

Computational Thinking for Life Scientists

Computational thinking is increasingly gaining importance in modern biology, due to the unprecedented scale at which data are nowadays produced. Bridging the cultural gap between the biological and computational sciences, this book serves as an accessible introduction to computational concepts for students in the life sciences. It focuses on teaching algorithmic and logical thinking, rather than just the use of existing bioinformatics tools or programming. Topics are presented from a biological point of view, to demonstrate how computational approaches can be used to solve problems in biology such as biological image processing, regulatory networks, and sequence analysis. The book contains a range of pedagogical features to aid understanding, including real-world examples, in-text exercises, end-of-chapter problems, color-coded Python code, and “code explained” boxes. User-friendly throughout, *Computational Thinking for Life Scientists* promotes the thinking skills and self-efficacy required for any modern biologist to adopt computational approaches in their research with confidence.

Benny Chor was a Professor in Computer Science (CS) at Tel-Aviv University, Israel, and head of the School of Computer Science at Tel-Aviv University between 2018 and 2020. His research interests spanned over computational biology, cryptography, and CS and math education, and he was renowned for his excellence in teaching. Benny passed away in June 2021.

Amir Rubinstein is a lecturer in Computer Science at Tel-Aviv University, Israel. His activity surrounds computer science education, and innovation and research in teaching and learning CS. He has received numerous awards for outstanding teaching.

“An excellent and very gentle introduction to bioinformatics for biologists. In contrast to books that focus on algorithms and ignore programming or focus on programming without explaining algorithms, this book is a perfect blend of both algorithms and programming!”

Pavel Pevzner, Ronald R. Taylor Chair and Distinguished Professor of Computer Science,
University of California at San Diego

“The ability to extract quantitative information from data is an essential skill for the modern biologist. In order to maximize the benefit of programming, use of existing computational tools and effective collaboration with computational scientists, biologists must be able to ‘think computationally’ by gaining a more algorithmic and logical thinking. In their book, Benny Chor and Amir Rubinstein introduce fundamental computational concepts to life sciences students. Each chapter covers a distinct computational idea motivated by a concrete biological challenge. Questions embedded throughout each chapter and code examples provide hands-on practice. Similarly to the way in which chemistry is perceived as being essential to the biology curriculum, computational thinking should also be considered a part of the modern biologist's basic training. This excellent book is essential reading for undergraduate life sciences students.”

Assaf Zaritsky, Ben-Gurion University of the Negev, Israel

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In loving memory of Benny Chor (1956–2021), my mentor,
role model, and friend.

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