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Titolo	Statistical Design and Analysis of Biological Experiments // by Hans-Michael Kaltenbach
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ISBN	9783030696412 3030696413
Edizione	[1st ed. 2021.]
Descrizione fisica	1 online resource (281 pages)
Collana	Statistics for Biology and Health, , 2197-5671
Disciplina	001.434
Soggetti	Statistics Bioinformatics Statistical Theory and Methods
Lingua di pubblicazione	Inglese
Formato	Materiale a stampa
Livello bibliografico	Monografia
Nota di contenuto	Principles of Experimental Design -- Review of Statistical Concepts -- Planning for Precision and Power -- Comparing More than Two Groups -- Comparing Treatment Groups with Linear Contrasts -- Multiple Treatment Factors: Factorial Designs -- Improving Precision and Power: Blocked Designs -- Split-Unit Designs -- Many Treatment Factors: Fractional Factorial Designs -- Experimental Optimization with Response Surface Methods -- References -- Index.
Sommario/riassunto	This richly illustrated book provides an overview of the design and analysis of experiments with a focus on non-clinical experiments in the life sciences, including animal research. It covers the most common aspects of experimental design such as handling multiple treatment factors and improving precision. In addition, it addresses experiments with large numbers of treatment factors and response surface methods for optimizing experimental conditions or biotechnological yields. The book emphasizes the estimation of effect sizes and the principled use of statistical arguments in the broader scientific context. It gradually transitions from classical analysis of variance to modern linear mixed models, and provides detailed information on power analysis and sample size determination, including 'portable power' formulas for making quick approximate calculations. In turn, detailed discussions of

several real-life examples illustrate the complexities and aberrations that can arise in practice. Chiefly intended for students, teachers and researchers in the fields of experimental biology and biomedicine, the book is largely self-contained and starts with the necessary background on basic statistical concepts. The underlying ideas and necessary mathematics are gradually introduced in increasingly complex variants of a single example. Hasse diagrams serve as a powerful method for visualizing and comparing experimental designs and deriving appropriate models for their analysis. Manual calculations are provided for early examples, allowing the reader to follow the analyses in detail. More complex calculations rely on the statistical software R, but are easily transferable to other software. Though there are few prerequisites for effectively using the book, previous exposure to basic statistical ideas and the software R would be advisable.

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