

**Federal State Autonomous Educational Institution of Higher Education "Moscow  
Institute of Physics and Technology  
(National Research University)"**

**APPROVED**  
**Vice Rector for Academic Affairs**

**A.A. Voronov**

**Work program of the course (training module)**

**course:** Fundamentals of Financial and Economic Analysis and Planning/Основы  
финансово-экономического анализа и планирования

**major:** Applied Mathematics and Informatics

**specialization:** Computer Science/Информатика  
Phystech School of Applied Mathematics and Informatics  
Educational and scientific center for the humanities and social sciences

**term:** 4

**qualification:** Bachelor

Semester, form of interim assessment: 8 (spring) - Pass/fail exam

Academic hours: 15 АН in total, including:

lectures: 15 АН.

seminars: 0 АН.

laboratory practical: 0 АН.

Independent work: 30 АН.

In total: 45 АН, credits in total: 1

Authors of the program:

Y.N. Volkov, candidate of physics and mathematical sciences, associate professor, associate professor

E.A. Starostin, assistant

The program was discussed at the Educational and scientific center for the humanities and social sciences 26.08.2022

## Annotation

The financial and economic aspects of the subjects of the economy are studied. The course reflects both microeconomic aspects of financial activity at the individual level and macroeconomic aspects that affect the most important financial indicators. The basics of financial calculations and criteria for the effectiveness of financial projects for decision-making at the individual level are given. We study the macroeconomic aspects of financial activity and the special role of the state in economic regulation to influence such financial indicators as GDP, deposit and loan banking rates, inflation rates, exchange rates. The course is implemented using e-learning and distance learning technologies.

### 1. Study objective

#### Purpose of the course

- To introduce students to the methods of financial calculations to improve their financial literacy;
- formation of skills for analyzing financial and economic problems at micro and macro levels;
- acquisition of skills for making informed economic decisions in the areas of life.

#### Tasks of the course

As a result of studying the course, the student must:

- know the main results of the financial aspects of micro- and macroeconomic theory;
- have the skills of economic modeling to make informed economic decisions.

### 2. List of the planned results of the course (training module), correlated with the planned results of the mastering the educational program

Mastering the discipline is aimed at the formation of the following competencies:

Code and the name of the competence	Competency indicators
UC-9 Ability to make informed economic decisions in various areas of activity	UC-9.1 Understands the basic principles of the functioning of the economy and economic development.
	UC-9.2 Knows the main types and sources of economic and financial risks and how to reduce them.
	UC-9.3 Knows the basics of economic analysis for making informed economic decisions.

### 3. List of the planned results of the course (training module)

As a result of studying the course the student should:

know:

- the key provisions of the sections of micro- and macroeconomic theory related to financial analysis, as well as to have an idea of the possibilities of applying the theory to analyze the financial and economic consequences of decisions made.

be able to:

- to model and analyze situations using micro- and macroeconomic financial tools, as well as to interpret the results obtained.

master:

- the logic of economic analysis and approaches to solving financial and economic problems.

### 4. Content of the course (training module), structured by topics (sections), indicating the number of allocated academic hours and types of training sessions

#### 4.1. The sections of the course (training module) and the complexity of the types of training sessions

№	Topic (section) of the course	Types of training sessions, including independent work			
		Lectures	Seminars	Laboratory practical	Independent work

1	The basics of an individual's financial literacy	7			14
2	Macroeconomic aspects of financial activity Modern financial markets.	4			8
3	State regulation of the economy and finance GNP as the sum of incomes of economic entities.	4			8
AH in total		15			30
Exam preparation		0 AH.			
Total complexity		45 AH., credits in total 1			

#### 4.2. Content of the course (training module), structured by topics (sections)

Semester: 8 (Spring)

##### 1. The basics of an individual's financial literacy

Efficiency of investing available funds in the banking sector: deposits, interest rates. Alternative options for investing money (bonds, stocks, promissory notes). Discounting as a financial computing tool. The behavior of an individual in conditions of uncertainty. The task of forming an optimal investment portfolio. Insurance demand model. The utility function of the consumer. Constructing a utility function based on indifference curves. Examples of utility functions for basic preference types. Consumer choice. The task of maximizing utility under budget constraints. Demand functions. The concept of revealed preference. A weak axiom of revealed preferences.

##### 2. Macroeconomic aspects of financial activity Modern financial markets.

Capital markets and money markets. Financial market instruments. Global financial centers and exchanges. The demand for money and the supply of money. Money supply (aggregates H0, M0, M1, M2, M3). Creation of deposits in the banking system. Money multiplier. Banks and the banking system. Banks in the era of globalization and the digital economy. The Central Bank and its functions. Instruments the influence of the state on the supply of money (operations on the open market, changes in the key interest rate, changes in the reserve rate). Current trends in financial markets: Bitcoins. Inflation: causes, its types and impact on the economy of consumption and the economy of development. Exchange rates: how they are formed and their impact on economic dynamics. The problem of capital outflow for the Russian Federation.

##### 3. State regulation of the economy and finance GNP as the sum of incomes of economic entities.

State regulation of the economy and finance GNP as the sum of incomes of economic entities. Investments and savings. Budget deficit. The equilibrium level of GDP. Keynes multipliers. The State budget of the Russian Federation: sources of replenishment and spending directions. Taxes and other mandatory payments. Economic models to demonstrate the consequences of government decisions. The AD-AS (closed economy) model. The formula of the country's trade balance. The balance of payments. The IS-LM-BP (Open Economy) model.

#### **5. Description of the material and technical facilities that are necessary for the implementation of the educational process of the course (training module)**

To master the course, it is necessary to have a personal computer with a stable Internet connection. The recommended connection speed is from 2 Mbit/s. Watching video lectures, taking tests (conducting ongoing monitoring of progress and intermediate certification), the forum is provided via Google Chrome or Firefox.

#### **6. List of the main and additional literature, that is necessary for the course (training module) mastering**

Main literature

Additional literature

## **7. List of web resources that are necessary for the course (training module) mastering**

1. Berk, J., DeMarzo, P., & Harford, J. V. T. (2014). Fundamentals of Corporate Finance, Global Edition (Vol. Third edition). Harlow: Pearson. Retrieved from <http://search.ebscohost.com/login.aspx?direct=true&site=eds-live&db=edsebk&AN=1419502>
2. Butler, K. C. (2016). Multinational Finance : Evaluating the Opportunities, Costs, and Risks of Multinational Operations (Vol. Sixth edition). Hoboken, New Jersey: Wiley. Retrieved from <http://search.ebscohost.com/login.aspx?direct=true&site=eds-live&db=edsebk&AN=1221493>
3. Damodaran, A. (2012). Investment Valuation : Tools and Techniques for Determining the Value of Any Asset (Vol. 3rd ed). Hoboken, New Jersey: Wiley. Retrieved from <http://search.ebscohost.com/login.aspx?direct=true&site=eds-live&db=edsebk&AN=442924>
4. Principles of corporate finance, Brealey, R. A., 2017
5. Managerial Economics : A Problem-Solving Approach, Wilkinson, Nick. Cambridge University Press, 2005. ProQuest Ebook Central,
6. Pindyck, R. S., & Rubinfeld, D. L. (2015). Microeconomics, Global Edition (Vol. Global edition, Eighth edition). Boston: Pearson. Retrieved from <http://search.ebscohost.com/login.aspx?direct=true&site=eds-live&db=edsebk&AN=1419566>
7. Waschik, Robert, et al. Managerial Economics : A Strategic Approach, Routledge, 2010. ProQuest Ebook Central

## **8. List of information technologies used for implementation of the educational process, including a list of software and information reference systems (if necessary)**

Educational materials are accessed through the MIPT distance learning system (lms.mipt.ru). To watch video lectures, pass intermediate certification, participate in the course forum, you need the Google Chrome or Firefox Internet browser.

## **9. Guidelines for students to master the course**

The course "Fundamentals of financial and economic analysis and planning" is designed for one semester. The test is carried out by testing students in three studied sections.

**Assessment funds for course (training module)**

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Educational and scientific center for the humanities and social sciences  
**term:** 4  
**qualification:** Bachelor

Semester, form of interim assessment: 8 (spring) - Pass/fail exam

**Authors:**

Y.N. Volkov, candidate of physics and mathematical sciences, associate professor, associate professor  
E.A. Starostin, assistant

## 1. Competencies formed during the process of studying the course

Code and the name of the competence	Competency indicators
UC-9 Ability to make informed economic decisions in various areas of activity	UC-9.1 Understands the basic principles of the functioning of the economy and economic development.
	UC-9.2 Knows the main types and sources of economic and financial risks and how to reduce them.
	UC-9.3 Knows the basics of economic analysis for making informed economic decisions.

## 2. Competency assessment indicators

As a result of studying the course the student should:

### know:

- the key provisions of the sections of micro- and macroeconomic theory related to financial analysis, as well as to have an idea of the possibilities of applying the theory to analyze the financial and economic consequences of decisions made.

### be able to:

- to model and analyze situations using micro- and macroeconomic financial tools, as well as to interpret the results obtained.

### master:

- the logic of economic analysis and approaches to solving financial and economic problems.

## 3. List of typical control tasks used to evaluate knowledge and skills

Questions and tasks by sections

1. Determine the current value of an annuity equal to 500 thousand rubles. at a discount rate of 12% and a period of 15 years.

2. A citizen has a debt in the amount of  $D=300$  thousand rubles, which is growing at a rate of  $h=2\%$  per year. To pay off the debt, there is an opportunity to sell the car, which is now valued at  $P=600$  thousand rubles, and then its price will fall at a rate of  $g=1\%$  per year.

3. Someone has a bank deposit  $S$  for one year at simple interest  $i$ . He has the opportunity to reissue the entire deposit on new terms: simple interest and with probability  $p$  are not charged, but with probability  $(1-p)$  are accrued at an annual rate of  $2i$ . When reissuing a deposit, the interest on the first deposit does not burn out.

Is it profitable for a risk-neutral entity with a linear utility function  $u(S)$  to re-arrange the deposit, and if so, at what time interval  $t$  of the current year and at what probability  $p$ ?

4. Suppose you have \$100 and you are choosing the best investment for that money. You can either put them on a bank deposit at 6% per annum or buy government bonds with a maturity in a year, denominated in rubles. If the ruble depreciates by 10% in a year, then at what minimum interest rate on government bonds could one buy them?

5. The yield of bonds and shares with annual maturities are 5% and 14%, respectively, and the risk of shares is estimated at  $\sigma = 0.2$ . Compose a portfolio of these assets using the Rubinstein utility function  $U = 0.5r - \sigma$  and calculate all its parameters. How will the calculation results change taking into account inflation of 5%?

6. Consider a two-period model where the consumer earns non-zero income in each of two periods.

(a) How will the current consumption of the net borrower change if the interest rate rises?

b) Will this result also hold for the net creditor?

c) What can be concluded about the dependence of aggregate consumption on the rate of interest?

Section 2. Macroeconomic aspects of financial activity

1. Suppose that the Central Bank sold government bonds for an amount equal to 50 million rubles, and at the same time issued an issue in the amount of 50 million rubles. If the money multiplier is 3, how has the stock of money in the economy changed?
2. Let the money supply be 900 billion rubles, deposits amount to 500 billion rubles. and the required reserve ratio is 10%. The Central Bank purchased government bonds for an amount equal to 40 million rubles.
  - a) Estimate by what maximum amount the nominal money supply can change as a result?
  - b) Why does the money supply actually change less?
3. In which case will fiscal expansion be more effective if it is financed by the issuance of money, or if it is financed by the sale of government bonds?

#### 4. Evaluation criteria

1. The consumer has a utility function  $u(X_1, X_2) = X_1 + X_2$ . The consumer's income is 12. If the price of the first good is 2, and the price of the second good is 1, then which set will the consumer choose?
  - (a)  $(X_1=6, X_2=0)$  (b)  $(X_1=0, X_2=12)$
  - (b)  $(X_1=3, X_2=6)$  (d)  $(X_1=6, X_2=6)$
2. The consumer has a utility function. The consumer's income is 12. If the price of the first good is 2, and the price of the second good is 6, then which set will the consumer choose?
  - (a)  $(X_1=6, X_2=2)$  (b)  $(X_1=0, X_2=2)$
  - (c)  $(X_1=12, X_2=0)$  (d)  $(X_1=6, X_2=0)$
3. Which of the following operations will not change the country's GDP for the current period:
  - a) the client paid for the services of a barber shop; b) the company purchased an old building for its needs;
  - c) the manufacturing company purchased products manufactured abroad last year;
  - d) options a) and c) are correct; e) all of the above; f) none of the above.
4. In 2001, you bought an apartment for \$80,000 in a house built a few years ago, and this year you sold it for \$110,000. The real estate agent's commission is 10%. How much and how did GDP change in 2001?
  - a) increased by \$8,000; b) increased by \$11,000;
  - c) did not change; d) increased by \$80,000.
5. Consider the model of forming an optimal investment portfolio of two assets for an individual risk-phobe. Let a unit of investment in a risk-free asset bring a (gross) return of 4, and a unit of investment in a risky asset gives a (gross) return of 8 with a probability of 1/3 and otherwise. At what value will an individual invest in a risky asset?
  - (a) 1/2 (b) 2
  - (c) 2/3 (d) there is no correct answer
6. Consider an economy that operates under a fixed exchange rate and is located at point A. The balance of payments curve is horizontal and passes through point A. An increase in the world interest rate can shift the equilibrium to point: a) B) G c) D d) F d) E e) your answer\_\_\_\_\_
7. Consider an economy that operates in a floating exchange rate and is located at point A. The balance of payments curve has a positive slope and passes through points A and C. An increase in the world interest rate may shift the equilibrium to point:
  - a) b) P v) C d) A d) E) has its own answer\_\_\_\_\_
8. Confirm or refute the following statements by explaining the answer using diagrams  $i - L$  and  $i - Y$ :
  - An increase in the nominal money supply leads to a shift of the LM curve to the right;
  - An increase in the price level has the same effect on the LM curve as an increase in the nominal money supply;
  - The increase in output does not affect the position of the LM curve in any way;
  - Only a change in the sensitivity of the demand for money to the interest rate can lead to a turn of the LM curve.
9. Confirm or refute the following statement: The Central Bank's requirement for commercial banks to hold mandatory reserves is equivalent to the introduction of an additional tax on banking activities.
10. Can the Central Bank's key rate be higher than the interest rate on the interbank loan market? Is the reverse situation possible?

11. Consider an investment project that requires an initial investment of  $X$  rubles and brings a net income of  $Y$  rubles in the first year and  $Z$  rubles for all subsequent years. The interest rate is constant and is  $i\%$ .

What is the reduced profit (NPV) of the project?

At what max. the interest rate (IRR) of the project can still be carried out without losses?

X (million rubles)	Y (million rubles)	Z (million rubles)	i (%)	NPV (million rubles)	IRR (%)
100	100	20	5		

To receive a credit, you must correctly solve at least 50% of the test tasks.

## **5. Methodological materials defining the procedures for the assessment of knowledge, skills, abilities and/or experience**

When passing the test, students can use the course program. The final grade for the course is set on the basis of statistics on answers to test tasks.