ABET Course Syllabi for IND E 316: Design of Experiments and Regression Analysis

1. Course number and name: IND E 316: Design of Experiments and Regression Analysis

2. Credits and contact hours: 4 credit hours, 4 hours per week

3. Instructor’s name: Kailash C. Kapur

4. Text book, title, author, and year
   - Lecture notes by Dr. Kapur (after seventh week)

5. Specific course information
   5a. Brief description of the content of the course (catalog description):
       Introduction to the analysis of data from planned experiments. Analysis of variance for multiple factors and applications of orthogonal arrays and linear graphs for fractional factorial designs to product and process design optimization. Regression analysis with applications in engineering.
   5b. Prerequisites: IND E 315
   5c. Required, elective, or selected elective (as per Table 5-1) course in the program: REQUIRED

6. Specific goals for the course

   6a. Specific outcomes of instruction
       - Students will be able understand causes of variation in any product or process
       - Students will be able to design statistical experiments
       - Students will be able to analyze the data from the experiments using Analysis of Variance [ANOVA]
       - Students will be able to design experiments with several factors and interactions
       - Students will be able to develop mathematical models and perform linear and nonlinear regression
       - Students will be able to use the methods of statistical experimental design to improve products and processes and thus improve quality of systems

   6b. explicitly indicate which of the student outcomes listed in Criterion 3 or any other outcomes are addressed by the course.
       a) an ability to apply knowledge of mathematics, science and engineering (through homework, exams and lectures)
       b) an ability to design and conduct experiments, as well as to analyze and interpret data (through homework, exams and lectures)
c) an ability to design a system, component, or process to meet desired needs (in terms of design of experiments through homework, exams and lectures)
e) an ability to identify, formulate, and solve engineering problems (through lectures and examples in class and discussion and feedback)
k) an ability to use the techniques, skills, and modern engineering tools necessary for engineering practice (through lectures and examples in class and discussion and feedback)
l) an understanding of the integrated, interdisciplinary nature of the discipline (through lectures and examples in class and discussion and feedback through small projects).

7. Brief list of topics to be covered

- Introduction to design of experiments
- Statistical Analysis and Comparative Experiments
- Single Factor Experiments and Analysis of Variance [ANOVA]
- Selected Topics on Randomized Block Design [RBD] and Latin Squares
- Factorial Design and two or more factors
- Design and analysis of complex experiments with multiple factors using orthogonal arrays and linear graphs
- Applications and case studies