DOE Course Content

Section 1. Statistical Methods - “A Review”

- 1.1. Statistical Thinking
- 1.2 Descriptive Statistics
  - 1.2.1. Statistics that Measure Center or ‘Location’ of the Data Set
  - 1.2.2. Statistics that Measure the ‘Dispersion’ or Variability of the Data Set

Section 2. Probability Density Functions

- 2.1. Discrete Density Functions
  - 2.1.1. Binomial Distribution
  - 2.1.2. Poisson Distribution
  - 2.1.3. Some Discrete Density Functions
- 2.2. Continuous Density Functions
  - 2.2.1. Normal Distribution
  - 2.2.2. Standard Normal Distribution
  - 2.2.3. Lognormal Distribution
  - 2.2.4. Weibull Distribution
  - 2.2.5. t Distribution or “Student’s T Distribution”
  - 2.2.6. Chi-Square Distribution
  - 2.2.7. F Distribution* ‘Important for Design of Experiments’
  - 2.2.8. Some Continuous Density Functions

Section 3. Quantiles

- 3.1. Percentiles
- 3.2. Quantile and Q-Q Plots
  - 3.2.1 Percentiles
- 3.3. Box Plots
- 3.4. Categorical Data (Nominal or Ordinal)
- 3.5. Enumerative and Analytical Statistical Studies
- 3.6. Select References

Section 4. ‘Data Quality’

12.6. JMP Example: Taguchi Philosophy

12.7. Minitab Example. Taguchi Analysis

12.8. Exercise: Helicopter Experiment with “Induce Noise”

Section 13. Two-Level Fractional Factorial Designs

13.1. One-Half Fraction of the 2^k Design

13.2. One-Half Fraction of the 2^k Design “Design Resolution”

Exercise 13.2.1. Fractional Factorial in JMP

Exercise 13.2.2. Fractional Factorial in Minitab

13.3. General 2^{k-p} Fractional Factorial Design

13.4. Example: Two-Level Fractional Factorial Designs using JMP or Minitab

Section 14. Blocking and Confounding in the 2k Factorial Design

14.1. Example: 2^{3-1} Fractional Factorial Design in Four Blocks

Exercise 14.1.1. 2^{3-1} Fractional Factorial Design in Four Blocks in JMP

Exercise 14.1.2. 2^{3-1} Fractional Factorial Design in Four Blocks in Minitab

Section 15. Response Surface Designs

15.1. Center Points in Response Surface Designs

15.2. The Central Composite Design or CCD

15.2.1 Axial Points in Central Composite Designs

Exercise 15.2.2. Central Composite Design in JMP

Exercise 15.2.3. Central Composite Design in Minitab

15.3. Box-Behnken Design

Exercise 15.3.1. Box-Behnken Design in JMP

Exercise 15.3.2. Box-Behnken in Minitab

15.4. ‘Plackett-Burman’ Experimental Design

Section 16. Mixtures Designs

16.1. Mathematical Proof – Important for Response Surface

16.2. Simplex and Centroid Designs - 3 Component Mixture Designs

16.3. Extreme Vertices Designs – Constrained Mixture Designs

16.4. Mixture Designs in JMP