

BIOLOGICAL COMPLEX SYSTEMS

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SYLLABUS

Chapter 1: Biological organisms under the lens of Complexity Science. A fascinating human journey to discovering the secrets of nature.

Chapter 2: The Irreversibility experienced by living and inanimate matter is explained by the 2nd principle of Thermodynamics.

Chapter 3: Living beings are constantly out-of-equilibrium. The principles of out-of-equilibrium thermodynamics.

Chapter 4: Living beings are non-linear dynamical systems. Linear analysis of the stability of the stationary states. Bifurcations.

Chapter 5: The emergence of temporal order in ecosystems.

Chapter 6: The emergence of temporal order in the economy.

Chapter 7: The emergence of temporal order in living beings.

Chapter 8: The emergence of temporal self-organization in a chemical laboratory.

Chapter 9: The emergence of order in space: Chemical Waves, Turing patterns, and periodic precipitations.

Chapter 10: The emergence of chaos in time

Chapter 11: Chaos in space: The fractals

Chapter 12: The features of Complex Systems and Epistemological Complexity

TEXTBOOK:

P. L. Gentili, "Untangling Complex Systems: A Grand Challenge for Science", CRC Press (FL, USA), 2018.