An Introduction to Ordinary Differential Equations (Universitext)

By Ravi P. Agarwal, Donal O'Regan

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Ordinary differential equations serve as mathematical models for many exciting real world problems. This textbook organizes material around theorems and proofs, comprising of 42 class-tested lectures that effectively convey the subject in easily manageable sections.

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Editorial Review

Review

From the reviews:

"Presents a thorough treatment of the classical material traditionally covered in an advanced book on ordinary differential equations, including a number of interesting historical notes. … The authors also discuss Lyapunov functions, Green's functions comparison and separation theorems, maximum principle, Sturm-Liouville problems, Fredholm alternative, and Floquet theory. In addition, the book addresses results by Perron, Kamke, Osgood, Nagumo, Krasnoselski-Krein, and Van Kampen which are not found in some similar works. … Summing Up: Recommended. Upper-division undergraduates, graduate students, researchers, and faculty." (J. D. Fehribach, Choice, Vol. 46 (8), April, 2009)

"The textbook is devoted to a systematic and rigorous introduction to the theory of ordinary differential equations. … the practical part include numerous exercises with answers or hints. Written by two prolific leaders in the field of ordinary differential equations and nonlinear analysis, the textbook provides a very clear, well-organized and lucid introduction to ordinary differential equations, with an implicit orientation towards the most recent research topics and methods in the field and related areas." (Radu Precup, Zentralblatt MATH, Vol. 1158, 2009)

"This text book provides an excellent introduction to the subject accessible to second-year undergraduate or graduate-level students. Its structure in the form of a succession of 42 class-tested lectures makes it not only an inspiring source for self-study but gives also a good framework for the organization of course material. … a highly recommendable book for students in mathematics, sciences, or engineering as well as for teachers on college and university level." (G. Hörmann, Monatshefte für Mathematik, Vol. 159 (4), March, 2010)

From the Back Cover

This textbook provides a rigorous and lucid introduction to the theory of ordinary differential equations (ODEs), which serve as mathematical models for many exciting real-world problems in science, engineering, and other disciplines.

Key Features of this textbook:

Effectively organizes the subject into easily manageable sections in the form of 42 class-tested lectures

Provides a theoretical treatment by organizing the material around theorems and proofs

Uses detailed examples to drive the presentation

Includes numerous exercise sets that encourage pursuing extensions of the material, each with an "answers or hints" section

Covers an array of advanced topics which allow for flexibility in developing the subject beyond the basics

Provides excellent grounding and inspiration for future research contributions to the field of ODEs and related areas

This book is ideal for a senior undergraduate or a graduate-level course on ordinary differential equations. Prerequisites include a course in calculus.

Series: Universitext

Ravi P. Agarwal received his Ph.D. in mathematics from the Indian Institute of Technology, Madras, India. He is a professor of mathematics at the Florida Institute of Technology. His research interests include numerical analysis, inequalities, fixed point theorems, and differential and difference equations. He is the author/co-author of over 800 journal articles and more than 20 books, and actively contributes to over 40 journals and book series in various capacities.

Donal O'Regan received his Ph.D. in mathematics from Oregon State University, Oregon, U.S.A. He is a professor of mathematics at the National University of Ireland, Galway. He is the author/co-author of 14 books and has published over 650 papers on fixed point theory, operator, integral, differential and difference equations. He serves on the editorial board of many mathematical journals.

Previously, the authors have co-authored/co-edited the following books with Springer: *Infinite Interval Problems for Differential, Difference and Integral Equations; Singular Differential and Integral Equations with Applications; Nonlinear Analysis and Applications: To V. Lakshmikanthan on his 80ᵗʰ Birthday*. In addition, they have collaborated with others on the following titles: *Positive Solutions of Differential, Difference and Integral Equations; Oscillation Theory for Difference and Functional Differential Equations; Oscillation Theory for Second Order Linear, Half-Linear, Superlinear and Sublinear Dynamic Equations.*

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