WORKSHOP ON INDUSTRIAL EXPERIMENTATION FOR ENGINEERS & SCIENTISTS

Name of Course

Workshop on Industrial Experimentation for Engineers & Scientists

Target Participants:

Scientists, Researchers and Engineers from Laboratories, R&D Establishments and Universities, who conducts or need to conduct experiments as a part of their regular duties/responsibilities.

Preamble:

In the pursuit of knowledge in the field of applied scientific and industrial research, often experiments are carried out. Today, the products and processes have become extremely complex and as a consequence the days of plucking the low hanging fruits are over.

In any manufacturing and technological setting there may be many potential factors that influence the outcome. Moreover, there might be ***interactions between factors***. All these need to be decoded, understood and used for improvement and betterment of the product or the process. *A simple intuitive and common sense One-Factor-At-a-Time (OFAT) approach to experimentation which is still being practiced by many has long become obsolete.*

Statistically Designed Experiments and the associated data analysis methods have been proved to be extremely useful, especially when many variables are involved, have the potential to reduce the cost and effort of experimentation to a great extent.

Objectives of the course

To introduce to the scientists/engineers working in various research laboratories, R & D establishments and academia to the methodologies that are useful for planning and conduct of experiments and their analysis with the ultimate objective of being

able to draw scientifically valid conclusions. Successful case studies from Indian industries will also be presented.

Expected outcome of the course

At the end of the program, it is expected that participants will become acquainted with the fundamentals of ***Design of Experiments*** (DOE) and their analysis.

Eligibility conditions of the participants

A graduate degree in Engineering, Technology, Statistics

Participant Profile

- Scientists and Researchers in Industry, R& D Dept involved in experimental studies
- University Faculty Members and Research Scholars (Physical Science/Engineering/Technology); with
- At least a graduate degree in Engineering/Technology
- knowledge Excel and the R software, at least at the preliminary level

Details about proposed host agency from the country

The proposing agency, namely, the **International Statistical Education Centre** (ISEC) is a sister institution of the Indian Statistical Institute and has been providing statistical education to international candidates for 70 years. The teaching support is provided entirely by the Indian Statistical Institute, which is acknowledged all over the world as a premier institute of statistical learning.

The Statistical Quality Control & Operations Research Division is one of the Divisions of the Indian Statistical Institute. It has been engaged in promotion, training and application of Statistical Techniques, Operations Research and other associated methodologies for Quality Improvement in the Indian Industries for more than six decades. In the process, ***the faculties of the division have acquired expertise*** *in practical applications of various kinds of statistical methodologies for solving real life problems besides the necessary skills communicate the concepts in plain English.*

Course Content:

Introduction to Design of Experiments:

- Why Designed Experimentation?
- Concept of Experimental Error
- Fundamental Principles of Experimentation

Statistical Preliminaries:

- Concepts of Statistical distributions
- Hypothesis Testing One day
- One-Way Analysis of Variance
- Two-Way Analysis of Variance
- Regression Analysis
- Hands on

Classical Design and Analysis of Experiments:

- Factorial Experiments
- Fractional Factorial Experiments
- Hands on

Taguchi Methods:

- Designing Experiments using Orthogonal Arrays (OA)
- Multi-Level and Dummy-Level Designs
- Analysis of OA experiments and validation of results
- Signal to Noise Ratio Analysis
- Dynamic Signal to Noise Ratio Analysis
- Hands on

Analysis of the experimental data

Case Studies

Faculty

Faculty Members of the Indian Statistical Institute

Duration

10 October 2022 to 21 October 2022

Seats

Minimum: 15 Maximum 15