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| <b>Identification</b>                 | <b>Subject</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | <b>BSA 245 “Statistics” – 3KU credits (6 ECTS)</b>                     |                       |
|                                       | <b>Department</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | Economics and Management                                               |                       |
|                                       | <b>Program (Undergraduate, Graduate)</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | Undergraduate                                                          |                       |
|                                       | <b>Term</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | Autumn 2026/2027                                                       |                       |
|                                       | <b>Instructor</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | Ahmadov Vusal, PhD                                                     |                       |
|                                       | <b>Email:</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | <a href="mailto:vusal.ahmadov@khazar.org">vusal.ahmadov@khazar.org</a> |                       |
|                                       | <b>Classroom/hours</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |                                                                        |                       |
| <b>Prerequisites</b>                  | <b>MATH 217</b> Probability Theory and Mathematical Statistics                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |                                                                        |                       |
| <b>Language</b>                       | English                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |                                                                        |                       |
| <b>Compulsory/Elective</b>            | Compulsory                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |                                                                        |                       |
| <b>Textbooks and course materials</b> | Main book:<br><br>1. Newbold Paul, William L. Carlson and Betty M. Thorne. (2022). Statistics for Business and Economics, 10 <sup>th</sup> Edition, USA. (NW)<br><br>Additional reading:<br><br>Illowsky, Barbara, and Susan Dean. (2022) Introductory Statistics 2e. Houston, Texas                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |                                                                        |                       |
| <b>Course description</b>             | Statistics course provides statistical methods for students to conduct effective research and forecasting. The main purpose is being familiar with foundation of statistics, which is important part of individual quantitative research. Therefore, the tools and methodology learned in this course are essential building blocks for Research methods courses in the sequence. Focus will be on basic principles, such as sampling methods, descriptive measures, probability densities and distributions, statistical inference, Hypothesis tests and basic forecasting. Emphasis will be placed on applied practical problems using the tools learned in the class.<br>The motivation in this course is not to be master of statistics, but to increase the quantitative research skills of students. At the end of this semester, students will acquire enough skills to understand basic statistical techniques and terms, which are essential to carry out simple but satisfactory quantitative research. |                                                                        |                       |
| <b>Course objectives</b>              | The academic aims of this course are to improve and deepen students’ knowledge of statistical methodologies, tools and practices to provide them ability and skills to carry out independent research with quantitative method.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |                                                                        |                       |
| <b>Learning Outcomes</b>              | At the end of this course, students should have an operational knowledge of Statistics. They should be able to: <ul style="list-style-type: none"><li>- Knowing different data collection methods.</li><li>- Different sampling techniques, such as random, systematic, and stratified.</li><li>- Collecting data that accurately addresses the research problem</li><li>- Measuring the effectiveness of estimation results</li><li>- Conducting simple forecasting of unknown population parameters</li><li>- Using data to make decisions</li></ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                            |                                                                        |                       |
| <b>Teaching methods</b>               | <b>Lecture</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |                                                                        | x                     |
|                                       | <b>Group discussion</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |                                                                        | x                     |
|                                       | <b>Lecture</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |                                                                        | x                     |
|                                       | <b>Project</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |                                                                        | x                     |
|                                       | Practice on Software                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |                                                                        | x                     |
| <b>Evaluation Criteria</b>            | <b>Methods</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |                                                                        | <b>Percentage (%)</b> |
|                                       | <b>Midterm Exam</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |                                                                        | 30                    |

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|                           | <b>Quizzes</b>                                                                                                                                                                                                                                                                                                                                                          |                                                                                                                     | 10                          |
|                           | <b>Project</b>                                                                                                                                                                                                                                                                                                                                                          |                                                                                                                     | 10                          |
|                           | <b>Activity</b>                                                                                                                                                                                                                                                                                                                                                         |                                                                                                                     | 5                           |
|                           | <b>Attendance</b>                                                                                                                                                                                                                                                                                                                                                       |                                                                                                                     | 5                           |
|                           | <b>Final Exam</b>                                                                                                                                                                                                                                                                                                                                                       |                                                                                                                     | 40                          |
|                           | <b>Total</b>                                                                                                                                                                                                                                                                                                                                                            |                                                                                                                     | 100                         |
| <b>Class Policy</b>       | <b>Attendance and activity</b>                                                                                                                                                                                                                                                                                                                                          |                                                                                                                     |                             |
|                           | The students are required to attend all classes as part of their studies and those having legitimate reasons for absence (illness, family bereavement etc) are required to inform the <b>dean's office</b> .                                                                                                                                                            |                                                                                                                     |                             |
|                           | To be on time for the classes is important. The list of students will be checked and registered within first 10 minutes of lectures and passed to dean's office.                                                                                                                                                                                                        |                                                                                                                     |                             |
|                           | Classes are interactive. Attendance will enable students to perform well at quizzes on topics.                                                                                                                                                                                                                                                                          |                                                                                                                     |                             |
|                           | <b>Withdrawal (pass/fail)</b>                                                                                                                                                                                                                                                                                                                                           |                                                                                                                     |                             |
|                           | This course strictly follows grading policy of the School of Economics and Management. Thus, a student is normally expected to achieve a mark of at least 60% to pass. In case of failure, he/she will be referred or required to repeat the course the following term or year. For referral, the student will be required to take examination scheduled by instructor. |                                                                                                                     |                             |
|                           | <b>Cheating/plagiarism</b>                                                                                                                                                                                                                                                                                                                                              |                                                                                                                     |                             |
|                           | Cheating or other plagiarism during the Quizzes, Mid-term and Final Examination will lead to paper cancellation. In this case, the student will automatically get zero (0), without any considerations.                                                                                                                                                                 |                                                                                                                     |                             |
|                           | <b>Professional behavior guidelines</b>                                                                                                                                                                                                                                                                                                                                 |                                                                                                                     |                             |
|                           | The students shall behave in the way to create favorable academic and professional environment during the class hours. Unauthorized discussions and unethical behavior are strictly prohibited.                                                                                                                                                                         |                                                                                                                     |                             |
|                           | <b>Quiz-quizzes</b> will be held twice in semester, and each will cover one topic. First quiz will be at fourth week and the second quiz will be at twelfth week.                                                                                                                                                                                                       |                                                                                                                     |                             |
|                           | <b>Project</b> -students should choose an economic topic according to their interests. They should collect data, apply the statistical methods that will be acquired during the course. You should prepare a presentation and present it. it will be a group project, and each team will consist of 4-5 students.                                                       |                                                                                                                     |                             |
|                           | <b>AI use rules:</b>                                                                                                                                                                                                                                                                                                                                                    |                                                                                                                     |                             |
|                           | Use of AI tools is allowed as a secondary aid for idea generating and brainstorming. Students should note its use in their work. However, generation of whole work by AI is not tolerated. Overall work should reflect own analysis of students and their critical approach and intellectual contributions.                                                             |                                                                                                                     |                             |
| <b>Tentative Schedule</b> |                                                                                                                                                                                                                                                                                                                                                                         |                                                                                                                     |                             |
| <b>Week</b>               | <b>Date/Day (tentative)</b>                                                                                                                                                                                                                                                                                                                                             | <b>Topics</b>                                                                                                       | <b>Textbook/Assignments</b> |
| 1                         |                                                                                                                                                                                                                                                                                                                                                                         | <b>Introduction to Statistics:</b> Statistical Methodology. Decision Making in an Uncertain Environment. Random and | Chapter 1 and 2 -NW         |

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|    |  | Systematic Sampling. Sampling and Non-Sampling Errors. Classification of variables. Measurement levels. Graphs to Describe Categorical and Numerical variables. Mean, Median and Mode. Shape of distribution. Geometric Mean. Percentiles and Quartiles. Weighted Mean and measures of grouped data.                                                                                                                                                                         | 25-57; 63-95                          |
| 2  |  | <b>Sampling and Sampling Distributions:</b> Sampling from a Population. Development of a Sampling Distribution. Sampling Distributions of Sample Means. Central Limit Theorem. Monte Carlo Simulations: Central Limit Theorem Acceptance Intervals                                                                                                                                                                                                                           | Chapter 6 (6.1, 6.2) - NW 249-258     |
| 3  |  | <b>Sampling and Sampling Distributions:</b> Sampling Distributions of Sample Proportions. Sampling Distributions of Sample Variances                                                                                                                                                                                                                                                                                                                                         | Chapter 6 (6.3, 6.4)- NW 269-274      |
| 4  |  | <b>Estimation: Single Population:</b> Properties of Point Estimators. Unbiased. Most Efficient. Confidence Interval Estimation for the Mean of a Normal Distribution: Population Variance Known. Intervals Based on the Normal Distribution. Reducing Margin of Error                                                                                                                                                                                                        | Chapter 7 (7.1, 7.2)-NW 289-299       |
| 5  |  | <b>Estimation: Single Population:</b> Confidence Interval Estimation for the Mean of a Normal Distribution: Population Variance Unknown. Student's t Distribution. Intervals Based on the Student's t Distribution. Confidence Interval Estimation for Population Proportion (Large Samples). Confidence Interval Estimation for the Variance of a Normal Distribution.                                                                                                      | Chapter 7 (7.3, 7.4, 7.5)- NW 301-313 |
| 6  |  | <b>Estimation: Additional Topics:</b> Confidence Interval Estimation of the difference between two normal population means: dependent samples and independent samples.                                                                                                                                                                                                                                                                                                       | Chapter 8 (8.1, 8.2) -NW 332-341      |
| 7  |  | <b>Hypothesis Testing: Single Population:</b> Concepts of Hypothesis Testing. Tests of the Mean of a Normal Distribution: Population Variance Known. p-Value. Two-Sided Alternative Hypothesis                                                                                                                                                                                                                                                                               | Chapter 9 (9.1, 9.2) -NW 350-366      |
|    |  | <b>Midterm exam</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                          |                                       |
| 8  |  | <b>Hypothesis Testing: Single Population:</b> Tests of the Mean of a Normal Distribution: Population Variance Unknown. Tests of the Population Proportion (Large Samples)                                                                                                                                                                                                                                                                                                    | Chapter 9 (9.3, 9.4)-NW 366-372       |
| 9  |  | <b>Hypothesis Testing: Single Population:</b> Assessing the Power of a Test Tests of the Mean of a Normal Distribution: Population Variance Known. Power of Population Proportion Tests (Large Samples). Tests of the Variance of a Normal Distribution                                                                                                                                                                                                                      | Chapter 9 (9.5, 9.6)-NW 373-389       |
| 10 |  | <b>Hypothesis Testing: Additional Topics:</b> Tests of the Difference Between Two Normal Population Means: Dependent Samples. Two Means, Matched Pairs. Tests of the Difference Between Two Normal Population Means: Independent Samples Two Means, Independent Samples, Known Population Variances. Two Means, Independent Samples, Unknown Population. Variances Assumed to be equal. Two Means, Independent Samples, Unknown Population Variances not assumed to be equal | Chapter 10 (10.1, 10.2)- NW 391-400   |
| 11 |  | <b>Hypothesis Testing: Additional Topics:</b> Tests of the difference between two Population Proportions (Large                                                                                                                                                                                                                                                                                                                                                              | Chapter 10 (10.3, 10.4)- NW 403-410   |

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|    |  | Samples). Tests of the equality of the Variances between two Normally Distributed Populations                                                                                                                                                                                                                                                                                                                                                   |                                             |
| 12 |  | <b>Simple Regression:</b> Overview of Linear Models. Linear Regression Model. Least Squares Coefficient Estimators Computer Computation of Regression Coefficients. The Explanatory Power of a Linear Regression Equation. Coefficient of Determination, $R^2$ . Statistical Inference: Hypothesis Tests and Confidence Intervals. Hypothesis Test for Population. Slope Coefficient Using the F Distribution. Prediction. Correlation Analysis | Chapter 11 (11.1, 11.2, 11.3)-NW<br>421-435 |
| 13 |  | <b>Analysis of Categorical Data:</b> Goodness-of-Fit Tests: Specified Probabilities. Goodness-of-Fit Tests: Population Parameters Unknown. A Test for the Normal Distribution. Contingency Tables                                                                                                                                                                                                                                               | Chapter 14 (14.1, 14.2, 14.3)-NW<br>606-635 |
| 14 |  | <b>Analysis of Variance:</b> Comparison of Several Population Means. One-Way Analysis of Variance. Multiple Comparisons Between Subgroup. Means Population Model for One-Way Analysis of Variance. The Kruskal-Wallis Test                                                                                                                                                                                                                      | Chapter 15 (15.1, 15.2, 15.3)-NW<br>649-674 |
| 15 |  | <b>Machine Learning Methods -Cornerstone of AI learning:</b> Regularization Extensions, Lasso and Ridge Regression                                                                                                                                                                                                                                                                                                                              | Chapter 16 (15.1, 15.2, 15.3)-NW<br>720-738 |
|    |  | <b>Final exam</b>                                                                                                                                                                                                                                                                                                                                                                                                                               |                                             |