

College of Engineering

Department of Civil Engineering



STAT 503 Probability and Mathematical Statistics

Credit and Contact hours	3/ 3 (Lectures), 0 (Tutorials), 0 (Laboratory)														
Required, or Elective	Required for a MSCE degree														
Course Description	The course covers the main concepts of probabilities with some applications. Then it covers the statistical distributions for both types (discrete and continuous). Next, sampling distribution is applied for mean and proportion. Finally, parameters estimate and some testing of hypothesis methods are used.														
Prerequisites or Co-requisites	None														
Course Learning Outcomes	<p>Students completing this course successfully will be able to</p> <table border="1"><thead><tr><th>Course Learning Outcomes</th><th>Related Program Outcomes</th></tr></thead><tbody><tr><td>CLO1: Recognize the main assumptions of probability</td><td>K1</td></tr><tr><td>CLO2: Use the rules of probability</td><td>K1</td></tr><tr><td>CLO3: Use the appropriate distribution with its applications.</td><td>K1</td></tr><tr><td>CLO4: Demonstrate parameters estimates with their confidence intervals and testing hypothesis about them.</td><td>K1</td></tr><tr><td>CLO5: Conduct and interpret results based on statistical concepts.</td><td>S1</td></tr><tr><td>CLO6: Use statistical tables to find probabilities.</td><td>S1</td></tr></tbody></table>	Course Learning Outcomes	Related Program Outcomes	CLO1: Recognize the main assumptions of probability	K1	CLO2: Use the rules of probability	K1	CLO3: Use the appropriate distribution with its applications.	K1	CLO4: Demonstrate parameters estimates with their confidence intervals and testing hypothesis about them.	K1	CLO5: Conduct and interpret results based on statistical concepts.	S1	CLO6: Use statistical tables to find probabilities.	S1
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Student Outcomes related to this Course	<p>K1. Recognize advanced engineering knowledge, concepts and techniques to identify, interpret and analyze complex and real-life engineering problems.</p> <p>S1. Provide solution for complex and real-life engineering problems through critical thinking and using modern engineering tools and identify its impact on social and ethical issues.</p>														

Topics Covered	List of Topics	Related CLOs
	1. Introduction and some simple concepts of statistics. Sample space, events, and counting sample points (combinations only)	CLO1
	2. Probability of an event, additive rules. Conditional Probability, Multiplication Rule	CLO2
	3. Independent random events. Random Variables (R.V.), Discrete Probability distributions.	CLO3
	4. Continuous Probability distributions. Mean of a Random Variable, Variance of a Random Variable.	CLO3
	5. Moments of a Random Variable, Mean of a linear combinations of Random Variables. Chebychev's Inequality.	CLO3
	6. Discrete Uniform distribution. Binomial distribution. Hypergeometric distribution. Poisson distribution.	CLO3
	7. Normal distribution. Areas under the standard normal curve. Applications of the normal distribution.	CLO3
	8. Random Sampling, Some important statistics, Sampling distributions. Sampling distribution of the mean from normal populations, t-distribution.	CLO3
	9. Statistical Inference, Classical estimation methods, Estimation of the mean.	CLO4
	10. Estimating the difference between two means. Estimating of a proportion. Estimating of the difference between two proportions.	CLO4
	11. Testing a statistical hypothesis, One- and Two-tail tests, Types of errors. Testing of means with known population variance, Relation to confidence intervals.	CLO4
	12. Testing of means with unknown population variance, two sample testing, paired comparison. Testing of a single proportion and two proportions.	CLO4
	13. Simple linear regression and Multiple regression, correlation and its applications	CLO5
	14. ANOVA one and two ways and its applications.	CLO6
	15. Principal component analysis, clustering technique	CLO6
Textbook(s) and Other Required Material	<ul style="list-style-type: none"> Probability and Statistics for Engineers and Scientists. By: R.E. Walpole and R.H. Myers 	
Grading System	First Midterm Exam	30%
	Second Midterm Exam	30%
	Final Exam	40%
Instructors	To be set by College of Science	
Date of Review	February, 2021	