Course description.

Week 1. Statistics and data. Descriptive Statistics. Mean, Median, Quartiles, Percentiles, Variance, Moments, Histograms, Order Statistics, tables etc. Raw and processed data, regression, correlation etc.

Week 2. Analysis of data, inferences from data, ambiguities and uncertainties. Level of ambiguity. How strong is the evidence? Indicative, convincing, overwhelming. Quantification. Examples. Prior knowledge. Errors in measurement. Tolerances.

Week 3. Probability as a tool to quantify uncertainty. Trial, outcomes, events, probabilities and probability distributions. Repeated trials, independence. Induced distributions. Conditional probability and Bayes' rule.

Week 4. Calculation of probabilities and some standard distributions. Binomial, Poisson, Geometric, Uniform, Negative Binomial. Moments, generating functions. Poisson as a limit of Binomial.

QUIZ.

Week 5. Random variables, their distributions, expectations, sums of independent random variables.

Week 6. Laws of large numbers. Basis for reliability of inference based on large samples. Notion of orthogonality of distributions.

Week 7. Continuous distributions, Distribution functions, densities. Approximations to discrete distributions. Some standard continuous distributions.

MID TERM EXAMINATION.

Week 8. Moments, bivariate distributions, correlations, conditional distributions. Normal distributions.

Week 9. Statistical inference. Testing simple null hypothesis against a simple alternative. Critical Region. Size or level of a test. Type I and Type II errors. Power. Trade-offs. Selection of the critical region. Neyman-Pearson lemma. Baysian approach. Priors and posteriors.

Week 10. Some examples of simple tests. Composite alternatives. UMP tests. One sided and two sided tests. Testing for means, variances in a normal population.

Week 11. Standard tests: z-score. "t" and "F" tests. Small sample and large sample tests.

QUIZ.

Week 12. Estimation. Method of moments. Unbiased Estimators. Variances. Cramer-Rao inequality. Consistency. Examples.

Week 13. Maximum likelihood estimators. Asymptotic properties. Examples.

Week 14. Testing for correlations and regression coefficients. Non-parametric inference. Run test.

Weak 15. Revison.

FINALS.