STAT S107 – Survey of Statistics

Upon successful completion of this course, students will be able to:

1. Distinguish between descriptive and inferential statistics, and between observational and experimental studies.
2. Distinguish between populations and samples, the various types of variables, types of data, and levels of measurement, and the various sampling techniques.
3. Organize data into appropriate frequency distributions.
4. Construct and interpret graphical displays of data, including Pie and Pareto Charts, histograms and boxplots, scatterplots.
5. Compute and interpret measures of central tendency, spread, and position.
6. Distinguish between classical and empirical probability. Use appropriate probability rules to compute and interpret results. Apply counting rules for combinations and permutations.
7. Distinguish between discrete and continuous probability distributions, and apply the central limit theorem as appropriate. Compute and interpret probabilities from binomial, normal, and Student's t-distributions.
8. Compute confidence intervals for population means and proportions. Correctly state hypotheses and apply methods appropriate for single of population means and proportions. Note: The traditional method, or the p-value method, or both may be used.
9. Conduct a simple regression (and correlation) analysis. This includes fitting data to a simple regression model and using the fitted model in predictions.

STAT S200 – Elementary Statistics

Upon successful completion of this course, students will be able to:

1. Distinguish between descriptive and inferential statistics; and observational, experimental and quasi-experimental studies.
2. Distinguish between populations and samples, and the various types of variables, types of data, and levels of measurement, and between the various sampling techniques.
3. Organize data into appropriate frequency distributions. Construct and interpret graphical displays of data, including Pie and Pareto Charts, histograms and boxplots, scatterplots.
4. Compute and interpret measures of central tendency, spread, and position.
5. Distinguish between classical and empirical probability. Identify and/or perform probability experiments and use appropriate probability rules to compute and interpret results.
6. Distinguish between discrete and continuous probability distributions, and apply the central limit theorem as appropriate. Compute and interpret probabilities and quantiles from binomial, normal, t-, chi-square and F-distributions.
7. Compute confidence intervals for population means, variances and proportions.
8. Correctly state hypotheses and apply methods appropriate for single and two-sample tests of population means, variances, and proportions.

9. Perform a one-way ANOVA to compare three or more population means, and interpret results. Correctly state hypotheses for contingency table chi-square tests and correctly interpret results. Note: The traditional method, or the p-value method, or both may be used.
10. Conduct a simple regression (and correlation) analysis.

STAT S373 – Probability and Statistics

Upon successful completion of this course, students will be able to:

1. Compute probabilities corresponding to prescribed events in a discrete sample space, including conditional and posterior probabilities.
2. Derive, interpret, and apply properties of discrete and continuous random variables, including probability density functions, expected value, variance, cumulative density functions, moment generating functions, covariance, and correlation coefficients.
3. Compute point estimates for parameters, including unbiased estimators and maximum likelihood estimators.
4. Create tests of hypotheses and be able to calculate rejection regions, significance levels, and p-values.
5. Calculate the probability of a type II error for a parameter space of size two.

STAT S400 – Statistical computing with R

Upon successful completion of this course, students will be able to:

1. Perform elementary and complex operations with numeric, character, and logical vectors. Extend these methods to matrices, data frames, lists and arrays.
2. Construct and apply simple and compound conditional statements, as well as simple and nested looping structures.
3. Apply built-in low- and high-level graphical functions to the construction of basic and enhanced graphical images.
4. Design original and well-documented code, including user-defined functions, to implement complex numerical and/or statistical methods.

STAT S401 – Regression and Analysis of Variance

Upon successful completion of this course, students will be able to:

1. Identify and apply appropriate linear models for use in the analysis of designed experiments and observational studies, and state relevant model assumptions.
2. Perform appropriate exploratory data analysis and/or structural, residual, outlier, influence and multi-collinearity diagnostics for fitted models. Implement remedial measures as appropriate/needed.
3. Apply variable and model selection methods to identify the best model and apply the chosen model to estimation and prediction tasks.
4. Apply appropriate pairwise comparison methods or tests of general contrasts and interpret results.