Overview
Planning Experiments, Conducting Experiments, and Analyzing Experimental Data
This program is planned for those interested in the design, conduct, and analysis of experiments in the physical, chemical, biological, medical, social, psychological, economic, engineering, or industrial sciences. The course will examine how to design experiments, carry them out, and analyze the data they yield.

Various designs are discussed and their respective differences, advantages, and disadvantages are noted. In particular, factorial and fractional factorial designs are discussed in greater detail. These are designs in which two or more factors are varied simultaneously; the experimenter wishes to study not only the effect of each factor, but also how the effect of one factor changes as the levels of other factors change. The latter is generally referred to as an interaction effect among factors.

The fractional factorial design has been chosen for extra-detailed study in view of its considerable record of success over the last 30 years. It has been found to allow cost reduction, increase efficiency of experimentation, and often reveal the essential nature of a process. In addition, it is readily understood by those who are conducting the experiments, as well as those to whom the results are reported.

The program will be elementary in terms of mathematics. The course includes a review of the modest probability and statistics background necessary for conducting and analyzing scientific experimentation. With this background, we first discuss the logic of hypothesis testing and, in particular, the statistical techniques generally referred to as Analysis of Variance. A variety of software packages are illustrated, including Excel, SPSS, JMP, and other more specialized packages.

Throughout the program we emphasize applications, using real examples from the areas mentioned above, including such relatively new areas as experimentation in the social and economic sciences.

We discuss Taguchi methods and compare and contrast them with more traditional techniques. These methods, originating in Japan, have engendered significant interest in the United States.

All participants receive a copy of the text, Experimental Design: with applications in management, engineering and the sciences, Duxbury Press, 2002, co-authored by Paul D. Berger and Robert E. Maurer, in addition to extensive PowerPoint notes.

Learn More and Register at: shortprograms.mit.edu/doe
ABOUT MIT PROFESSIONAL EDUCATION SHORT PROGRAMS

Short Programs offers one- to five-day intensive courses that enable you to access world-class thinking, acquire new skills, and bring innovative ideas back to work. Taught on the MIT campus by MIT faculty/researchers and experts from industry and academia, programs are offered in the following topic categories:

Biotechnology; Pharmaceutical; Computer Science; Crisis Management; Data Modeling and Analysis; Design, Analysis, and Manufacturing; Energy/Transportation; Imaging; Innovation; Leadership; Communication; Radar; Real Estate; Robotics; Systems Engineering; Sustainability; and Tribology.

DESIGN AND ANALYSIS OF EXPERIMENTS

COURSE INSTRUCTOR

Paul D. Berger

Professor Berger has been teaching in the program for over 40 years, since he was pursuing graduate studies as Professor Freeman’s student and teaching assistant. He has also taught in MIT’s Sloan Fellows Program and Management of Technology Program, as well as a wide range of in-house industrial programs in experimental design, quality control, and Taguchi methods. He has extensive consulting experience in the area of design of experiments, and is the principal author of a textbook, Experimental Design, with applications in Management, Engineering, and the Sciences, published by Duxbury Press, which is used at several colleges and universities.

PARTICIPANTS’ COMMENTS

⭐ EXPERIMENT DIRECTOR, SCIENCE APPLICATIONS INTERNATIONAL CORPORATION

“Very knowledgeable professor who in almost every instance provided real-world examples to illustrate lessons. I enjoyed the opportunity to be in a classroom setting and found the material germane to my job and learned new methods that I will incorporate into our technical approach.”

⭐ PROCESS ENGINEER, BAYER FILMS AMERICAS

“Overall, this course was excellent. The knowledge I gained from the course I don’t think I could get from anywhere [else].”

⭐ PRODUCT MANAGER, VERTEX PHARMACEUTICALS

“Professor Berger was very engaging and he clearly has a lot of relevant knowledge regarding the complications and pitfalls of DOE application to real-world problems. The material he covered was material that I can instantly apply to my job function. He did an excellent job of covering just enough mathematical/statistical principles to maintain the rigor of his statements without bogging the class down in theoretical discussions. He really focused well on practical applications of the techniques covered in the class.”