A Course in Mathematical Modeling (Mathematical Association of America Textbooks)

By Douglas D. Mooney, Randall Swift

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The emphasis of this book lies on the teaching of mathematical modeling rather than simply presenting models. To this end the book starts with the simple discrete exponential growth model as a building block, and successively refines it. This involves adding variable growth rates, multiple variables, fitting growth rates to data, including random elements, testing exactness of fit, using computer simulations and moving to a continuous setting. No advanced knowledge is assumed of the reader, making this book suitable for elementary modeling courses. The book can also be used to supplement courses in linear algebra, differential equations, probability theory and statistics.

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Editorial Review

From the Publisher
Students taking a course based on this book should have some mathematical maturity, but will need little advanced knowledge. The book presents more advanced topics on an as-needed basis and serves to show how the different topics of undergraduate mathematics can be used together to solve problems. The course presents elements of discrete dynamical systems, basic probability theory, differential equations, matrix algebra, stochastic processes, curve fitting, statistical testing, and regression analysis. Computer analysis is extensively used in conjunction with these topics. You can also use this book if you are seeking applications to supplement a course in linear algebra, differential equations, difference equations, probability theory, or statistics.

About the Author
Douglas Mooney's interest in how the physical world works led him to study physics as an undergraduate, and his interest in the mathematics behind physics led him to obtain his MA and PhD degrees in mathematics from the University of Kansas. A 1993 NSF-sponsored workshop in modeling biological resource issues at the University of Montana ignited Mooney's interest in applications and sparked an interest in biological modeling. It also led him to team up with colleague Randall Swift to develop the modeling course at Western Kentucky University that is the basis of this textbook. Douglas Mooney has also published a number of refereed papers on extensions and ordered extensions of topological spaces. He currently works at The Center for Healthcare Industry Performance Studies in Columbus, Ohio.

Randall Swift earned his PhD from the University of California, Riverside, and is currently associate professor of mathematics at Western Kentucky University in Bowling Green, Kentucky. He has published many refereed papers on harmonizable and other nonstationary processes, appled mathematics, and modeling. In 1997 he received the Western Kentucky University Ogden College of Science, Technology, and Health award for outstanding faculty research. One of his goals as a teacher has been to develop relevant applications of technology for use in the mathematics courses he teaches. This textbook is the result of that continuing effort.

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