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Nota di contenuto	Part I Linear Differential and Difference Equations: 1 Introduction to Linear Population Dynamics -- 2 Existence and Uniqueness of Solutions -- 3 Stability and Instability of Linear -- 4 Positivity and Perron-Frobenius's Theorem -- Part II Non-Linear Differential and Difference Equations: 5 Nonlinear Differential Equation -- 6 Omega and Alpha Limit -- 7 Global Attractors and Uniformly -- 8 Linearized Stability Principle and Hartman-Grobman's Theorem -- 9 Positivity and Invariant Sub-region -- 10 Monotone semiflows -- 11 Logistic Equations with Diffusion -- 12 The Poincare-Bendixson and Monotone Cyclic Feedback

Systems -- 13 Bifurcations -- 14 Center Manifold Theory and Center Unstable Manifold Theory -- 15 Normal Form Theory -- Part III Applications in Population Dynamics: 16 A Holling's Predator-prey Model with Handling and Searching Predators -- 17 Hopf Bifurcation for a Holling's Predator-prey Model with Handling and Searching Predators -- 18 Epidemic Models with COVID-19.

Sommario/riassunto

This book provides an introduction to the theory of ordinary differential equations and its applications to population dynamics. Part I focuses on linear systems. Beginning with some modeling background, it considers existence, uniqueness, stability of solution, positivity, and the Perron–Frobenius theorem and its consequences. Part II is devoted to nonlinear systems, with material on the semiflow property, positivity, the existence of invariant sub-regions, the Linearized Stability Principle, the Hartman–Grobman Theorem, and monotone semiflow. Part III opens up new perspectives for the understanding of infectious diseases by applying the theoretical results to COVID-19, combining data and epidemic models. Throughout the book the material is illustrated by numerical examples and their MATLAB codes are provided. Bridging an interdisciplinary gap, the book will be valuable to graduate and advanced undergraduate students studying mathematics and population dynamics.