

Identification	Subject	MATH 217 Probability Theory and Mathematical Statistics 3KU (6 ECTS)
	Department	Mathematics
	Program	Undergraduate
	Term	Fall, 2026
	Instructor	Leyla Bayramova
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	Classroom/hours	Friday: 08:30-10:00, 10:10-11:40
Prerequisites	MATH 101 – Calculus - 1	
Language	English	
Compulsory/Elective	Compulsory	
Required textbooks and course materials	1. “A First Course in Probability” by Sheldon M. Ross, 10th Edition, 2019 2. Basic Statistics for Business and Economics, Douglas A. Lind, William G. Marchal, Samuel A. Wathen, Published by McGraw-Hill Education, 9th Edition, 2018 3. Montgomery, Douglas C., Introduction to Statistical Quality Control (8th ed.), Wiley, New York, 2019. Supplementary book 1. Applied Statistics and Probability for Engineers, Douglas C. Montgomery, George C. Runger, John Wiley & Sons, 7th, 2018 2. Richard Durrett-Probability Theory and Examples 5th ed. 2019 3. Joseph K. Blitzstein & Jessica Hwang-Introduction to Probability, 2nd ed, 2019 4. Achim Klenke-Probability theory: A Comprehensive Course, 3rd ed, 2020	
Course outline	• Define principal concepts about probability. • Explain the concepts of a random 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	Theme and initial notions of Probability Theory, Probability in discrete sample space, Elements of Combinatorics, Kolmogorov’s axioms, Properties of Probability, Geometrical Probability, Conditional Probability and Independence of events, Total probability and Bayes’ formula, Independent trials, Bernoulli scheme, Random Variables, Discrete and continuous distributions, Mathematical expectation and variance, Sampling Methods and Limit Theorems, Law of large numbers, Elements of mathematical Statistics, Describing Data, Estimation and Confidence Intervals, Linear regression, 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
	Others		
Evaluation	Methods	Date/deadlines	Percentage (%)
	Midterm Exam		30
	Class Attendance		5
	Quizzes		20 (4 quizzes)
	Activity		5
	Final Exam		40
	Total		100
Policy	▪ Use of Generative AI Tools The use of generative artificial intelligence (GAI) tools is strictly prohibited in this course. The primary aim of the course is to develop students' independent mathematical reasoning, problem-solving skills, and creative thinking. Students are therefore expected to complete all assignments and assessments independently without the use of GAI tools. If it is determined that a student has used generative artificial intelligence (GenAI) tools while completing assignments, one of the following measures may be applied: • Issuing an oral or written warning; • Requiring the resubmission of the assignment; • Reducing the grade for the assignment or assigning a zero (0). • 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
18.09.26 18.09.26	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
25.09.26 25.09.26	Probability of Intersection, Union, and Complementary Event Probability and Counting Techniques	[1] Ch. 2.1, 2.2,2.3, 2.4, 2.5
02.10.26 02.10.26	Conditional Probabilities. Posterior Probabilities: Bayes' Formula Independent Events	[1] Ch. 3.1, 3.2, 3.3, 3.4
09.10.26 09.10.26	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)
16.10.26 16.10.26	Bernoulli Trials and Binomial Distributions The Expected Value and Variance of the Binomial Distribution	[1] Ch. 4.6, 4.7, 4.8
23.10.26 23.10.26	Continuous Random Variables Normal Distribution Exponential Distribution	[1] Ch. 5.1,5.2,5.3,5.4,5.5
30.10.26 30.10.26	Gamma Distribution Joint Distribution Independent Random Variables	[1] Ch. 5.6,6.1,6.2
06.11.26 06.11.26	Mathematical Expectations and its Properties	[1] Ch. 7.1 Quiz 2 (5 pts)
13.11.26 13.11.26	Midterm Exam Covariance and Correlation Coefficient Limit Theorems of Probability Theory	[1] Ch. 7.4,8.1,8.2,8.3,8.4
20.11.26 20.11.26	What is Statistics? Introduction	[1] Ch. 1
27.11.26 27.11.26	Describing Data: Graphic Presentation	[2] Ch. 2
04.12.26 04.12.26	Describing Data:Numerical Measures	[2] Ch. 3 Quiz 3 (5 pts)
11.12.26 11.12.26	Estimation and Confidence Intervals	[2] Ch. 9
18.12.26 18.12.26	Hypothesis Testing	[2] Ch. 10
25.12.26 25.12.26	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.