NATIONAL UNIVERSITY OF LIFE AND ENVIRONMENTAL SCIENCES OF UKRAINE

ECONOMIC FACULTY

Department of Statistics and Economic Analysis

STATISTICS

guidelines for writing the report on educational practice for students of the first (bachelor's) level of higher education, specialty 051 "Economics", academic programme "International Economics"

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Recommendations on educational practice from the statistics in methodical guidelines are presented. There is foreseen mastering of statistical methods with real cases.

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STATISTICS

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Recommended by the Academic Council of the Economic faculty of the National University of Life and Environmental Sciences of Ukraine

Protocol №3 from «20» September 2024

Head of the Counsil,
Anatolii D. Dibrova, Doctor of Economic Sciences, Professor

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CONTENT

INTRODUCTION

Statistics is one of the fundamental economic sciences, which is mastered by students, and statistical tools and methods are widely used in practical activities by employees of enterprises, institutions and organizations. In modern conditions, mastering the methodology of statistics is one of the indispensable conditions for understanding the patterns of development of socio-economic processes, studying the peculiarities of the market situation, studying trends and forecasting the development of economic phenomena, and contributing to making optimal decisions at all levels of management. Statistics provides tools for obtaining information that is used in the development of state programs and the formation of economic and social policy, contributes to the objective solution of many specific issues (in particular, in the economic and social life of the state), satisfies the information needs of many individuals and institutions participating in the processes of public and economic life. The purpose of studying the academic discipline is to form in students knowledge of methods for collecting, processing and analyzing information on socio-economic phenomena and processes.

The curriculum of the cycle of general training of disciplines in the academic programme “International Economics” provides educational practice on Statistics. The course project can be the basis for further writing a master's thesis.

In the report of the educational practice, it is necessary to show the ability to deeply and comprehensively investigate the issues raised, draw substantiated conclusions and provide specific proposals.

The purpose of writing a report of the educational practice is an in-depth study and research of individual methods of processing statistical information that characterizes a socio-economic phenomenon or process.

The tasks of writing a report are:

1) development of abilities in planning, organized collection and visual presentation of statistical information;

2) deep and comprehensive study of scientific and regulatory literature;

3) development of the student's skills and abilities to apply statistical methods to analyze socio-economic phenomena and processes;

4) mastering the skills of independent logical thinking.

Completion of a report on educational practice is one of the important stages of the educational process. There is foreseen 30 hours (1 ECTS credit) are allocated for completing the educational practice.

The main stages of preparing and completing the report on educational practice:

- selection and justification of the topic;
- research of theoretical sources on the selected topic;
- drawing up a work plan according to chosen plan;
- collection of necessary statistical information;
- processing of statistical information in accordance with the requirements of statistical science;
- carrying out calculations and generalizing their results;
- drawing up conclusions;
- design of the report on educational practice in accordance with the requirements of the department and in the specified deadline to submit to the scientific supervisor;
- defense of the educational practice.

Acquisition of competencies:

Integrated competency (IC): the ability to solve complex specialized tasks and practical problems in the economic sphere, which are characterized by the complexity and uncertainty of conditions, which involves the application of theories and methods of economic science.

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General competencies (GC):

GC 3. Ability to abstract thinking, analysis and synthesis.

GC 7. Information and communication skills technologies.

GC 8. Ability to search, process and analyze information from various sources.

Special (professional) competencies (SC):

SC 6. Ability to apply economic and mathematical methods and models for solving economic problems.

SC 7. Ability to use computer technologies and data processing software to solve economic tasks, information analysis and preparation analytical reports.

SC 8. The ability to analyze and solve problems in the field of economic and social and labor relations.

SC 9. Ability to predict based on standard theoretical and econometric models of socio-economic processes.

***Program learning outcomes (PLO)*:**

PLO 5. Apply analytical and methodical toolkit for substantiating proposals and acceptance management decisions by various economic agents (individuals, households, enterprises and by state authorities).

PLO 8. Apply relevant economic and mathematical methods and models for solving economic problems.

PLO 19. Use information and communication technologies to solve socio-economic problems, prepare and present analytical reports.

Topics of the educational practice relates to the formation of theoretical knowledge and practical skills in students regarding the quantitative and qualitative assessment of socio-economic phenomena and processes of Ukraine.

1. REQUIREMENTS FOR THE DESIGN OF THE REPORT ON EDUCATIONAL PRACTICE

The report on educational practice on statistics is an independent work of a student on statistical research of economic phenomena and processes in the economy with the design of a system of indicators, tables and the use of statistical methods for analyzing research results.

The student should demonstrate the ability to independently conduct statistical research using the methods of statistical observation, summarizing and grouping primary statistical material; calculating generalizing statistical indicators; measuring the relationships between the studied features; constructing statistical tables and graphs; analyzing the results and making scientifically sound conclusions.

The sequence of preparing and writing a report on educational practice:

1) choosing a topic for research;

2) justification of the goal, objectives, subject and object of the study;

3) drawing up a plan and preparing the content of the work;

4) identifying information sources and forming a data set for the analytical part of the work;

5) processing of statistical data, summarizing the research results and drawing conclusions in accordance with the set goals and objectives;

6) writing results of the research in accordance with the requirements and submitting the report for review within the agreed time frame;

7) defense the report on educational practice.

The topic of the statistical research is chosen by the student from the topics recommended by the department and, together with the project assignment, is agreed with the supervisor of the department. The report on educational practice could written by students on other topics when students agreed their research with the teacher beforet the beginning of the practice. Report on educational practice based on literature without a calculation is not allowed for defense and is returned to the student for revision.

Each course paper should be based on primary or secondary statistical information depend on the theme.

The sources of information for the educational practice are the reports of the State Statistics Service of Ukraine: "Statistical Yearbook of Ukraine", "Ukraine in Figures" and official statistical publications of the sectoral focus: Statistical collection "Gross agricultural production of Ukraine", Statistical collection "Agriculture of Ukraine", Statistical collection "Crop production of Ukraine", Statistical collection "Livestock production of Ukraine", Statistical bulletin "Application of mineral and organic fertilizers for crops", Statistical bulletin "Gross agricultural production of Ukraine", Statistical bulletin "Main economic indicators of agricultural production in agricultural enterprises", Statistical bulletin "Main economic indicators of agricultural production in agricultural enterprises", Statistical bulletin "Gross agricultural production of Ukraine", Statistical bulletin "Gross agricultural production of Ukraine", Statistical bulletin "Gross agricultural production of Ukraine", Statistical bulletin "Gross agricultural production of Ukraine", Statistical bulletin "Gross agricultural production of Ukraine", "Harvesting of crops and other field work"; information available on the website of the State Statistics Service of Ukraine (http://www.ukrstat.gov.ua). In addition, the teacher may provide data from other sources that could enhance the research theme.

Assignment signed by the teacher is filed with the report on educational practice after the title page.

The structure of the course paper consists of an introduction, three chapters that reveal the content of the research topic, conclusions based on the results of the statistical study, list of references and appendixes if needed. The volume of the course project is 20-25 pages of computer text. Theoretical issues should be reviewed in introduction of the report and the first part of the report.

2. REQUIREMENTS FOR THE DESIGN OF THE REPORT ON EDUCATIONAL PRACTICE

The report on educational practice should be well organized, neatly designed and bound.

The report on educational practice is printed in Times New Roman font, 14 pt. Page margins: up and down - 20 mm, left - 30 mm, right - 10 mm. Paragraph indentation - 1.25 cm; style - normal; line spacing – 1.5; text alignment - width; hyphenation - automatic.

Pages should be numbered. The numbering starts from the first title page with Arabic numerals in the upper right corner. Title pages and the table of contents are not numbered but are included in the general numbering.

The table of contents is on the second page. The table of contents lists all the parts of the course paper and indicates the number of the page from which it begins on the right against each title.

Each section of the report should be started on a new page and should be headed. Paragraphs of the sections are separated by intervals and headings. Before the title of the paragraph, the Arabic numerals are separated by a dot: the first numeral identifies the section, the second - the paragraph.

Particular attention should be paid to the design of statistical tables, following certain rules for their construction. A well-designed statistical table is an important means of displaying the processed material of a statistical study. Large tables containing more than 8 columns should be placed in an appendix. Tables are numbered.

The word "Table" and its serial number are placed in the upper right corner above the title. The table number should consist of the section number and the table number, separated by a period. For example, "Table 3.1" (the first table of the third section). Tables should have meaningful titles. The table heading is placed symmetrically above the table.

If the table does not fit on one page, it can be moved to another. In this case, the vertical lines (columns) under the table headings should be numbered, and on the next page, instead of the heading, "Continuation of Table 3.1" should be written in the upper

right corner.

If the table data are borrowed from a literary source, it should be referenced in the text, indicating the source number in square brackets and the table number in round brackets. For example, "according to [5], the efficiency of grain production (Table 3)...".

The text should contain references to all literature, which are indicated in square brackets.

Graphs should be placed in the center, with the graph number and title below the graph. The number of a graph or diagram consists of the section number and the figure number separated by a dot (for example, Figure 2.3). Figures are placed after the reference to them in the text.

Formulas should be centered and numbered at the end of the line. Number the formulas consecutively within the section and indicate them in parentheses on the right.

No abbreviations of words are allowed in the course paper, except for common abbreviations of units of measurement (tons, centners/ha, UAH).

The list of references should be arranged alphabetically by author's name or title.

Tables of auxiliary calculation data, illustrations, forms of documents, etc. should be included in the appendices.

3. STRUCTURE AND CONTENT OF THE EDUCATIONAL PRACTICE

The report on educational practice from statistics must meet certain requirements. The student should demonstrate a thorough theoretical knowledge of the issue under study, be able to present the material clearly, locally, and in an accessible manner. Particular attention should be paid to the use of statistical research methods and the performance of relevant calculations, and the formulation of reasoned conclusions. The structure and content of report on different topics may differ slightly. This depends on the methodological framework used to reveal the chosen research topic.

The structure of the report should be logically consistent and roughly correspond to the following scheme, where typical content of the course paper is presented as following:

Content

Initial data

INTRODUCTION

1. Analysis of current trends in the sugar beet market
2. Segmentation of the sugar beet market
3. Forecast of sugar beet market development

CONCLUSIONS

REFERENCES

APPENDIXES

4. METHODICAL GUIDELINES FOR THE CALCULATION PART OF THE EDUCATIONAL PRACTICE

Initial data

Table 1

Sugar beet yield and production, 2023

№	Areas	Yield, c/ha	Gross sales, c
1.	Vinnytsia		
2.	Volyn		
3.	Dnepropetrovsk		
4.	Donetsk		
5.	Zhytomyr		
6.	Transcarpathian		
7.	Zaporizhzhya		
8.	Ivano-Frankivsk		
9.	Kyiv		
10.	Kirovograd		
11.	Luhansk		
12.	Lviv		
13.	Mykolayivska		
14.	Odesa		
15.	Poltava		
16.	Rivne		
17.	Sumy		
18.	Ternopil		
19.	Kharkiv		
20.	Kherson		
21.	Khmelnytsky		
22.	Cherkasy		
23.	Chernivtsi		
24.	Chernihiv		

Table 2

Dynamics of sugar beet yield and production, 2006-2021

Years / Indicators	Yield, centner/ha	Production, t
2006		
2007		
2008		
2009		
...		
2020		
2021		
2023		

Introduction. The volume is 2-3 pages. The introduction substantiates the relevance of the research topic, formulates the purpose and objectives of the statistical study, the object and subject of the study, and indicates the methods that will be used in writing the report and sources of information.

Chapter 1. Analysis of current trends in the sugar beet market

Based on the study of literature, it is necessary to reveal the essence of the subject of research, formulate its main tasks, characterize the system of indicators used to solve the research problem, and the method of their calculation.

According to the chosen topic there is analyze current trends in the market sugar beet (market description, specifics, problems, factors influencing the market, market volume in Ukraine in physical and monetary terms) (up to 5 pages).

Chapter 2. Market segmentation.

In order to segment the Ukrainian consumer market by geography, create 5 consumer groups with equal intervals according to the yield/productivity and gross harvest criteria. For each consumer segment to determine:

1) the number of regions;

2) average yield/productivity;

3) the share of each group in the total volume.

Present the results of the consumer market segmentation in a group table. Draw conclusions.

Provided that the feature changes uniformly within the range of variation, the width of the interval *h* is determined by the formula

$$h = \frac{x_{\max} - x_{\min}}{k},$$

where $x_{(\max)}$ - $x_{\min}$ is the range of variation of the attribute values; k is the number of groups.

Table 2.1

Distribution of the regions of Ukraine by sugar beet yield,

Groups	Interval by sugar beet yield, c/ha (x)	Number of regions (f)	Average sugar beet yield per group, t/ha (x_i)	Share in % of total
I				
II				
III				
IV				
....				
Σ				100

Conclusions:

Table 2.2

Distribution of the studied regions by gross sugar beet production, thousand tonnes

Groups	Interval by gross sugar beet production, thousand tonnes (x)	Number of regions	Average gross production by group, thousand tonnes	Share in % of total
I				
II				
III				
IV				
....				
Σ				

Conclusions:

Calculate the characteristics of the centre (arithmetic mean, mode and median), measures of variation (variance, standard deviation, coefficient of variation) and distribution shapes (skewness, kurtosis). Draw appropriate conclusions.

Table 2.3

Input and calculation data for determining the average yield of sugar beet

Groups of regions by sugar beet yield	Number of regions	xi	xi*f	$(x-xav.)^2*f$	$(x-xav.)^3*f$	$(x-xav.)^4*f$
Σ		x				

Table 2.4

Input and calculation data for determining the average gross sugar beet production

Groups of regions by gross sugar beet production	Number of regions	xi	xi*f	$(x-xav.)^2*f$	$(x-xav.)^3*f$	$(x-xav.)^4*f$
Σ		x				

Based on the calculated data in Tables 3.1 and 3.2, calculate the average yield and average gross production using:

- **weighted arithmetic mean:**

$$\bar{x} = \frac{\sum xf}{\sum f}$$

- **mode:**

$$Mo = x_{Mo_{min}} + i\frac{f_{Mo} - f_{Mo-1}}{(f_{Mo} - f_{Mo-1}) + (f_{Mo} - f_{Mo+1})}$$

,

where x_{M0min} is the lower boundary of the modal interval. The modal interval is the interval with the highest frequency;

and is the interval step;

f_{MO} the frequency of the modal interval;

$f_{MO(-1}$) is the frequency of the interval preceding the modal interval;

f_{MO+1} (-) is the frequency of the interval following the modal interval.

- **median:**

$$M_e = x_{Me\,min} + i\frac{\frac{1}{2}\sum f_i - S_{Me-1}}{f_{\text{Me}}},$$

where x_{Memin} is the lower bound of the median interval;

and is the interval step;

S_{Me-1} is the sum of the accumulated frequencies preceding the medial interval;

$f_{(M)(e\text{ -) is the}}$ frequency of the medial interval.

3) variance;

$$\sigma^2 = \frac{\sum_{i=1}^{n}(x-\bar{x})^2}{\sum n_i}$$

4) standard deviation;

$$\sigma = \sqrt{\frac{\sum_{i=1}^{n}(x-\bar{x})^2}{n_i}}$$

5) coefficient of variation.

$$V_\sigma = \frac{\sigma}{\bar{x}} \cdot 100\%$$

For small samples, the coefficient of variation is $V \leq 33\%$.

Based on the calculated data in Tables 1 and 2, calculate the indicators of the distribution form using:

- **asymmetry:**

- **excess** $A = \frac{\mu_3}{\sigma^3}$; $\mu_3 = \frac{\sum (x_j - \bar{x})^3 f_j}{\sum f_j}$

$E = \frac{\mu_4}{\sigma^4}$; ; $E = \frac{\mu_4}{\sigma^4} - 3$ $\mu_4 = \frac{\sum (x_j - \bar{x})^4 f_j}{\sum f_j}$

Conclusions on the averages and indicators of distribution forms.

Chapter 3. Forecast of sugar beet market development

To assess the development trend and fluctuations in sales of goods to determine:

1) basic and chain sales growth rates;

2) the average annual sales volume;

3) average absolute growth, average growth rate and average growth rate for the entire period;

4) a trend model for the sale;

5) standard deviation of actual sales from the trend;

6) approximation factor.

7) make a forecast for the next time period

Table 3.1

Indicators of the dynamics of gross sugar beet production

Indicator.	Year				
	2019	2020	2021	2022	2023
Gross sugar beet production, thousand tonnes					
Absolute growth, UAH million:					
basic	X				
chain	X				
Growth rate:					
basic	X				
chain	X				
Growth rate, %:					
basic	X				
chain	X				
Growth rate, %:					
basic	X				
chain	X				
Absolute value of 1% growth, UAH million: chain	X				

Make conclusions on getting results.

Using the statistical data of the studied attributes for 15 years, construct a linear trend equation.

The straight line alignment of the dynamics series looks like this:

$$y_t = a_0 + a_1 t,$$

where a_0 is the levelled level of the series; a_1 is the average annual change in the phenomenon under study; t is the serial number of the year.

The parameters a_0 and a_1 are determined by the least squares method, by solving a system of normal equations:

$$\begin{cases} na_0 + a_1 \sum t = \sum y \\ a_0 \sum t + a_1 \ t^2 = \sum yt \end{cases}$$

If $\sum t = 0$, the system will look like this:

$$\begin{cases} na_0 = \sum y \\ a_1 \sum t^2 = \sum yt \end{cases}$$

$$a_0 = \frac{\sum y}{n}$$

$$a_1 = \frac{\sum yt}{\sum t^2}$$

Calculated data is presented in the form of tables 3.1 and 3.2.

Table 3.2

Analytical straightening of the dynamics series

Year	Sugar beet yield, tonnes per hectare y	t	t^2	yt	y_t	$(y-\bar{y})^2$	$(y_t-\bar{y})^2$	$(y-y_t)^2$
2007								
2008								
2009								
2010								
...								
2023								
∑								

To evaluate the constructed analytical equations, fluctuations of the analytical series of dynamics around the average.

To do this, it is needed to calculate:

1) for the empirical series of dynamics:

- variance: $\sigma^2 = \frac{\sum(y-\bar{y})^2}{n}$
- standard deviation: $\sigma = \sqrt{\sigma^2}$
- coefficient of variation: $v = \frac{\sigma}{\bar{y}} \cdot 100\%$

For example, if σ=36.18 c/ha and v= is 42.57%, then we note that the variation in the empirical wheat yield series is large, with a year-to-year variation of 42.57%, or 36.18 centners/ha.

2) for the analytical series of dynamics in a straight line:

- variance: $\sigma^2 = \frac{\sum(y_t-\bar{y})^2}{n}$
- standard deviation: $\sigma = \sqrt{\sigma^2}$

- coefficient of variation: $v = \frac{\sigma}{\bar{y}} \cdot 100\%$

For example, if σ = 19.53 c/ha and v= is 21.77%, then we note that the variation of the analytical series aligned with a straight line is large, amounting to 21.77%, or 19.53 c/ha.

- correlation and determination coefficient: $R = \sqrt{1 - \frac{\sum (y - y_t)^2}{\sum (y - \bar{y})^2}}$;

  $D = R^2 x 100\%$

Draw appropriate conclusions.

Table 3.3

Analytical straightening of the dynamics series

Year	Sugar beet production, thousand tonnes, y	t	t^2	yt	y_t	$(y-\bar{y})^2$	$(y_t-\bar{y})^2$	$(y-y_t)^2$
2007								
2008								
2009								
2010								
...								
2023								
∑								

Using the data in Table 3.3, perform similar calculations. Draw appropriate conclusions.

Assess the adequacy of the built trend models by calculating the standard error of the approximation using the formula:

$$v = \sqrt{\frac{1}{n-m-1} \times \sum \left(\frac{y_t - y}{y} \right)^2} \times 100\%$$

where n is the number of levels of the time series;

m is the number of parameters of the trend equation.

For our case, n=15, m=2.

If the value does not exceed 15%, the model can be used for forecasting purposes.

Prepare the calculation data in the form of calculation tables 3.4

Table 3.4

Calculation data for calculating the approximation error

Year	Sugar beet yield, tonnes per hectare y	y_t	$\left(\frac{y_t - y}{y}\right)^2$
2007			
2008			
...			
2020			
2023			
∑			

Table 3.5

Calculation data for calculating the approximation error

Year	Sugar beet production, thousand tonnes y	y_t	$\left(\frac{y_t - y}{y}\right)^2$
2007			
2008			
...			
2020			
2021			
∑			

Determine the point and interval estimates of the forecast for each of the studied features.

To forecast the studied attribute with the assumption that the identified trend will continue beyond the studied dynamics series, the trend equation is substituted with the value of t, according to the continuation of the original series, and the point forecast value $Y_{forecast.}$ is obtained.

Conclusions. The volume is 2-3 pages. In this part, it is necessary to clearly formulate the conclusions based on the results of the statistical study.

References. The list of literature includes literature (legislative and regulatory documents, materials of the State Statistics Services of Ukraine, the Ministry of Agrarian Policy and Food of Ukraine, educational and scientific literature, as well as information resources of the global computer information network Internet) used in writing the course paper. The list of used literature should be drawn up in accordance with the requirements.

References

1. Anderson D.R., Sweeney D.J., Williams T.A. Statistics for Business & Economics, 14th Edition, Cengage Learning, 2019, 1120 p.

2. Hamulczuk M. Makarchuk O., Kuts T. Time-Varying Integration of Ukrainian Sunflower Oil Market with the EU Market. Agris on-line (Papers in Economics and Informatics). 2021. Vol. XIII, №3. P. 35-49.
URL: https://doi.org/10.7160/aol.2021.130304

3. Hamulczuk M., Cherevyk D., Makarchuk O., Kuts T., Voliak L. Integration of Ukrainian grain markets with foreign markets during russia's invasion of Ukraine. Zagadnienia Ekonomiki Rolnej Problems of Agricultural Economics. 2023. Vol. 377(4). P. 1-25. URL: https://doi.org/10.30858/zer/177396

4. Illukkumbura A. Introduction to Regression Analysis (Easy Statistics), 2020, 121 p.

5. Kuts T., Makarchuk O. Environmental Awareness of students of National University of Life And Environmental Sciences (Nules) of Ukraine in the context of modern challenges, Papers: Management, Economic Engineering in Agriculture & Rural Development. 2023. Vol. 23 Issue 16, P. 363-370.
URL: https://managementjournal.usamv.ro/pdf/vol.23_2/Art42.pdf

6. Makarchuk O., Kuts T., Voliak L. Green economy in Ukraine: analysis and modelling of development in agriculture. Grail of Science, 2024. №46, pp. 264-270. URL: https://archive.journal-grail.science/index.php/2710-3056/issue/view/29.11.2024/34

7. Makarchuk O., Kuts T., Labenko O., Kuts O. Market evaluation of rapessed in Ukraine: perspectives and challenges. Scientific Papers Series Management, Economic Engineering in Agriculture and Rural development. 2024. Vol. 24 (4), pp. 505-513.
URL: https://managementjournal.usamv.ro/pdf/vol.24_4/volume_24_4_2024.pdf

8. Makarchuk O. Sunflower oil market in Ukraine: state and challenges. Біоекономіка і аграрний бізнес. 2022 р., НУБіП України. 2022. №2. С. 100-110. URL:

https://economicscience.com.ua/uk/journals/t-13-2-2022/rinok-sonyashnikovoyi-oliyi-v-ukrayini-stan-ta-vikliki

9. Quirk T. Excel 2019 in Applied Statistics for High School Students: A Guide to Solving Practical Problems (Excel for Statistics) 2nd ed., Springer, 2021, 264 p.

10. Вінничук О. Ю., Григорків М. В., Маханець Л. Л. Статистика: тестові завдання: навч. посібник. Чернівці : Чернівецький нац. ун-т, 2023. 180 с.

11. Горкавий В.К. Статистика: підручник. Третє вид., переробл. і доповн. Київ: Алерта, 2020. 644 с.

12. Городянська Л.В., Сизов А.І. Статистика для економістів: навчальний посібник. Київ: Нац. ун-т ім. Т.Шевченка, 2019. 350 с.

13. Григорків В.С., Вінничук О.Ю., Григорків М.В., Маханець Л.Л. Статистика: основи теорії та практикум: навчальний посібник. Чернівці: Чернівец. нац. ун-т, 2022. 304 с.

14. Козирєва О.В., Федорова В.О. Статистика: навчальний посібник. Х.: Видавництво Іванченка І.С., 2021. 187 с.

15. Кушнір Н.Б. Статистика: навчальний посібник. Київ: Центр учбової літератури, 2019. 208 с.

16. Мармоза А.Т. Практикум з теорії статистики і сільськогосподарської статистики: Навч.посіб. Центр навчальної літератури, 2019. 664 с.

17. Мармоза А.Т. Теорія статистики: Навч. посібник. К.: ЦУЛ, 2019.592 с.

18. Методологічні положення зі статистики.
URL: https://ukrstat.gov.ua/metod_ polog/old/titul_old.html

19. Опря А.Т., Дорогань-Писаренко Л.О., Єгорова О.В., Кононенко Ж.А. Статистика (модульний варіант з програмованою формою контролю знань). Навчальний посібник. Підручник. К.: Центр навчальної літератури, 2019. 536 с

20. Офіційний сайт Державної служби статистики України.
URL: http://ukrstat.gov.ua/

21. Офіційний сайт Державної служби України з питань праці.

URL: https://dsp.gov.ua/

22. Офіційний сайт Євростату.

URL: http://epp.eurostat.ec.europa.eu/portal/page/portal/ eurostat/home

23. Офіційний сайт Кабінету Міністрів України.

URL: http://www.kmu.gov.ua/control/

24. Офіційний сайт Міністерства економічного розвитку і торгівлі України. URL: http://www.kmu.gov.ua

25. Офіційний сайт Продовольчої та сільськогосподарської організації ООН (ФАО). URL: http://www.fao.org/

26. Офіційний сайт Світового банку. URL: http://www.worldbank.org/

27. Педченко Г. П. Статистика: навчальний посібник. Мелітополь: Колор Принт, 2018. 266 с.

28. Підгорний А. З., Погорєлова Т. В. Фінансова статистика : навчальний посібник. Київ : ФОП Гуляєва В.М., 2020. 204 с.

29. Провост Ф., Фоусет Т. Data Science для бізнесу. Як збирати, аналізувати і використовувати дані. Видавництво: Наш формат, 2019 . 400 с.

30. Скрипник А. В., Галаєва Л. В., Коваль Т. В., Шульга Н. Г. Практикум «Теорія ймовірностей». Навч. пос. Київ: ВЦ «Компринт», 2019. 464 с.

31. Статистика : підручник. Колектив авторів: С. І. Пирожков, В. В. Рязанцева, Р. М. Моторин та ін. Київ : Київ. нац. торг.-екон. ун-т, 2020. 328 с.

32. Статистико-аналітичне забезпечення управління інноваційним розвитком економічних суб'єктів. За заг. ред. В.К. Савчука. К.: ФОП Ямчинський О. 2020. 385 с.

33. Ткач Є. І., Сторожук В. Загальна теорія статистики: підручник. Київ: Центр навчальної літератури, 2019. 442 с.

34. Толбатов Ю.А. Статистика засобами Excel: Навч. посібник. К.: Університет «Україна», 2019. 326 с.

35. Тютченко С.М. Практикум з навчальної дисципліни «Статистика»: навч.-метод.посіб. Дніпро: ДДУВС, 2022. 52 с.

36. Чекотовський Е. В. Статистика з Microsoft Excel 2016: навч. посіб. Київ: Знання України, 2019. 811 с.

Appendix A

Sample design of the cover page of a term paper

National University of Life and Environmental Sciences of Ukraine

Faculty of Economics
Department of Statistics and Economic Analysis

Report on educational practice
from Statistics on the topic:
"Statistical study of winter wheat production"

Executed by:
2d year student of __ group,
Specialty "051 Economics" (International Economics)
Name and surname

Checked by:
Oksana Makarchuk,
Ph.D. in Economics, Associate Professor of
the Department of Statistics and Economic Analysis

Total points: _____

Members of the commission: _____ _____

_____ _____
(signature) (last name and initials)

_____ _____
(signature) (last name and initials)

Kyiv -20__

Oksana Makarchuk

Appendix B

Research topics during the educational practice

1. Statistical study of the oilseed market in Ukraine
2. Statistical study of the rapeseed market in Ukraine
3. Statistical study of the corn market in Ukraine
4. Statistical study of the barley market in Ukraine
5. Statistical study of the wheat market in Ukraine
6. Statistical study of the soybean market in Ukraine
7. Statistical study of the rapeseed market in Ukraine
8. Statistical study of the potato market in Ukraine
9. Statistical study of the pea market in Ukraine
10. Statistical study of the buckwheat market in Ukraine
11. Statistical study of the rice market in Ukraine
12. Statistical study of the millet market in Ukraine
13. Statistical study of the flour market in Ukraine
14. Statistical study of the sugar market in Ukraine
15. Statistical study of the nuts market in Ukraine
16. Statistical study of the apples market in Ukraine
17. Statistical study of the grain market in Ukraine
18. Statistical study of the milk market in Ukraine in Ukraine
19. Statistical study of the dairy products market in Ukraine
20. Statistical study of the meat market in Ukraine
21. Statistical study of the pork market in Ukraine
22. Statistical study of the chicken market in Ukraine
23. Statistical study of the beef market in Ukraine
24. Statistical study of the mushrooms market in Ukraine
25. Statistical study of the honey market in Ukraine
26. Statistical study tea market in Ukraine

27. Statistical study coffee market in Ukraine
28. Statistical study flower market in Ukraine
29. Statistical study fish market in Ukraine
30. Statistical study cheese market in Ukraine

Appendix C

Student's t-test value at the significance level of 0.05

1	12,706	16	2,1199
2	4,3027	17	2,1098
3	3,1825	18	2,1009
4	2,7764	19	2,0930
5	2,5706	20	2,0860
6	2,4469	21	2,0796
7	2,3646	22	2,0739
8	2,3060	23	2,0687
9	2,2622	24	2,0639
10	2,2281	25	2,0595
11	2,2010	26	2,0555
12	2,1788	27	2,0518
13	2,1604	28	2,0484
14	2,1448	29	2,0452
15	2,1315	30	2,0423

Appendix D

Fisher's F-test value at the significance level P=0.95

	1	2	3	4	5	6	7	8	9	10
1	161	200	216	225	230	234	237	239	241	242
2	18,51	19,00	19,16	19,25	19,30	19,33	19,35	19,37	19,38	19,40
3	10,13	9,55	9,28	9,12	9,01	8,94	8,89	8,85	8,81	8,79
4	7,71	6,94	6,59	6,39	6,26	6,16	6,09	6,04	6,00	5,94
5	6,61	5,79	5,41	5,19	5,05	4,95	4,88	4,82	4,77	4,74
6	5,99	5,14	4,76	4,53	4,39	4,28	4,21	4,15	4,10	4,06
7	5,59	4,74	4,35	4,12	3,94	3,87	3,79	3,73	3,68	3,64
8	5,32	4,46	4,07	3,84	3,69	3,58	3,50	3,44	3,39	3,35
9	5,12	4,26	3,86	3,63	3,48	3,37	3,28	3,23	3,18	3,14
10	4,96	4,10	3,71	3,48	3,33	3,22	3,14	3,07	3,02	2,98
11	4,84	3,98	3,59	3,36	3,20	3,09	3,01	2,95	2,90	2,85
12	4,75	3,89	3,49	3,26	3,11	3,00	2,91	2,85	2,80	2,75
13	4,67	3,81	3,41	3,18	3,03	2,92	2,83	2,77	2,71	2,67
14	4,60	3,74	3,34	3,11	2,96	2,85	2,76	2,70	2,65	2,60
15	4,54	3,68	3,30	3,09	2,90	2,79	2,71	2,64	2,59	2,54
16	4,49	3,63	3,24	3,01	2,85	2,74	2,66	2,59	2,55	2,49
17	4,45	3,56	3,20	2,96	2,81	2,70	2,61	2,55	2,51	2,45
18	4,41	3,55	3,16	2,93	2,77	2,66	2,58	2,51	2,48	2,41
19	4,38	3,52	3,13	2,90	2,74	2,63	2,54	2,48	2,45	2,38
20	4,35	3,49	3,10	2,87	2,71	2,60	2,51	2,45	2,42	2,35
120	3,92	3,07	2,68	2,45	2,29	2,17	2,09	2,02	1,96	1,91