

Course title: FINANCIAL MATHEMATICS

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| Lecturers | Full Prof. Zlatko Erjavec, Ph.D. Damir Horvat, M.A. Petra Žugec, Ph.D. |
| Language of instruction | Croatian and English |
| Study level | Bachelor |
| Study programme | Information and Business Systems |
| Semester | 5 th (winter) |
| ECTS | 4 |
| Goal | Introduction to basic concepts of financial mathematics necessary for understanding and development of models required for financial management and business calculations. |
| General and specific learning outcomes | <ol style="list-style-type: none"> 1. Understand relevant factors that affect the business operation of an organization and individuals, and apply basic methods and concepts of business planning, management and accounting 2. Keep track of professional literature in Croatian and a foreign language, prepare and independently deliver presentations in Croatian and a foreign language to professional and general public, and critically evaluate a presented professional topic. 3. Understand and apply appropriate mathematical methods, models and techniques to solving problems in the information and business systems field. |
| Content | <p>1. INTRODUCTION (2 hours)</p> <p>Introduction to the course – explanation of goals and purpose of the course. Repeating of definition, characteristics and graphs of elementary functions (1 hour)</p> <p>Arithmetic and geometric sequence - repetition. Interest -basic notations. Decursive and anticipative interest. (1 hour)</p> <p>2. SIMPLE AND COMPOUND INTEREST (2 hours)</p> <p>Simple interest and simple discount. Compound interest (1 hour)</p> <p>Nominal rate of interest. Sub-annual compounding. Annual effective interest rate. Derive of formula for equivalent rates. Continuous compounding. (1 hour)</p> <p>3. ANNUITIES (3 hours)</p> <p>Accumulated value of a due simple annuity of n payments. Accumulated value of an ordinary simple annuity of n payments. Use of M. Excel financial function FV and Goal Seek tool. (1 hour)</p> <p>Discounted value of a due simple annuity of n payments. Discounted value of an ordinary simple annuity of n payments. Small concluding payment. Use of M. Excel financial function PV, NPER, RATE. (1 hour)</p> <p>Ordinary general annuities. Other general annuities. Perpetuities. Ordinary simple perpetuity. Annuities whose payments vary. (1 hour)</p> <p>4. LOAN (2 hours)</p> <p>Basic notions. Types of loans according to means of payment. Loan payment by equal annuity (amortization). Construction of amortization schedule. Use of M. Excel financial functions PMT, RATE, IPMT and PPMT. (1 hour)</p> |

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| | <p>Notion of refinancing a loan and types of loan refinancing. Loan payment through equal principal repaid. (1 hour)</p> <p>5. ASSESSMENT OF INVESTMENT (1 hour)</p> <p>Notion of investments. Some methods of assessing investments justification: method of Net present value (NPV) and method of Internal rate of return (IRR). Use of M. Excel financial functions - NPV, IRR and MIRR.</p> <p>6. DEPRECIATION (1 hour)</p> <p>Notion of depreciation and basic notions. Depreciation base. Methods of depreciation. The straight-line method. The declining-balance method. The sum-of-years digits method. The physical-service method and depletion. Use of M. Excel financial functions SLN, DB, DDB and SYD.</p> <p>7. SIMPLE AND COMPOUND DISCOUNT (1hour)</p> <p>Simple discount. Equivalence between a simple interest rate and a simple discount rate. Annual effective discount rate. Accumulated value of principal in compound discount. Relation between a compound discount rate and a compound interest rate. Loan payment through equal annuity with respect of compound discount. Comparison of annuity in compound discount with annuity in compound interest.</p> <p>8. LIFE INSURANCE (2 hours)</p> <p>Repeating of basic terms of probability theory. Conditional probability. Survival probability. Mortality tables. (1 hour)</p> <p>Pure endowment. Whole-life and n-year life annuity due. Discrete whole-life insurance. Endowment policy. (1 hour)</p> <p>9. ANALYSIS OF PRACTICAL TASKS (1 hour)</p> <p>Analysis of practical tasks which teams of students complete through semester and present through seminars. Problems noticed in data gathering, team work and application of financial mathematic on practical problems. Propositions of new subjects for practical work.</p> |
| Exercises | Regular attendance and active participation on classes, regular studying and doing homeworks, participate in preliminary exams and solving a practical task in teams. |
| Realization and examination | Efforts and knowledge of the students is assessing during semester through homeworks, presentations, problem task solving (practical tasks) in groups and three monthly tests . Student may achieve maximum of 100 points. If he/she gets more than 50 points, he/she passes the course. Students who do not fulfill the above mentioned criteria (at least 50 points) are subjected to written and oral examination, but only after they meet requirements for signature which is confirmation of regular attendance on classes. |
| Related courses | |
| Literature | <p>Zima, P., Brown, R. L.: Mathematcs of Finance, Schaum`s O.S.,1996.</p> <p>Mc Cutcheon, J.J., Scott, W.F.: Introduction to Mathematics and Finance, Butterworth-Heinemann, 1989.</p> |