



# Physical Mathematics

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Unique in its clarity, examples and range, Physical Mathematics explains as simply as possible the mathematics that graduate students and professional physicists need in their courses and research. The author illustrates the mathematics with numerous physical examples drawn from contemporary research. In addition to basic subjects such as linear algebra, Fourier analysis, complex variables, differential equations and Bessel functions, this textbook covers topics such as the singular-value decomposition, Lie algebras, the tensors and forms of general relativity, the central limit theorem and Kolmogorov test of statistics, the Monte Carlo methods of experimental and theoretical physics, the renormalization group of condensed-matter physics and the functional derivatives and Feynman path integrals of quantum field theory.

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#### Review

"Cahill has given us a concise and mathematically clear text, one that adds many contemporary topics to a classic selection."

R. Glauber, Harvard University

"I am impressed by the extremely clear and direct style with which this book has been written. I am sure that today's PhD students, advanced undergraduates and researchers in physics will derive great benefit from using this book. The author has distilled his experience and obvious enjoyment of the subject, and presented mathematics in a remarkably human and accessible form."

David Waxman, Fudan University

"Professor Kevin Cahill's book collects and presents the mathematical methods of physics succinctly, and will be much welcomed by students and researchers alike."

A. Zee, University of California at Santa Barbara

"This book provides a comprehensive coverage of the mathematics necessary for advanced study in physics. The key notions are presented concisely and accurately with a wealth of beautiful examples borrowed from physics, biophysics and probability theory. The inclusion of advanced topics such as differential forms and group theory makes this book a most useful resource for graduate students and researchers in theoretical physics."

Alain Comtet, Université Pierre et Marie Curie

"The book should be very useful as an up-to-date text for either a one-semester or one-year course in mathematical physics at the graduate level. The instructor can choose the chapters to be covered in a one-semester course, and the entire book is suitable to be treated in a course of an entire year ... researchers in physics will find the book useful as a reference tool."

Don Lichtenberg, American Journal of Physics

#### About the Author

Kevin Cahill is Professor of Physics and Astronomy at the University of New Mexico. He has done research at NIST, Saclay, Ecole Polytechnique, Orsay, Harvard University, NIH, LBL and SLAC, and has worked in quantum optics, quantum field theory, lattice gauge theory and biophysics. Physical Mathematics is based on courses taught by the author at the University of New Mexico and at Fudan University in Shanghai.

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