

*Federal State Autonomous Educational Institution of Higher Education  
"Peoples' Friendship University of Russia"*

*Faculty of Economics  
Department of National Economy*

Recommended by MSSN / MO

**Program and Description  
of the Course**

**Econometrics  
(advanced level)**

**Master Program "International Business"  
field 38.04.01 "Economy"  
specialization "International Business"**

**Qualification (degree) graduate: Master Degree**

**2021**

## 1. Goals and objectives of discipline:

**The goal of the course** Econometrics (advanced course) is to familiarize students with modern econometrics and its applications. Studied are the methods of analysis of spatial data, time series and panel data. The emphasis is given to modern research methods, illustrated by applications from micro- and macroeconomics, as well as from finance. A special feature of the course is the use of specialized software that allows to perform econometric modeling at a professional level.

### **The main objectives of the study subjects are:**

Mastering the modern methods of econometric analysis. To learn to apply various methods of econometric analysis to solve problems in the field of micro-and macroeconomics, and in the field of finance and to use special software for solving econometric problems. Acquiring methods for constructing forecasts for economic processes based on econometric models.

## 2. Place of discipline in the structure of the study plan:

This theoretical course is a core course of the economic block for master students with specialization in International Business.

Table No. 1 shows the previous and subsequent disciplines aimed at the formation of the competencies of the discipline in accordance with the competency matrix of OP VO.

**Table No. 1 - Previous and subsequent disciplines aimed at the formation of competencies**

<b>Competence</b>	<b>Preceding</b>	<b>Subsequent</b>
UC-7. Able to use digital technologies and methods of searching, processing, analyzing, storing and presenting information (in the professional field) in the digital economy and modern corporate information culture.	Microeconomics, International trade, Technology transfer, Doing business in Russia	Corporate innovation policy, International monetary relations, International business management, Custom and tariff regulation, Corporate security, Research practice.
GPC-2. Able to apply advanced instrumental methods of economic analysis in applied and/or fundamental research.	Microeconomics, Econometrics, International trade, Technology transfer, Doing business in Russia	Corporate innovation policy, International monetary relations, International business management, Corporate security, Research practice.

	Microeconomics, Econometrics, International trade, Technology transfer, Doing business in Russia	Corporate innovation policy, International monetary relations, International business management, Custom and tariff regulation, Corporate security, Research practice.
GPC-5. Able to use modern information technologies and software tools in solving professional tasks.	Microeconomics, International trade, Technology transfer, Doing business in Russia	Corporate innovation policy, International monetary relations, International business management, Custom and tariff regulation, Corporate security, Research practice.
GPC-6. Able to critically evaluate the capabilities of digital technologies for solving professional problems, work with digital data, evaluate their sources and relevance .	Microeconomics, International trade, Technology transfer, Doing business in Russia	Corporate innovation policy, International monetary relations, International business management, Custom and tariff regulation, Corporate security, Research practice.

### 3. Requirements for the results of the studying of disciplines are:

Student graduated with the qualification (degree) "Master" in Economics (38.04.01 Economics) must possess the following competencies:

UC-7. Able to use digital technologies and methods of searching, processing, analyzing, storing and presenting information (in the professional field) in the digital economy and modern corporate information culture.

GPC-2. Able to apply advanced instrumental methods of economic analysis in applied and/or fundamental research.

GPC-5. Able to use modern information technologies and software tools in solving professional tasks.

GPC-6. Able to critically evaluate the capabilities of digital technologies for solving professional problems, work with digital data, evaluate their sources and relevance .

As a result of studying the Econometrics (advanced level) course, master students should: *know:*

- basic types of econometric models;
- methods of preparation and presentation of research results;
- procedures for statistical testing of various hypotheses;
- statistical methods for estimating the parameters of econometric models;
- techniques for interpreting the results of econometric modeling;
- the fundamental concepts of econometric analysis of complex economic phenomena;

- the main methodological approaches and principles of application of the econometric modeling apparatus in applied research.

*be able to:*

- competently use computer software for estimating parameters of econometric models;
- correctly carry out the specification of econometric models;
- formulate and set goals for the development of an innovative project;
- interpret the meaning of the parameters of regression model;
- calculate predictive estimates using the constructed econometric models;
- use econometric models in the practice of economic analysis.

*master:*

- the methods of data conversion in case of violation of the assumptions of the method of least squares;
- the skills for solving economic problems using econometric models;
- the skills of constructing an econometric model consistent with economic theory;
- the skills of using software products for building econometric models;
- techniques of selection of factors for an econometric model;
- the least-squares method and its generalizations for estimating the parameters of econometric models.

#### 4. The work load of discipline and types of training activities

Credit hours for the discipline are **3 credit units (one semester)**

Type of school work	Total hours	Semester			
		1	2	3	4
	<b>51</b>	<b>51</b>			
Including:	-	-	-	-	-
Lectures	17	17			
Seminars (C)	34	34			
Self-study (total)	<b>57</b>	<b>57</b>			
Including:	-	-	-	-	-
Course project (individual project)					
Cash and graphics					
Review					
<i>Other types of independent work:</i>					
Preparation of 2 creative projects					
Independent study of recommended literature	40	40			

Preparation for the final certification	17	17			
Type of interim assessment (test, exam)					
The overall credit hours	<b>108</b>	<b>108</b>			
	<b>3</b>	<b>3</b>			

## 5. Syllabus

### **Topic 1: Introduction to econometrics. Statistical inference and hypothesis testing**

The nature of econometrics data. Statistical inference and hypothesis testing. The confidence-interval approach. The test-of-significance approach. Some practical aspects.

### **Topic 2: The Simple Regression Model**

Assumptions of the classical linear model. Ordinary Least Squares (OLS) as a minimization problem. Assumptions of OLS. Properties of OLS. Examples of OLS.

### **Topic 3. Multiple Regression**

Goodness of Fit; Interpretation. Inference and estimation in the OLS model.

### **Topic 4: Violation of the Assumptions of the Classical Regression Model**

Multicollinearity. Autocorrelation. Heteroskedasticity. Weighted least squares method. Instrumental variables. Maximal likelihood method.

### **Topic 5: Univariate time series**

Stationary time series. Autocorrelation. Autoregressive-Moving average models. Unit roots. ARCH and GARCH models.

### **Topic 6. Multivariate time series**

Dynamic models for stationary and not stationary time series. Cointegration.

### **Topic 7: Panel data methods**

Fixed effect models and random effect models.

## **5.2 Thematic sections and interdisciplinary connection with other disciplines.**

Discipline is taught in the second semester of the master's program and does not require follow-up training courses.

## **5.3. Workload composition**

TOPIC	lectures (h)	seminars (h)
Topic 1: Introduction to econometrics. Statistical inference and hypothesis testing.	1,5	3

Topic 2: The simple regression model.	2	4
Topic 3: Multiple regression.	2,5	5
Topic 4: Violation of the assumptions of the classical regression model.	3	6
Topic 5: Univariate time series.	3	6
Topic 6: Multivariate time series.	3	6
Topic 7: Panel data methods	2	4
Total	36	34

## 6. Laboratory workshop. Not provided.

## 7. Seminars

TOPIC	seminars (h)
Topic 1: Introduction to econometrics. Statistical inference and hypothesis testing.	3
Topic 2: The simple regression model.	4
Topic 3: Multiple regression.	5
Topic 4: Violation of the assumptions of the classical regression model.	6
Topic 5: Univariate time series.	7
Topic 6: Multivariate time series.	6
Topic 7: Panel data methods. Final test.	3

## 8. Methodical and informational support

### a) Main literature:

1. *Dougherty Christofer*. Introduction to Econometrics. 5<sup>th</sup> edition. Oxford University Press, 2016. 15 copies in the RUDN library.
2. *Балашова С.А., Лазанюк И.В.* Эконометрика в задачах и решениях: учебное пособие для магистров. М.: РУДН, 2-е изд., 2017. Electronic version  
<http://lib.rudn.ru/ProtectedView/Book/ViewBook/4363>

### b) Additional literature:

1. *Матюшок В.М., Балашова С.А., Лазанюк И.В.* Основы эконометрического моделирования с использованием Eviews. – М.: изд-во РУДН, 2015. Electronic version <http://lib.rudn.ru/ProtectedView/Book/ViewBook/4781>

**c) Databases, reference and retrieval systems:**

1. [www.gks.ru](http://www.gks.ru) - Federal State Statistics Service of the Russian Federation
2. [www.cbr.ru](http://www.cbr.ru) - Central Bank of the Russian Federation
3. <http://censtats.census.gov/> - U.S. Census Bureau
4. <http://www.bls.gov/> - U.S. Bureau of Labor Statistics
5. <http://data.worldbank.org/> - World Bank database
6. <http://pwt.econ.upenn.edu/> - database for cross-country comparisons

**10. Software**

MSOffice, Eviews 7.0, Eviews 10.0

**Logistical support discipline:**

- classrooms (rooms) at the workplace for lectures (depends on the number of students) and for seminars (the number of students in separate groups);
- board;
- desktop PC with Microsoft Office 2010;
- multimedia projector;
- portable equipment - a laptop and a projector;
- screen (stationary or portable floor).

<b>№ aud.</b>	<b>Name-equipped classrooms</b>	<b>List of main equipment</b>
17	Classroom	Multimedia Projector - 2 pcs., Sound Tribune - 1 pc., Screen - 2 pcs.
19	Computer Class	Computers Pentium 4-1700/256MB/cd/audio - 21 pcs., Multimedia projector PanasonicPT-LC75 - 1 pc., The screen is 1 unit.
103	Classroom	Multimedia Projector - 1 pc.,
105	Classroom	Multimedia Projector - 1 pc.,
1	Classroom	Multimedia Projector - 1 pc.,
2	Classroom	Multimedia Projector - 1 pc.,
Conference hall	Classroom	Multimedia Projector - 1 pc., Sound equipment
Hall 4 Library	Classroom	Multimedia Projector - 1 pc.,

There are 770 library workstations in the reading rooms of PFUR library. Reading and lending rooms of the Academic and Research Library are located in 5 university buildings. Some rooms are used for group work, 3 rooms are equipped with multimedia devices. Internet access is provided in the library via Wi-Fi.

There are more than 17000 Library readers. Library fund contains 1.800.000 books and is increased monthly. The funds are universal, they are formed by the discipline principle. It is increased due to departments' orders. The library staff counts 43, 36 of them have university degrees, 90% are computer competent.

Electronic catalogue has been compiled since 1990. Since 2010 PFUR e-library system has provided readers with information and full-text document access.

Book lending is done automatically. The free access room is equipped with self-service lending station applying RFIT-technology.

All PFUR computers provide access to PFUR e-library system and electronic sources.

The platform for information, service and resource access is available at the library website <http://lib.rudn.ru/>.

## 11. Guidelines on the organization of the discipline:

The implementation of the course includes interactive lectures, practical sessions (workshops) including multimedia equipment and an interactive tutorial, the independent creative works and their subsequent presentation, testing, group discussions on topics of the course.

Lectures	The classroom form of instruction in which the main provisions of the academic discipline are given. The ultimate goal of the lectures is the achievement by students of the degree of mastering the theoretical knowledge they need for further professional activity. The form of the lecture can be both traditional and interactive.
Seminars	A classroom dialogue form of classes on one of the course topics, involving the active participation of students (all or some of them), aimed at developing their skills of independent theoretical analysis of the problems addressed in the course, including by studying texts of primary sources, accumulating practical experience in solving typical professional tasks.
Group academic counseling	The main task of group academic counseling is a detailed or in-depth examination of some theoretical course topics, the development of which, as a rule, makes it difficult for some students. At the request of students, it is possible to introduce additional ones for discussion: topics of particular interest to them that do not receive sufficient coverage in the lecture course. This form of study is mandatory for the teacher, the student has the right not to take part in such a consultation if he has successfully mastered this section of the course on his own or the additional topic being discussed does not interest him.

Individual consultations	An out-of-class form of a teacher's work with an individual student, implying discussion of those sections of the discipline that were not clear to the student, or caused by the student's desire to work on writing a course or final qualifying work for the course being studied.
Master class	Lecture and / or group counseling by a guest of well-known and highly qualified foreign or domestic scholar (or practice in this field). The task is to show the real side of research and applied work in science and demonstrate to students the standards of professional thinking in their chosen specialty.
Independent work	Reading the recommended literature (mandatory and optional), preparing for oral presentations, preparing for written examinations (midterm, final tests), writing essays, essays, term papers and final qualifying works; as well as other types of work required to complete the curriculum

### Terms and criteria for grading

From students are required to attend lectures and seminars, mandatory participation in the certification tests, the performance of the teacher's assignments. Especially appreciated is the active work at the seminar (the ability to lead a discussion, a creative approach to the analysis of materials, the ability to clearly and concisely formulate their thoughts), as well as the quality of the preparation of quizzes (tests) and reports.

Evaluation of the discipline being taught is based on the results of the study, demonstrated by students throughout the entire period of study (usually a semester). The final grade is determined by the amount of points received by students for various types of work during the entire period of study provided by the curriculum.

All types of educational work are carried out exactly in the terms stipulated by the training program. If a student, without good reason, did not complete any of the study tasks (he missed the test, passed the abstract later, etc.), then points are not awarded for this type of study, and the works prepared after the due date are not evaluated.

For various types of work during the entire period of study a student can get the maximum amount - 100 points, of which:

- 25 points - final exam
- 15 points - mid-term exam
- 42 - active work at seminars, assignments, including homework (up to 10 points to each homework)
- 18 - attendance of classes

### Evaluation Criteria

№	Evaluation Criteria	points
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		Corresponds to parameters	Does not correspond to parameters
	The structure of the work: introduction - relevance, problem, purpose, subject, objectives of the abstract, conclusion.	2	1 0
	Completeness of the disclosure of the topic in accordance with the purpose and objectives. Independence of the formulation of the intent and conclusions	2	1 0
	Bibliography, information base - used sources and literature. Completeness, correctness of the designation of sub-page footnotes and a list of references	2	1 0
	The design of the text of the work in accordance with the standard	2	0
	Presentation to work (at least 10 slides, reflecting the essential content of the abstract)	2	1 1
<b>TOTAL</b>			<b>10</b>

### Score-rating system of knowledge assessment, rating scale

BRS points	Traditional RF ratings	ECTS
95 - 100	Excellent - 5	A (5+)
86 - 94		B (5)
69 - 85	Good - 4	C (4)
61 - 68	Satisfactory - 3	D (3+)
51 - 60		E (3)
31 - 50	Unsatisfactory - 2	FX (2+)
0 - 30		F (2)
51 - 100	Test	Passed

### Description of ECTS ratings:

A ("Excellent") - the theoretical content of the course has been mastered completely, without gaps, the necessary practical skills of working with the mastered material have been formed, all the training tasks provided by the training program have been completed, the quality of their implementation is estimated by the number of points close to the maximum.

B ("Very Good") - the theoretical content of the course has been fully mastered, without gaps, the necessary practical skills of working with the mastered material are basically formed, all the training tasks provided by the training program are completed, the quality of performance of most of them is assessed by the number of points close to the maximum.

C ("Good") - the theoretical content of the course has been fully mastered, without gaps, some practical skills of working with mastered material are not sufficiently developed, all the training tasks provided for by the training program are completed, the quality of performance of none of them is assessed by the minimum number of 5 dollars, some types of tasks are completed with errors.

D ("Satisfactory") - the theoretical content of the course has been partially mastered, but the gaps are not essential, the necessary practical skills of care with the material mastered are mostly formed, most of the training tasks provided by the training program are completed, some of the completed tasks may contain mistakes.

E ("Mediocre") - the theoretical content of the course has been partially mastered, some practical skills have not been formed, many of the training tasks provided by the training program have not been completed, or the quality of performance of some of them is assessed by the number of points close to the minimum.

FX ("Conditionally unsatisfactory") - the theoretical content of the course is partially mastered, the necessary practical skills are not formed, most of the training tasks provided by the training program are not fulfilled or the quality of their implementation is assessed by the number of points close to the minimum; with additional independent work on the course material it is possible to improve the quality of the performance of training tasks

F ("Certainly unsatisfactory") - the theoretical content of the course is not mastered, the necessary practical skills are not formed, all completed training tasks contain blunders, additional independent work on the course material will not lead to any significant improvement in the quality of the training tasks.

## **12. The fund of assessment tools for the midterm evaluation of students in the discipline**

1. Gauss-Markov conditions
2. Properties of OLS-estimates
3. Asymptotic properties of OLS estimators
4. Testing restrictions
5. Selecting a set of explanatory variables.
6. Testing non-nested models
7. Testing the functional form of the model
8. The concept of heteroscedasticity. Implications for OLS-estimate
9. Methods of identifying and eliminating heteroscedasticity
10. The concept of autocorrelation. Implications for OLS-estimate
1. Methods for detecting and eliminating autocorrelation
2. Autocorrelation of high orders
3. The Problem of endogeneity in regression models
4. Method of instrumental variables
5. Estimation of systems of simultaneous equations
6. Structural and reduced form of a system of simultaneous equations
7. Two-step least squares method
8. Maximum likelihood method
9. Autoregression and moving average processes
10. Stationarity and autocorrelation function
11. Stationarity and single roots
12. Testing single roots
13. Testing unit roots in high-order autoregression models

14. ARCH and GARCH models
15. Partial adjustment model
16. Model of adaptive expectations
17. Vector autoregression models
18. Cointegration

The complete fund of assessment tools for the discipline is available as a stand-alone document.  
The program is compiled in accordance with the requirements of OS VO RUDNF

### **Developers**

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