## Contents

Preface vii

- 1 What Is Biological Intelligence? 1
- 2 Types of Behavior 9
- 3 Motor Strategies and Biomechanical Advantages for Diverse Environments 17
- 4 Identified Neurons and Neuroanatomy 25
- 5 Physiological Models of Neurons 33
- 6 Nonlinear Dynamical Models of Neurons 71
- 7 Synaptic Physiology and Networks 79
- 8 Neuronal Integration 113
- 9 Neuromodulation and Behavioral States 127
- 10 Motor Networks and Central Pattern Generators 151
- 11 Command Neurons 165
- 12 Coordinating Systems and Gaits 173
- 13 Sensory Neurons and Sensory Coding 179
- 14 Physiology of Muscle 195
- 15 Types of Motor Systems 203
- 16 Proprioceptive Reflexes 211
- 17 Spatial Orientation—Taxes, Kineses, and Exteroceptive Reflexes 221

- 18 Behavioral Choice and Hierarchies 231
- 19 Behavioral Sequencing 237
- 20 Biomimetic Robots 247
- 21 Power Supplies and Charging 255
- 22 Control Hardware, Morphing Bodies, and Hulls 265
- 23 Synthetic Biology and Biohybrid Sensors 279
- 24 Myomorphic Actuators 283
- 25 Acoustic Communications and Localization 291
- 26 Supervision and Motivation 297
- 27 Reactive Autonomy and Adaptive Sequencing 303
- 28 Stigmergy and Cooperative Behavior 309
- 29 Biological Intelligence 313

References 319 Index 345