

**Bachelor program,
Instrument Engineering (INEN) program, “Instrument Engineering” department**

Course Unit Title	Probability theory and statistics	
Course Unit Code		
Type of Course Unit	Compulsory	
Level of Course Unit	4 th year INEN program	
National Credits	0	
Number of ECTS Credits Allocated	7	
Theoretical (hour/week)	2	
Practice (hour/week)	2	
Laboratory (hour/week)	2	
Year of Study	4	
Semester when the course unit is delivered	7	
Course Coordinator	Kamala Aliyeva	
Name of Lecturer (s)	Kamala Aliyeva	
Name of Assistant (s)	-	
Mode of Delivery	Face to Face, Seminar.	
Language of Instruction	English	
Prerequisites	-	
Recommended Optional Program Components	-	
Course description:		
<p>This course Statistics is the branch of mathematics that transforms data into useful information for decision makers. These transformations often require complex calculations that are practical only if done by computer, so using statistics usually means also using computers. This is especially true when dealing with the large volumes of data that a typical business collects. Attempting to do statistics, using manual calculations for such data would be too time-consuming to benefit a business.</p>		
Objectives of the Course:		
<p>In this course, is learnt set of methods and the conditions under which it is appropriate to use those methods. And because so many statistical methods are practical only when you use computers, learning statistics means learning more about using computer programs that perform statistical analyses.</p>		
Learning Outcomes		
At the end of the course the student will be able to		Assessment
1	After completing the course, students should be able to:	1,3
2	Present and describe business data and information properly	1,2,3
3	Draw conclusions about large populations, using information collected from samples	1
Assessment Methods: 1. Final Exam, 2. Presentation, 3. Midterm exam		
Course’s Contribution to Program		
		CL
1	Ability to develop as a specialist in the field of fundamental sciences and apply basic knowledge.	3
2	Ability to analyze and model functional and structural schemes of various purpose devices and systems.	5
3	Ability to use modern methods and tools, creation, selection, and application of engineering and information technology tools and modern devices and equipment.	5
4	The ability to use the strategy of team cooperation in the exchange of information, knowledge, and experience to achieve the set goal.	4
5	As a result of training, the ability to use engineering knowledge, mathematical models, and basic concepts of physics and chemistry in production and technological processes, automation, measurement, and control systems.	5

6	The ability to use modern software to process technical documents of devices, design their structures, and algorithmize processes.	4
7	The ability to apply artificial intelligence to improve the quality characteristics of measurement and control systems.	4
8	The ability to process information acquisition, processing, and transmission processes based on schematic and programmable logical integrated circuits.	4
9	Ability to use knowledge to improve quality indicators and environmental safety of production processes.	5
10	Self-development ability to apply theoretical and experimental knowledge in solving modern engineering problems.	5

CL: Contribution Level (1: Very Low, 2: Low, 3: Moderate, 4: High, 5: Very High)

Course Contents

Week	Chapter	Topics	Exam
1	[1]: Chapter 1	Introduction to the Course. The meaning and role of Statistics. The Population and the Sample. Types of Data. Types of Samples. Descriptive and Inferential Statistics. LAB: Constructions and graphing different type of categorical and numerical Data. Generating a Bar, Pie Chart ,Line Graphs (Instructions-Software commands for Excel)	
2	[1]: Chapter 2	Describing Sets of Measurement. Frequency Distribution. Graphical methods. Measures of Variability. Lab. Constructions and graphing Relative and Cumulative Frequency Distribution Generating Measures of Central tendency, Variation, and share Using Microsoft Excel	
3	[1]: Chapter 3	Principles of Probability. The probability of an Event. Probability Laws and their use. Bays rule and conditional probability Lab. Calculating Simple, Joint ,Compound, Conditional Probabilities using Microsoft Excel	
4	[1]: Chapter 4	Probability Distributions and Interferences. Probability Distributions. The Probability Distribution for a Discrete Random Variable Expected Value of a Discrete Random Variable Variance and Standard Deviation of a Discrete Random Variable Lab. Generating a Histograms of Binomial, Poisson, and Hypergeometric Distributions . (Software commands for Excel)	
5	[1]: Chapter 5	Principles of Normal Distribution. Finding particular value associated with known probabilities. Assessing the normal assumptions. The Exponential Distribution. Lab. Calculating Normal Probabilities using Microsoft Excel. Generating Exponential Probabilities using Microsoft Excel.	
6	[1]: Chapter 6	Sampling Distributions. Inferential Statistics. Sampling Distributions of the proportions. Sampling from Finite Populations. Lab. Simulating Sampling Distributions using Microsoft Excel	
7	[1]: Chapter 7	Confidence Interval Estimation. Confidence Interval Estimation for the Proportion Determining Sample Size Sample Size Determination for the Mean	Midterm

		<p>Sample Size Determination for the Proportion Calculating confidence interval estimation when σ is known and σ-is unknown. Lab. Determining confidence interval estimation when σ is known and σ-is unknown using Microsoft Excel (on p.429-440) . Determining the sample size for estimating the mean using Microsoft Excel</p>	
8		MIDTERM EXAM	
9	[1]: Chapter 8	<p>Inferences from Large Samples. Point Estimation. Interval Estimation. Hypothesis Testing . A connection between Confidence Interval estimation and hypothesis Testing. Lab. Performing the t Test and z Test Hypothesis for the Mean when σ is known and σ-is unknown using Microsoft Excel.</p>	
10	[1]: Chapter 9	<p>Inferences from small Samples. Tests of two populations. F Test for Differences in two variances. Comparing Two related samples. Lab. Performing the Pooled – Variance t test for Differences in two Means using Microsoft Excel</p>	
11	[1]: Chapter 10	<p>Simple Regression and Correlation Analysis. Linear Probabilistic Model. The Method of Least Squares. Coefficient of Correlation. Assumptions. Lab. Calculating the simple linear regression coefficients using Microsoft Excel. Generating Residual plots using Microsoft Excel.</p>	
12	[1]: Chapter 11	<p>Multiple Regression. Formulating a Multiple Regression Model. Measuring the Goodness of Fit of a Model. Lab. Calculating the coefficients of Partial Determination using Microsoft Excel. Generating Transformations</p>	
13	[1]: Chapter 12	<p>Time Series Analysis. Smoothing the Annual Time-series. Least-squares Trend Fitting and Forecasting. Lab. Calculating Moving average using Microsoft Excel. Generating Time Series Forecasting of Monthly or Quarterly Data</p>	
14	[1]: Chapter 13	<p>Forecasting Models. The importance of business forecasting. Least-squares Trend Fitting and Forecasting. Calculating Mean Absolute Deviation (MAD). Choosing appropriate forecasting models. Lab. Performing Least-squares Trend Fitting using Microsoft Excel.</p>	
15	[1]: Chapter 14-15	<p>Decision Making. Calculating Opportunity loss. Criteria for Decision Making. Decision Making with sample information. Lab. Decision Analysis and Decision-Making using Microsoft Excel.</p>	
16		Final	Exam
<p>Recommended Sources TEXTBOOK(S)</p> <p>1. The Textbook :”STATISTICS FOR MANAGERS USING Microsoft Excel” David M. Levine David F. Stephan. Timothy C. Krehbiel Mark L. Berenson Printed in the United States of America, ISBN 0-536-04080 X</p>			

2008600006 KA Copyright 2008, 2005, 2002, 1999, 1997 by Pearson Education, Inc. Published by Prentice Hall, Upper Saddle River, New Jersey 07458, Option: Applied Statistics for Business and Economics, A. Webster. Richard D. Irwin, Inc., pp.996.

2. Arak M. Mathai and Hans J. Haubold. Probability and Statistics A Course for Physicists and Engineers, Published by De Gruyter, 2018.

Course reading is composed of articles, laws as well as book chapters. Additional information will be distributed either electronically or delivered in printed forms.

Assessment

Attendance	0%	At least 75% class attendance is compulsory
Presentation	10%	
Quiz	5%	
Lab. works	10%	
Course work	10%	
Midterm Exam	15%	Written Exam
Final Exam	50%	Written- Exam
Total	100%	

Assessment Criteria

Final grades are determined according to the Academic Regulations of Azerbaijan State Oil and Industry University for Undergraduate Studies

Course Policies

- Attendance of the course is mandatory.
- Late assignments will not be accepted unless an agreement is reached with the lecturer.
- Students cannot use calculators during the exam.
- Cheating and plagiarism will not be tolerated. Cheating will be penalized according to the Azerbaijan State Oil and Industrial University General Student Discipline Regulations

ECTS allocated based on Student Workload

Activities	Number	Duration (hour)	Total Workload(hour)
Course duration in class (including midterm)	15	6	90
Presentation	1	10	10
Tutorials	15	1	15
Preparation for midterm exam	1	10	10
Final Examination	1	3	3
Preparation for final exam	1	22	22
Self-study	15	4	60
Total Workload			210
Total Workload/30(h)			210/30
ECTS Credit of the Course			7