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A quarter of Taiwanese companies are well into their AI journey

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SMU Professor Gets $315K Grant To Create New Disaster Evacuation Models

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Four Key Differences Between Mathematical Optimization And Machine Learning

For Ontario's schools to reopen in September without producing a spike in COVID-19 cases may require sustained mask-wearing, especially among younger students, medical experts say, while high schools ...

What needs to happen before Ontario students return to class?

It is ubiquitous, yet it remains obscured, invoked all too often as an otherworldly, almost godlike invention, rather than the product of an iterative series of mathematical equations ... A.I. and ...

Guide to Mathematical Modelling is a book designed for students and professionals interested in an introduction to mathematical modelling. It explains the concept of a mathematical model, examines why mathematical modelling is important, and presents several different modelling situations, ranging from simple to very complex. The book also discusses communication and the art of presenting and reporting on modelling activities.

Almost every year, a new book on mathematical modeling is published, so, why another? The answer springs directly from the fact that it is very rare to find a book that covers modeling with all types of differential equations in one volume. Until now. Mathematical Modeling: Models, Analysis and Applications covers modeling with all kinds of differential equations, namely ordinary, partial, delay, and stochastic. The book also contains a chapter on discrete modeling, consisting of differential equations, making it a complete textbook on this important skill needed for the study of science, engineering, and social sciences. More than just a textbook, this how-to guide presents tools for mathematical modeling and analysis. It offers a wide-ranging overview of mathematical ideas and techniques that provide a number of effective approaches to problem solving. Topics covered include spatial, delayed, and stochastic modeling. The text provides real-life examples of discrete and continuous mathematical modeling scenarios. MATLAB® and Mathematica® are incorporated throughout the text. The examples and exercises in each chapter can be used as problems in a project. Since mathematical modeling involves a diverse range of skills and tools, the author focuses on techniques that will be of particular interest to engineers, scientists, and others who use models of discrete and continuous systems. He gives students a foundation for understanding and using the mathematics that is the basis of computers, and therefore a foundation for success in engineering and science streams.

Thirty years ago, biologists could get by with a rudimentary grasp of mathematics and modeling. Not so today. In seeking to answer fundamental questions about how biological systems function and change over time, the modern biologist is as likely to rely on sophisticated mathematical and computer-based models as traditional fieldwork. In this book, Sarah Otto and Troy Day provide biology students with the tools necessary to both interpret models and to build their own. The book starts at an elementary level of mathematical modeling, assuming that the reader has had high school mathematics and first-year calculus. Otto and Day then gradually build in depth and complexity, from classic models in ecology and evolution to more intricate class-structured and probabilistic models. The authors provide primers with instructive exercises to introduce readers to the more advanced subjects of linear algebra and probability theory. Through examples, they describe how models have been used to understand such topics as the spread of HIV, chaos, the age structure of a country, speciation, and extinction. Ecologists and evolutionary biologists today need enough mathematical training to be able to assess the power and limits of biological models and to develop theories and models themselves. This innovative book will be an indispensable guide to the world of mathematical models for the next generation of biologists. A how-to guide for developing new mathematical models in biology Provides step-by-step recipes for constructing and analyzing models Interesting biological applications Explores classical models in ecology and evolution Questions at the end of every chapter Primers cover important mathematical topics Exercises with answers Appendixes summarize useful rules Labs and advanced material available

Addressed to engineers, scientists, and applied mathematicians, this book explores the fundamental aspects of mathematical modelling in applied sciences and related mathematical and computational methods. After providing the general framework needed for mathematical modelling-definitions, classifications, general modelling procedures, and validation methods-the authors deal with the analysis of discrete models. This includes modelling methods and related mathematical methods. The analysis of models is defined in terms of ordinary differential equations. The analysis of continuous models, particularly models defined in terms of partial differential equations, follows. The authors then examine inverse type problems and stochastic modelling. Three appendices provide a concise guide to functional analysis, approximation theory, and probability, and a diskette included with the book includes ten scientific programs to introduce the reader to scientific computation at a practical level.

This text presents a wide variety of common types of models found in other mathematical modeling texts, as well as some new types. However, the models are presented in a very unique format. A typical

section begins with a general description of the scenario being modeled. The model is then built using the appropriate mathematical tools. Then it is implemented and analyzed in Excel via step-by-step instructions. In the exercises, we ask students to modify or refine the existing model, analyze it further, or adapt it to similar scenarios.

A concise guide to mathematical modeling and analysis of pharmacokinetic data, this book contains valuable methods for maximizing the information obtained from given data. It is an ideal resource for scientists, scholars, and advanced students.

Mathematical modelling is often spoken of as a way of life, referring to habits of mind and to dependence on the power of mathematics to describe, explain, predict and control real phenomena. This book aims to encourage teachers to provide opportunities for students to model a variety of real phenomena appropriately matched to students' mathematical backgrounds and interests from early stages of mathematical education. Habits, misconceptions, and mindsets about mathematics can present obstacles to university students' acceptance of a "models-and-modelling perspective" at this stage of mathematics education. Without prior experience in building, interpreting and applying mathematical models, many students may never come to view and regard modelling as a way of life. The book records presentations at the ICTMA 11 conference held in Milwaukee, Wisconsin in 2003. Examines mathematical modelling as a way of life, referring to habits of mind and dependence on the power of mathematics to describe, explain, predict and control real phenomena Encourages teachers to provide students with opportunities to model a variety of real phenomena appropriately matched to students' mathematical backgrounds and interests from early stages of mathematical education Records presentations at the ICTMA 11 conference held in Milwaukee, Wisconsin in 2003

Introduction to Mathematical Oncology presents biologically well-motivated and mathematically tractable models that facilitate both a deep understanding of cancer biology and better cancer treatment designs. It covers the medical and biological background of the diseases, modeling issues, and existing methods and their limitations. The authors introduce mathematical and programming tools, along with analytical and numerical studies of the models. They also develop new mathematical tools and look to future improvements on dynamical models. After introducing the general theory of medicine and exploring how mathematics can be essential in its understanding, the text describes well-known, practical, and insightful mathematical models of avascular tumor growth and mathematically tractable treatment models based on ordinary differential equations. It continues the topic of avascular tumor growth in the context of partial differential equation models by incorporating the spatial structure and physiological structure, such as cell size. The book then focuses on the recent active multi-scale modeling efforts on prostate cancer growth and treatment dynamics. It also examines more mechanistically formulated models, including cell quota-based population growth models, with applications to real tumors and validation using clinical data. The remainder of the text presents abundant additional historical, biological, and medical background materials for advanced and specific treatment modeling efforts. Extensively classroom-tested in undergraduate and graduate courses, this self-contained book allows instructors to emphasize specific topics relevant to clinical cancer biology and treatment. It can be used in a variety of ways, including a single-semester undergraduate course, a more ambitious graduate course, or a full-year sequence on mathematical oncology.

Mathematical Modeling: Branching Beyond Calculus reveals the versatility of mathematical modeling. The authors present the subject in an attractive manner and flexibley manner. Students will discover that the topic not only focuses on math, but biology, engineering, and both social and physical sciences. The book is written in a way to meet the needs of any modeling course. Each chapter includes examples, exercises, and projects offering opportunities for more in-depth investigations into the world of mathematical models. The authors encourage students to approach the models from various angles while creating a more complete understanding. The assortment of disciplines covered within the book and its flexible structure produce an intriguing and promising foundation for any mathematical modeling course or for self-study. Key Features: Chapter projects guide more thorough investigations of the models The text aims to expand a student's communication skills and perspectives WThe widespread applications are incorporated, even includinge biology and social sciences Its structure allows it to serve as either primary or supplemental text Uses Mathematica and MATLAB are used to develop models and computations

The articles included in this book are from the ICTMA 9 conference held in Lisbon, attended by delegates from about 30 countries. This work records the 1999 Lisbon Conference of ICTMA. It contains the selected and edited content of the conference and makes a significant contribution to mathematical modelling which is the significant investigative preliminary to all scientific and technological applications from machinery to satellites and docking of space-ships. Contains the selected and edited content of the 1999 Lisbon Conference of ICTMA Makes a significant contribution to mathematical modelling, which is the significant investigative preliminary to all scientific and technological applications from machinery to satellites and docking of space-ships