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Optimal Design Of Experiments A Case Study Approach

**Optimal Design of Flexural
Systems: Beams, Grillages,**

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**Slabs, Plates and Shells
covers theoretical
developments and optimal
solutions for all boundary
conditions that may be of
practical or theoretical
interest in the design of**

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flexural systems. Organized into nine chapters, this book begins with a review of certain fundamental concepts of mechanics, calculus of variations, and optimal design. Subsequent

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chapters discuss in considerable details the theories of optimal plastic design, as well as the elastic and prestressed systems. Other chapters describe the theory of

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**optimal flexure fields that
give an absolute minimum
statically admissible
""moment volume"" for
plane systems, as well as
the slabs and grillages
optimized within various**

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types of geometrical constraints. The last chapter evaluates experimental work and certain practical aspects of the optimization of flexural systems. This book will be

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**of interest to graduate
students, research workers,
practicing engineers, and
architects in structural
engineering, architectural
science, aerospace
technology, solid**

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mechanics, and applied mathematics.

"There are several textbooks covering material in design of experiments (DOE). It is a fair question, then, to ask,

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"Why write another DOE textbook?" One answer is based on the observation that in 2018 over a quarter of the DOE courses taught at the university level rely on course notes rather than

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a text. We view this as an evidence of pent-up demand for a different kind of textbook than is currently available. A characteristic of many DOE textbooks is that they focus

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as much or more on analysis than on design. A student might get the impression that there is only one appropriate design for any scenario and this design should be

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orthogonal. Orthogonal designs have the desirable feature that the analysis of the data generated after running the experiment is less demanding than the analysis of observational

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data" --

Experimental optimization methods are used to determine optimal decision policies in the cases where the functional form or parameter values are

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unknown. The optimal design of such experiments is developed in this paper for a variety of methods of experimentation.

Parameter values are estimated, an optimal

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decision policy is obtained, and estimates of the expected gain from experimentation are derived. Expected gains are compared for alternative experimental designs. In

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particular, methods are derived for obtaining the optimal size, organization structure, and duration time of the experiment. The general methods are applied to the problem of

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design of a maintenance experiment to obtain the scheduled maintenance frequency that achieves maximum cost savings. There is an increasing need to rein in the cost of

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scientific study without sacrificing accuracy in statistical inference. Optimal design is the judicious allocation of resources to achieve the objectives of studies using

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minimal cost via careful statistical planning.

Researchers and practitioners in various fields of applied science are now beginning to recognize the advantages and

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**potential of optimal
experimental design.**

**Applied Optimal Designs is
the first book to catalogue
the application of optimal
design to real problems,
documenting its**

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widespread use across disciplines as diverse as drug development, education and ground water modelling. Includes contributions covering: Bayesian design for

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**measuring cerebral blood-
flow Optimal designs for
biological models Computer
adaptive testing Ground
water modelling
Epidemiological studies and
pharmacological models**

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Applied Optimal Designs
bridges the gap between
theory and practice,
drawing together a
selection of incisive articles
from reputed collaborators.
Broad in scope and inter-

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disciplinary in appeal, this book highlights the variety of opportunities available through the use of optimal design. The wide range of applications presented here should appeal to

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statisticians working with optimal designs, and to practitioners new to the theory and concepts involved.

This concise, self-contained and cohesive book focuses

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on commonly used and recently developed methods for designing and analyzing high-throughput screening (HTS) experiments from a statistically sound basis.

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**Combining ideas from
biology, computing and
statistics, the author
explains experimental
designs and analytic
methods that are amenable
to rigorous analysis and**

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**interpretation of RNAi HTS
experiments. The opening
chapters are carefully
presented to be accessible
both to biologists with
training only in basic
statistics and to**

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**computational scientists
and statisticians with basic
biological knowledge.
Biologists will see how new
experiment designs and
rudimentary data-handling
strategies for RNAi HTS**

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experiments can improve their results, whereas analysts will learn how to apply recently developed statistical methods to interpret HTS experiments. Praise for the First Edition:

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"If you . . . want an up-to-date, definitive reference written by authors who have contributed much to this field, then this book is an essential addition to your library." —Journal of

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**the American Statistical
Association Fully updated
to reflect the major
progress in the use of
statistically designed
experiments for product
and process improvement,**

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Experiments, Second Edition introduces some of the newest discoveries—and sheds further light on existing ones—on the design and analysis of experiments and

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their applications in system optimization, robustness, and treatment comparison. Maintaining the same easy-to-follow style as the previous edition while also including modern updates,

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**this book continues to
present a new and
integrated system of
experimental design and
analysis that can be applied
across various fields of
research including**

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**engineering, medicine, and
the physical sciences. The
authors modernize
accepted methodologies
while refining many cutting-
edge topics including
robust parameter design,**

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reliability improvement, analysis of non-normal data, analysis of experiments with complex aliasing, multilevel designs, minimum aberration designs, and orthogonal

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arrays. Along with a new chapter that focuses on regression analysis, the Second Edition features expanded and new coverage of additional topics, including: Expected

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mean squares and sample size determination One-way and two-way ANOVA with random effects Split-plot designs ANOVA treatment of factorial effects Response surface modeling

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**for related factors Drawing
on examples from their
combined years of working
with industrial clients, the
authors present many
cutting-edge topics in a
single, easily accessible**

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source. Extensive case studies, including goals, data, and experimental designs, are also included, and the book's data sets can be found on a related FTP site, along with

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additional supplemental material. Chapter summaries provide a succinct outline of discussed methods, and extensive appendices direct readers to resources for

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**further study. Experiments,
Second Edition is an
excellent book for design of
experiments courses at the
upper-undergraduate and
graduate levels. It is also a
valuable resource for**

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practicing engineers and statisticians.

Functional or dynamic responses are prevalent in experiments in the fields of engineering, medicine, and the sciences, but proposals

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for optimal designs are still sparse for this type of response. Experiments with dynamic responses result in multiple responses taken over a spectrum variable, so the design matrix for a

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dynamic response have more complicated structures. In the literature, the optimal design problem for some functional responses has been solved using genetic

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algorithm (GA) and approximate design methods. The goal of this dissertation is to develop fast computer algorithms for calculating exact D-optimal designs. First, we

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demonstrated how the traditional exchange methods could be improved to generate a computationally efficient algorithm for finding G-optimal designs. The

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proposed two-stage algorithm, which is called the cCEA, uses a clustering-based approach to restrict the set of possible candidates for PEA, and then improves the G-

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efficiency using CEA. The second major contribution of this dissertation is the development of fast algorithms for constructing D-optimal designs that determine the optimal

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sequence of stimuli in fMRI studies. The update formula for the determinant of the information matrix was improved by exploiting the sparseness of the

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information matrix, leading to faster computation times. The proposed algorithm outperforms genetic algorithm with respect to computational efficiency and D-efficiency.

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The third contribution is a study of optimal experimental designs for more general functional response models. First, the B-spline system is proposed to be used as the non-

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parametric smoother of response function and an algorithm is developed to determine D-optimal sampling points of a spectrum variable. Second, we proposed a two-step

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algorithm for finding the optimal design for both sampling points and experimental settings. In the first step, the matrix of experimental settings is held fixed while the

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algorithm optimizes the determinant of the information matrix for a mixed effects model to find the optimal sampling times. In the second step, the optimal sampling times

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obtained from the first step is held fixed while the algorithm iterates on the information matrix to find the optimal experimental settings. The designs constructed by this

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**approach yield superior
performance over other
designs found in literature.**

**Theory Of Optimal
Experiments**

**Planning, Analysis, and
Optimization**

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**The Construction of Optimal
Stated Choice Experiments
Experiments
Optimal Design for
Experiments with Mixtures
A Case Study Approach
Optimal Design of**

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**Experiments for Multiple
Objectives**

**Theory of Optimal Designs
A Modern Approach**

Optimal Design

**Optimal Design and Related
Areas in Optimization and**

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Statistics

The Optimal Design of Blocked and Split-Plot Experiments

Experiments in the field and
in the laboratory cannot
avoid random error and

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statistical methods are essential for their efficient design and analysis. Authored by leading experts in key fields, this text provides many examples of SAS code, results, plots and tables,

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along with a fully supported website.

The first to solve the general problem of sequential tests of statistical hypotheses, the author of this text explains his revolutionary theory of

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the sequential probability ratio test and its applications. 1947 edition. Prior to the 1970's a substantial literature had accumulated on the theory of optimal design, particularly of optimal linear regression

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design. To a certain extent the study of the subject had been piecemeal, different criteria of optimality having been studied separately. Also to a certain extent the topic was regarded as being largely of

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theoretical interest and as having little value for the practising statistician.

However during this decade two significant developments occurred. It was observed that the various different optimality criteria had

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Several mathematical properties in common; and general algorithms for constructing optimal design measures were developed. From the first of these there emerged a general theory of remarkable

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simplicity and the second at least raised the possibility that the theory would have more practical value. With respect to the second point there does remain a limiting factor as far as designs that are optimal for

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parameter estimation are concerned, and this is that the theory assumes that the model to be collected is known a priori. This of course underlying data to is seldom the case in practice and it often happens that designs

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which are optimal for parameter estimation allow no possibility of model validation. For this reason the theory of design for parameter estimation may well have to be combined with a theory of model

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validation before its practical potential is fully realized. Nevertheless discussion in this monograph is limited to the theory of design optimal for parameter estimation.

The present book is devoted

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to studying optimal experimental designs for a wide class of linear and nonlinear regression models. This class includes polynomial, trigonometrical, rational, and exponential models as well as many

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particular models used in ecology and microbiology. As the criteria of optimality, the well known D-, E-, and c-criteria are implemented. The main idea of the book is to study the dependence of optimal - signs on values of

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unknown parameters and on the bounds of the design interval. Such a study can be performed on the base of the Implicit Function Theorem, the classical result of functional analysis. The idea was first

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introduced in the author's paper (Melas, 1978) for nonlinear in parameters exponential models.

Recently, it was developed for other models in a number of works (Melas (1995, 2000, 2001, 2004, 2005), Dette,

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Melas (2002, 2003), Dette, Melas, Pepelyshev (2002, 2003, 2004b), and Dette, Melas, Biederman (2002)). The purpose of the present book is to bring together the results obtained and to develop further underlying concepts and

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tools. The approach, mentioned above, will be called the functional approach. Its brief description can be found in the Introduction. The book contains eight chapters. The first chapter introduces basic concepts

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and results of optimal design theory, initiated mainly by J.Kiefer.

Design of Experiments in Nonlinear Models: Asymptotic Normality, Optimality Criteria and Small-Sample Properties provides a

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comprehensive coverage of the various aspects of experimental design for nonlinear models. The book contains original contributions to the theory of optimal experiments that will interest students and

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researchers in the field. Practitioners motivated by applications will find valuable tools to help them designing their experiments. The first three chapters expose the connections between the asymptotic

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properties of estimators in parametric models and experimental design, with more emphasis than usual on some particular aspects like the estimation of a nonlinear function of the model parameters, models

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with heteroscedastic errors, etc. Classical optimality criteria based on those asymptotic properties are then presented thoroughly in a special chapter. Three chapters are dedicated to specific issues raised by

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nonlinear models. The construction of design criteria derived from non-asymptotic considerations (small-sample situation) is detailed. The connection between design and identifiability/estimability

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issues is investigated. Several approaches are presented to face the problem caused by the dependence of an optimal design on the value of the parameters to be estimated. A survey of algorithmic

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methods for the construction of optimal designs is provided.

Offering deep insight into the connections between design choice and the resulting statistical analysis, Design of

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Experiments: An Introduction Based on Linear Models explores how experiments are designed using the language of linear statistical models. The book presents an organized framework for understanding the

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statistical aspects of experimental design as a whole within the structure provided by general linear models, rather than as a collection of seemingly unrelated solutions to unique problems. The core

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material can be found in the first thirteen chapters. These chapters cover a review of linear statistical models, completely randomized designs, randomized complete blocks designs, Latin squares,

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analysis of data from orthogonally blocked designs, balanced incomplete block designs, random block effects, split-plot designs, and two-level factorial experiments. The remainder of the text discusses

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factorial group screening experiments, regression model design, and an introduction to optimal design. To emphasize the practical value of design, most chapters contain a short example of a real-

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world experiment. Details of the calculations performed using R, along with an overview of the R commands, are provided in an appendix. This text enables students to fully appreciate the fundamental concepts and

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techniques of experimental design as well as the real-world value of design. It gives them a profound understanding of how design selection affects the information obtained in an experiment.

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Optimal Design of Experiments A Case Study Approach John Wiley & Sons
Although statistical design is one of the oldest branches of statistics, its importance is ever increasing, especially in

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the face of the data flood that often faces statisticians. It is important to recognize the appropriate design, and to understand how to effectively implement it, being aware that the default

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settings from a computer package can easily provide an incorrect analysis. The goal of this book is to describe the principles that drive good design, paying attention to both the theoretical background and

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the problems arising from real experimental situations. Designs are motivated through actual experiments, ranging from the timeless agricultural randomized complete block, to microarray experiments,

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which naturally lead to split plot designs and balanced incomplete blocks. George Casella is Distinguished Professor in the Department of Statistics at the University of Florida. He is active in

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many aspects of statistics, having contributed to theoretical statistics in the areas of decision theory and statistical confidence, to environmental statistics, and has more recently concentrated efforts in

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statistical genomics. He also maintains active research interests in the theory and application of Monte Carlo and other computationally intensive methods. He is listed as an ISI "Highly Cited

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Researcher." In other capacities, Professor Casella has served as Theory and Methods Editor of the Journal of the American Statistical Association, 1996-1999, Executive Editor of Statistical Science,

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2001-2004, and Co-Editor of the Journal of the Royal Statistical Society, Series B, 2009-2012. He has served on the Board of Mathematical Sciences of the National Research Council, 1999-2003, and many committees of both

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the American Statistical Association and the Institute of Mathematical Statistics. Professor Casella has co-authored five textbooks: Variance Components, 1992; Theory of Point Estimation, Second

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Edition, 1998; Monte Carlo Statistical Methods, Second Edition, 2004; Statistical Inference, Second Edition, 2001, and Statistical Genomics of Complex Traits, 2007.

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[Topics in Optimal Design](#)

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[Collecting Spatial Data](#)

[An Introduction to Optimal](#)

[Designs for Social and](#)

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Biomedical Research

Optimal Design of

Experiments

Bayesian Experimental

Design, Best Linear Unbiased

Prediction, Bootstrap Error-

Adjusted Single-Sample

Technique, C+-Probability,

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Statistical Design

Theory Of Optimal

Experiments

Pharmaceutical Experimental

Design

An exploration of the interrelated fields of design of experiments and

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sequential analysis with emphasis on the nature of theoretical statistics and how this relates to the philosophy and practice of statistics.

The increasing cost of

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research means that scientists are in more urgent need of optimal design theory to increase the efficiency of parameter estimators and the statistical power of their

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tests. The objectives of a good design are to provide interpretable and accurate inference at minimal costs. Optimal design theory can help to identify a design with maximum power and

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maximum information for a statistical model and, at the same time, enable researchers to check on the model assumptions. This Book: Introduces optimal experimental design in an

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accessible format. Provides guidelines for practitioners to increase the efficiency of their designs, and demonstrates how optimal designs can reduce a study's costs. Discusses the

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merits of optimal designs and compares them with commonly used designs. Takes the reader from simple linear regression models to advanced designs for multiple linear

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regression and nonlinear models in a systematic manner. Illustrates design techniques with practical examples from social and biomedical research to enhance the reader's

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understanding. Researchers and students studying social, behavioural and biomedical sciences will find this book useful for understanding design issues and in putting

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*optimal design ideas to
practice.*

*"This is an engaging and
informative book on the
modern practice of
experimental design. The
authors' writing style is*

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entertaining, the consulting dialogs are extremely enjoyable, and the technical material is presented brilliantly but not overwhelmingly. The book is a joy to read. Everyone

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*who practices or teaches
DOE should read this book."*

*- Douglas C. Montgomery,
Regents Professor,
Department of Industrial
Engineering, Arizona State
University "It's been said:*

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***'Design for the experiment, don't experiment for the design.'* This book ably demonstrates this notion by showing how tailor-made, optimal designs can be effectively employed to**

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meet a client's actual needs. It should be required reading for anyone interested in using the design of experiments in industrial settings."

—Christopher J.

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***Nachtsheim, Frank A
Donaldson Chair in
Operations Management,
Carlson School of
Management, University of
Minnesota This book
demonstrates the utility of***

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the computer-aided optimal design approach using real industrial examples. These examples address questions such as the following: How can I do screening inexpensively if I have

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dozens of factors to investigate? What can I do if I have day-to-day variability and I can only perform 3 runs a day? How can I do RSM cost effectively if I have

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How can I design and analyze experiments when there is a factor that can only be changed a few times over the study? How can I include both ingredients in

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*a mixture and processing factors in the same study?
How can I design an experiment if there are many factor combinations that are impossible to run?
How can I make sure that a*

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time trend due to warming up of equipment does not affect the conclusions from a study? How can I take into account batch information in when designing experiments

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involving multiple batches? How can I add runs to a botched experiment to resolve ambiguities? While answering these questions the book also shows how to evaluate and compare

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designs. This allows researchers to make sensible trade-offs between the cost of experimentation and the amount of information they obtain. Optimal Design for

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***Nonlinear Response Models
discusses the theory and
applications of model-based
experimental design with a
strong emphasis on
biopharmaceutical studies.
The book draws on the***

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authors' many years of experience in academia and the pharmaceutical industry. While the focus is on nonlinear models, the book begins with an explanation of the key

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ideas, using linear models as examples. Applying the linearization in the parameter space, it then covers nonlinear models and locally optimal designs as well as minimax, optimal

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on average, and Bayesian designs. The authors also discuss adaptive designs, focusing on procedures with non-informative stopping. The common goals of experimental

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design—such as reducing costs, supporting efficient decision making, and gaining maximum information under various constraints—are often the same across diverse applied

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areas. Ethical and regulatory aspects play a much more prominent role in biological, medical, and pharmaceutical research. The authors address all of these issues through many

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examples in the book.

Introductory remarks about the experiment and its design. The regression model and methods of estimation. The ordering of designs and the properties

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*of variances of estimates.
Optimality criteria in the
regression model. Iterative
computation of optimum
desings Design of
experiments in particular
cases. The functional model*

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*and measurements of
physical fields.*

2013 GOLD MEDAL

***WINNER: Reader's Favorite
International Book Award
for Christian Romance. The
Missing Piece by***

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international bestselling author Carol McCormick. "Fresh dialogue, realistic characters, a powerful message. McCormick does a great job creating her characters and portraying

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the struggles they endure,"

The Romance Readers

*Connection How does a man
pick up the pieces when his
world crashes around him?*

Misplaced priorities

shattered his marriage.

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Problems almost crushed him. Love motivated him to mend the damage, once he found all the pieces. After only a few months of marriage, Lorraine left Dylan on a wintry night

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after he'd spent one too many nights out with the guys. Unable to cope with the loss, Dylan escapes the painful feelings by drinking them away. This decision costs him a year-and-a-half

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of his life after he stops in a little mountain town and ends up in the local jail. When he's released, he returns home in search of a job to get his life...and his wife back. The Missing

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Piece is not only a love story about a man who loves a woman, but is also a love story about a merciful God who loves mankind, even when he falls. The novel is an emotionally-charged

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journey of hope and redemption with a touch of spunk, a hint of humor, and a few twists along the way. The objective of the book is to present recently developed theories and

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techniques in optimal design and analysis of experiments, along with related methods such as linear and nonlinear models and quality control. The book will be of use to

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research workers in most branches of applied science, and could also be used as a reference or textbook in universities. The main mathematical prerequisites are matrix

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*algebra, mathematical
statistics and some
knowledge of statistical
inference and optimization
theory.*

*This book offers a step-by-
step guide to the*

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experimental planning process and the ensuing analysis of normally distributed data, emphasizing the practical considerations governing the design of an

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experiment. Data sets are taken from real experiments and sample SAS programs are included with each chapter. Experimental design is an essential part of

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*investigation and discovery
in science; this book will
serve as a modern and
comprehensive reference to
the subject.*

*Proceedings of the Sixth
Eugene Lukacs Symposium,*

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Bowling Green, OH, USA,
29-30 March 1996

Theory and Applications
Statistical Methods

Optimal Experimental
Design for Non-Linear

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Models

Multidimensional

Statistical Analysis and

Theory of Random Matrices

Model-Oriented Design of

Experiments

Design of Experiments in

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Nonlinear Models

Inspirational Love Story

Beams, Grillages, Slabs,

Plates and Shells

Handbook of Advanced

Multilevel Analysis

This new handbook is the definitive

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resource on advanced topics related to multilevel analysis. The editors assembled the top minds in the field to address the latest applications of multilevel modeling as well as the specific difficulties and methodological problems that are becoming more

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common as more complicated models are developed. Each chapter features examples that use actual datasets. These datasets, as well as the code to run the models, are available on the book's website <http://www.hlm-online.com> . Each chapter includes an introduction

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that sets the stage for the material to come and a conclusion. Divided into five sections, the first provides a broad introduction to the field that serves as a framework for understanding the latter chapters. Part 2 focuses on multilevel latent variable modeling including item

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response theory and mixture modeling.

Section 3 addresses models used for longitudinal data including growth curve and structural equation modeling.

Special estimation problems are examined in section 4 including the difficulties involved in estimating

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survival analysis, Bayesian estimation, bootstrapping, multiple imputation, and complicated models, including generalized linear models, optimal design in multilevel models, and more. The book's concluding section focuses on statistical design issues encountered when

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doing multilevel modeling including nested designs, analyzing cross-classified models, and dyadic data analysis.

Intended for methodologists, statisticians, and researchers in a variety of fields including psychology, education, and the social and health sciences, this handbook

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also serves as an excellent text for graduate and PhD level courses in multilevel modeling. A basic knowledge of multilevel modeling is assumed. Optimal Design of Experiments offers a rare blend of linear algebra, convex analysis, and statistics. The optimal

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design for statistical experiments is first formulated as a concave matrix optimization problem. Using tools from convex analysis, the problem is solved generally for a wide class of optimality criteria such as D-, A-, or E-optimality. The book then offers a complementary

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approach that calls for the study of the symmetry properties of the design problem, exploiting such notions as matrix majorization and the Kiefer matrix ordering. The results are illustrated with optimal designs for polynomial fit models, Bayes designs,

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balanced incomplete block designs, exchangeable designs on the cube, rotatable designs on the sphere, and many other examples.

This book provides a comprehensive treatment of the design of blocked and split-plot experiments. The optimal

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design approach advocated in the book will help applied statisticians from industry, medicine, agriculture, chemistry and many other fields of study in setting up tailor-made experiments. The book also contains a theoretical background, a thorough

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review of the recent work in the area of blocked and split-plot experiments, and a number of interesting theoretical results. This dissertation, "Optimal Design for Experiments With Mixtures" by [?][?][?], Ling-yau, Chan, was obtained from The University of Hong Kong (Pokfulam,

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Hong Kong) and is being sold pursuant to Creative Commons: Attribution 3.0 Hong Kong License. The content of this dissertation has not been altered in any way. We have altered the formatting in order to facilitate the ease of printing and reading of the dissertation. All rights

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not granted by the above license are retained by the author. DOI:

10.5353/th_b3123079 Subjects:

Mixtures - Statistical methods

Experimental design Mathematical optimization

The book is concerned with the statistical

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theory for locating spatial sensors. It bridges the gap between spatial statistics and optimum design theory. After introductions to those two fields the topics of exploratory designs and designs for spatial trend and variogram estimation are treated. Special attention

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is devoted to describing new methodologies to cope with the problem of correlated observations.

This book tackles the Optimal Non-Linear Experimental Design problem from an applications perspective. At the same time it offers extensive

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mathematical background material that avoids technicalities, making it accessible to non-mathematicians: Biologists, Medical Statisticians, Sociologists, Engineers, Chemists and Physicists will find new approaches to conducting their experiments. The book is recommended

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for Graduate Students and Researchers.

The present volume is a collective monograph devoted to applications of the optimal design theory in optimization and statistics. The chapters reflect the topics discussed at the workshop “W-Optimum Design and Related Statistical

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Issues” that took place in Juan-les-Pins, France, in May 2005. The title of the workshop was chosen as a light-hearted celebration of the work of Henry Wynn. It was supported by the Laboratoire I3S (CNRS/Universit ´e de Nice, Sophia Antipolis), to which Henry is a frequent

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visitor. The topics covered partly reflect the wide spectrum of Henry's research interests. Algorithms for constructing optimal designs are discussed in Chap. 1, where Henry's contribution to the field is acknowledged. Steepest-ascent algorithms used to construct optimal designs are

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very much related to general gradient algorithms for convex optimization.

In the last ten years, a significant part of Henry's research was devoted to the study of the asymptotic properties of such algorithms. This topic is covered by Chaps. 2 and 3. The work by

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Alessandra Giovagnoli concentrates on the use of majorization and stochastic ordering, and Chap. 4 is a hopeful renewal of their collaboration. One of Henry's major recent interests is what is now called algebraic statistics, the application of computational

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commutative algebra to statistics, and he was partly responsible for introducing the experimental design sub-area, reviewed in Chap. 5. One other sub-area is the application to Bayesian networks and Chap. 6 covers this, with Chap. 7 being strongly related.

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The book dwells mainly on the optimality aspects of mixture designs. As mixture models are a special case of regression models, a general discussion on regression designs has been presented, which includes topics like continuous designs, de la Garza phenomenon,

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Loewner order domination, Equivalence theorems for different optimality criteria and standard optimality results for single variable polynomial regression and multivariate linear and quadratic regression models. This is followed by a review of the available literature on

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estimation of parameters in mixture models. Based on recent research findings, the volume also introduces optimal mixture designs for estimation of optimum mixing proportions in different mixture models, which include Scheffé's quadratic model, Darroch-Waller

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model, log-contrast model, mixture-amount models, random coefficient models and multi-response model.

Robust mixture designs and mixture designs in blocks have been also reviewed. Moreover, some applications of mixture designs in areas like

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agriculture, pharmaceuticals and food and beverages have been presented.

Familiarity with the basic concepts of design and analysis of experiments, along with the concept of optimality criteria are desirable prerequisites for a clear understanding of the book. It is

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likely to be helpful to both theoreticians and practitioners working in the area of mixture experiments.

Theory and Methods

Optimal Design of Optimization

Experiments

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Here, the authors explain the basic ideas

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so as to generate interest in modern problems of experimental design. The topics discussed include designs for inference based on nonlinear models, designs for models with random parameters and stochastic processes, designs for model discrimination and incorrectly specified (contaminated)

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models, as well as examples of designs in functional spaces. Since the authors avoid technical details, the book assumes only a moderate background in calculus, matrix algebra, and statistics. However, at many places, hints are given as to how readers may enhance and adopt the basic ideas for advanced problems or applications. This

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allows the book to be used for courses at different levels, as well as serving as a useful reference for graduate students and researchers in statistics and engineering. The most comprehensive and applied discussion of stated choice experiment constructions available The Construction of Optimal Stated Choice Experiments

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provides an accessible introduction to the construction methods needed to create the best possible designs for use in modeling decision-making. Many aspects of the design of a generic stated choice experiment are independent of its area of application, and until now there has been no single book describing these

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constructions. This book begins with a brief description of the various areas where stated choice experiments are applicable, including marketing and health economics, transportation, environmental resource economics, and public welfare analysis. The authors focus on recent research results on the construction of

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optimal and near-optimal choice experiments and conclude with guidelines and insight on how to properly implement these results. Features of the book include: Construction of generic stated choice experiments for the estimation of main effects only, as well as experiments for the estimation of main effects plus two-factor

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interactions Constructions for choice sets of any size and for attributes with any number of levels A discussion of designs that contain a none option or a common base option Practical techniques for the implementation of the constructions Class-tested material that presents theoretical discussion of optimal design Complete

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and extensive references to the mathematical and statistical literature for the constructions Exercise sets in most chapters, which reinforce the understanding of the presented material The Construction of Optimal Stated Choice Experiments serves as an invaluable reference guide for applied

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statisticians and practitioners in the areas of marketing, health economics, transport, and environmental evaluation. It is also ideal as a supplemental text for courses in the design of experiments, decision support systems, and choice models. A companion web site is available for readers to access web-based software that

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can be used to implement the constructions described in the book.

This book covers a wide range of topics in both discrete and continuous optimal designs. The topics discussed include designs for regression models, covariates models, models with trend effects, and models with competition effects. The

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prerequisites are a basic course in the design and analysis of experiments and some familiarity with the concepts of optimality criteria.

There has been an enormous growth in recent years in the literature on discrete optimal designs. The optimality problems have been formulated in various models

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arising in the experimental designs and substantial progress has been made towards solving some of these. The subject has now reached a stage of completeness which calls for a self-contained monograph on this topic. The aim of this monograph is to present the state of the art and to focus on more recent

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advances in this rapidly developing area.

We start with a discussion of statistical optimality criteria in Chapter One.

Chapters Two and Three deal with optimal block designs. Row-column designs are dealt with in Chapter Four. In Chapter Five we deal with optimal designs with mixed effects models. Repeated

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measurement designs are considered in Chapter Six. Chapter Seven deals with some special situations and Weighing designs are discussed in Chapter Eight. We have endeavoured to include all the major developments that have taken place in the last three decades. The book should be of use to research workers in several

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areas including combinatorics as well as to the experimenters in diverse fields of applications. Since the details of the construction of the designs are available in excellent books, we have only pointed out the designs which have optimality properties. We believe, this will be adequate for the experimenters.

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Please note that the content of this book primarily consists of articles available from Wikipedia or other free sources online. Pages: 34. Chapters: Bayesian experimental design, Best linear unbiased prediction, Bootstrap error-adjusted single-sample technique, C+-probability, Causal inference, Comparing means, Descriptive

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research, Design of experiments, Dual-flashlight plot, Factorial experiment, Fold change, Fractional factorial design, Kolmogorov-Smirnov test, Mixed model, Multivariate analysis, Newey-West estimator, Optimal design, Pocock boundary, Principal stratification, Regression analysis, Response surface

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methodology, Smoothing spline, Structural equation modeling, Structured data analysis (statistics), Student's t-test, Taguchi methods, Volcano plot (statistics).
Excerpt: In the design of experiments, optimal designs are a class of experimental designs that are optimal with respect to some statistical criterion. In the design of

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experiments for estimating statistical models, optimal designs allow parameters to be estimated without bias and with minimum-variance. A non-optimal design requires a greater number of experimental runs to estimate the parameters with the same precision as an optimal design. In practical terms, optimal experiments can

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reduce the costs of experimentation. The optimality of a design depends on the statistical model and is assessed with respect to a statistical criterion, which is related to the variance-matrix of the estimator. Specifying an appropriate model and specifying a suitable criterion function both require understanding of

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statistical theory and practical knowledge with designing experiments. Optimal designs are also called optimum designs. Optimal designs offer three advantages over suboptimal experimental designs: Experimental designs are evaluated using statistical criteria. It is known that the least squares estimator minimizes the variance

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of mean-unbiased estimators (under the conditions of the...

This volume contains the papers from the Sixth Eugene Lukacs Symposium on "Multidimensional Statistical Analysis and Random Matrices", which was held at the Bowling Green State University, Ohio, USA, 29--30 March 1996.

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Multidimensional statistical analysis and random matrices have been the topics of great research. The papers presented in this volume discuss many varied aspects of this all-encompassing topic. In particular, topics covered include generalized statistical analysis, elliptically contoured distribution, covariance

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structure analysis, metric scaling, detection of outliers, density approximation, and circulant and band random matrices.

This useful reference describes the statistical planning and design of pharmaceutical experiments, covering all stages in the development process-

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including preformulation, formulation, process study and optimization, scale-up, and robust process and formulation development. Shows how to overcome pharmaceutical, technological, and economic constraint

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