Contents

Preface —— IX

Overview —— XI

Part I: **Theories**

Eva Déli
The role of thermodynamics in the evolution of biological complexity —— 5

Jochen Mau
Structure-function-energy, I: Structure —— 29

Idan Sorin, Michael Zaks, and Alexander Nepomnyashchy
Seasonal forcing in rock–paper–scissors population dynamics —— 43

Part II: **Person's life-sphere**

Natalia Levashova, Evgenii Generalov, Alexey Goltsov, and Alla Sidorova
Three-dimensional spatiotemporal dynamics of tumor growth —— 75

Aleksey Lutsenko and Alla Sidorova
Quantitative assessment of chirality of supersecondary protein structures —— 93

Denis Shpigun, Alla Sidorova, and Pavel Levashov
The relationship between chirality of secondary helical structures and the stability of lysozyme and myoglobin —— 111

Pavel Levashov
Mathematics of supercooperativity in biochemistry —— 123

Alexander Khrulenko and Fedor Popko
Modeling circulatory substance dynamics with integrated hepatic clearance —— 139

Alexander N. Churilov and John G. Milton
Modeling pulsatile and diurnal rhythmicity of free and total cortisol —— 153

Anastasiia Mozokhina and Vitaly Volpert
Investigation of virus infection progression in tissue with reaction–diffusion models —— 177

Masoud Saade, Samiran Ghosh, Malay Banerjee, and Vitaly Volpert
Recent developments in epidemiological delay models —— 205

Jochen Mau and Wenhua Tian
Shanghai 2022 outbreak of SARS-CoV-2 omicron revisited —— 243

Alla Sidorova and Natalia Levashova
A model of territorial development of cities as autowave self-organization of conjugated natural and anthropogenic subsystems —— 291

Emmanuelle Augeraud-Véron, Arnaud Ducrot, and Ousmane Seydi
Game-theoretic optimization in spatial control of invasive plants —— 313

Pierre Auger, Ali Moussaoui, Tri Nguyen-Huu, and Doanh Nguyen-Ngoc
Enhancing maximum sustainable yield in multisite single-species and predator–prey fisheries —— 345

Wenhua Tian
The effects of social support to frailty of elderly people in a longevity township of China —— 367

Part III: **Technologies**

Arthur I. Sabirov and Tatyana V. Zakharova
Solving the magnetoencephalography inverse problem for continuously distributed source models —— 387

Alexei Shishkin and Stepan Denisov
Classification of intracytoplasmic sperm injection videos —— 403

Pavel V. Panov and Tatyana V. Zakharova
Bioequivalence testing based on the Kullback–Leibler divergence —— 421

Part IV: **Clinical medicine**

Evgenii N. Khailov, Nikolay L. Grigorenko, and Ellina V. Grigorieva
Optimization of adaptive treatment protocols for melanoma patients —— 437

Index —— 465