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Abstract

The book includes basic elements of Biology and Genetics presented in a way that makes it easier for engineers and other disciplines that do not have the basic biological knowledge to understand the basics and to be introduced to areas such as cell factory, omics technologies (genomics, proteomics, metabolomics, lipidomics), high throughput technologies etc. The concept of Systems Biology is presented and the elements that differentiate it from classical biology are highlighted, such as the quantified study of bioprocesses as integrated systems and the need for its support from bioinformatics and omics technologies. The systemic approach of organisms, cells and the entire biological structure (metabolic networks, protein synthesis, transcriptional process etc.) highlights the relationships that govern its elements and the need for their mathematical formulation that allows the possibility of predicting functions and designing new ones. In addition, the techniques and methods used in the Systemic study of

biological systems such as the bioinformatics tools, as well as the modelling methods of cellular function are presented with specific examples. Finally, new applications based on systemic approaches are described and define the concept of "Systemic Biotechnology". The fundamental role of Metabolic Engineering in the development of Systemic and Synthetic Biology is also presented. Synthetic Biology (SB) and how it arose from the development of the systemic approach to biological systems is also described. The connection of Biology with Engineering and the rational management of the cell and mechanisms through the control of the flow of genetic information are attempted. Concepts such as the synthesis of "new life" from simple "biological spare parts", what these are, what is meant by "orthogenicity" of cellular functions, "minimal cell" and "cellular chassis" are analyzed. Finally, the development of "Synthetic Biotechnology" is described with examples in areas from health and food to the environment.

