

COURSE DESCRIPTION – ACADEMIC YEAR 2019/2020

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| Course title | Mathematics for Business Informatics |
| Course code | 76400 |
| Scientific sector | MAT/02 |
| Degree | Bachelor in Informatics and Management of Digital Business (L-31) |
| Semester | 1+2 |
| Year | 1 |
| Credits | 12 |
| Modular | Yes |

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| Total lecturing hours | 80 |
| Total lab hours | 40 |
| Attendance | Attendance is not compulsory, however, it is recommended. |
| Prerequisites | There are no prerequisites. |
| Course page | https://ole.unibz.it/ |

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| Specific educational objectives | <p>The course belongs to the type "di base – formazione matematico-fisica".</p> <p>Module 1 (Introduction to Linear Algebra and Discrete Mathematics)</p> <p>The aim of this module is to present a rather comprehensive treatment of linear algebra and discrete mathematics. It covers vector, matrix and numbers theory, sets, functions and graphs to some degree of mathematical logic and rigour, emphasizing topics that are in support of computer science. The course also provides practice in using the tools of mathematics to solve problems and to make judgements autonomously.</p> <p>Module 2 (Introduction to Analysis and Optimization Techniques) :</p> <p>The aim of this module is to introduce students to the following topics: sequences and series, univariate functions, derivatives and differentials, basic optimization techniques (necessary and sufficient optimality conditions, a numerical method), discrete (financial) market models, and mathematical methods for decision making.</p> |
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| Module 1 | Introduction to Linear Algebra and Discrete Mathematics |
| Module code | 76400A |
| Module scientific sector | MAT/02 |
| Lecturer | Bruno Carpentieri and Livia Predoiu |
| Contact | Office POS 3.10, bruno.carpentieri@unibz.it , +39 0471 016027 Office POS 3.04, livia.predoiu@unibz.it |
| Scientific sector of lecturer | MAT/08 and INF/01 |
| Teaching language | English |
| Office hours | Monday 16:00-18:00, Faculty of computer science, Piazza Domenicani 3, Office 3.10 (it is recommended to make an appointment by email). |
| Lecturing assistant (if any) | Simone Ugolini |
| Contact LA | Piazza Domenicani, 3 – Office 1.04, Simone.Ugolini@unibz.it |
| Office hours LA | To be announced |
| Credits | 6 |
| Lecturing hours | 40 |

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| Lab hours | 20 |
| List of topics | <ul style="list-style-type: none"> • Background on complex numbers, trigonometry and polynomials • Vectors and matrices • Linear systems • Induction principle and recursion • Sets, functions and counting • Relations and graphs |
| Teaching format | This course will be delivered through a combination of formal lectures and exercises. |

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| Module 2 | Introduction to Analysis and Optimization Techniques |
| Module code | 76400B |
| Module scientific sector | MAT/05 |
| Lecturer | Tammam Tillo and Andreas Hamel |
| Contact | Office POS 1.17, ttillo@unibz.it , +39 0471 016026 Office BK A1.11, andreas.hamel@unibz.it , +39 0474 013651 |
| Scientific sector of lecturer | ING-INF/05 and SECS-S/06 |
| Teaching language | English |
| Office hours | Thursday 15:00-17:00, Faculty of computer science, Piazza Domenicani 3, Office 1.17 (it is recommended to make an appointment by email). |
| Lecturing assistant (if any) | Daniela Visetti |
| Contact LA | Office BK A1.08, daniela.visetti@unibz.it , +39 0474 013642 |
| Office hours LA | Wednesday 16:00 - 18:00, arrange beforehand by email. |
| Credits | 6 |
| Lecturing hours | 40 |
| Lab hours | 20 |
| List of topics | <ul style="list-style-type: none"> • Sequences and series • Univariate functions • Derivatives and differentials • Basic optimization techniques • Discrete (financial) market models • Mathematical methods for decision making |
| Teaching format | This course will be delivered through a combination of formal lectures and exercises. |

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| Learning outcomes | <p>Knowledge and understanding:</p> <ul style="list-style-type: none"> • D1.1 - Possess basic knowledge of mathematical analysis, algebra, numerical calculation and optimisation methods which support computer science and advanced economics. <p>Applying knowledge and understanding:</p> <ul style="list-style-type: none"> • D2.1 - Ability to use mathematics and statistical data analysis tools to solve computational problems. <p>Learning skills</p> <ul style="list-style-type: none"> • D5.1 - Learning ability to undertake further studies with a high degree of autonomy. |
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| Assessment | <p>Written exam for each of the two modules.</p> <p>The written exam will consist of a set of verification questions, transfer of knowledge questions and exercises. The aim of the assessment is</p> |
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| | to check to which degree students have mastered the following learning outcomes: 1) knowledge and understanding, 2) applying knowledge and understanding. |
| Assessment language | English |
| Assessment Typology | Monocratic |
| Evaluation criteria and criteria for awarding marks | <p>Final Written Exam, 100% covering the full program. Written exam questions will be evaluated in terms of correctness, clarity, quality of argumentation and problem solving ability.</p> <p>Both modules must be positive to pass the course. A positive evaluation of one module will remain valid.</p> |
| Required readings | <p>Module 1 (Introduction to Linear Algebra and Discrete Mathematics) :</p> <ul style="list-style-type: none"> • Introduction to Linear Algebra, Fifth Edition, author: Gilbert Strang, Publisher: Wellesley-Cambridge Press, Print ISBN: 978-0980232776 • Matrix Analysis and Applied Linear Algebra, author: Carl D. Meyer, Publisher: SIAM, Print ISBN: 978-0898714548 • Discrete Mathematics with Applications, Fourth Edition, author: Susanna S. Epp, Publisher: Cengage Learning, Print ISBN: 978-0495391326 <p>Module 2 (Introduction to Analysis and Optimization Techniques) :</p> <p>Students should refer primarily to their notes taken in class (lectures and exercise classes) and consult the suggested textbooks.</p> |
| Supplementary readings | <p>Module 1 (Introduction to Linear Algebra and Discrete Mathematics) :</p> <ul style="list-style-type: none"> • Coding the Matrix Linear Algebra through Applications to Computer Science, First Edition, author: Philip N. Klein, Publisher: Newtonian Press, Print ISBN: 978-0615880990 • Discrete Mathematics and its Applications, Seventh Edition, author: Kenneth H. Rosen, Publisher: McGraw-Hill, Print ISBN: 978-0073383095 <p>Module 2 (Introduction to Analysis and Optimization Techniques) :</p> <ul style="list-style-type: none"> • Real Analysis, author: John M. Howie, Publisher: Springer, Print ISBN: 978-1-85233-314-0 <p>Additional textbooks can be recommended during the course.</p> |
| Software used | No software is needed for Module 2 (Introduction to Analysis and Optimization Techniques). |