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## Preface

The rapid expansion of synthetic biology showing exponentially growing publication numbers is based on the design and construction of synthetic gene networks opening many new avenues in fundamental and applied research.

In this book, we provide comprehensive information to design and construct synthetic gene networks in different host backgrounds. In the first section, we focus on design concepts to devise synthetic gene networks and how mathematical models can be applied to the predictable engineering of desired network features while taking into account inherent cellular imponderability like noise and stochastic fluctuations. The second section highlights the construction and validation of biologic tools ranging from engineering the codon usage to the development and validation of sophisticated RNA-based switches. In the third section, strategies are described to optimize and streamline the host cell for optimized network performance. The last section forms a synthesis of the previous ones by describing how optimally designed gene networks can be implemented in a large variety of host cells ranging from bacteria over yeast and insect cells to plant and mammalian cell culture.

This book written by designated experts in synthetic biology represents an encyclopedic resource for biologists, engineers, and computer scientists already established or just entering into the rapidly expanding field of synthetic biology and therefore serves as a positive feedback loop for further promoting the exponential growth of synthetic biology.

*Freiburg, Germany*  
*Basel, Switzerland*

*Wilfried Weber*  
*Martin Fussenegger*



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