East Carolina University -- Department of Engineering -- Course Syllabus

ENGR 4000: Quality Systems Engineering

This course, or BIOE 4000 Bioprocess Validation & Quality Engineering, is required for all Engineering majors.

Course Coordinator:
BJ Kim

Catalog Description:
Analytical procedures associated with statistical quality and process control. This course includes design of experiments and systematic approaches to maintenance and improvement of process quality.

Course Structure:
Three 50-minute lectures (three credits)

Prerequisites:
MATH 3307 Mathematical Statistics I

Required Materials:

1. *Probability and Statistics for Engineers and Scientists*, *8th Edition*, Ronald E. Walpole, et al. Pearson Education, 2006. (ISBN 0131877119)
2. *Fundamental Of Engineering Supplied-Reference Handbook*, *7th Edition*, National Council of Examiners. (ISBN 1-932613-19-6)

Course Objectives:
Upon completion of this course, students shall be able to:

- Estimate one- and two-sample parameters
- Perform one- and two-sample statistical hypothesis testing
- Apply simple and multiple linear regression models
- Design and perform one-factor and two or more factors experiments
- Design and implement factorial experiments
- Apply control charts for variables and attributes
- Analyze results of control charts
- Design a quality management system

Lecture Topics:

- Review of Probability Distributions and Sampling Distributions (2 classes)
- One-Sample Statistical Inference (3 classes)
- Two-Sample Statistical Inference (3 classes)
- One-Sample Statistical Hypothesis Testing (2 classes)
- Two-Sample Statistical Hypothesis Testing (2 classes)
- Simple Linear Regression Model (3 classes)
- Analysis-of-Variance Approach and Correlation (3 classes)
- Multiple Linear Regression Model (2 classes)
- One-Way Analysis of Variance (3 classes)
- Two-Factor Analysis of Variance (3 classes)
- Factorial Experiments (2 classes)
- Fractional Factorial Experiments (2 classes)
- Statistical Process Control (3 classes)
- Control Charts for Variables (2 classes)
- Control Charts for Attributes (2 classes)
- Process Capability Analysis and Acceptance Sampling (2 classes)
- Systems for Quality Improvement: ISO 9000 (2 classes)

Relevant Program Outcomes:
Graduates of the BS in Engineering Program will demonstrate:
a) an ability to apply knowledge of mathematics, science, and engineering.
b) an ability to design and conduct experiments, as well as to analyze and interpret data.
c) an ability to design a system, component, or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability.
e) an ability to identify, formulate, and solve engineering problems.
g) an ability to communicate effectively.
j) a knowledge of contemporary issues.

Professional Component Content:
Math/Science: 0; Engineering: 3 cr; General Education: 0

Assessment Requirements:
Student Work Samples:
- Homework report (Outcomes b and g)
- Assignment on contemporary issues (Outcome j)

Targeted Exam Questions
- Application of statistics (Outcome a)
- Quality systems analysis (Outcome c)
- Solution of engineering problems (Outcome e)

Student Course Survey

Last Review:
November 1, 2006 by BJ Kim