Federal State Autonomous Educational Institution of Higher Education
PEOPLES' FRIENDSHIP UNIVERSITY OF RUSSIA
RUDN University

Faculty of Physics, Mathematics and Natural Sciences

educational division (faculty/institute/academy) as higher education programme developer

COURSE SYLLABUS

Mathematical models in economics

course title

Recommended by the Didactic Council for the Education Field of:

01.04.01 Mathematics

field of studies / speciality code and title

The course instruction is implemented within the professional education programme of higher education:

«Functional methods in differential equations and interdisciplinary research»

higher education programme profile/specialisation title

2025

1. COURSE GOAL(s)

The purpose of mastering the discipline "Mathematical models in economics" is to give students an idea of the current state of the theory and practice of socio-economic forecasting based on the use of mathematical models of economic systems

2. REQUIREMENTS FOR LEARNING OUTCOMES

Mastering the discipline "Mathematical models in economics" is aimed at developing the following competencies (parts of competencies):

Table 2.1. List of competences that students acquire through the course study

Code	Competence	Competence achievement indicators (within this discipline)
PC-1	Able to conduct scientific research and obtain new scientific and applied results independently and as part of a research team	**PC-1.1.** Draws up a general research plan and detailed plans for individual stages **PC-1.2.** Selects experimental and computational theoretical methods for solving the problem based on the available material and time resources

3. COURSE IN HIGHER EDUCATION PROGRAMME STRUCTURE

The discipline "Mathematical models in economics" refers to the part formed by the participants in the educational relations of block B1 of the EP HE.

As part of the EP HE, students also master other disciplines and / or practices that contribute to the achievement of the planned results of mastering the discipline "Mathematical models in economics".

Table 3.1. The list of the higher education programme components/disciplines that contribute to the achievement of the expected learning outcomes as the course study results

Code	Competence	Previous disciplines/modules, practices	Subsequent disciplines/modules, practices*
PC-1	Able to conduct scientific research and obtain new scientific and applied results independently and as part of a research team	-	Pre-graduation practical training, The final examination, Research work

4. COURSE WORKLOAD AND ACADEMIC ACTIVITIES

The total labor intensity of the discipline "Mathematical models in economics" is 3 credits.

*Table 4.1. Types of academic activities during the periods of higher education programme mastering (**full-time training**)**

Type of study work	TOTAL, a.h.	Semester			
		1	2	3	4
Contact work, academic hours	*36*		*36*		
Lectures (LC)	36		36		
Lab work (LW)					
Seminars (workshops/tutorials) (S)					
Self-studies	*45*		*45*		
Evaluation and assessment (exam/passing/failing grade)	*27*		*27*		
Course workload a.h.	**108**		**108**		
credits	**3**		**3**		

5. COURSE CONTENTS

Table 5.1. Course contents and academic activities types

Course Module Title	Brief Description of the Module Content	Type of study work
Section 1. Introduction topic	Topic 1.1. Doing. Lyapunov stability and orbital stability. Lyapunov's methods for studying stability. structural stability. Examples	Lecture
Section 2. Economic models and their dynamics	Topic 2.1. Economic models of Goodwin Topic 2.2. Rayleigh type equations. Limit cycles for equations of Rayleigh-type economic models. Hopf bifurcation of the Rayleigh equations	Lecture

6. CLASSROOM EQUIPMENT AND TECHNOLOGY SUPPORT REQUIREMENTS

Table 6.1. Classroom equipment and technology support requirements

Classroom type	Classroom equipment	Specialized educational/laboratory equipment, software and materials for mastering the discipline
Lecture	An auditorium for lecture-type classes, equipped with a set of specialized furniture; board (screen) and technical means of multimedia presentations.	-
For independent	An auditorium for conducting seminar-type	-

Classroom type	Classroom equipment	Specialized educational/laboratory equipment, software and materials for mastering the discipline
work of students	classes, group and individual consultations, current control and intermediate certification, equipped with a set of specialized furniture and technical means for multimedia presentations.	

7. RESOURCES RECOMMENDED FOR COURSE STUDY

Main literature:

1. Ashmanov S. A. Introduction to mathematical economics. - M., Nauka, 1984.
2. Nikaido H. Convex structures and mathematical economics. - M., Mir, 1972.

Additional literature:

1. Aubin J-P. Nonlinear analysis and its economic applications. - M., Mir, 1988.
2. Moulin E. Theory of games with examples from mathematical economics. - M., Mir, 1985.
3. Ekland I. Elements of mathematical economics. - M., Mir, 1983.

Resources of the information and telecommunications network "Internet":

1. RUDN ELS and third-party ELS, to which university students have access on the basis of concluded agreements:
- RUDN Electronic Library System - RUDN EBS http://lib.rudn.ru/MegaPro/Web
- ELS "University Library Online" http://www.biblioclub.ru
- EBS Yurayt http://www.biblio-online.ru
- ELS "Student Consultant" www.studentlibrary.ru
- EBS "Lan" http://e.lanbook.com/
- EBS "Trinity Bridge"

2. Databases and search engines:
- electronic fund of legal and normative-technical documentation http://docs.cntd.ru/
- Yandex search engine https://www.yandex.ru/
- Google search engine https://www.google.ru/
- abstract database SCOPUS http://www.elsevierscience.ru/products/scopus/

8. ASSESSMENT TOOLKIT AND GRADING SYSTEM* FOR EVALUATION OF STUDENTS' COMPETENCES LEVEL UPON COURSE COMPLETION

Evaluation materials and a point-rating system* for evaluating the level of formation of competencies (parts of competencies) based on the results of mastering the discipline «Mathematical models in economics» are presented in the Appendix to this Work Program of the discipline

Developer:

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_____   **A.B. Muravnik**

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