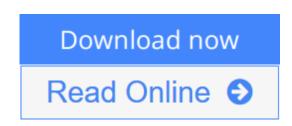# Chaotic Dynamics: Fractals, Tilings, and Substitutions (Cambridge Mathematical Textbooks)

By Geoffrey R. Goodson

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This undergraduate textbook is a rigorous mathematical introduction to dynamical systems and an accessible guide for students transitioning from calculus to advanced mathematics. It has many student-friendly features, such as graded exercises that range from straightforward to more difficult with hints, and includes concrete applications of real analysis and metric space theory to dynamical problems. Proofs are complete and carefully explained, and there is opportunity to practice manipulating algebraic expressions in an applied context of dynamical problems. After presenting a foundation in one-dimensional dynamical systems, the text introduces students to advanced subjects in the latter chapters, such as topological and symbolic dynamics. It includes two-dimensional dynamics, Sharkovsky's theorem, and the theory of substitutions, and takes special care in covering Newton's method. Mathematica code is available online, so that students can see implementation of many of the dynamical aspects of the text.

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Review
Advance praise: 'This remarkable book provides a thoroughly field-tested way of teaching analysis while introducing dynamical systems. Combining lightness with rigor, it motivates and applies a wide range of subjects in the theory of metric spaces as it explores a broad variety of topics in dynamics.' Boris Hasselblatt, Tufts University, Massachusetts

Advance praise: 'This is a most impressive book. The author presents a range of topics which are not usually included in a book at this level (for example Sharkovsky's theorem, fractals, substitutions). The writing is clear and there are exercises of varying difficulty. A fine undergraduate text, which will also be of interest to graduate students and researchers in dynamics.' Joseph Auslander, Professor Emeritus of Mathematics, University of Maryland

Advance praise: 'This carefully written book introduces the student to a wealth of examples in dynamical systems, including several modern topics such as complex dynamics, topological dynamics and substitutions.' Cesar E. Silva, Williams College, Massachusetts

Advance praise: 'More rigorous than other undergraduate texts but less daunting than graduate books, this book is perfect for a core course on chaotic dynamic systems for undergraduates in their junior or senior year. Thoughtful, clear, and written with just the right amount of detail, Goodson develops the necessary tools required for an in-depth study of dynamical systems.' Alisa DeStefano, College of the Holy Cross, Massachusetts

About the Author
Geoffrey R. Goodson is Professor of Mathematics at Towson University, Maryland. He previously served on the faculty of the University of Witwatersrand and the University of Cape Town. His research interests include dynamical systems, ergodic theory, matrix theory, and operator theory. He has published more than thirty papers, and taught numerous classes on dynamical systems.

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