Ministry of Agriculture of the Republic of Kazakhstan

S.Seifullin Kazakh Agrotechnical University

"Approved"
Dean of Economics Faculty
S. A itkhozhin
22.06 2020

SYLLABUS

Discipline: Statistics

Educational Programs - «Accounting and Audit in the real sector of economy», «Finance, Economics, banking and insurance»

Specialties: Accounting and Audit - 5B050800, Finance - 5B050900

Nur-Sultan 2020

The Syllabus has been designed on the base of typical program adopted by methodical council of the T.Ryskulov Kazakh Economic University for the specialty 5B050800 - “Accounting and Audit” for higher education institutions and in accordance with work academic plan of the specialty.

The Syllabus was discussed and approved by the Department of Accounting and Audit, _____ , , 2020, protocol №

Head of the Department A.Baidakov

The Syllabus was recommended by Methodical Commission of Economics Faculty, 2020, протокол №

Head of the Commision S. Daripbayeva

DISCIPLINE “STATISTICS”

1. LECTURER INFO

Lecturer –Talgat Amanzholovich Kussaiynov, Doctor of Sciences (Economics), Professor
S.Seifullin Kazakh Agrotechnical University - Astana
Department of Accounting and Audit, tel.: 39 -55-07
Consultation time: 09-00 to 17-00, Monday-Friday

2. DISCIPLINE INFO

Name - Statistics
Code - Sta
Number of credits – 5
Lectures – 20
Practical/laboratory work - 30
Independent work under teacher’s supervision - 10
Trimester – 1
Type of Module – Basic, mandatory

2.1 SAMPLE DISTRIBUTION OF ACADEMIC HOURS OF THE DISCIPLINE

Trimester weeks	1	2	3	4	5	6	7	8	9	10	Total
Lecture	2	2	2	2	2	2	2	2	2	2	20
Laboratory/Practical work	3	3	3	3	3	3	3	3	3	3	30
Office hours	2	2	2	2	2	2	2	2	2	2	20
Self-study	8	8	8	8	8	8	8	8	8	8	80
Sum	15	15	15	15	15	15	15	15	15	15	150

3. COURSE PREREQUISITES

Economic theory, Mathematics, Informatics

4. COURSE POSTREQUISITES

Economic analysis, Economics of Enterprises, Econometrics, Diploma Paper

5 SHORT DESCRIPTION OF THE COURSE

The objective of the course – to teach students to methodology of statistics and help them become proficient in statistical survey, gathering, processing, and analysis of mass statistical data related to socio- and economic processes.

Tasks of the Course:

- To impart skills of consolidation and grouping of mass data to students;
- To impart skills of calculation of the system of statistical indicators to students;
- To impart skills of making statistical inferences;
- To impart skills to use mathematical and statistical methods when studying links and interlinks in socio-economic processes;
- To impart skills to formulate conclusions and recommendations which come from the statistical analysis

Results expected:

- Skills to analyze economic and business problems with statistical tools;
- Students' ability to approach business-related problems in a systemic way.

6. COURSE CONTENT

6.1 LIST OF LECTURES

MODULE NAME	TOPIC TITLE	AMOUNT OF HOURS	REFERENCES	WEEK
Describing Data 1	Basic Concepts, Tables and Graphs	2	1-6	1
Describing Data 2	Summary Measures	2	1-6	2
Probability Concepts	Probability Distributions	3	1-6	3-4
Sampling	Sampling Methods and Sampling Distributions.	2	1-6	4-5
Confidence Intervals	Confidence Interval Estimation	2	1-6	5-6
Hypothesis Testing concepts	Hypothesis Testing Technics	3	1-6	6-7
Regression Analysis	Estimation of Relationships with Use of Regression technics	4	1-6	8-9
Introduction to Bayesian Statistics	Basic Ideas of Bayesian Statistics	2	3	10

6.2 THE LIST OF LABORATORY AND PRACTICAL CLASSES (LPC)

MODULE NAME	TOPIC TITLE	TASKS OF LPC, PURPOSE AND CONTENT	AMOUNT OF HOURS	TEXTS	WEEK	ASSESSMENT 0/100 POINTS
Describing Data 1	Describing Data: Basic Concepts, Tables and Graphs.	Basic Concepts of Data. Populations and Samples. Variables and Observations. Types of Data. Frequency Tables and Histograms. Analyzing Relationships with Scatterplots. Time Series Plots	4	1-6	1-2	0/100
Describing Data 2	Describing Data: Summary Measures.	Measures of Central Location. Quartiles and Percentiles. Minimum, Maximum, and Range. Measures of Variability: Variance and Standard Deviation. Interpretation of the Standard Deviation: Rules of Thumb. Measures of Association: Covariance and Correlation	4	1-6	2-3	0/100
Probability Concepts	Probability Distributions.	The Normal Distribution. Continuous Distributions and Density Functions. The Normal Density. Standardizing: Z-Values. Normal Calculations in Excel. The Binomial Distribution. Mean and Standard Deviation of the Binomial Distribution. The Binomial Distribution in the Context of Sampling. The Normal Approximation to the Binomial	4	1-6	4-5	0/100
Sampling	Sampling and Sampling Distributions.	Sampling Terminology. Methods of Selecting Random Samples. Simple Random Sampling. Systematic Sampling. Stratified Sampling. Cluster Sampling. Multistage Sampling Schemes. An Introduction to Estimation. Sources of Estimation Error. Sampling Distribution of the Sample Mean. The Central Limit Theorem. Sample Size Determination. Summary of Key Ideas for Simple Random Sampling	2	1-6	5	0/100
Confidence Intervals	Confidence Interval Estimation.	Sampling Distributions. The *t* Distribution. Confidence Interval for a Mean. Confidence Interval for a Proportion. Confidence Interval for the Difference Between Means. Independent Samples. Paired Samples. Confidence Interval for the Difference Between Proportion. Controlling Confidence Interval Length. Sample Size for Estimation of the Mean. Sample Size for Estimation of Other Parameters	4	1-6	6-7	0/100

Hypothesis Testing concepts	Hypothesis Testing.	Concepts in Hypothesis Testing. Null and Alternative Hypotheses. One-Tailed Versus Two-Tailed Tests. Types of Errors. Significance Level and Rejection Region. Hypothesis Tests for a Population Mean. Hypothesis Tests for Other Parameters. Hypothesis Tests for a Population Proportion. Hypothesis Tests for Differences Between Population Means. Hypothesis Tests for Differences Between Population Proportions. Tests for Normality	4	1-6	7-8	0/100
Regression Analysis	Regression Analysis: Estimating Relationships.	Scatterplots: Graphing Relationships. Correlations: Indicators of Linear Relationships. Simple Linear Regression. Least Square Estimation. Standard Error of Estimate. *R*-Square: the Coefficient of Determination. Multiple Regression. Interpretation of Regression Coefficients. Interpretation of Standard Error of Estimate and *R*-Square. Modeling Possibilities. Dummy Variables. Nonlinear Transformations. Validation of the Fit	6	1-5, 7	8-10	0/100
Introduction to Bayesian Statistics	Basics of Bayesian Statistics	Conditional Probability. Prior and Posterior Probabilities. Bayes' Theorem. Bayesian Factor.	2	1-5, 7	10	0/100

6.3 Criteria for assessing tasks of laboratory/practical classes
Correctness of problems solutions (70%). Apart from the correctness, presentation style and logic (15%) and effectiveness (15%) will be considered.

6.3 Criteria for evaluation of practical training tasks

Percentage	Criterion
95-100	- it is put in the case when a full, detailed answer to the question is given, a set of conscious knowledge of statistics is shown, which manifests itself in the free operation of concepts, the ability to highlight its essential and non-essential features, cause-and-effect relationships. Knowledge of statistics is demonstrated on the background of understanding it in the system of this science and interdisciplinary connections. Freely demonstrates knowledge of statistical indicators, knows the calculation methodology and gives the correct economic interpretation
90-94	- it is put in the case when a full, detailed answer to the question is given, a set of conscious knowledge about the object is shown, the main provisions of the topic are evidently disclosed; the answer traces a clear structure, a logical sequence that reflects the essence of the disclosed concepts, theories, phenomena. Knowledge about the object is demonstrated on the background of understanding it in the system of this science and interdisciplinary connections. However, there are shortcomings in the definition of indicators, corrected by students themselves in the process of response.
85-89	- put in the case where students are given a complete, detailed answer to the question, evidence disclosed the main provisions of the topic in the answer can be traced a clear structure, logical sequence, reflecting the essence of the disclosed concepts, theories, phenomena. In the answer there are mistakes corrected by the student with the help of the teacher.
80-84	- it is put in the case when the full, detailed answer to the question is given, the ability to allocate essential and insignificant signs, cause-and-effect relations is shown. The answer is clearly structured, logical, presented in literary language in terms of science. However, minor errors in the calculations are made or there are shortcomings corrected by the student with the help of leading questions.
75-79	- it is put in the case when the full answer to the question is given, the ability to allocate essential and insignificant signs, cause-and-effect relations is shown. The answer is clearly structured, logical, stated in terms of science. There may be shortcomings or minor errors corrected by the student with the help of the teacher.
70-74	- ставится в том случае, когда дан недостаточно последовательный ответ на поставленный вопрос, но при этом показано умение выделить существенные и несущественные признаки и причинно-следственные связи. Могут быть допущены 1-2 ошибки в определении основных понятий, которые обучающийся затруднился исправить самостоятельно.
65-69	- it is put in the case when the insufficiently consistent answer to the question is given, but at the same time the ability to allocate essential and insignificant signs and cause-and-effect relations is shown. There may be 1-2 errors in the definition of basic concepts that the student found it difficult to correct by himself.
60-64	- put in the case where an incomplete answer is given, the logic and sequence of presentation have significant violations. Gross errors were made in determining the essence of disclosed concepts, theories, phenomena, due to students ' misunderstanding of their essential and non-essential features and connections. There are no conclusions in the answer. The ability to reveal specific manifestations of generalized knowledge is not shown.

55-59	- is put in the case when an incomplete answer is given. There is illogical presentation. The educator is at a loss for evidence. The mass of significant errors in the definitions of terms, concepts, characteristics of facts, phenomena. Speech is illiterate. When answering additional questions, the Teacher begins to realize the existence of a link between knowledge only after prompting the teacher.cepts, theories, phenomena, due to students ' misunderstanding of their essential and non-essential features and connections. There are no conclusions in the answer. The ability to reveal specific manifestations of generalized knowledge is not shown.
50-54	- is put in the case where the answer is given, which is a disparate knowledge on the subject of the question with significant errors in the definitions. There are fragmentary, illogical presentation. The teacher is not aware of the relationship of this concept, theory, phenomena with other objects of the module (discipline). It illiterate. Additional and clarifying questions of the teacher do not lead to correction of the student's answer not only to the question, but also to other questions of the module (discipline).
25-49	- put in the event that the student found gaps in the knowledge of the basic material provided by the program, has not mastered more than half of the program module (discipline) there Are no conclusions, specification and evidence of presentation. It illiterate. Additional and clarifying questions of the teacher do not lead to correction of the student's answer not only to the question, but also to other questions.
0-24	put in the event that the student has found significant gaps in the knowledge of statistics provided by the program, has not mastered more than half of the program module (discipline), in the answers made fundamental mistakes, did not perform certain tasks provided by the forms of the control, did not work on all the basic literature.

6.4. SCHEDULE EXECUTION AND DELIVERY OF ASSIGNMENTS OF SELF-STUDY IN THE COURSE

№	MODULE NAME	TOPIC TITLE	SELF-STUDY ASSIGNMENTS, PURPOSE AND CONTENT	RECOM-MENDED LITERATURE	FORM OF TASKS CONTROL	TASKS DEADLINE	ASSES-SMENT 0/100 POINTS
1	2	3	4	6	7	8	9
1	Describing Data: Basic Concepts, Tables and Graphs.	Populations and Samples. Variables and Observations.	Construction of Frequency Tables and Histograms. Analysis of Relationships with Scatterplots. Time Series Plots	1-6	Written Presentation	2nd week	0/100
2	Describing Data: Summary Measures.	Measures of Central Location, Association, and Variability	Calculation of Quartiles and Percentiles; Minimum, Maximum, and Range; Variance and Standard Deviation; Covariance and Correlation. Interpretation of the	1-6	Written Presentation	3rd week	0/100
3	Probability Distributions.	The Normal Distribution. Standardizing: Z-Values. The Binomial Distribution. Mean and Standard Deviation of the Binomial Distribution.	Normal Calculations in Excel. The Binomial Distribution in the Context of Sampling. The Normal Approximatio n to the	1-6	Written Presentation	4th week	0/100
4	Sampling and Sampling Distributions.	Sampling Terminology. Methods of Sampling. Sampling Distribution of the Sample Mean. The Central Limit Theorem.	Summary Key Ideas for Simple Random Sampling. Sample Size Determinati on	1-6	Written Presentation	5th week	0/100

5	Confidence Interval Estimation.	Sampling Distributions. The *t* Distribution.	Confidence Interval for a Mean. Confidence Interval for a Proportion. Confidence Interval for the Difference Between Means. Confidence Interval for the Difference Between Proportion. Controlling Confidence Interval	1-6	Written Presentation	6th week	0/100
6	Hypothesis Testing.	Concepts in Hypothesis Testing.	Hypothesis Tests for a Population Mean, for a Population Proportion, for Differences Between Population Means, for Differences Between Population Proportions	1-6	Written Presentation	7th week	0/100
7	Regression Analysis: Estimating Relationships.	Multiple Regression. Modeling Possibilities. Dummy Variables. Validation of the Fit	Interpretation of Regression Coefficients. Interpretation of Standard Error of Estimate and *R*-Square.	1-6	Written Presentation	8th week	0/100
8	Using Regression Analysis in Practice	Case study	Construction of multi-regression model and statistical inference making	1-6	Written Presentation	9th week	0/100
9	Basics of Bayesian Statistics	Conditional Probability. Prior and Posterior Probabilities. Bayes' Theorem. Bayesian Factor.	Decision with Use of Bayesian rule.	3	Written Presentation	10th week	0/100

6.5 Criteria for the assessment of SIS tasks

Percentage	Criterion
95-100	- it is put in the case when a full, detailed answer to the question is given, a set of conscious knowledge of statistics is shown, which manifests itself in the free operation of concepts, the ability to highlight its essential and non-essential features, cause-and-effect relationships. Knowledge of statistics is demonstrated on the background of understanding it in the system of this science and interdisciplinary connections. Freely demonstrates knowledge of statistical indicators, knows the calculation methodology and gives the correct economic interpretation
90-94	- it is put in the case when a full, detailed answer to the question is given, a set of conscious knowledge about the object is shown, the main provisions of the topic are evidently disclosed; the answer traces a clear structure, a logical sequence that reflects the essence of the disclosed concepts, theories, phenomena. Knowledge about the object is demonstrated on the background of understanding it in the system of this science and interdisciplinary connections. However, there are shortcomings in the definition of indicators, corrected by students themselves in the process of response.
85-89	- put in the case where students are given a complete, detailed answer to the question, evidence disclosed the main provisions of the topic in the answer can be traced a clear structure, logical sequence, reflecting the essence of the disclosed concepts, theories, phenomena. In the answer there are mistakes corrected by the student with the help of the teacher.
80-84	- it is put in the case when the full, detailed answer to the question is given, the ability to allocate essential and insignificant signs, cause-and-effect relations is shown. The answer is clearly structured, logical, presented in literary language in terms of science. However, minor errors in the calculations are made or there are shortcomings corrected by the student with the help of leading questions.
75-79	- it is put in the case when the full answer to the question is given, the ability to allocate essential and insignificant signs, cause-and-effect relations is shown. The answer is clearly structured, logical, stated in terms of science. There may be shortcomings or minor errors corrected by the student with the help of the teacher.
70-74	- it is put in the case when an insufficiently consistent answer to the question is given, but at the same time the ability to identify essential and non-essential signs and cause-and-effect relationships is shown. There may be 1-2 mistakes in the definition of the basic concepts that the student found it difficult to correct on their own.
65-69	- it is put in the case when the insufficiently consistent answer to the question is given, but at the same time the ability to allocate essential and insignificant signs and cause-and-effect relations is shown. There may be 1-2 errors in the definition of basic concepts that the student found it difficult to correct by himself.
60-64	- put in the case where an incomplete answer is given, the logic and sequence of presentation have significant violations. Gross errors were made in determining the essence of disclosed concepts, theories, phenomena, due to students ' misunderstanding of their essential and non-essential features and connections. There are no conclusions in the answer. The ability to reveal specific manifestations of generalized knowledge is not shown.
55-59	- is put in the case when an incomplete answer is given. There is illogical presentation. The educator is at a loss for evidence. The mass of significant errors in the definitions of terms, concepts, characteristics of facts, phenomena. Speech is illiterate. When answering additional questions, the Teacher begins to realize the existence of a link between knowledge only after prompting the teacher.cepts, theories, phenomena, due to students ' misunderstanding of their essential and non-essential features and connections. There are no conclusions in the answer. The ability to reveal specific manifestations of generalized knowledge is not shown.

50-54	- is put in the case where the answer is given, which is a disparate knowledge on the subject of the question with significant errors in the definitions. There are fragmentary, illogical presentation. The teacher is not aware of the relationship of this concept, theory, phenomena with other objects of the module (discipline). It illiterate. Additional and clarifying questions of the teacher do not lead to correction of the student's answer not only to the question, but also to other questions of the module (discipline).
25-49	- put in the event that the student found gaps in the knowledge of the basic material provided by the program, has not mastered more than half of the program module (discipline) there Are no conclusions, specification and evidence of presentation. It illiterate. Additional and clarifying questions of the teacher do not lead to correction of the student's answer not only to the question, but also to other questions.
0-24	- put in the event that the student has found significant gaps in the knowledge of statistics provided by the program, has not mastered more than half of the program module (discipline), in the answers made fundamental mistakes, did not perform certain tasks provided by the forms of the control, did not work on all the basic literature.

7. BASIC FORMS AND TEACHING METHODS

Lecturers in classroom and computer lab, computer exercises, case study.

8. LIST OF REFERENCES

1. Keller&Warrack. Statistics for Management and Economics, 4th edition.
2. Weiers. Introduction to Business Statistics, 3rd edition.
3. Albright&Winston&Zappe. Data Analysis and Decision Making with Microsoft Excel, 1st edition.
4. Larsen, Marx&Cooil. Statistics for Applied Problem solving and Decision Making, 1st edition.
5. Dielman. Applied Regression Analysis for Business&Economics, 2nd edition.
6. Kussaiynov, T. Statistics in Economics and Business. 2016

9. COURSE REQUIREMENTS

In this discipline, students must learn to understand the basic ideas of descriptive statistics and inferential statistics and get skills on how to use the statistical methods in economics and business management. They are supposed to be able to construct regression models and apply the models in forecasting and decision making and policy analysis in the agricultural and food industry.

10. INFORMATION ABOUT COURSE ASSESSMENT

Overall grading will be based on the tutor's assessment of the tasks fulfilled by students and final exams. Apart from correctness of problems solutions, presentation style and effectiveness will be taken into account.

11. GRADING POLICY

11.1 END OF COURSE EVALUATION CRITERIA

THE TOTAL SCORE FOR THE COURSE IN PERCENTAGE IS DETERMINED BY THE FORMULA: T% = AAVE * 0,6 + E * 0,4

SCHEME OF KNOWLEDGE ASSESSMENT OF THE DISCIPLINE

#	TYPES OF CLASSES AND STUDENT WORK	POINTS MIN/ MAX
I	ASSESSMENT TASKS TAKEN DURING THE TRIMESTER (LABORATORY AND PRACTICAL TRAINING, SELF-STUDY).	0/100
	TOTAL (AVERAGE):	0/100
II	*FINAL ASSESSMENT: EXAM*	0/100
	TOTAL (AVERAGE):	0/100

STUDENTS KNOWLEDGE ASSESSMENT SCHEME IN THE EXAM

#	*EXAMINATION ASSESSMENT*	SCORE (FOR EACH COMPLETED TASK)
1	*ASSESSMENT*	0/100
2	*END OF COURSE ASSESSMENT*	0/100
	Total (Average):	0/100

Students` assessment scale

LETTER GRADE	DIGITAL EQUIVALENT OF POINTS	PERCENTAGEOF POINTS	EVALUATION BY THE TRADITIONAL SYSTEM
A	4,0	95-100	Excellent
A-	3,67	90-94	
B+	3,33	85-89	Good
B	3,0	80-84	
B-	2,67	75-79	
C+	2,33	70-74	
C	2,0	65-69	Satisfactorily
C-	1,67	60-64	
Д+	1,33	55-59	
Д-	1,0	50-54	
FX	0,5	25-49	Unsatisfactorily
F	0	0-24	

In the case of receiving "FX" the student has the opportunity to retake the final exam without re-enrolling the program of the discipline / module (free of charge). During the student interim period, the exam may be retaken (FX) in the discipline (module) no more than two times. In the case of receiving (FX) "unsatisfactory" third time, the student is expelled from the University and loses the opportunity to enroll in the course again.

In the case of receiving an "F", the student is re-enrolled in the given discipline / module, attends all types of studies (summer semester), takes all types of studies according to the program and retakes the final exam.