PURDUE UNIVERSITY FORT WAYNE

DEPARTMENT OF ELECTRICAL AND COMPUTER ENGINEERING

Course	SE 58301 - Applied Engineering Statistics for Industry
Type of Course	Elective
Catalog Description	The purpose of this course is to teach the practitioner how to use and make better informed decisions as a manager for making optimum process, business, or personnel decisions. Emphasis will be placed on Verification, Validation in R&D, Manufacturing, QA/QC, basic probability, Summarizing Data, Basic Tools (flowcharts, fishbone diagrams, Pareto charts), Process Capability - Cp/Cpk. Upper and lower control limits/charts, Use of Control Charts for Continual Improvement, Six Sigma, Design of Experiments, Taguchi Methodology and Data Analytics will also be covered.
Credits	3
Contact Hours	3
Prerequisite Courses	None
Corequisite Courses	None
Prerequisites by Topics	Prerequisites: Senior or graduate class standing in an engineering or science degree program, or consent of instructor.
Textbook	None
Course Objectives	Students who successfully complete this course will be able to: 1. Demonstrate the importance of the Central Limit Theorem and its application 2. Evaluate the capability of a process using the process capability index (CPI) 3. Analyze variation reduction in relation to process capability and design of experiments 4. Articulate how single-piece flow, standard work, and continuous improvement processes enable variation reduction 5. Determine the expected number of defects from a given process. 6. Explain the statistical meaning of Six Sigma. 7. Differentiate between Type I and Type II errors. 8. Calculate sample size based on specified Type I and Type II Error. 9. Calculate a confidence interval. 10. Define direct run rate / first time through and its calculation.

11. Develop a hypothesis test
12. Calculate regression and correlation of data and distinguish between correlation and causation
13. Select and evaluate the test statistic for different kinds of hypothesis tests and make statistical inference decisions
14. Construct and evaluate an ANOVA table and make statistical inference decisions
15. Differentiate among different types of experimental designs and design an experiment.
16. Demonstrate the Taguchi quality loss function and how to make quality loss calculations
17. Classify the procedural errors that can occur in experimental design, such as confirmation bias
18. Explain data mining and Big Data and their role in the future of experimental design

Lecture Topics

1. Intro to Probability and Statistics
2. Process Capability and Variation Reduction
3. Confidence Intervals and Hypothesis Tests
4. Hypothesis Testing and Statistical Experiments
5. Analysis of Variance (ANOVA) and Design of Experiments
6. Regression and Interpreting Statistical Results
7. Industry Applications of Statistics

Computer Usage None

Laboratory Experience None

Design Experience Low

Coordinator David S. Cochran, Ph.D.

Date 11/16/2022