagrange method and economic applications. Simple least square regression.</li> <li>4. If enough time remains: Basics of probability theory.</li> </ol> |
| <b>Modalità di insegnamento</b>                 | Lectures and exercise sessions.   |
| <b>Bibliografia obbligatoria</b>                | Lecture notes provided in due course (available in the Reserve Collection)  |
| <b>Bibliografia facoltativa</b>                 |   |