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Titolo	Dynamics of Neural Networks : A Mathematical and Clinical Approach / / by Michel J.A.M. van Putten
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Descrizione fisica	1 online resource (XVII, 259 p. 138 illus., 40 illus. in color.)
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Soggetti	Biophysics Biomedical engineering Neurosciences Nonlinear Optics Neurology Signal processing Biomedical Engineering and Bioengineering Neuroscience Signal, Speech and Image Processing
Lingua di pubblicazione	Inglese
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Nota di contenuto	Part I Physiology of neurons and synapses: Electrophysiology of the Neuron -- Synapses -- Part II Dynamics: Dynamics in one-dimension -- Dynamics in two-dimensional systems -- Part III Networks: Prototype neural networks -- Part IV The electroencephalogram: Basics of the EEG -- Neural mass modeling of the EEG -- Part V Pathology: Hypoxia and neuronal function -- Seizures and Epilepsy -- Part VI Neurostimulation: Neurostimulation -- Epilogue.
Sommario/riassunto	This book treats essentials from neurophysiology (Hodgkin–Huxley equations, synaptic transmission, prototype networks of neurons) and related mathematical concepts (dimensionality reductions, equilibria, bifurcations, limit cycles and phase plane analysis). This is subsequently applied in a clinical context, focusing on EEG generation, ischaemia, epilepsy and neurostimulation. The book is based on a graduate course taught by clinicians and mathematicians at the

Institute of Technical Medicine at the University of Twente. Throughout the text, the author presents examples of neurological disorders in relation to applied mathematics to assist in disclosing various fundamental properties of the clinical reality at hand. Exercises are provided at the end of each chapter; answers are included. Basic knowledge of calculus, linear algebra, differential equations and familiarity with MATLAB or Python is assumed. Also, students should have some understanding of essentials of (clinical) neurophysiology, although most concepts are summarized in the first chapters. The audience includes advanced undergraduate or graduate students in Biomedical Engineering, Technical Medicine and Biology. Applied mathematicians may find pleasure in learning about the neurophysiology and clinic essentials applications. In addition, clinicians with an interest in dynamics of neural networks may find this book useful, too.