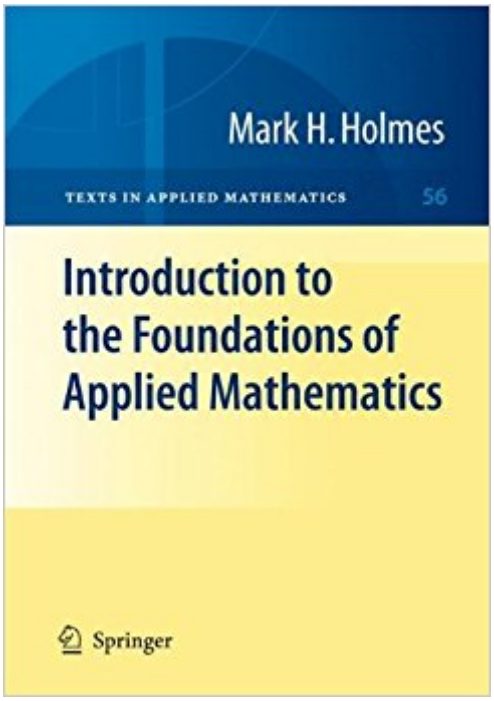
Introduction To The Foundations Of Applied Mathematics (Texts In Applied Mathematics)



Synopsis

FOAM. This acronym has been used for over ?fty years at Rensselaer to designate an upper-division course entitled, Foundations of Applied Ma- ematics. This course was started by George Handelman in 1956, when he came to Rensselaer from the Carnegie Institute of Technology. His objective was to closely integrate mathematical and physical reasoning, and in the p- cess enable students to obtain a qualitative understanding of the world we live in. FOAM was soon taken over by a young faculty member, Lee Segel. About this time a similar course, Introduction to Applied Mathematics, was introduced by Chia-ChÃ¢â ¬â„¢iao Lin at the Massachusetts Institute of Technology. Together Lin and Segel, with help from Handelman, produced one of the landmark textbooks in applied mathematics, Mathematics Applied to - terministic Problems in the Natural Sciences. This was originally published in 1974, and republished in 1988 by the Society for Industrial and Applied Mathematics, in their Classics Series. This textbook comes from the author teaching FOAM over the last few years. In this sense, it is an updated version of the Lin and Segel textbook.

Book Information

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Customer Reviews

From the reviews:Ã¢â ¬Å“This work by Holmes (RPI) is a thorough overview of classical analysis/differential equations-based applied mathematics (not statistics or discrete mathematics). Ã¢â ¬Â¦ This is a wonderful, well-written book that should be in every academic library. Includes many examples, 126 references, and 221 exercises. Summing Up: Highly recommended.

Upper-division undergraduates, graduate students, researchers, and faculty.Ã¢â ¬Â• (J. D. Fehribach, Choice, Vol. 47 (8), April, 2010)Ã¢â ¬Å“The goal of this book is to introduce the mathematical tools needed for analyzing and deriving mathematical models. Ã¢â ¬Â¦ Holmes is able to integrate the theory with application in a very nice way providing an excellent book on applied mathematics. Ã¢â ¬Â¦ One of the best features of the book is the abundant number of exercises found at the end of each chapter. Ã¢â ¬Â¦ I think this is a great book, and I recommend it for scholarly purposes by students, teachers, and researchers.Ã¢â ¬Â• (Joe Latulippe, The Mathematical Association of America, December, 2009)Ã¢â ¬Å“One of the primary objectives of the book is to use mathematics to derive a fundamental understanding of the derivation, analysis and interpretation of mathematical models. Ã¢â ¬Â¦ The book contains a wide spectrum of exercises and detailed illustrations. It addresses students and researchers interested in mathematical modeling in physics, engineering and applied sciences. It can also be recommended as a textbook at the graduate student level.Ã¢â ¬Â•Ã Â- Ã Â- Ã Â- (Iuliana Oprea, Mathematical Reviews, Issue 2011 c)Ã¢â ¬Å“HolmesÃ¢â ¬â„¢s text Ã¢â ¬Â¦ should be accessible to both mathematicians and science and engineering audiences at the senior or beginning graduate level. Ã¢â ¬Â¦ it establishes the tools of applied mathematics and the underlying concepts of model development independent of a specific application. Ã¢â ¬Â¦ I strongly recommend this book for an introductory senior or graduate level course in applied mathematics.Ã¢â ¬Â• (J. David Logan, SIAM Review, Vol. 52 (1), 2010)

The objective of this textbook is the construction, analysis, and interpretation of mathematical models to help us understand the world we live in. Rather than follow a case study approach it develops the mathematical and physical ideas that are fundamental in understanding contemporary problems in science and engineering. Science evolves, and this means that the problems of current interest continually change. What does not change as quickly is the approach used to derive the relevant mathematical models, and the methods used to analyze the models. Consequently, this book is written in such a way as to establish the mathematical ideas underlying model development independently of a specific application. This does not mean applications are not considered, they are, and connections with experiment are a staple of this book. The book, as well as the individual chapters, is written in such a way that the material becomes more sophisticated as you progress. This provides some flexibility in how the book is used, allowing consideration for the breadth and depth of the material covered. Moreover, there are a wide spectrum of exercises and detailedÃ Â illustrations that significantly enrich the material. Students and researchers interested in

mathematical modelling in mathematics, physics, engineering and the applied sciences will find this text useful.

I took a one-semester upper-level undergraduate / graduate course in mathematical modeling that used this textbook. We covered the material in chapters 1 (dimensional analysis), 2 (perturbation methods), 3 (kinetics), and 4 (diffusion) and we talked a wee bit about chapter 5 (traffic flows). In general, this is a well-written, well-structured textbook with clear examples. The author uses direct and plain language to communicate ideas. To use this textbook, a student really must have the prerequisite knowledge listed in the introduction written by Holmes (that is, a solid understanding of Taylor's theorem, ordinary differential equations, and linear algebra). Parts of the example problems leave out steps that a student with that background would know how to perform. I think this is a good thing because it forced me to work the examples through myself and keep a pencil in hand while reading, but I really did need to rely on knowledge I acquired earlier. Also, like most first-edition textbooks, this book had some minor typos (some incorrect kinetic equations in chapter 3, for example) -- the kind of stuff that you just have to keep an eye out for as a reader of a new textbook. Overall, a solid effort, well-written, one of the better textbooks I've read.

Excellent overview of many topics in applied mathematics. A few typos, but the author has nearly all of them on his webpage and they are by in large minor. A true introduction: students of mathematics or the natural sciences should be able to tackle the material with little to no background beyond basic 1st or 2nd year undergraduate mathematics.

The book is brand new and in good condition.

in Pure & Applied Mathematics) Linear Algebra: An Introduction to Abstract Mathematics (Undergraduate Texts in Mathematics) Foundations of Differentiable Manifolds and Lie Groups (Graduate Texts in Mathematics) (v. 94) Foundations of Differentiable Manifolds and Lie Groups (Graduate Texts in Mathematics) Fractal Geometry and Dynamical Systems in Pure and Applied Mathematics I: Fractals in Pure Mathematics (Contemporary Mathematics) Rarefied Gas Dynamics: From Basic Concepts to Actual Calculations (Cambridge Texts in Applied Mathematics) Differential Equations and Dynamical Systems (Texts in Applied Mathematics) Modeling and Simulation in Medicine and the Life Sciences (Texts in Applied Mathematics) Numerical Analysis: Mathematics of Scientific Computing (The Sally Series; Pure and Applied Undergraduate Texts, Vol. 2) The Mathematical Theory of Finite Element Methods (Texts in Applied Mathematics) Numerical Partial Differential Equations: Finite Difference Methods (Texts in Applied Mathematics) Partial Differential Equations with Numerical Methods (Texts in Applied Mathematics) Numerical Partial Differential Equations: Conservation Laws and Elliptic Equations (Texts in Applied Mathematics) (v. 33)