Identification	Subject	MATH217, Probability Theory and Mathematical Statistics, 3KU (6 ECTS)
	Department	Mathematics
	Program	Undergraduate
	Term	Fall, 2025
	Instructor	Leyla Bayramova
	E-mail:	leyla.mustafayeva.96@bk.ru
	Classroom/hours	Friday: 11:50-13:20, 13:40-15:10
Prerequisites	MATH 101 – Calculus -1	
Language	English	
Compulsory/Elective	Compulsory	
Required textbooks and course materials	• "A First Course in Probability" by Sheldon M. Ross, Eighth Edition • Basic Statistics for Business and Economics, Douglas A. Lind, William G. Marchal, Samuel A. Wathen, Published by McGraw-Hill Education, 2013 • Montgomery, Douglas C., Introduction to Statistical Quality Control (6th ed.), Wiley, New York, 2008. **Supplementary books** • Applied Statistics and Probability for Engineers, Douglas C. Montgomery, George C. Runger, John Wiley & Sons, 2003 • Richard Durrett - Probability Theory and Examples 2nd ed. 2005; 5th ed. 2019 • Joseph K. Blitzstein & Jessica Hwang - Introduction to Probability 2014 • George Csella & Roger L.Berger - Statistical Inference 2nd ed., 2002 • Statistics for Economics by Shahdad Naghshpour, 2012	
Course outline	This course provides students with fundamental concepts of probability and statistics. It covers the basic principles of random events, probability theorems, conditional probability, Bayes' theorem and the central limit theorem. Students will also learn practical applications in estimation, hypothesis testing, and determining appropriate sample sizes for research.	
Course objectives	**By the end of the course, students will be able to:** • Define principal concepts about probability. • Explain the concepts of a random event. • Formulate and prove basic theorems about probability. • Calculate probabilities using conditional probability, the rule of total probability and Bayes' theorem. • Apply and interpret the central limit theorem. • Calculate the sample size required to estimate a population mean and a population proportion given a desired confidence level and margin of error.	
Learning outcomes	Upon successfully completing this course students will be able to:	

	- Express the concepts of factorial and the basic principal of counting. - Calculate the probability of simple events, compound events, complementary events. - Solve the problems about conditional probability and Bayes' theorem. - Express the features of random variables. - Calculate the expected value, variance and standard deviation of a random variable. - Solve the problems about continuous distributions. - Define central limit theorem problems. - Calculate and interpret confidence Interval. - Conduct and interpret hypothesis tests.

Teaching methods		
	Lecture	x
	Assisted work	x
	Assisted lab work	x
	Others	

Evaluation	Methods	Date/deadlines	Percentage (%)
	Midterm Exam		30
	Class Attendance		5
	Quizzes		20 (4 quizzes)
	Activity		5
	Final Exam		40
	Total		100

Policy	
	• NO CELL PHONES are allowed during lecture and lab sessions. PLEASE turn them off before lecture! (Not silent or vibrating mode). This is a university policy and violators will be reprimanded accordingly. • No late assignments will be accepted without prior arrangement with the instructor for acceptable excuses. Medical and family emergency will be considered on case-by-case basis. • No late homework will be accepted. Homework is to be completed on an individual basis. Students may discuss homework with classmates, but students are responsible for your own work. If students have consulted classmates, please note the individuals name on the top of students' assignment. • Quizzes may be given unannounced throughout the term and will count as one homework. There will be no make-up quizzes. • Students will be divided into groups of 3 individuals for study group sessions and will be assigned some problems to solve together in the class. • No make-up exams. If students miss an exam, a zero score will be assigned to the missed exam. • If students should miss class due to personal emergency or medical reasons, please notify the instructor by email immediately. A

	doctor's note will be required for make-up work. • Students are responsible for completing the reading assigned from the textbook related to the covered topics and for checking email regularly for important information and announcements related to the course. • University policy on academic honesty concerning exams and individual work will be strictly enforced. • BE ON TIME!

Date/Day (Tentative)	Topics	Textbook/Assignments
19.09.25 19.09.25	Probability Sample Space, Events, Probability measure The Fundamental Principle of counting Permutations Combinations	**[1] Ch. 1.1, 1.2, 1.3, 1.4, 1.5**
26.09.25 26.09.25	Probability of Intersection, Union, and Complementary Event Probability and Counting Techniques	**[1] Ch. 2.1, 2.2,2.3, 2.4, 2.5**
03.10.25 03.10.25	Conditional Probabilities. Posterior Probabilities: Bayes' Formula Independent Events	**[1] Ch. 3.1, 3.2, 3.3, 3.4**
10.10.25 10.10.25	Random Variables Probability Mass Function and Cumulative Distribution Function	**[1] Ch. 4.1, 4.2, 4.3,4.4, 4.5** **Quiz 1 (5 pts)**
17.10.25 17.10.25	Bernoulli Trials and Binomial Distributions The Expected Value and Variance of the Binomial Distribution	**[1] Ch. 4.6, 4.7, 4.8**
24.10.25 24.10.25	Continuous Random Variables Normal Distribution Exponential Distribution	**[1] Ch. 5.1,5.2,5.3,5.4,5.5**
31.10.25 31.10.25	Gamma Distribution Joint Distribution Independent Random Variables	**[1] Ch. 5.6,6.1,6.2**
07.11.25 07.11.25	Mathematical Expectations and its Properties	**[1] Ch. 7.1** **Quiz 2 (5 pts)**
14.11.25 14.11.25	**Midterm Exam** Covariance and Correlation Coefficient Limit Theorems of Probability Theory	**[1] Ch. 7.4,8.1,8.2,8.3,8.4**
21.11.25 21.11.25	What is Statistics? Introduction	**[1] Ch. 1**
28.11.25 28.11.25	Describing Data: Graphic Presentation	**[2] Ch. 2**

05.12.25 05.12.25	Describing Data:Numerical Measures	**[2] Ch. 3** **Quiz 3 (5 pts)**
12.12.25 12.12.25	Estimation and Confidence Intervals	**[2] Ch. 9**
19.12.25 19.12.25	Hypothesis Testing	**[2] Ch. 10**
26.12.25 26.12.25	One-Sample Tests of Hypothesis	**[2] Ch. 10** **Quiz 4 (5 pts)**
TBA	**Final Exam**	

This syllabus is a guide for the course and any modifications to it will be announced in advance.