

**MINISTRY OF EDUCATION AND SCIENCE OF UKRAINE
SUMY NATIONAL AGRARIAN UNIVERSITY**

**Cybernetics and Informatics Department
Faculty of Economics and Management**

MODULE SYLLABUS

Econometrics

(optional)

Implemented in the “_Management” Academic Program

Area of specialization _073 “Management”

at the first (bachelor's) level of higher education

Sumy-2021

Syllabus review data:

The academic year in which changes are made	The Academic program attachment number with changes description	Changes revised and approved		
		Minutes No and date of the department meeting	Head of Department	Guarantor of the Academic program
2022-2023	Appendix 1	Minutes No20 dated June_14_2022	<i>[Signature]</i>	<i>[Signature]</i>

Table 1 – changes of Syllabus of Econometrics

9.	Total workload and time allotment	Directed study			Self-directed study
		Lectures	Practicals	Labs	
		10	6		74

Table 2 – changes of Syllabus of Econometrics

3. MODULE INDICATIVE CONTENT

Topics	<u>Autumn semester</u>				Learning resources
	Distribution of hours			Self-directed study	
	Directed study				
	Lectures	Practicals	Labs		
<p>Topic 1. <i>Linear model with two by variables, its structure, estimation of parameters.</i></p> <p>2.1 Concept of regression. A general concept is about linear regression.</p> <p>1.2 An estimation of parameters of linear regression is by a least-squares method.</p>	2	2		5	Basic: 1(pp. 5-38) Additional: 1(pp. 17-22)
<p>Topic 2. <i>Analysis of variance of regression, prognosis.</i></p> <p>6.1 Coefficients of correlation and determination.</p> <p>7.1 Verification of statistical meaningfulness of coefficients of linear equalization of regression.</p> <p>8.1 Verification of statistical meaningfulness of coefficient of correlation.</p> <p>9.1 Checking of regressive model is for adequacy after the F-criteria of Fisher.</p> <p>10.1 Prognostication after the model of linear regression.</p>	2	2		5	Basic: 1(pp. 40-48) Additional: 1(pp. 27-32)
<p>Topic 3. <i>Nonlinear models and their linearizing.</i></p> <p>7.1 The concept of growth curves.</p> <p>8.1 Summary exponential function to a simple linear function.</p> <p>9.1 The power function.</p> <p>10.1 The report to the linear regression.</p> <p>11.1 Examples of power-law functions of finance.</p> <p>12.1 Inverse transformation.</p>	2			6	Basic: 1(pp. 55-68) Additional: 1(pp. 37-42)
Topic 4. <i>General view of</i>	2	2		10	Basic: 1(pp. 70-88)

<p><i>multivariable linear regression.</i></p> <p>5.1 Unfolded and vectorial-matrix form of record of theoretical model of multivariable linear regression.</p> <p>6.1 Empiric form of record of model of multivariable linear regression.</p> <p>7.1 Pre-conditions of MNK.</p> <p>8.1 Theorem of Gauss.</p>					Additional: 1(pp. 47-52)
<p>Topic 5. <i>Estimation of parameters of linear equalization of multivariable regression.</i></p> <p>3.1 Criterion of MNK</p> <p>4.1 Estimation of parameters of linear equalization of multivariable regression.</p>	2			10	Basic: 1(pp. 82-88) Additional: 1(pp. 57-62)
<p>Topic 6. <i>Verification of model correctness: estimation of meaningfulness of parameters and model on the whole. Confidence intervals of regression and prognosis.</i></p> <p>6.1 a t-test of Student is for verification of meaningfulness of parameters of linear equalization of multivariable regression</p> <p>7.1 General quality of equalization of regression control</p> <p>8.1 Coefficient of determination</p> <p>9.1 Analysis of statistical meaningfulness of coefficient</p> <p>10.1 Point prognosis. Dispersion of point prognosis. Intervals of trust.</p>	2			10	Basic: 1(pp. 82-88) Additional: 1(pp. 57-62)
<p>Topic 7. <i>Concept about multicollenearity and its influence on the estimation of parameters. Methods of determination of presence of multicollenearity and methods of its removal.</i></p> <p>6.1 A concept about</p> <p>7.1 Basic consequences of multicollenearity</p> <p>8.1 Signs of multicollenearity</p> <p>9.1 Algorithm of Farrar-Glober</p> <p>10.1 Methods of removal.</p>	2			10	Basic: 1(pp. 88-98) Additional: 1(pp. 60-62)
<p>Topic 8. <i>A concept about homo- and heteroskedastic. An estimation of model parameters is with heteroskedastic tailings. Nature and consequences of autocorrelation, methods of its</i></p>	2			18	Basic: 1(pp. 105-108) Additional: 1(pp. 77-82)

<i>determination.</i> 11.1 Heteroskedastic 12.1 A concept is about homo- and heteroskedastic. 13.1 Consequences of heteroskedastic 14.1 Exposure of heteroskedastic. Graphic analysis of tailings. 15.1 Method of the self-weighted least squares. Features of application of method are at the unknown values of dispersions of casual rejections. 16.1 Autocorrelation 17.1 Nature of autocorrelation. 18.1 Consequences of autocorrelation. 19.1 Exposure of autocorrelation. Graphic method. Method of rows. Criterion of Darbin-Watson. 20.1 Methods of removal of autocorrelation. Methods of estimation of coefficient					
Total hours	16	6		74	

Table 3 – changes of Syllabus of Econometrics

4. TEACHING AND LEARNING METHODS

MLOs	Teaching methods (directed study)	Hours	Learning methods (self-directed study)	Hours
MLOs 1.Ability to abstract thinking, analysis and synthesis and establishing relationships between socio-economic phenomena and processes.	Lecture, practical lesson, discussion of topical issues	2	Elaboration of theoretical material, solution of calculation tasks	4
MLOs 2.Ability to learn and master modern knowledge	Lecture, practical lesson, discussion of topical issues	2	Elaboration of theoretical material, solution of calculation tasks	10
MLOs 3.Ability to adapt, be creative, generate ideas and actions in a new situation	Lecture, practical lesson, discussion of topical issues	2	Elaboration of theoretical material, solution of calculation tasks	10
MLOs 4.Ability to analyze the results of the organization' activity, compare them with the factors of external and internal environment, to determine the prospects for the organization.	Lecture, practical lesson, discussion of topical issues	2	Elaboration of theoretical material, solution of calculation tasks	10

MLOs 5.Ability to manage the organization and its divisions through the implementation of management functions	Lecture, practical lesson, discussion of topical issues	2	Elaboration of theoretical material, solution of calculation tasks	10
MLOs 6.Ability to choose and use modern management tools.	Lecture, practical lesson, discussion of topical issues	2	Elaboration of theoretical material, solution of calculation tasks	10
MLOs 7.Ability to analyze and structure the problems of the organization, to form to form reasonable decisions.	Lecture, practical lesson, discussion of topical issues	4	Elaboration of theoretical material, solution of calculation tasks	20
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Author: *S. Ahadzhanova* (S. Ahadzhanova)

Module syllabus agreed at the Cybernetics and Informatics Department meeting	Minutes No <u>15</u> dated June <u>9</u> 2021
	Head of Cybernetics and Informatics Department <u><i>S. Ahadzhanova</i></u> (S. Ahadzhanova)

Approved by:

Guarantor of the Academic program *A. Nykhailov* (A. Nykhailov)


Dean of the Faculty *N. Strochenko* (N. Strochenko)

Syllabus review (attached) is provided by : *Vinograd.* (*Vinograd.*)
Paskov. (*Paskov.*)

Representative of the Department of Education Quality assurance, licensing and accreditation *Debozhynets* (Debozhynets)

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Syllabus review data:

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		Minutes No and date of the department meeting	Head of Department	Guarantor of the Academic program
2022-2023	Appendix 1	Minutes No20 dated June_14_ 2022		** 

1. MODULE OVERVIEW

1.	Title	Econometrics		
2.	Faculty/Department	Economics and Management		
3.	Type (compulsory or optional)	Optional		
4.	Program(s) to which module is attached (to be filled in for compulsory types)	073 Management		
5.	Module can be suggested for (to be filled in for optional types)			
6.	Level of the National Qualifications Framework	6-th		
7.	Semester and duration of module	5 semester, 1-15 weeks		
8.	ECTS credits number	3-d		
9.	Total workload and time allotment	Directed study		Self-directed study
		Lectures	Practicals	Labs
		10	6	74
10.	Language of instruction	english		
11.	Module leader	Svitlana Ahadzhanova, Associated Pofessor, Ph.D		
12.	Module leader contact information	svitlana.ahadzhanova@snau.edu.ua; room 307e.		
13.	Module description	The purpose of the course is to provide the students with a rigorous introduction to advanced econometric analysis of cross section and panel data. The focus will be on a theoretical foundation for conducting and evaluating empirical analysis of micro data, with special attention given to methods aimed at enabling causal inference. The course is designed to provide necessary concepts, tools, and techniques for analyzing and modeling microeconomic data and drawing conclusions from such data.		
14.	Module aim	Study of methods constructions of econometric models, which in number describe intercommunications between economic indicators.		
15.	Module Dependencies (prerequisites, co-requisites, incompatible modules)	1.The educational component is based on educational component Informatics and hard ware. 2. The educational component is the basis for the following educational component – Information professional technologies		
16.	The policy of academic integrity	The student must follow the rules of academic integrity during the performing practical work, writing essays , attestation, test and examination papers. If the facts of write-off or academic dishonesty are revealed, the work done by the student is canceled.		
17.	Link in Moodle	https://cdn.snau.edu.ua/moodle/course/view.php?id=819		

2. CORRELATION BETWEEN MODULE LEARNING OUTCOMES (MLOs) AND PROGRAM LEARNING OUTCOMES (PLOs)

MLOs: On successful completion of the module the learner will be able to:	PLOs		How assessed
	PLO 1	PLO 2	
	Demonstrate skills of search, collection and analysis of information, calculation of indicators to substantiate management decisions.	Be able to use modern information technologies, blockchain technologies in the management of resources and databases to justify management decisions on the choice of innovative technologies in agricultural enterprises.	
MLOs 1.Ability to abstract thinking, analysis and synthesis and establishing relationships between socio-economic phenomena and processes.	+		Multiple choice tests, calculation tasks
MLOs 2.Ability to learn and master modern knowledge	+		Multiple choice tests, calculation tasks
MLOs 3.Ability to adapt, be creative, generate ideas and actions in a new situation	+		Multiple choice tests, calculation tasks
MLOs 4.Ability to analyze the results of the organization' activity, compare them with the factors of external and internal environment, to determine the prospects for the organization.	+		Multiple choice tests, calculation tasks
MLOs 5.Ability to manage the organization and its divisions through the implementation of management functions	+		Multiple choice tests, calculation tasks
MLOs 6.Ability to choose and use modern management tools.		+	Multiple choice tests, calculation tasks
MLOs 7.Ability to analyze and structure the problems of the organization, to form to form reasonable decisions.		+	Multiple choice tests, calculation tasks

3. MODULE INDICATIVE CONTENT

Autumn semester

Topics	Distribution of hours			Self-directed study	Learning resources
	Directed study				
	Lectures	Practicals	Labs		
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<p>Topic 2. <i>Analysis of variance of regression, prognosis.</i></p> <p>1.1 Coefficients of correlation and determination.</p> <p>2.1 Verification of statistical meaningfulness of coefficients of linear equalization of regression.</p> <p>3.1 Verification of statistical meaningfulness of coefficient of correlation.</p> <p>4.1 Checking of regressive model is for adequacy after the F-criteria of Fisher.</p> <p>5.1 Prognostication after the model of linear regression.</p>	2	2		5	Basic: 1(pp. 40-48) Additional: 1(pp. 27-32)
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<p>model of multivariable linear regression.</p> <p>3.1 Pre-conditions of MNK.</p> <p>4.1 Theorem of Gauss.</p>					
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4.1 Exposure of heteroskedastic. Graphic analysis of tailings.					
5.1 Method of the self-weighted least squares. Features of application of method are at the unknown values of dispersions of casual rejections.					
6.1 Autocorrelation					
7.1 Nature of autocorrelation.					
8.1 Consequences of autocorrelation.					
9.1 Exposure of autocorrelation. Graphic method. Method of rows. Criterion of Darbin-Watson.					
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5. ASSESSMENT

5.1. Diagnostic assessment

5.2. Summative assessment

5.2.1. Intended learning outcomes methods:

No	Summative assessment methods	Grades	Deadline
Autumn semester			
1.	Practical Work 1-4	40 points / 40 %	7 week
2.	Practical Work 5-8	45 points / 45 %	14 week
3.	Test	15 points / 15 %	During semester

5.2.2. Grading criteria

Summative assessment method	Unsatisfactory	Satisfactory	Good	Excellent
Practical Works 1-4.	<i>0 points</i>	<i>10-20 points</i>	<i>20-30 points</i>	<i>31-40 points</i>
	Task not completed (method and answers are incorrect)	The progress is correct, but there are significant errors, the answers are mostly wrong	The task is completed, but there are minor errors	Task completely done. Mistakes missing
Certification (multiple choice test)	<i>0-3 points</i>	<i>3-7 points</i>	<i>7-13 points</i>	<i>14-15 points</i>
	Depends on the number of correct answers to the test	Depends on the number of correct answers to the test	Depends on the number of correct answers to the test	Depends on the number of correct answers to the test
Practical Works 5-8	<i>0 points</i>	<i>10-20 points</i>	<i>20-30 points</i>	<i>31-45 points</i>
	Task not completed (method and answers are incorrect)	The progress is correct, but there are significant errors, the answers are mostly wrong	The task is completed, but there are minor errors	Task completely done. Mistakes missing

5.3. Formative assessment

Formative exercises are designed to enable students to develop particular aspects of their learning, prior to summative assessments. Formative exercises are designed to help students use feedback and self-reflection to manage and develop their learning so that they can see how to improve their work.

No	Formative Assessment elements	Date
Autumn semester		
1.	Oral interview after studying each topic	After completing the study of the topic
2.	Passing the test on certification and modular control with feedback from the teacher	According to the schedule of the educational process
3.	Passing the test after the end of the study of each topic for independent control of knowledge and preparation for the test (exam)	Regulated by the student independently
4.	Protection of practical works	One week after their delivery
5.	Oral feedback from the teacher while working on practical work during classes	Throughout the semester

Self-assessment can be used both an element of formative and summative assessment.

6. LEARNING RESOURCES

6.1. Key resources

1. Marno Verbeek, A Guide to Modern Econometrics, 5th Edition. ISBN: 978-1-119-47211-7 September 2017. - 520 Pages.

6.3. Additional resources

1. Principles of Econometrics, 5th Edition [Print Replica] Kindle Edition by R. Carter Hill (Author), William E. Griffiths (Author), Guay C. Lim (Author)

6.4. Computer Applications and soft

1. ICEF Information System: <http://icef-info.hse.ru>
2. University of London site: <http://www.londoninternational.ac.uk/community/students>
3. VLE Student Portal: <http://my.londonexternal.ac.uk/london/portal> Course EC2020 Elements of econometrics
4. Oxford University Press: www.oup.com/uk/orc/bin/9780199567089
5. <http://crow.academy.ru/econometrics>

6.5 Methodical advices

S. Ahadzhanova –e-course at Moodle platform - <https://cdn.snau.edu.ua/moodle/course/view.php?id=819>

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9.	Total workload and time allotment	Directed study			Self-directed study
		Lectures	Practicals	Labs	
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