

1. Course Name:	
Statistics and Probability	
2. Course Code:	
CIV22202	
3. Semester / Year:	
2 nd / second	
4. Description Preparation Date:	
9-12-2025	
5. Available Attendance Forms:	
Weekly (Theory: 3 hours)	
6. Number of Credit Hours (Total) / Number of Units (Total)	
Theory: 45 Hours Total: 45 hours ECTS: 3	
7. Course administrator's name (mention all, if more than one name)	
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8. Course Objectives	
Course Objectives	1. To apply statistical methods and techniques for analyzing, interpreting and presenting data in engineering applications. 2. To use statistical tools such as hypothesis testing, regression analysis, analysis of variance (ANOVA), and design of experiments (DOE) for optimization, quality control, and decision making in engineering. 3. To understand the principles and assumptions of probability theory and statistical inference and apply them to solve real-world engineering problems. 4. To develop skills in data analysis and visualization using statistical software packages such as Excel.
9. Teaching and Learning Strategies	
Strategy	1. Active learning: Engineering statistics involves a lot of data analysis and interpretation, which require students to engage actively in the learning process by working on case studies, projects, and real-world problems. 2. Experimental learning: Engineering statistics courses often include hands-on experiments and simulations to help students understand statistical concepts, as well as the strengths and limitations of different data analysis methods.

3. Classroom discussion: Students are encouraged to participate in classroom discussions and debates to promote critical thinking and problem-solving skills.
4. Technology integration: The use of computer-based statistical software is essential in engineering statistics, and should be integrated into the teaching and learning processes to prepare students for real-world applications.
5. Assessment: Students are assessed using a variety of strategies, such as exams, quizzes, projects, and presentations, to evaluate their understanding of statistical concepts and applications.

1. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	3	Understanding of the concepts of Statistics	Review of Statistics, Introduction, definitions.	Theoretical	Homework
2	3	Data collection and analysis: Civil	Data Presentation, Tables, Graphical.	Theoretical	Quiz
3	3	engineers continually collect data and use it to make important decisions, from designing structures to making project cost evaluations. Knowing engineering statistics helps engineers properly analyze and interpret the available data.	Frequency Distribution, Relative Frequency, Cumulative Frequency, Frequency Histogram, Frequency Polygon, Frequency Curve, Frequency Cumulative Polygon.	Theoretical	Homework
4	3	Understanding the Live line precautions.	Forms of Distributions.	Theoretical	Exam
5	3	Understanding variability: Civil engineering projects often involve working with large datasets affected by various types of	Measures of Central Tendency (Arithmetic Mean, Geometric Mean, Harmonic Mean, Mean of Mean, Meadian, Mode).	Theoretical	Homework
6	3	variability. Engineers trained in statistics can identify and interpret the sources of variability in their data, and	Measures of Dispersion (Range, Mean Deviation, Varaince, Mean Deviation, Standard Deviation,	Theoretical	Homework

		develop solutions to manage them.	Standard Error.)		
7	3	Risk assessment and management: Civil engineering projects have many potential risks associated with them, from functional failures to budget overruns. Using statistical techniques can help in identifying and mitigating such risks.	Measures of Skewness, Kurtosis.	Theoretical	Quiz
8	3		Random Variables and Probability Distributions (Discrete probability distribution, mathematical expectations, Binomial Distribution, Poisson Distribution, Continuous Probability Distribution, Normal Distribution, Standard normal distribution, t-distribution, chi-square distribution, f-distribution).	Theoretical	Homework
9	3	Predictive modelling: Engineers often need to make predictions about how a project will perform, such as estimating the useful life of a bridge or predicting how pavement will wear. Statistics helps in testing hypotheses and develop models to make accurate predictions.	Sampling Theory(sampling methods, sampling distribution of sample means, central limit theorem, distribution of the difference between two sample means, distribution of proportions, distribution of two sample variances).	Theoretical	Homework
10	3		Confidence Limits of Mean (Confidence limits of variances).	Theoretical	Exam
11	3		Testing Hypothesis (test about means, tests about variances, goodness' of fit test).	Theoretical	homework
12	3	Benchmarking and quality control: Engineers often must deal with high-stakes and complex engineering problems.	Correlation(linear correlation, partial correlation, multiple correlation, significance of correlation).describing	Theoretical	Homework

		Having a statistics background enables engineers to benchmark their processes and evaluate the effectiveness of their operations. Overall, learning engineering statistics is an important requisite for all civil engineers, as it helps them collect, analyze, and interpret data, and apply that understanding to solve real-world problems.	capabilities and limitations		
13	3		Regression(single linear regression, single non-linear regression, linear multiple regression, nonlinear multiple regression)	Theoretical	Exam
14	3	Personal work	Stochastic Models (time series analysis.	Theoretical	Quiz
15	3	Preparatory	Preparatory week before the final exam	Theoretical	

2. Course Evaluation

The grade distribution is as follows:

Assessment: Formative 40 marks,

Final exam: Theory 60 marks.

3. Learning and Teaching Resources

Required textbooks (curricular books, if any)	"Applied Statistics and Probability for Engineers"
Main references (sources)	"Introduction to Statistical Data Analysis" Peak, Olsen, Devone
Recommended books and references (scientific journals, reports...)	
Electronic References, Websites	

Course Description Form

(Statistics and Probability)