

1. **Name** Analysis of socioeconomic data

2. **Code** 11119

3. **Type** professional minor

4. **Year of studies** 2018-2019

5. **Term** First

6. **Amount of credits ECTS** 5 credits

7. **Lecturer** Malyarets Lyudmyla Mykhailovna, Doctor of economics, Professor, Head of department of higher mathematics and EMM

8. **Results of studies**

Competences formed

– ability to set and formalize the tasks of measuring the size of characteristics in economical objects;

- ability to analyze the socioeconomic data that are measured in metric scales;

- ability to analyze the socioeconomic data that are measured in nonmetric scales;

- ability to determine complicated characteristics of socioeconomic systems;

- ability to set and formalize the tasks of analysis of socioeconomic data, to perform this analysis in various software environments (Excel, Statgraphics, Statistica, MatLab).

9. **Obligatory previous educational disciplines**

Mathematical disciplines that are taught in first (bachelor) year of studies

10. **Contents**

Conceptual module 1. Mathematical methods and technologies of analysis of the socioeconomic data measured in metric scales

Lecture 1. Methodological methods of measuring object characteristics in economics.

Genesis of data analysis in economics.

Lecture 2. Theoretical and practical problems of using mathematical methods in socioeconomic data analysis measured in metric scales.

Methods for multidimensional statistical analysis of socioeconomic systems' metrical characteristics and their computer realization.

Lecture 3. Special aspects of the analysis techniques for the socioeconomic data measured in metric scales

Logics and content of the stages of the analysis techniques for the socioeconomic data measured in metric scales.

Conceptual module 2. Mathematical methods and analysis techniques for the socioeconomic data measured in nonmetric scales

Lecture 4. Theoretical and practical problems of using mathematical methods in socioeconomic data analysis measured in nonmetric scales.

Methods for statistical analysis of socioeconomic systems' nonmetrical characteristics and their computer realization.

Lecture 5. Special aspects of analysis techniques for the socioeconomic data measured in nonmetric scales.

Lecture 6. Special aspects of analysis techniques for the socioeconomic data measured in different scales.

Lecture 7. Descriptive models used in socioeconomic data analysis

List of subjects for laboratory studies

Conceptual module 1. Mathematical methods and analysis techniques for the socioeconomic data measured in metric scales

Laboratory work 1. Development of conceptual models for socioeconomic systems description

Study of meaning and model types used for solving practical problems in economics. Development of conceptual descriptive models of socioeconomic systems.

Laboratory work 2. Methods for descriptive statistics of elementary characteristics of socioeconomic systems measured in metric scales and their computer realization

Definition and description of elementary characteristics of socioeconomic systems measured in metric scales using software packages and environment Statgraphics, Statistica, MatLab

Laboratory work 3. Multivariate regression analysis and its computer realization

Building models for complicated characteristics of socioeconomic systems measured in metric scales with the help of multivariate regression analysis and their realization in software packages and environment Statgraphics, Statistica, MatLab

Laboratory work 4. Methods of multivariate statistical analysis (factor analysis, cluster analysis) and their computer realization

Building models for complicated characteristics of socioeconomic systems measured in metric scales with the help of the methods of multivariate regression analysis (factor analysis, cluster analysis) and their realization in software packages and environment Statgraphics, Statistica, MatLab

Laboratory work 5. Methods of multivariate statistical analysis (discriminatory analysis, canonical analysis) and their computer realization

Building models for complicated characteristics of socioeconomic systems measured in metric scales with the help of the methods of multivariate statistical analysis (discriminatory and canonical analysis) and their realization in software packages and environment Statgraphics, Statistica, MatLab

Conceptual module 2. Mathematical methods and analysis techniques for the socioeconomic data measured in nonmetric scales

Laboratory work 6. Methods for descriptive statistics of elementary characteristics of socioeconomic systems measured in nonmetric scales (nominal) and their computer realization

Definition and description of elementary characteristics of socioeconomic systems measured in nonmetric scales (nominal) using software packages and environment Statgraphics, Statistica, MatLab

Laboratory work 7. Methods for descriptive statistics of elementary characteristics of socioeconomic systems measured in nonmetric scales (order) and their computer realization

Definition and description of elementary characteristics of socioeconomic systems measured in nonmetric scales (order) using software packages and environment Statgraphics, Statistica, MatLab

Laboratory work 8. Using measuring instruments in the analysis of socioeconomic systems

Development of instruments for measuring metric characteristics for analyzing socioeconomic systems.

Laboratory work 9. Analysis of complicated combined characteristics of socioeconomic systems

Analysis of complicated combined characteristics of socioeconomic systems on the basis of factor analysis

Laboratory work 10. Analysis of complicated combined characteristics of socioeconomic systems

Analysis of complicated combined characteristics of socioeconomic systems on the basis of the method of multivariate scaling

Laboratory work 11. Analysis of dynamics of socioeconomic systems structure

Development of dynamic structure standard and analysis of dynamics of socioeconomic systems structure

Laboratory work 12. Development of hierarchical system of models for analyzing socioeconomic systems

11. Recommended literature sources

1. Malyarets L.M. Vymiryuvannia oznak objective v economitsi. Naukove vydannia. Kharkiv: Vyd.HNEU, 2006. -384 s.

2. Ponomarenko V.S., Malyarets L.M. Bagatovymirny analiz sotsialno-economichnyh system. Navchalnyi posibnyk. Kharkiv: Vyd. HNEU, 2009. – 384 s.

3. Malyarets L.M. Ekonomiko-matematychni metody ta modeli: navchalnyi posibnyk / L.M. Malyarets. – Kharkiv: Vyd. HNEU im. S. Kuzneta, 2014. – 412 s.

4. Malyarets L.M. Matematychni metody i modeli v upravlinni ekonomichnymy protsesamy. Monografiya. Malyarets L.M., Misiura Ye. Yu., Koibichuk V.V. ta insh. – Kharkiv: HNEU im. S. Kuzneta, 2016. – 420 s. (Ukr. mov.)

5. Malyarets L.M. Ekonomiko-matematychus modeli v diagnostytsi efektyvnosti vyrobnycho-gospodarskoji dijalnosti pidpryjemstva : monografija / L.M. Malyarets, L. O. Norikk, A. V. Zhukov. – Kharkiv: HNEU im. S. Kuzneta, 2016. – 232 s.

6. Yegorshyn O.O., Malyarets L.M. Laboratornyi praktykum z navchalnoji dystsypliny «Ekonomiko-matematychni metody ta modeli: ekonometrika»: Kh.: Vyd. HNEU, 2011. – 148 s.

7. Malyarets L.M., Rieznik Ye. V., Sinkievich B.V. Suchasni optymizatsijni metody v seredovyshchi MatLab: navchlnyi posibnyk. CH.1. Kharkiv: Vyd. HNEU, 2011. – 360 s.

8. Malyarets L.M., Rieznik Ye.V., Sinkievich B.V. Suchasni optymizatsijni metody v seredovyshchi MatLab: navchlnyi posibnyk. CH.2. Kharkiv: Vyd. HNEU, 2013. – 268 s.

Informatsijni resursy v Interneti

9. Ukrstat.org – publikatsia dokumentiv Derzhavnoji Sluzhby Statystyky Ukrainy. [Electronny resurs] – Rezhim dostupu: https://ukrstat.org/uk/druk/publicat/Arhiv_u/01/Arch_Ukr_.htm

10. Derzhavna Sluzhba Statystyky Ukrainy [Electronny resurs] – Rezhim dostupu: <http://www.ukrstat.gov.ua/>

12. Methods of training

Laboratory work is a form of training under which postgraduate (PG) students supervised by a lecturer carry out simulation experiments themselves aiming to prove in practice some theoretical points of the subject. While doing laboratory work PG students gain professional competences and practical skills of working with computer hardware and corresponding software.

Laboratory work is fulfilled using the software package MS Excel, Statgraphics, Statistica, MatLab.

Independent work of PG students is a form of training under which postgraduate (PG) students carry out the planned tasks independently under the methodical guidance of a lecturer.

The aim the independent work of PG students is to master the program of training to the full extent and to form general and professional competences essential for making a future scientist of professional qualification.

In the course of the works PG students have to turn into active participants of the training process, to teach themselves to be responsible gaining the theoretical knowledge, to develop skills of its practical usage while solving modeling tasks and real economic problems, to learn to feel familiar in the information space, to teach themselves to be individually responsible for the quality of their own professional training. Independent work of PG students involves: retention of lecture material; processing and studying of bibliographical guidance, key terms and concepts according to the topics of the subject; preparation for laboratory work; presentation of the laboratory work performed; in-depth study of some lecture topics or problems that are to be learned independently; doing homework and tests; doing individual assignments on calculations according to the topic under study; selection and review of literature sources according to the problems of the subject; analytical study of a scientific published work; test check of individual knowledge of PG students according to the questions for self-control; reading for written tests and other forms of current checking knowledge; reading for the module test (colloquium); writing an essay on a given problem; carrying out a creative engagement on the topic chosen; systematization of the material studied.

PG students' independent work with both mathematical and economic professional literature and information resources of the Internet is the essential element of successful digestion of the.

13. Methods of assessment

The system of assessment of PG students' competences takes into account different kinds of work that students have according to the program: lectures, laboratory work, independent work as well. The competences of PG students are assessed according to the cumulative 100-point system. As specified in Temporary regulations "About the Conditions of the Training Results Assessment for PG Students According to the Accumulative 100-point and Rating System" of S. Kuznets Kharkiv National University of Economics control checklist includes:

continuous assessment that takes place during the semester at lectures and laboratory works, and stated as a sum of cumulated points (max – 100 points; min sum of point that allows the PG student to make the grade is 60 points);

module assessment that is held in the form of a colloquium as a trial mini-examination on the initiative of the lecturer and takes into account the continuous assessment for the corresponding conceptual module; it is intended to get an *integral* grade of the PG student's training results after the material of the logically finished part of the subject – conceptual module – had been studied;

final/semester assessment that is held in the form of end-of-term test according to the academic schedule.

Procedure of PG students continuous assessment. PG students' knowledge during laboratory work and fulfilling individual tasks is assessed according to the following criteria:

understanding and level of mastering the theory and methodological problems under study; level of digestion of the factual material of the subject; knowledge of recommended literature and modern books on problems under study; ability to combine theory and practice while handling business situations, solving problems, carrying out calculations while fulfilling individual assignments and tasks that are to be discussed in the classroom; logics, structure and the style of material exposition in written papers and during the talks in the class-room, ability to substantiate one's own point of view, generalize data and draw a conclusion; arithmetical accuracy in fulfilling individual and complex calculation task; ability to make a critical and independent assessment of certain challenging issues; ability to explain alternative views and to prove one's own view on a certain problem; using analytical approaches; quality and accuracy in presenting considerations; logics, structuring and foundation of conclusions related to the certain problem; independence in fulfilling the task; literacy in presenting the material; using the methods of comparison, of concept and phenomenon generalization; issuance of the work.

General assessment criteria that are used for PG students' out-of-class work assessment are: depth and strength of knowledge, level of thinking, ability for systematization of knowledge on certain topics, ability to draw reasoned conclusions, grasp of categorical instrument, skills and techniques of carrying out laboratory tasks, ability to find necessary information, process and systematize it, use of their full potential at practical and seminar classes.

A PG student **passes the test** if the sum of points cumulated during the continuous/semester assessment equals or exceeds 60 points.

Graduation evaluation in the subject is calculated taking into account the points that have been cumulated during continuous assessment. The cumulative result in points for a semester constitutes: "60 point and more – passed", "59 points and less – not passed" and is written down into the "Academic record of progress in studies" on the subject.

14. Language of training Ukrainian