

# University of Toledo

## Mechanical Engineering Technology

### Master Syllabus

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**Course Title: Applied Statistics & DOE**    **Course Code & Number: ENGT 3010**

**Credit Hour Total: 4 Semester Hours**

**Lecture Contact Hours: 4**

**Lab Contact Hours: 0**

**Corequisite: Applied Engineering Math**

**Text: Vining, Statistical Methods for Engineers, Duxbury Press, 1998**

**Software: Minitab**

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#### **A. Course Description**

This course is an introduction to applied probability, statistical inference, and design of experiments. Topics include discrete and continuous probability distributions, confidence intervals, tests of hypotheses, linear regression and correlation, analysis of variance, factorial experimental designs, and propagation of measurement uncertainty. MINITAB interactive statistical and graphical software will be utilized for data display and analysis.

#### **B. Related Program Outcomes (f, g):**

- An ability to identify, analyze and solve technical problems associated with engineering technology, as evidenced by the ability to solve an assortment of statistical problems on the final exam.
- An ability to communicate effectively, as evidenced by completion of assigned problems utilizing the integration of statistical software results.

#### **C. Course Objectives:**

In this course students are expected to:

- Establish frequency distributions
- Distinguish between populations and samples
- Calculate measures of central tendency, such as the mean, median or mode
- Calculate measures of dispersion, such a standard deviation, variance or skewness

- Understand basic concepts of probability
- Utilize binomial and Poisson probability distributions
- Utilize normal probability distributions
- Utilize distribution of sample means
- Perform Chi-square tests
- Establish confidence intervals
- Test hypotheses
- Perform correlation analysis
- Perform linear regression analysis
- Understand multiple linear regression analysis
- Perform various nonparametric tests
- Utilize the MINITAB computer program
- Perform experimental design

#### **D. Course Outline – Major Content Areas**

- Probability
- Histograms
- Stem-and-leaf displays
- Boxplots
- Discrete random variables
- Binomial distribution
- Poisson distribution
- Continuous random variables
- Normal distribution
- Chi-square distribution
- Random behavior of means
- Normal approximation to binomial
- Confidence intervals
- Test of hypothesis
- p-value
- Simple linear regression
- Multiple linear regression
- Residual analysis
- $2^2$  factorial design
- $2^k$  factorial design