

1. Record Nr.	UNINA9910580147003321
Autore	Sneyd James
Titolo	Mathematics and Statistics for Science // by James Sneyd, Rachel M. Fewster, Duncan McGillivray
Pubbl/distr/stampa	Cham : , : Springer International Publishing : , : Imprint : Springer, , 2022
ISBN	3-031-05318-4
Edizione	[1st ed. 2022.]
Descrizione fisica	1 online resource (952 pages)
Collana	Mathematics and Statistics Series
Disciplina	507.2 510
Soggetti	Mathematics Statistics General Mathematics Applications of Mathematics Statistics in Engineering, Physics, Computer Science, Chemistry and Earth Sciences
Lingua di pubblicazione	Inglese
Formato	Materiale a stampa
Livello bibliografico	Monografia
Nota di bibliografia	Includes bibliographical references and index.
Nota di contenuto	Part I Units and Measurement -- 1 Units -- 2 Measurement, rounding and uncertainty -- Part II Functions and Complex Numbers -- 3 Functions -- 4 Exponential and log functions -- 5 Periodic functions -- 6 Linearising functions -- 7 Complex numbers -- Part III Vectors, Matrices and Linear Systems -- 8 Vectors -- 9 Matrices -- 10 Systems of linear equations -- 11 Solving systems of linear equations using matrices -- Part IV Differentiation: Functions of One Variable -- 12 Limits -- 13 Differentiation as a limit -- 14. Differentiation in practice -- 15 Numerical differentiation -- 16 Implicit differentiation -- 17 Maxima and minima -- Part V Differentiation: Functions of Multiple Variables -- 18 Functions of multiple variables -- 19 Partial derivatives -- 20 Extreme of functions of two (or more) variables -- Part VI Integration -- 21 The area under a curve -- 22 Calculating antiderivatives and areas -- 23 Integration techniques -- 24 Numerical integration -- Part VII Differential Equations -- 25 First-order ordinary differential equations -- 26 Numerical solutions of differential equations -- Part VIII Probability -- 27 Probability foundations -- 28

Random variables -- 29 Binomial distribution -- 30 Conditional probability -- 31 Total probability rule -- Part IX Statistical inference -- 32 Hypothesis test -- 33 Hypothesis testing in practice -- 34 Estimation and likelihood -- Part X Discrete Probability Distributions -- 35 Simulation and visualisation -- 36 Mean -- 37 Variance -- 38 Discrete probability models -- Part XI Continuous Probability Distributions -- 39 Continuous random variables -- 40 Common continuous probability models -- 41 Normal distribution and inference -- Part XII Linear Regression -- 42 Fitting linear functions: theory and practice -- 43 Quantifying relationships -- References -- Index.

Sommario/riassunto

Mathematics and statistics are the bedrock of modern science. No matter which branch of science you plan to work in, you simply cannot avoid quantitative approaches. And while you won't always need to know a great deal of theory, you will need to know how to apply mathematical and statistical methods in realistic scenarios. That is precisely what this book teaches. It covers the mathematical and statistical topics that are ubiquitous in early undergraduate courses, but does so in a way that is directly linked to science. Beginning with the use of units and functions, this book covers key topics such as complex numbers, vectors and matrices, differentiation (both single and multivariable), integration, elementary differential equations, probability, random variables, inference and linear regression. Each topic is illustrated with widely-used scientific equations (such as the ideal gas law or the Nernst equation) and real scientific data, often taken directly from recent scientific papers. The emphasis throughout is on practical solutions, including the use of computational tools (such as Wolfram Alpha or R), not theoretical development. There is a large number of exercises, divided into mathematical drills and scientific applications, and full solutions to all the exercises are available to instructors. Mathematics and Statistics for Science covers the core methods in mathematics and statistics necessary for a university degree in science, highlighting practical solutions and scientific applications. Its pragmatic approach is ideal for students who need to apply mathematics and statistics in a real scientific setting, whether in the physical sciences, life sciences or medicine.
