**Financial Math**

**TS1 (60 Hours)**

**Course Description:**

This course is intended to serve as a basic introduction to financial mathematics. It gives a mathematical perspective on the valuation of financial instruments (futures, options, etc.) and their risk-management. The purpose of the course is to introduce students to the stochastic techniques employed in derivative pricing.

The goal of this course is also to introduce basic mathematical tools used in finance. By the end of this course, Student should be familiar with terms like: no-arbitrage principle, money market, risk and return, forward contracts call and put options, continuous compounding, coupon bonds and many others.

This course will extend student’s knowledge and introduce him to some fundamental tools to help him comprehending the basics of financial transactions.

**Learning Outcomes:**

At the end of this course, the student should be able to:

* Understand compounding and the differences between discrete and continuous compounding method.
* Describe the concept of the time value of money and discounting.
* Analyze and calculate the net present value and internal rate of return of a stream of cash flows.
* Understand the principles of valuing shares, bonds and forward contracts and appreciate how they may be calculated.
* Solve exercises and application problems on proportionality, percentages, prices, reports, and proportions.
* Apply the general formula of simple interest in calculating the interest, capital, rate, and time; and use the methods of quick calculation of interests.
* Deal with exercises and problems concerning commercial discount, equivalence of effects, common and average.
* Deal with exercises and problems concerning and interests; apply the direct method and the Hambourg method
* Solve exercises and problems on measures, currencies, precious metals and international exchanges
* Calculate simple statistics: average arithmetics, statistical series, solve exercises and problems relative to indices and composed interests.

**Chapter One**

**Proportionality**

***Learning Objectives:***

* Solve exercises and problems about ratios and proportions
* Apply direct and inverse proportionality
* Determine the chains of magnitudes and apply the chain rule, specify the magnitudes that are proportional to many others
* Execute directly proportional divisions

**Contents:**

1.1. Ratios and proportions

1.1.1. Ratios

1.1.2. Proportions

1.2. Proportionality

1.2.1. Direct proportionality

1.2.2. Inverse proportionality

* 1. Magnitude chains, chain rule
  2. Magnitudes that are proportional to many others
  3. Directly proportional divisions

**Chapter Two**

**Percentage and price**

**Learning Objectives:**

* Solve exercises and problems by applying direct percentages
* Calculate additive, successive and per portions percentages: taxes, digressive prices
* Apply indirect percentages
* Calculate the cost, income price, benefit and definitive sale prices
* Take the markup rate into account

**Contents:**

2.1. Direct percentages

2.1.1. Generalities

2.1.2. Additive, successive percentages

2.1.3. Percentages per portions,

Applications: tax on the income of natural persons: for a bachelor, a family man, digressive prices

2.2. Indirect percentages

2.3. Cost and income price

2.4. Benefit (markup rate)

2.5. Definitive sale prices

**Chapter Three**

**Simple interests**

**Learning Objectives:**

* State the arithmetic properties of simple interests, calculate the interest, capital, rate and time by applying the general formulae
* Apply the methods of fast calculation of interests: numbers and divisors, aliquot parts of time, aliquot parts of time and rate (method of 60), aliquot parts of capital and year of 365 days

**Contents:**

3.1. Arithmetic properties

3.1.1. Calculation of interest

3.1.2. Calculation of capital

3.1.3. Calculation of rate

3.1.4. Calculation of time

3.2. Methods of fast calculation of interests

3.2.1. Numbers and divisors

3.2.2. Aliquot parts of capital

3.2.3. Aliquot parts of time

3.2.4. Aliquot parts of time and rate (method of 60)

3.2.5. 365-days year

**Chapter Four**

**Commercial discount**

**Learning Objectives:**

* Explain the commercial discount, calculate the actual commercial value
* Apply the general formula and calculate the commercial discount
* Calculate the commercial discount by applying the methods of numbers and fixed divisors, of aliquot parts, of arithmetic properties

**Contents:**

4.1. Definition

4.2. Commercial discount, actual commercial value

4.3. Calculation of commercial discount

4.3.1. General formula

4.3.2. Numbers and fixed divisors

4.3.3. Aliquot parts

4.3.4. Arithmetic properties

**Chapter Five**

**Study of the list of bills for discount**

**Learning Objectives:**

* Execute the payment and cashing of effects by banks, calculate the commissions, determine the value date (availability) and establish the list of bills for cashing
* Execute the negotiation of commercial effects, the rediscount, apply the discount rate, calculate the commission
* Establish the lists of bills, calculate with immediate interests and practical methods, determine the real rate of discount
* Analyze the list of bills established by banks

**Contents:**

5.1. Cashing

5.1.1. Payment and cashing of effects by banks

5.1.2. Commissions

5.1.3. Value date, availability

5.1.4. List of bills for cashing

5.2. Negotiation of commercial effects

5.2.1. Conditions of negotiation of commercial effects

5.2.2. Value date, availability

5.2.3. Rediscount, discount rate

5.2.4. Commissions

5.3. List of bills for discount

5.3.1. Establishment of the lists of bills

5.3.2. Calculation with immediate interests

5.3.3. List of bills established by banks

5.3.4. Calculation with the method of 60

5.3.5. Calculation with numbers

5.4. Real discount rate

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**Chapter Six**

**Equivalence of effects**

**Learning Objectives:**

* Calculate the equivalence of two effects
* Calculate the renewal of an effect
* Calculate the common due date of many effects
* Calculate the average due date
* Calculate the equivalence of many effects and a simple effect and specify the conditions of equivalence

**Contents:**

6.1. Equivalence of two effects

6.2. Renewal of an effect

6.3. Equivalence of many effects and a simple effect, conditions of equivalence

6.4. Common due date of many effects

6.5. Average due date

**Chapter Seven**

**Current accounts and interests**

**Learning Objectives:**

* Specify the general notions for the keeping of current accounts and interests
* Apply the direct method
* Apply the Hamburg method

**Contents:**

7.1. General notions

7.2. Direct method

7.3. Hamburg method

**Chapter Eight**

**Measures and currencies**

**Learning Objectives:**

* Identify and determine foreign measures
* Calculate the value of Lebanese currency conversion to foreign currencies
* Handle operations on precious metals
* Solve exercises and problems about measures, currencies and precious metals

**Contents:**

8.1. Foreign measures

8.2. Lebanese and foreign currencies

8.3. Precious metals

**Chapter Nine**

**International exchange**

**Learning Objectives:**

* Execute the mechanism of exchange: method, transfer exchange or payment exchange , drawn exchange.
* Practice the exchange for delivery, forward exchange and drawn exchange: discount of effects in foreign currencies.
* Solve exercises and problems about international exchange.

**Contents:**

9.1. Exchange mechanism

9.1.1. Generalities

9.1.2. Methods of exchange

9.1.3. Transfer exchange or payment exchange

9.1.4. Drawn exchange

9.2. Exchange for delivery

9.3. Drawn exchange; discount of effects in foreign currencies

9.4. Forward exchange

**Chapter Ten**

**Simple statistic calculations, averages, medians**

**Learning Objectives:**

* Calculate the simple arithmetic average
* Calculate the weighted arithmetic average
* Identify the statistic series
* Calculate the median
* Solve exercises and problems about averages and medians

**Contents:**

10.1. Simple arithmetic average

10.2. Weighted arithmetic average

10.3. Median

**Chapter Eleven**

**Indices**

**Learning Objectives:**

* Calculate the particular index and synthetic index
* Calculate the monthly gross index of production
* Calculate the monthly index of consumption prices
* Solve exercises and problems about indices

**Contents:**

11.1. Particular index

11.2. Synthetic index

11.3. Monthly gross index of production

11.4. Monthly index of consumption prices

**Chapter Twelve**

**Compound interests**

**Learning Objectives:**

* Develop and use the formula of capitalization and calculate the compound interests
* Calculate the proportional rates and equivalent rates
* Solve exercises and problems about compound interests

**Contents:**

12.1. Formula of capitalization

12.2. Proportional rates

12.3. Equivalent rates