Identification	Subject	**MATH 217,** Probability Theory and Mathematical Statistics **3KU (6 ECTS)**
	Department	Mathematics
	Program	Undergraduate
	Term	Spring, 2024
	Instructor	Leyla Bayramova
	E-mail:	mustafayevaleyla@khazar.org
	Classroom/hours	Wednesday: 10:10-11:40, 11:50-13:20
Prerequisites	**MATH 215** Linear Algebra and Mathematical Analysis	
Language	English	
Compulsory/Elective	Compulsory	
Required textbooks and course materials	1. "A First Course in Probability" by Sheldon M. Ross, Seventh Edition, 576 pages Published May 28th 2005 by Prentice Hall 2. Basic Statistics for Business and Economics, Douglas A. Lind, William G. Marchal, Samuel A. Wathen, Published by McGraw-Hill Education, 2013 3. Montgomery, Douglas C., Introduction to Statistical Quality Control (6th ed.), Wiley, New York, 2008. **Supplementary book** 1. Applied Statistics and Probability for Engineers, Douglas C. Montgomery, George C. Runger, John Wiley & Sons, 2003 2. Statistics for Business and Economics, Paul Newbold, William L. Carlson, Betty M. Thorne 3. Gnedenko B.V. Theory of Probability, 1996 4. B.V.Gnedenko and A.Ya.Khinchin. An Elementary Introduction to the Theory of Probability, New York, 1992	
Course outline	• Define principal concepts about probability. • Explain the concepts of a radom event. • Formulate theorems about the concept of probability. • Calculate probabilities using Conditional probability, Rule of total probability and Bayes' theorem. • Apply and interpret the central limit theorem means. • Calculate the sample size required to estimate a population mean and a population proportion given a desired confidence level and margin of error.	
Course objectives	Probability Theory Conditional Probability and Independence, Random Variables, Sampling Methods and Limit Theorems, Describing Data, Estimation and Confidence Intervals, Hypothesis Testing.	
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
Evaluation	**Methods**	**Date/deadlines**	**Percentage (%)**
	Midterm Exam		30
	Class Attendance		5
	Quizzes		20 (3 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!		

Week	Date/Day (Tentative)	Topics	Textbook/Assignments
1	14.02.24 14.02.24	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**
2	21.02.24 21.02.24	Probability of Intersection, Union, and Complementary Event Probability and Counting Techniques	**[1] Ch. 2.1, 2.2, 2.3, 2.4, 2.5**
3	28.02.24 28.02.24	Conditional Probabilities. Posterior Probabilities: Bayes' Formula Independent Events	**[1] Ch. 3.1, 3.2, 3.3, 3.4**
4	06.03.24 06.03.24	Random Variables Probability Mass Function and Cumulative Distribution Function	**[1] Ch. 4.1, 4.2, 4.3, 4.4, 4.5**
5	13.03.24 13.03.24	Bernoulli Trials and Binomial Distributions The Expected Value and Variance of the Binomial Distribution	**[1] Ch. 4.6, 4.7, 4.8 Quiz 1 (6 pts)**
6	20.03.24 20.03.24	Holiday	
7	27.03.24 27.03.24	Continuous Random Variables Normal Distribution Exponential Distribution Gamma Distribution Joint Distribution Independent Random Variables	**[1] Ch. 5.1, 5.2, 5.3**
8	03.04.24 03.04.24	Mathematical Expectations and its Properties **Midterm Exam**	**[1] Ch. 5.4, 5.5, 5.6**
9	10.04.24 10.04.24	Ramadan Holiday	
10	17.04.24 17.04.24	Covariance and Correlation Coefficient Limit Theorems of Probability Theory Initial Notions of Mathematical Statistics Characteristics of Sample	**[1] Ch. 6.1, 6.2, 6.3, 6.4, 6.5** **[1] Ch. 7.1, 7.2, 7.3, 7.4, 7.5, 7.6, 7.7**
11	24.04.24 24.04.24	Using Graphs to Describe data	**Quiz-2 (7 pts) [3] Ch. 1**
12	01.05.24 01.05.24	Using Numerical Measures to Describe data	**[3] Ch. 2, 3**
13	08.05.24 08.05.24	One-Sample Tests of Hypothesis	**[3] Ch. 4, 5**
14	15.05.24 15.05.24	Estimation and Confidence Intervals Hypothesis Testing	**Quiz-3 (7 pts) [3] Ch. 8, 9**

15	22.05.24 22.05.24	Hypothesis Tests of Single Population	[3] Ch. 10
	TBA	**Final Exam**	

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