

## **PROBABILITY AND STATISTICS FOR CIVIL ENGINEERS**

1.5-0-0-0-5

Review of Basic Concepts of Probability and Distributions; Review of Estimation and Hypothesis Testing; Properties of good estimates, Interval estimation, Maximum likelihood estimates, Sample size determination, Basic format of hypothesis testing, Type I and Type II errors, One and two tailed tests, Tests on mean and variance from samples under different assumptions and knowledge of the underlying distribution; Regression Analysis and Hypothesis Testing; OLS estimates; Assumptions and proof of BLUE; Detection, effect, and remedy of multi-collinearity; Detection, effect, and remedy of heteroskedasticity; Detection, effect, and remedy of autocorrelation; Mis-specification errors and regression model building; Hypothesis testing on OLS estimates; GLS; Comparison of regression model; Use of dummy independent variables; Robust regression and effect of outliers Miscellaneous Topics; Fitting theoretical distributions to observed frequency distributions and Tests of goodness-of-fit (chi-square test, Kolmogorov-Smirnov test); Identification of outliers; Simultaneous equation models; Regression with discrete dependent variables; Practical applications with (civil) engineering data