STATS PRINCIPLES IN MEDICAL DEVICES

SMD

Stats Principles in Medical Devices is a course designed to provide students with hands-on understanding of basic statistic tools. Central tendency metrics, dispersion analysis, distribution fit, hypothesis testing, and graphs creation and interpretation are tools that allow students to describe and compare data behaviors, identify desirable and undesirable conditions related with the process or data collection procedure. Appropriate data description and analysis are the first step in many mayors decision-making processes in the Medical Devices Industry, consequently, it becomes crucial knowledge for engineers in the industry. This course is given with the support of software traditionally used in this industry and based on application cases.

Duration
9 hours

E-learning platform
Tools and templates

Hands to work
Simulated learning

Certification
After successful course completion

COURSE CONTENT

1. **Introduction to statistics and basic concepts**

- Introduction to statistics and basic concepts
  - General concepts
  - Bias
  - Population and sample
  - Skewness
  - Kurtosis
  - p-value
  - Random Variables
- Descriptive statistics
  - Central tendency metrics
    - Mean
    - Median
    - Mode
  - Variability Metrics
    - Standard deviation
    - Variance
    - Percentiles and quartiles

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COURSE CONTENT

1. **Introduction to statistics and basic concepts**
    - Inference statistics
      - Central limit theorem
      - Hypothesis test
        - One Tailed
        - Bilateral
        - Paired Observations
        - Normality test
2. **Graphs and distribution**
3. **Commonly used graph for data analysis**
    - Histogram
    - Boxplot
    - Bar Chart
    - Individual plot
    - Interval
    - Time series
    - Scatter plots

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COURSE CONTENT

4. **Introduction to statistics and basic concepts**

- Discrete
  - Uniform
  - Bernoulli
  - Binomial
  - Negative Binomial
  - Geometric
  - Poisson
- Continuous
  - Uniform
  - Exponential
  - Chi- square
  - Gamma
  - Beta
  - Weibull
  - Normal
  - Log-Normal
  - T-student

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At the end of the course you will be able to

- Know main concepts required for data collection and statistical analysis.

- Use and interpret descriptive metrics such as mean, mode, median, variance, standard deviation, quartile, percentile, and range.

- Fit data to probability distributions.

- Understand basic distributions characteristics and how it helps to describe the data under analysis using well known probability distributions.

- Use of graphs to describe and rationalize data behaviors.

- Recognize the graphs that are better fit to use under different situations.

- Use graphs to recognize suspicious data behaviors or data collection mistakes that could affect the data credibility, for instance outliers, data from mixed populations, truncated data or rounding problems.

- Identify if a sample mean is statistically similar or not to a reference value through hypothesis testing.

- Make decisions through the interpretation of data from applied examples.