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Reforming Master Programmes in Finance in Armenia and Moldova / REFINe

An Erasmus+ Capacity Building Project (2017-2020)

# THE COURSE

## Financial and Actuarial Calculations at the National and International Level

### OVERVIEW

*University Moldova State University*

*Teacher Andrei Mulic*



# BASIC INFORMATION



<b>TITLE OF THE COURSE</b>	Financial and Actuarial Calculations at the National and International Level
<b>TEACHERS</b>	Andrei Mulic
<b>YEAR OF THE COURSE</b>	YEAR the 1st
<b>SEMESTER OF THE COURSE</b>	The 2nd semester
<b>LANGUAGE</b>	Romanian/ Russian/ English
<b>NUMBER OF ECTS CREDITS</b>	7

# LEARNING OUTCOMES



- Applying in practice concepts and basic principles to financial and actuarial calculation ;
- Creating and implementing the plan for the optimal distribution of available financial funds;
- Evaluating critical of the valuation methods of financial instruments, assets and liabilities elements and Gordon-Shapiro and Bates Models;
- Integrating of staggered payments and different types of annuities in different loan depreciation models and accumulating financial funds methods;
- Applying and critiquing of the methods for solving the deterministic investment problems;
- Evaluating of the cost of short-term and long-term credits using simple or compound interest techniques;
- Integrating of the elements of actuarial mathematics in insurance operations.

# SYLLABUS OF THE COURSE



WEEK	TOPIC
1-2	The cost of international and national short-term credit.
3-4	The cost of long-term credit at the national level. Compound interest
5-7	Staggered payments (rent)
8	Repayment of credits in national banking system
9-10	Financial placement in shares on the international securities market
11-12	Deterministic international investment problems
13-15	Elements of actuarial mathematics. Using Spreadsheet software (Excel), SAP or related software in actuarial calculation.

# SYLLABUS OF THE COURSE

## ADMINISTRATION OF THE DISCIPLINE



Code of discipline of the study plan	Title of the course	Responsible for discipline	Semester	Total hours				Assessment	Number of ECTS credits	
				Total	inclusive					
					C	S	L			IW
S.02.A.07	FAC	Mulic A.	2	210	30	30		150	ex.	7

## ORIENTAL TIMETABLE AND ORIENTAL DISTRIBUTION OF HOURS

Nr	Content units	Number of hours per week		
		Lecture	Seminars	Individual Work
1.	The cost of international and national short-term credit.	4	4	15
2.	The cost of long-term credit at the national level. Compound interest	4	4	15
3.	Staggered payments (rent)	6	6	15
4.	Repayment of credits in national banking sistem	2	2	15
5.	Financial placement in shares on the international securities market	4	4	10
6.	Deterministic international investment problems	4	4	10
7.	Elements of actuarial mathematics. Using Spreadsheet software (Excel), SAP or related software in actuarial calculation.	6	6	15
<b>Total</b>		<b>30</b>	<b>30</b>	<b>150</b>

# WEEK 1-2



## TOPIC I The cost of international and national short-term credit

1. Simple interest
2. Equivalence through interest
3. Calculation of interest on cash receipts, treasury bills and certificates of deposit
4. Pre-calculated interest equivalent to Post-Calculated Interest Rate
5. Calculating the amount of interest on the deposits deposited in the bank or accounts at the savings banks
6. Calculate the amount of interest on cashing operations and payments in your current account
7. Calculation of interest on discount credits

# The students should be able to:

- define the notion of simple interest
- determine short-term credit components
- classify the methods of calculating the interest
- calculate interest on cash, cash and deposit certificates
- calculate the amount of interest on cashing operations and payments to your current account

# WEEK 3-4



## TOPIC II. The cost of long-term credit at the national level. Compound interest

1. The formula for increasing in the mode of compound interest
2. Equivalent interest payment methods
3. Financial operations equivalent to compound interest
4. Placement under inflationary conditions. Inflation and real interest rate





# The students should be able to:

- define compound interest
- describe the equivalent methods of payment of interest
- analyze the equivalent financial transactions under compound interest

# WEEK 5-7



## TOPIC III. Staggered payments (rent)

1. Immediate temporary ordinary annuities
2. Postponed temporary ordinary annuities
3. The perpetuated ordinary annuities
4. Immediate temporary annuity due
5. Delayed Temporary annuity due
6. Perpetual annuity due
7. Equivalence in staggered payments



# The students should be able to:

- identify annuity types
- recognize and examine the temporary ordinary annuities
- justify the use of perpetual annuity due
- revalue the equivalence in staggered payments operations

# WEEK 8



## TOPIC IV. Repayment of credits in national banking system

1. Reimbursement using immediate Ordinary Annuity
2. Reimbursement using immediate Annuity Due



# The students should be able to:

- determine the process of reimbursement through the immediate temporary Ordinary Annuity
- set the reimbursement by the immediate Annuity Due

# WEEK 9-10



## TOPIC V. Financial placement in shares on the international securities market

1. Evaluate under certain conditions
2. The model of Gordon and Shapiro
3. The Bates's model
4. Dividend model in arithmetic progression

# The students should be able to:



- leave the assessment under certain conditions
- interpret the model of Gordon and Shapiro
- compare Bates' model with the dividend model in arithmetic progression

# WEEK 11-12



- **TOPIC VI.** Deterministic international investment problems
  1. Optimal choice of investment
  2. Optimal choice of investments with a limited investment fund
  3. Profitability of an investment. Percentage of profitability.
  4. Determine the optimal time to replace a piece of equipment





# The students should be able to:

- Identify the optimal choice of investment
- calculate the return on investment, the rate of return, the absolute profitability and the relative profitability
- determine the optimal moment of replacement of equipment



## TOPIC VII. Elements of actuarial mathematics. Using Spreadsheet

software (Excel), SAP or related software in actuarial calculation.

1. Life insurance. Biometric Functions
2. Probability of life and death. Survival function. Average life. Probable life
3. Ensuring an amount in case of survival at the end of the insurance term. Single life payment
4. Immediate ordinary annuities. Calculation of the single premium
5. Immediate due annuity. Calculation of the single premium
6. Immediate life annuities limited to  $n$  years. Calculation of the single premium
7. Deferred annuities. Calculation of the single premium
8. Pension annuities. Calculation of premiums
9. Death insurance. Calculation of the single premium

# The students should be able to:

- recognize biometric features
- formulate the insurance of an amount in case of survival at the end of the insurance term
- calculate the single premium using the pension annuities

# TEACHING METHODOLOGY



- In the teaching of the discipline are mainly used interactive methods: **problem-solving, case study, heuristic methods** by which the student is stimulated to find solutions through the outcome of his own learning activity, **interactive-creative learning, brainstorming, blended learning, E-learning MoodleUSM.md** (<http://moodle.usm.md/moodle/>), but also traditional methods like: **description, explanation of economic phenomena and processes, graphic representations, comparison.**

# TEACHING METHODOLOGY



- The forms of organizing the training at discipline are made up of lectures, seminars, guiding the individual activity, extra-curricular activity of financial education.
- In the lectures are taught the basic concepts of the themes of the discipline, the principles of performing financial and actuarial calculations in specialized financial institutions, the functions, methods and tools used in the management of the financial processes, etc.
- The purpose of the seminars is to examine the most complicated concepts, to solve problems related to the topics studied, to discuss case studies. In the course of the seminar, students are tested on the students' level of learning, the presentation of the individual work.

# TEACHING METHODOLOGY



- **Individual work** involves preparing for the seminars in accordance with the objectives set in the syllabus, studying the legislative and normative framework related to the respective themes, solving, problem-solving, execution of research projects or **case studies**.
- If necessary, the student has the possibility to get a **personal teacher's consultation**.

# LABOUR MARKET RELEVANCE



- Based on the analysis results from WP 1 (Annex 1B, Figure 16-18) the most important FINANCE - specific skills and competencies of current employees - Level of the MA graduates is: Budgeting and financial planning, IT and math skills.
- Features of this specialty consist in the need for students to develop knowledge and skills in the field of financial calculation.
- The peculiarities of the orientation of these competencies allow uniting financial and accounting activities and creating universal specialists for the national economy, which certainly will provide them with undoubted advantages in the job placement.
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# LABOUR MARKET RELEVANCE



- According to the Classification of Occupations in Moldova, discipline Financial and Actuarial Calculations at the National and International Level, will create the specialists for following occupational posts:
- 1120 Directors-General, Executive Directors and Assignees,
- 1211 Financial heads,
- 1213 Heads in the field of economic and planning policies,
- 1346 Heads of units providing financial and insurance services,
- 2412 Financial and investment specialists and consultants,
- 4312 Officials in the field of statistics, finance and insurance.



# LABOUR MARKET RELEVANCE



- More than that, the internalization of economic relations requires economic entities to be more competitive on international markets, that is why it is important to adapt the teaching process to new international trends in financial calculation.
- Developing course units (modules) to course Financial and Actuarial Calculations at the National and International Level in partnership with labor market representatives, analysis of real case studies offered by companies and recommending solutions to some problems in practice national companies.

# ASSESSMENT AND GRADING



- In order to evaluate the learning outcomes within the discipline, it is done:
- 1. Current evaluation - is conducted throughout the semester during courses, seminars, consultations. They are also rated on a scale of 1 to 10 compulsory semesters, which take place in pre-established periods in the annual academic calendar. The weight of the current assessment is 60% of the final grade.
- 2. Final assessment - is done through the written exam, using the institutional test, consisting of 2 subjects of tasks on 3 levels with different degree of complexity (knowledge, applied, integration). The weight of the mark on the exam is 40% of the final grade in the discipline.
- 3. Evaluation of the product of individual work - is done outside direct contact hours: at counselling hours or in the sessions of the student's academic seminar.
- a) The final grade in the discipline is calculated according to the MSU Academic Performance Evaluation Regulation: Semester grade (60%) + Examination note (40%)

# ASSESSMENT AND GRADING



The semester assessment is determined based on the components that make up the current evaluation:

$$\text{Semester assessment} = \frac{T_1 + T_2 + \frac{MEC + LI}{2}}{3}$$

- T1 - mandatory Test 1.
- T2 - - mandatory Test 2.
- MEC - the average of the current assessment, is calculated as a simple arithmetic mean of grades accumulated in seminars and courses.
- LI -not granted for the final product (Case study) presented for the individual work carried out.
- - Final exam (final assessment) - 40%;

Minimum requirements for promotion

- Obtaining the minimum promotion mark for the discipline (semester note);
- Obtaining the minimum mark for promotion at the course exam;
- elaboration, presentation and support of individual work (case study);

# REFERENCES



- Brigham, Joel F. Houston, Colin Drury «Managerial Finance 2<sup>nd</sup> Edition» IBMMS Regular and Fast-Track Programmes Eugen F. United Kindom Ashford Colour Press 2018, ISBN 978-1-4737-5666-3
- Corelli, Analytical Corporate Finance (Springer Texts in Business and Economics), 2nd ed. 2018, Springer, ISBN 978-3-319-95761-6
- Pavel Cížek, Wolfgang Härdle, Rafał Weron «Statistical Tools for Finance and Insurance» Springer Berlin Heidelberg New York, 2017, ISBN 3-540-22189-1
- Girasa, Regulation of Cryptocurrencies and Blockchain Technologies (Palgrave Studies in Financial Services Technology) Palgrave Macmillan, London, 2018, ISBN 978-3-319-78508-0
- Mulic Andrei, Constantinescu Vladislav, Development of a strategy for financing investment projects of enterprises in the conditions of the Republic of Moldova The Scientific Annals of the State University of Moldova Volume IV Chisinau 2006 p. 242 - 248 ISBN 978-9975-70-025-2
- Römănu, Analytical Finance: Volume I-II Palgrave Macmillan, London, 2017, ISBN 978-3-319-34026-5



**group work/ case study/homework on discipline "Financial and Actuarial Calculations"  
Year I Master**

- 1) Define the concept of interest (2)
- 2) Classification of staggered payments (2)
- 3) Determine, on an equal basis with interest (using EXCEL spreadsheet), the average amount, the average percentage, the common maturity and the average maturity in the case of the following loans of «WETRADE» LLC for the purpose of accumulation:
  - 30000 u.m., with an annual percentage of 12%, over 180 days;
  - 40000 u.m., with an annual percentage of 15%, over 250 days;
  - 20000 u.m., with an annual percentage of 20%, over 200 days. (3)
- 4) Place the amount of 75,000 u.m. under compound interest rate for 5 years (2012-2018) with the successive annual percentages of (using the Internet, it is necessary to find data on the average interest deposit rate in the banking system of Republic of Moldova, for the specified period). Find the final amount (capitalized capital) and the related interest. (3)
- 5) A client of the MOLDINCONBANK wishes to know what the amount should be deposited annually for 10 years under a compound interest rate with the annual percentage  $p = 12\%$  so that he and his followers can perpetually withdraws at every beginning of the semester 15,000 (3)
- 6) JSC «Cricova» debt of 250000 u.m. contracted today will be reimbursed, over three years, through the equal annuity targets, for 4 years and an average annual percentage  $p = 8\%$  for all 7 years. Draw up the repayment plan for the loan. (3)

**The scale of assessment**

Points	5 – 6	7 – 8	9 – 10	11 – 12	13 – 14	15 – 16
Note	5	6	7	8	9	10



**Test on discipline "Financial and Actuarial Calculations" Year I Master**

**VARIANT 1**

**Topic I Deterministic investment problems**

**I. Level of knowledge** **3 p.**

1.1. Describe the process of determining the optimal replacement time for equipment

**II. At the application level** **5 p.**

1.2. Compare the method of global profitability to the net benefit (accounting) method

**III. At the level of integration** **7 p.**

1.3. «AgroProfi» LLC, which has an annual investment budget of 396,000 u.m., seeks to make a placement as profitable as possible. For this purpose, some of the following seven investment projects should be selected (using EXCEL spreadsheet), the cost of which is, and the coefficients of profitability C (Ps) is estimated to be: (76,000; 1,16), (56,000; 1,13) (90000, 1.2), (71000, 1.11), (48000, 1.1), (69000, 1.17), (75000, 1.18).

**Topic II. Staggered payments (rent)**

**I. Level of knowledge** **3 p.**

1.1. Define the concept of annuity.

**II. At the application level** **5 p.**

1.2. Classify staggered payments

**III. At the level of integration** **7 p.**

1.3. At the end of each of three consecutive years (2016, 2017, 2018), the same amount equal to 6500 lei will be deposited into a deposit account with a corresponding annual interest (using the Internet, it is necessary to find data on the interest rate for the specified period on commercial bank deposits VICTORIABANK). Determine the final and current cost of the operation.

**The scale of assessment**

Points	6 – 8	9 – 11	12 – 18	19 – 25	26 – 28	29 – 30
Note	5	6	7	8	9	10

# CASE STUDY DESCRIPTION



- **General information:**

<b>Title of the course (as specified in the reformed curriculum)</b>	<b>Financial and Actuarial Calculations at the National and International Level / Corporate Finance</b>
<b>Name of the teacher</b>	Andrei Mulic, Cojocaru Maria
<b>Title of the case study</b>	Development an optimal financial strategy in the context of the company's loan financing / Analysis of a potential purchase transaction
<b>Company with which the case study was developed</b>	Joint Stock Company “Taraclia Wine Factory” “Purcari Wineries” Public Company Limited

# CASE STUDY DESCRIPTION



- This case study will be analysed at the seminar.
- This case study is interdisciplinary and will be used in the development of individual works in two disciplines.

Refers to content units:

- Financial and Actuarial Calculations at the National and International Level
- Corporate Finance
- The course notes, available online at [www.moodle.usm](http://www.moodle.usm), will be consulted.
- The financial statements of Joint Stock Company “Taraclia Wine Factory” will also be downloaded from the platform.
- The management's report (2018) and the financial statements of the group "Purcari Wineries Public Company Limited" will be accessed from the company's website.



# CASE STUDY DESCRIPTION



- At the end of the project (case study), the group of students develop a presentation and show it to a financial manager, director of an investment fund or a partner of a Joint Stock Company “Taraclia Wine Factory” from Republic of Moldova. For example Purcari Wineries Public Company Limited Group, for the purpose of interdisciplinary practical correlation of the first and second section of Case Study).

## Group task (Joint Stock Company “Taraclia Wine Factory”)

- Each group chooses different types of financial strategies (financing strategy, credit strategy, investment strategy). Using a financial calculator and Excel spreadsheets, a repayment schedule is drawn up).
- Options to choose from:
- - Total amount of financing and investment program: from 500.000 to 4.000.000 MDL;
- - Discount rate: using the data from the site <http://bnm.md/> to calculate the required discount rate for this company in the conditions of the Republic of Moldova, using the WACC method;
- - Duration of investment and credit strategy: from 12 to 48 months;

# CASE STUDY DESCRIPTION



- Each group is requested to receive an advisory report on the financing plan, planned cash flows, the optimal amount of loan financing, the repayment schedule, which meets the following three conditions:
- 1. Verifying the correctness of the due date, the duration and amount of funding by calculating using the special financial calculation methods mentioned above. Also indicate the type of loan financing. Present all payments and interest payments per month using Excel's redemption schedule, columns should contain month, redemption amount, interest, total and residual debt.
- 2. A good visual representation of payments, equity and residual debt and their relationships. Select (appropriate type (s) of graphics for this. Also indicate what profit the company can extract from this.
- 3. The company's management also wants to see what the consequences of introducing a financial strategy are for a certain period. As an example, select a realistic period of loan depreciation (in years). Prepare a credit depreciation schedule.

# CASE STUDY DESCRIPTION



- Evaluation is carried out on the basis of (whole) assessment for each of the three parts mentioned, as well as report correctness indicators (Introduction - Main conclusions (s), Romanian / English / Russian, good argumentation, clarity of the material, contribution of each student in the overall task) and, finally, an indicator of originality. The final mark is the average of these five numbers, rounded to one decimal place. There may be deviations from the per student.



**THANK FOR ATTENTION**

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