

1. General Provisions

1.1. Goals and Objectives of the Course

The goal of the course is to develop theoretical knowledge and practical skills in the study of statistical data and the construction of econometric models that let conduct research of economic and management processes using existing mathematical methods and computer technology.

The objectives of the course are:

- to develop knowledge:
- investigation of econometric models used in solving economic and management problems;
- formation of ideas about the opportunities of econometric modeling in economic and management practice;
- to develop the abilities:
- selection of a mathematical method to solve the problem and make a meaningful analysis of the solution results;
- to develop the skills:
- construction, analysis, and calculation of econometric models of certain economic and managerial problems, including using computer facilities, interpretation of solution results, and their analysis.

1.2. Prescribed Objects of the Course

parameters of functioning and development of economic entities, economic sectors, municipalities, regions and the state as a whole; economic relations of individual economic entities.

1.3. Starting Conditions

Unstipulated

2. Planned Results of the Course Training

Competence	Indicator's Index	Planned Results of the Course Training (to know, to be able, to master the skills)	Indicator of Attaining Competence which the planned results of training are correlated with	Means of Assessment
GPC-2	AI-1 _{GPC-2}	To know types of econometric models used for solving economics and management problems, estimation methods for parameters, and quality of econometric models	Knows theory of probability, mathematical statistics, and econometrics: types of economic data; methods of least squares (OLS) and maximum likelihood; generalized method of moments, instrumental variables method; verification methods of statistical	Report on practicals.

			hypotheses of model parameters; basic methods of econometric models quality control; estimating of multi-equational models; modeling and time series analysis; methods of time series modeling and analysis; panel data modeling and analysis.	
GPC-2	AI-2 _{GPC-2}	To be able to find the necessary information in national and international databases, build econometric models based on statistical data, estimate the parameters and quality of econometric models, analyse the results and draw correct conclusions, use econometric models in the market and entity analysis.	Is able to work with national and international databases to search for the necessary information about economic phenomena and processes; process statistical information and obtain statistically sound conclusions; make data visualization; make a plan and carry out statistical studies of the real economic situation using the methods studied; plan and carry out statistical analysis of the real economic situation by applying studied methods; on the basis of the results achieved, make reasonable conclusions about possible relations and estimate hypotheses.	Individual task
GPC-2	AI-3 _{GPC-2}	To master the skills the methodology of modeling and analyzing econometric models for specific economic and management goals, econometric model based forecasting, skills of interpreting the results of the analysis.	Masters the skills to select and use appropriate econometric methods of economic data analysis.	Individual task
GPC-5	AI-1 _{GPC-5}	To know software tools to build econometric models, know electronic library systems to search necessary scientific literature and socio-economic statistics.	Knows software tools to execute statistical procedures, know electronic library systems to search necessary scientific literature and socio-economic statistics.	Report on practicals.
GPC-5	AI-2 _{GPC-5}	To be able to apply Microsoft Excel ToolPack to model, analyse and compute	Is able to apply at least one of the general or specialised applications (such as MS	Presentation of laboratory work

		econometric models for various conditions	Excel, Eviews, Stata, SPSS, R, etc.) to execute statistical procedures (processing statistical information, building and estimating econometric models)	
GPC-5	AI-3 _{GPC-5}	To master the skills to use electronic library systems to search necessary scientific literature and socio-economic statistics	Masters the skills to use electronic library systems to search necessary scientific literature and socio-economic statistics	Individual task
OPC-1	AI-1 _{OPC-1}	To know the goals, objectives, methods and stages of scientific research.	Knows the goals, objectives, methods and stages of scientific research.	Individual task
OPC-1	AI-2 _{OPC-1}	To be able to define the research problem (purpose and objectives); position own research in the relevant scientific literature; use econometric models in the analysis of the market and entities; build econometric models based on statistical data; estimate the parameters and quality of econometric models; analyse the results of the research and draw correct conclusions.	Is able to define the research problem (purpose and objectives); position own research in the relevant scientific literature; apply modern theoretical and econometric tools; choose and justify an appropriate research method.	Individual task
OPC-1	AI-3 _{OPC-1}	To master the skills to conduct econometric research and present its results as a complete scientific article	Masters the skills to conduct research and present its results as a complete scientific article.	Individual task

3. Full time and forms of academic work

Form of academic work	Hours in all	Distribution in hours according to semesters
		Number of semester
		2
1. Holding classes (including results monitoring) in the form: 1.1. Contact classwork, including:	54	54
- lectures (L)		
- laboratory work (LW)	40	40
- practice, seminars and/or other seminar-type work (PW)	10	10
- control of self-work (CSW)	4	4
- test		
1.2. Students' self-work (SSW)	54	54

2. Interim/midterm assessment		
Exam	36	36
Grading test		
Test (Credit)		
Course Project (CP)		
Course Work (CW)		
Workload in hours	144	144

4. Course contents

Course units with brief contents	Full time of classroom activity in hours according to the forms			Full time of extracurricular work in hours according to the forms
	L	LW	PW	SSW
Semester 2				
Introduction	0	0	1	2
Stages and problems of econometric modeling. Features of econometric modeling. Relation between model and actual process. Examples of applying econometrics. Macroeconomics application: Keynesian theory of consumption, control and regulation of political objectives, stock exchange, forecasting financial assets prices, analysis and prediction of regional and industry development. Microeconomics application: production volume, analysis of the correlation between profit and internal and external factors.	0	0	4	
Indicators for assessing and managing interdependencies between processes and phenomena in the economy	0	0	4	6
Data source Measurements in econometrics. Natural research. Use of databases. Data types: spatial data, time series. Data quality analysis and application for econometric modeling. Statistical database. Federal state statistics service. Central database. Unified Interdepartmental Statistical Information System. Territorial body of the Russian Federal State Statistics Service. Central Bank of the Russian Federation. Company reports. Electronic system Consultant Plus. Electronic library E-library. Simple and multiple linear regression in economics. Concept of a single factor model. Types of dependence. Dual regression equation, types of equations. Simple regression equation. Nonlinear regression. Determination of parameters. Least Squares Method. Gauss-Markov Theorem. The concept of a multiple regression model. Determination of parameters of the equation. Least Squares Method. Dummy variables in multiple regression. Chow test. The Nature of heteroscedasticity. Consequences of using the				

<p>least squares method in the case of heteroskedasticity. Detection of heteroscedasticity: graphical approach, Goldfeld-Quandt test, White test. Generalized least squares method.</p> <p>Problems of correlation coefficients choice. Dual correlation coefficients Multiple correlation coefficient. Partial coefficient of multiple correlation. Spearman's rank correlation coefficient. False correlation. Positive and negative autocorrelation. Detection of autocorrelation: graphical approach, Durbin-Watson test. Correlation for nonlinear regression. Coefficients of the covariance. Student's and Fisher's tests.</p> <p>The concept and types of collinearity. Reasons and consequences of multicollinearity. Estimation of coefficients in case of collinearity. Multicollinearity detection methods, partial correlation coefficients. Multicollinearity elimination methods.</p>				
<p>Applying Microsoft Excel to examine the relationship between economic and management processes</p>	0	20	1	20
<p>Applying Microsoft Excel to examine the relationship between economic and management processes</p> <p>General information about software applications (MS Excel, Eviews, Stata, SPSS, R) to execute statistical procedures (processing statistical information, building and estimating econometric models).</p> <p>Time analysis. Regional analysis. Problems of factor choice and ways of solution. Applying Microsoft Excel ToolPack to detect the relationship between economic and management processes.</p>				
<p>Theoretical aspects of forecasting</p>	0	0	3	6
<p>Theoretical aspects of forecasting</p> <p>Econometric modeling. The concept of a time series and its components. 3. Extrapolation forecasting methods. Their possibilities in economics. The concept of a trend, seasonality, and cyclicity. Trend test. Seasonal fluctuations. Estimation methods of seasonal fluctuations. Trend estimation methods. Modeling of seasonal and cyclical fluctuations. Additive series model.</p> <p>Applying least squares method to determine regression's parameters.</p> <p>Determination of parameters of the pair regression equation. Determination of parameters of the trend. Determination of parameters of the multiple regression equation.</p> <p>Model estimation: correlation coefficient, coefficient of determination, Fisher's F-test, standard deviation, average approximation error, variation coefficient.</p> <p>Multiple regression model forecasting.</p> <p>Point prediction. A confidence interval of the forecast.</p> <p>Systems of econometric equations</p> <p>The general concept of the system of regression equations. Identification problem. Models.</p>				

Parameters. Simultaneous equations. A system of independent simultaneous equations. Reduced form and structural equations. Indirect least squares method. Two-stage least squares regression. Applying systems of econometric equations. Path analysis. Indirect least squares method.				
Applying Microsoft Excel to forecast economic and management processes	0	20	1	20
Applying Microsoft Excel to forecast economic and management processes Construction, analysis, and calculation of econometric models of certain economic and managerial problems, interpretation of solution results, and their analysis. Build and forecast trends. Point prediction. Application of model. Forecast interval. Estimated accuracy and reliability of forecasting. Multiple regression modeling and forecasting. Forecast interval. Applying of computer technologies and Analysis ToolPak in Microsoft Excel for modeling, analysis and computation of econometric models for various conditions.				
Total with regard to semester 2	0	40	10	54
Total with regard to the course	0	40	10	54

Topics of exemplary practicals

№	Topic of practicals (seminars)
1	Stages and problems of econometric modeling. Features of econometric modeling. Relation between model and actual process. Examples of applying econometrics.
2	Data source. Natural research. Statistical database.
3	Modeling, analysis, and estimation of simple and multiple regressions.
4	Problems of factor choice. Correlation Coefficient. Student's and Fisher's tests. Identification and elimination of multicollinearity.
5	Modeling, analysis, and estimation of simple and multiple regressions. Time series analysis. Model quality and reliability estimation. Multiple regression model forecasting.
6	Modeling and application of systems of econometric equations

Topics of exemplary laboratory practice

№	Topic of laboratory work
1	Applying Microsoft Excel to examine the relationship between economic and management processes. Analysis of the company's production volume. Correlation analysis between company's profit and internal and external factors
2	Applying Microsoft Excel to examine the relationship between economic and management processes. Analysis of regional and industry development
3	Applying Microsoft Excel to forecast economic and management processes. Forecasting using

	the trend equation. Prediction of financial asset prices fluctuation
4	Applying Microsoft Excel to forecast economic and management processes. Forecasting using a multifactor model. Forecasting of regional and industry development

5. Organizational and Pedagogical Conditions

5.1. Educational Technologies Used for Competences Formation

Holding the course Econometrics (advanced level) students obtain knowledge and skills for modeling, analysis, and estimation of econometric models of economic and managerial processes and phenomena.

Practicals and laboratory work aim for mastering and consolidating theoretical material on modeling; developing skills for modeling and estimation. The teacher defines a task and students analyze the conditions, goals, and build various models. The result is discussed. As a result, a student obtains the skills to solve common management problems, draw a conclusion, justify necessary measures and confirm the effectiveness of the implementation of management decisions.

The share of classroom activity in hours is more than 50% of the total labour intensiveness.

5.2. Students' Manual for the Course Study

Learning the course, it is advisable for students to implement the following recommendations:

1. Learning of the discipline should be done systematically.
2. After learning one of the course units with the help of the text-book or lecture notes it is recommended to reproduce the basic terms, definitions, notions of the unit from memory.
3. Special attention should be paid to the reports on practical studies, laboratory works and individual complex tasks for self-work.

6. List of Teaching Materials and Information Supply for Students' Self work in the Discipline

6.1. Paper-based courseware

Sl.No	Bibliographic entry (author, title, mode of publication, place, publishing house, year of publication, number of pages)	Number of copies in the library
1. Basic literature		
1	Roanova N. and all: Basic Points of Economic English. Macroeconomics: Language and Landscape. M.: UNITY, 2009. 503 p.	11
2	Hinton P.R. Statistics Explained : a guide for social science students. London New York : Routledge, 1996. 322 p.	1
3	Mathematical Analysis / . Leipzig : B.G. Teubner Verl.-Ges., 1985. 284 p.	1
4	Sirkin M.R. Statistics for the Social Sciences. Thousand Oaks : SAGE Publ. Inc., 1995. 502 p.	1
2. Additional literature		

2.1. Educational and scientific literature			
2.2. Standardized and Technical literature			
2.3. Normative and Technical Editions			
	Not in use		
3. Students' manual in mastering discipline			
4. Teaching and learning materials for students' self-work			

6.2. Electronic Courseware

Kind of literature	Name of training tool	Reference to information resource	Accessibility of EBN (Internet/local net; authorized free assess)
Additional literature	Business Intelligence : The Savvy Manager's Guide / . New York : Elsevier, 2013.	URL: https://elib.pstu.ru/Record/RUPNRPUelib4249	authorized free assess

6.3. License and Free Distributed Software used in the Course Educational Process

Type of Software	Software branding
Operating systems	MS Windows XP (sub. Azure Dev Tools for Teaching till 27.02.2022)
Desktop applications	Adobe Acrobat Reader DC. Free PDF viewing software
Desktop applications	Microsoft Office Professional 2007. lic. 42661567
General purpose application software	Dr.Web Enterprise Security Suite, lic. 3000 лиц, PNRPU RIC 2017

6.4. Modern Professional Databases and Inquiry Systems Used in the Course Educational Process

Branding	Reference to information resource
Database of Academic Electronic Library (eLIBRARY.RU)	https://elibrary.ru/
Scientific Library of Perm National Research Polytechnic University	http://lib.pstu.ru/
Electronic Library System LAN	https://elanbook.com/
Electronic Library System IPRbooks	http://www.iprbookshop.ru/
Information resources of ConsultantPlus	http://www.consultant.ru/
Electronic Dissertations Library of The Russian State Library	http://www.diss.rsl.ru/

7. Logistics of the Course Educational Process

Type of classes	Name of the necessary basic equipment	Number of units
Laboratory work	Personal computers	18
Practicals	Personal computers	18

8. Fund of the Course Evaluating Tools

Described in a separate document

Ministry of Science and Higher Education of the Russian Federation
Federal State Budgetary Educational Institution of Higher Education
Perm National Research Polytechnic University

FUND OF ESTIMATING TOOLS
for students' midterm assessment in the discipline
Econometrics (Advanced Level)
Supplement to the Academic Course Working Program

Training program	38.04.01 Economics
Direction (specialization) of educational program	Oil and Gas Enterprise Economics and Management; Economy and Management of Mechanical Engineering Industries
Graduate qualification	Master's degree
Graduate academic department	Economics and Industrial Production Management
Form of study	Full-time studies
Year (-s): 1 Semester (-s): 2	
Workload:	
in credits: 4 CU	
in hours: 144	
The form of midterm assessment:	
Test: 2 semester	

Fund of estimating tools for midterm assessment of students learning the subject Econometrics (Advanced Level) is the part (supplement) to the academic course working program. Fund of estimating tools for midterm assessment of students' learning the discipline has been developed in accordance with the general part of the fund of estimating tools for midterm assessment of the basic educational program which determines the system of the midterm assessment results and criteria of putting marks. Fund of estimating tools for midterm assessment of students learning the subject determines the forms and procedures of monitoring results and midterm assessment of the students.

1. List of controlled results of learning the discipline, objects of assessment and forms of control.

According to the Academic Course Working Program (ACWP), mastering course content is planned during one semester (the second semester of curriculum) and is divided into four educational modules. Classroom activities, lectures and laboratory work as well as students' self-work are provided for every module. In the frames of mastering course content, such competences as *to know, to be able, to master the skills* pointed out in the ACWP are formed. These competencies act as the controlled results of learning the discipline Econometrics (Advanced Level) (Table 1.1).

Monitoring of the acquired knowledge, abilities and skills level is made in the frames of continuous assessment, progress check and formative assessment in the process of studying theoretical material, reports on laboratory works and during the test. Types of control are given in Table 1.1.

Table 1.1. List of controlled results of learning the discipline

Controlled results of learning the discipline (KAS)	Type of control			
	Continuous assessment		Progress check	Midterm assessment (final control)
	PW	LW	PC	Test
Acquired knowledge				
K.1 Know types of econometric models used for solving economics and management problems, estimation methods for parameters, and quality of econometric models	PWR	LW		T
K.2 Know software tools to build econometric models, know electronic library systems to search necessary scientific literature and socio-economic statistics.	PWR			
K.3 Know the goals, objectives, methods and stages of scientific research		LW	IT	
Acquired abilities				
A.1 Know how to find the necessary information in national and international databases, build econometric models based			IT	

on statistical data, estimate the parameters and quality of econometric models, to analyse the results and draw correct conclusions, use econometric models in the market and entity analysis.				
A.2 Know how to apply Microsoft Excel ToolPack to model, analyse and compute econometric models for various conditions		LW	IT	
A.3 Know how to define the research problem (purpose and objectives); to position own research in the relevant scientific literature; to use econometric models in the analysis of the market and entities; to build econometric models based on statistical data; to estimate the parameters and quality of econometric models; to analyse the results of the research and draw correct conclusions.			IT	E
Acquired skills				
S.1 Have the methodology of construction, analysis, and calculation of econometric models of certain economic and managerial problems, interpretation of solution results, and their analysis		LW	IT	
S.2 Have the skills to use electronic library systems to search necessary scientific literature and socio-economic statistics			IT	
S.3 Have the skills to conduct econometric research and present its results as a complete scientific article			IT	

PWR - report on practicals; LW - report on laboratory work; IT - individual task; T - test.

A final assessment of the learned discipline results is the midterm assessment which is made in the form of examination taking into consideration the results of continuous assessment and progress check.

2. Types of control, standard control tasks and scales of learning results assessment

2.1. Continuous assessment of education

Continuous assessment of learning and competences (according to Table 1.1) is made in the form of control questions during practicals on every topic. According to the four-point system the results of assessment are put into the teachers' note-book and are considered in the form of an integral mark in the process of the midterm assessment.

Control questions for the continuous assessment

Dual regression:

1. Econometrics: definition, subject and objectives.
2. Definition of model and modeling.
3. Steps of econometric modeling.
4. Relation between model and actual process.
5. Concept of a single factor model.
6. Types of dependence.

7. Dual regression equation, types of equations.
8. Simple regression equation.
9. Least Squares Method.
10. Gauss-Markov Theorem.
11. Correlation Coefficient.
12. Coefficient of Determination.
13. Nonlinear regression.
14. Standard deviation.
15. Average approximation error.
16. Forecasting using the regression equation.

Time series:

1. The concept of time series.
2. Components of the time series.
3. Extrapolation forecasting methods. Opportunities to use them in economics.
4. The concept of a trend.
5. Seasonal fluctuations and methods of their estimation.
6. Trend estimation methods.
7. Student's and Fisher's tests.
8. Trends forecasting.
9. Confidence intervals of forecast.
10. Estimated accuracy and reliability of forecasting.

Multiple classification in economics:

1. The concept of a multiple regression model.
2. Determination of parameters of the equation. Least Squares Method.
3. The concept of multiple correlation.
4. Multiple regression model estimation.
5. Multiple correlation coefficient.
6. Coefficient of Determination.
7. Average approximation error.
8. Standard deviation.
9. Partial coefficient of multiple correlation.
10. Student's and Fisher's tests.
11. Correlation coefficients.
12. Problems of factor choice and ways of solution.
13. Forecasting using the multiple regression model.
14. Forecast confidence intervals.

Multicollinearity:

1. The concept and types of collinearity.
2. Causes of multicollinearity and its consequences.
3. Estimation of coefficients in case of collinearity.
4. Multicollinearity detection methods.
5. Coefficient of partial correlation.

6. Multicollinearity elimination methods.

Linear regression models with heteroscedastic and autocorrelated residuals of equations:

1. The nature of heteroscedasticity.
2. Detection of heteroscedasticity: graphical approach, Goldfeld-Quandt test, White test.
3. Positive and negative autocorrelation.
4. Dummy variables in multiple regression.

Systems of econometric equations:

1. Concept of systems of econometric equations.
2. Identification problem.
3. Application of systems of econometric equations.
4. Path analysis.

2.2. Progress check

For the complex assessment of the acquired knowledge, abilities and skills (Table 1.1) progress check is carried out according to the academic schedule presented in ACWP in the form of a report on laboratory work (LW) during laboratory classes and analytical report on an individual task (IT).

2.2.1. Laboratory work as progress check

According to ACWP, 2 laboratory works are planned as a progress check after students have mastered the discipline.

Standard tasks for LW:

Topic 1. Applying Microsoft Excel to examine the relationship between economic and management processes. Analysis of the company's production volume. Correlation analysis between company's profit and internal and external factors. Analysis of regional and industry development.

According to their test option a student completes the following tasks:

1. finds a correlation matrix and select the factors that most affect the explanatory variable (regressor);
2. conducts a p -test and exclude factors that are not adequate to the model;
3. determines the parameters of the regression;
4. finds model quality and reliability estimators;
5. finds an estimated value of the explanatory variable (regressor) if the last year independent variable increases by 5 units, estimate the upper and lower value of the forecast.

Topic 2. Applying Microsoft Excel to forecast economic and management processes. Forecasting using the trend equation. Prediction of financial asset prices fluctuation. Forecasting using a multifactor model. Forecasting of regional and industry development.

According to his test option a student completes the following tasks:

1. determines the parameters of the linear regression;

2. finds model quality and reliability estimators;
3. finds an estimated value of the explanatory variable (regressor), upper and lower value of the confidence interval.
4. evaluates the trend to fluctuation;
5. estimates seasonality and find smoothed values of series;
6. builds trend equations;
7. finds model quality and reliability estimators;
8. finds the forecast value of the variable for the next four quarters, upper and lower value of the confidence interval.

As a result of the calculation work, the student writes and performs a report based on theoretical knowledge, analysis and estimation. Presentation of laboratory work is made by a student individually or by a group of students. Standard scale and criteria of assessment are given in the general part of FET of the educational program.

2.2.2. Standard tasks for IT

The individual task consists of calculation and analytical parts that correspond with the subject of dissertation research. Formulate an object (parameters of functioning and development of economic entities, economic sectors, municipalities, regions, and the state as a whole; economic relations of individual entities), relevance, purpose and objectives of the research. Determine the resulting indicator and factors of the research object, collect statistical data. Evaluate an object according to one of the fields of the individual task.

Fields of individual task:

1. The first field: Statistical analysis and forecasting of economic indicators.

The computation task is to build a multifactor econometric model based on statistical data.

Based on statistical data of economic indicators:

- Check a development trend's existence.
- Estimate seasonal fluctuations and smoothing of the series.
- Build and forecast various trends, estimation of equations, choosing the best equation.
- Forecasting using the trend equation, estimated accuracy and reliability of forecasting.

2. The second field: Multiple analysis in economics.

The computation task is to build a multifactor econometric model based on statistical data.

Based on statistical data of economic indicators:

- Selection of the most important factors by analyzing the correlation coefficients between the studied indicator and each factor, taking into account the correlation coefficient between factors.
- Multiple regression modeling.
- Forecasting the indicator under study, estimated accuracy of forecasting.

3. The third field: Dummy variables application in Multiple regression model.
4. The fourth field: Modeling system of linear interdependent equations.

Statistical data for individual work is taken from Unified Interdepartmental Statistical Information System (www.fedstat.ru).

As a result of the individual calculation work, the student writes a report. A report includes title sheet, introduction, body, conclusion, list of references. The introduction should contain the relevance, object, aim and tasks of the research and sphere of application. The list of references contains 5-10 sources. The student turns his paper to the teacher for review. Then the student performs a report based on theoretical knowledge, analysis and estimation.

A report consists of 12-15 pages of typewritten text (font size 12 p., line interval 1.5). The rest of the requirements are generally accepted. The work is executed in accordance with the State Standard (GOST).

Presentation of laboratory work is made by a student individually or by a group of students. Standard scale and criteria of assessment are given in the general part of FET of the educational program.

The materials of the research could be used for a scientific publication or a conference report.

2.3. Midterm assessment (final control)

Admission for midterm assessment is made according to the results of the continuous assessment and progress check. Preconditions for admittance are successful presentation of all practicals reports and positive integral estimation with respect to the results of progress check.

2.4. Scales of examination assessment of educational achievements

Evaluation of discipline achievements in the form of the maturity level of the components *to know*, *to be able*, *to master the skills* of the declared competences is made according to the four-point assessment scale by selective control during the test.

Standard scale and criteria of estimating educational achievements in the process of testing for the components *to know*, *to be able*, *to master the skills* are given in the general part of FET of educational program.

3. Assessment criteria for components and competences level of maturity

3.1. Assessment of competences components level of maturity

While estimating the level of competences maturity by selective control in the process of testing it is considered that *the mark obtained for the components of the examined competence is combined with the corresponding component of all competences formed in the frames of the given academic course.*

Standard scale and assessment criteria for components and competences level of maturity are given in the general part of FET of the educational program.

3.2. Assessment of maturity level of all competences

General assessment of maturity level of all competences is made by aggregation of marks obtained by the student for each component of the formed competences taking into account the results of continuous assessment and progress check in the form of integral mark according to the four-point scale. All control results are put into the assessment sheet by the teacher according to the results of midterm attestation.

The form of the assessment sheet and requirements for its completion are given in the general part of FET of the educational program.

While making the final assessment of the midterm attestation in the form of test standard criteria given in the general part of FET of the educational program are used.

Appendix 1

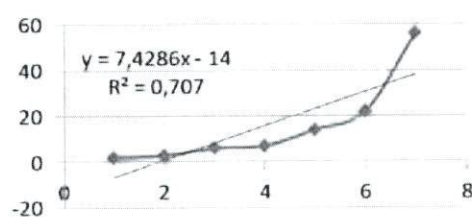
Standard situational tasks and case studies for abilities and skills control

Questions for acquired knowledge control:

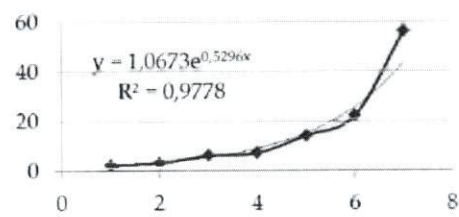
1. Give the definition of econometrics, models and modeling
2. Give the definition of linear and multiple regression.
3. Describe the model quality and reliability estimators: correlation, Fisher's F-test, standard deviation
4. Present dual linear regression equation and multiple linear regression equation
5. Give definition for time series, trend, cyclic, seasonal and random components
6. List steps of econometric modeling and sphere of application
7. List the sources of statistical data

Tasks to control the acquired skills:

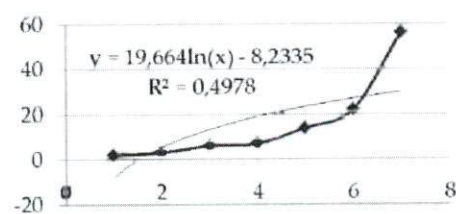
1. Find equation that describes this trend better



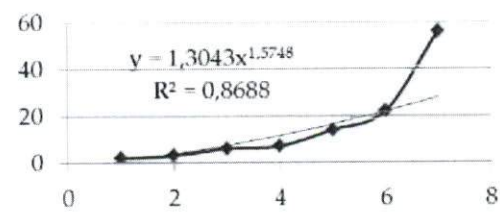
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2



3



4

2. Find seasonality coefficients:

	1 year	2 year	3 year
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1 quarter	25	28	29
2 quarter	30	30	32
3 quarter	33	33	34
4 quarter	25	21	26

3. Find factors that have the greatest influence on the explanatory variable (regressor):

	y	x1	x2	x3	x4
y	1				
x1	0.50	1			
x2	-0.90	0.99	1		
x3	-0.75	0.70	0.97	1	
x4	0.33	0.33	0.33	0.33	1

4. What is the marginal revenue and marginal costs abbreviation?

1) AR, AC 2) TR, TC 3) MR, MC 4) ATR, ATC

Tasks to control the acquired skills:

1. Find the gross domestic product (GDP) of the Russian Federation for the period 2005-2015 and present them as a time series.
2. Find gross regional product for regions of the Volga Federal District for 2015 and present them as a spatial series.
3. Find revenue of PJSC Gazprom for the period 2010-2015 and present them as a time series.
4. Two sets of statistics are given: the company's revenue in million rubles (y) and the average number of employees (x). Find dual linear regression equation, find model quality and reliability estimators.

<i>N^o</i>	x	y
1	73	0.5
2	85	0.7
3	102	0.9
4	115	1.1
5	122	1.4
6	126	1.4
7	134	1.7
8	147	1.9

5. Quarter sales volumes (y) are given for three years: 2011, 2012, 2013. Examine the time series for trend and seasonality existence.

Year	Quarter	Sales volume (y), million rubles
2011	1	66.73

	2	65.14
	3	61.67
	4	68.22
2012	1	73.55
	2	70.78
	3	66.07
	4	74.50
2013	1	75.24
	2	73.75
	3	70.10
	4	75.67

Scale and criteria of assessment:

The mark “Five” is given to the student if he/she enunciates conclusions and evaluates the essence of the situations with the argumentation of his point of view if he is able to analyze, generalize and offers the right ways to solve the situation.

The mark “Four” is given to the student if he/she understands the essence of the situation, constructs his answer logically, but allows minor inaccuracies in determining the solutions.

The mark “Three” is given to the student if he/she focuses on the essence of the situation, but needs leading questions, does not know how to analyze and does not correctly identify ways to solve the situation.

The mark “Two” is given to the student if he/she is not oriented and does not understand the essence of this situation, cannot suggest ways to solve it, or makes egregious errors.