# Foundation of Data Science
# Syllabus

| Week/Module | Topics |
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| **Week 1: DescriptiveStatistics and Data Visualization** | • Introduction<br>• Data Types and Scales<br>• Population and Sample<br>• Measures of CentralTendency<br>• Measures of Variation<br>• Measures of Shape<br>• Data Visualization<br>• Demo Using Excel andTableau |
| **Week 2: Probability Theory** | • Introduction<br>• Probability Theory-Terminology<br>• Axioms of Probability<br>• Bayes' Theorem<br>• Random Variables<br>• PDF& CDF of Continuous<br>• Binomial Distribution<br>• Poisson Distribution<br>• Geometric Distribution<br>• Uniform Distribution<br>• Exponential Distribution<br>• Normal Distribution<br>• Chi-Square Distribution<br>• Student's t-Distribution<br>• F-Distribution<br>• Tutorials |
| **Week 3: Sampling andEstimation** | • Introduction<br>• Population Parameter &Sample Statistic<br>• Sampling<br>• Probabilistic Sampling<br>• Non-Probability Sampling<br>• Sampling Distribution<br>• Central Limit Theorem<br>• Sample Size Estimation forMean of the Population |

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| | • Estimation of PopulationParameters<br>• Method of Moments<br>• Estimation of Parameters Using Maximum LikelihoodEstimation |
| **Week 4: ConfidenceIntervals** | • Introduction<br>• CI for Population Mean<br>• CI for PopulationProportion<br>• CI for Population Mean when Standard Deviation isunknown<br>• CI for Population Variance |
| | Mid – Term Assessment |
| **Week 5: Hypothesis Testing** | • Introduction<br>• Setting up a HypothesisTest<br>• One-Tailed and Two-TailedTest<br>• Type I Error, Type II Error,and Power of the Hypothesis Test<br>• Hypothesis testing for Population Mean with Known Variance: Z-Test<br>• Hypothesis testing for Population Proportion: Z-Test<br>• Hypothesis test for Population Mean underUnknown Population Variance: t-test<br>• Paired Sample t-test<br>• Two-Sample Z and t-test<br>• Two-Sample Z-Test forProportions<br>• Effect Size: Cohen's D<br>• Hypothesis Test for Equality of PopulationVariances<br>• Non-Parametric Tests: Chi-Square Tests |

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| | • Tutorials |
| **Week 6: Analysis ofVariance** | • Introduction<br>• Multiple t-Tests for Comparing Several Means<br>• One-way ANOVA<br>• Two-way ANOVA<br>• Tutorials |
| **Week 7: CorrelationAnalysis** | • Introduction<br>• Pearson CorrelationCoefficient<br>• Spearman Rank Correlation<br>• Point Bi-Serial Correlation<br>• The Phi-Coefficient |
| **Week 8: Applied LinearAlgebra** | • Why do we need LinearAlgebra?<br>• Matrix Algebra andOperations<br>• Eigen Values and EigenVectors<br>• Linear Algebra in Dimensionality Reduction<br>• Linear Algebra in NaturalLanguage Processing<br>• Linear Algebra in MachineLearning |
| | End – Term Assessment |

**Final Exam Details:**

If you wish to obtain a certificate, you must register and take the proctored exam in person at one of the designated exam centres. The registration URL will be announced when the registration form is open. To obtain the certification, you need to fill out the online registration form and pay the exam fee. More details will be provided when the exam registration form is published, including any potential changes. For further information on the exam locations and the conditions associated with filling out the form, please refer to the form.

**Grading Policy:**

| Assessment Type | Weightage |
|---|---|
| **Mid-Term & End-Term** | 25% |
| **Final Exam** | 75% |

**Certificate Eligibility:**

- 40% marks and above in Mid Term & End Term
- 40% marks and above in the final proctored exam

***Disclaimer: In order to be eligible for the certificate, you must register for enrolment and exams using the same email ID. If different email IDs are used, you will not be considered eligible for the certificate.***