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Special Issue on Computational Modelling of Cell and Tissue Processes and Function Oct 03 2021
Neural Networks: Computational Models and Applications Sep 21 2020 Neural Networks: Computational Models and Applications presents important theoretical and practical issues in neural networks, including the learning algorithms of feed-forward neural networks, various dynamical properties of recurrent neural networks, winner-take-all networks and their applications in broad manifolds of computational intelligence: pattern recognition, uniform approximation, constrained optimization, NP-hard problems, and image segmentation. The book offers a compact, insightful understanding of the broad and rapidly growing neural networks domain.
Computational Models in Political Economy Mar 16 2020 The use of innovative computational models in political economic research as a complement to traditional analytical methodologies.
Computational Modelling of Nanoparticles Nov 04 2021 Computational Modelling of Nanoparticles highlights recent advances in the power and versatility of computational modelling, experimental techniques, and how new progress has opened the door to a more detailed and comprehensive understanding of the world of nanomaterials. Nanoparticles, having dimensions of 100 nanometers or less, are increasingly being used in applications in medicine, materials and manufacturing, and energy. Spanning the smallest sub-nanometer nanoclusters to nanocrystals with diameters of 10s of nanometers, this book provides a state-of-the-art overview on how computational modelling can provide, often otherwise unobtainable, insights into nanoparticulate structure and properties. This comprehensive, single resource is ideal for researchers who want to start/improve their nanoparticle modelling efforts, learn what can be (and what cannot) achieved with computational modelling, and understand more clearly the value and details of computational modelling efforts in their area of research.
Concrete and Concrete Structures Aug 21 2020 Concrete is a composite material that is composed of coarse and fine construction aggregate bonded together with fluid cement that hardens over time. The construction aggregate is mixed with water and dry cement, to form fluid slurry which is easy to pour and mold into shapes. The cement forms a hard matrix by reacting with water and other ingredients. This matrix binds together the materials into a durable stone-like material which has many uses. Additives like pozzolans can be added in the mixture in order to improve its physical properties. Concrete is the most frequently used building material. It must be produced carefully since it is time sensitive. This book elucidates the concepts and innovative models around prospective developments with respect to concrete and concrete structures. The readers would gain knowledge that would broaden their perspective about this field. Coherent flow of topics, student-friendly language and extensive use of examples make this book an invaluable source of knowledge.
Computational Modelling of Historical Constructions Oct 11 2019
Computational Modeling of Genetic and Biochemical Networks Jan 26 2021 How new modeling techniques can be used to explore functionally relevant molecular and cellular relationships.
Computational Modelling of Nanomaterials Jun 11 2022 Due to their small size and their dependence on very fast phenomena, nanomaterials are ideal systems for computational modelling. This book provides an

overview of various nanosystems classified by their dimensions: 0D (nanoparticles, QDs, etc.), 1D (nanowires, nanotubes), 2D (thin films, graphene, etc.), 3D (nanostructured bulk materials, devices). Fractal dimensions, such as nanoparticle agglomerates, percolating films and combinations of materials of different dimensionalities are also covered (e.g. epitaxial decoration of nanowires by nanoparticles, i.e. 0D+1D nanomaterials). For each class, the focus will be on growth, structure, and physical/chemical properties. The book presents a broad range of techniques, including density functional theory, molecular dynamics, non-equilibrium molecular dynamics, finite element modelling (FEM), numerical modelling and meso-scale modelling. The focus is on each method's relevance and suitability for the study of materials and phenomena in the nanoscale. This book is an important resource for understanding the mechanisms behind basic properties of nanomaterials, and the major techniques for computational modelling of nanomaterials. Explores the major modelling techniques used for different classes of nanomaterial Assesses the best modelling technique to use for each different type of nanomaterials Discusses the challenges of using certain modelling techniques with specific nanomaterials

Computer Simulation of Porous Materials Mar 28 2021 This book covers key approaches in the modelling of porous materials, with a focus on how these can be used for structure prediction and to rationalise or predict a range of properties.

Agent-Based Computational Modelling Feb 07 2022 The present book describes the methodology to set up agent-based models and to study emerging patterns in complex adaptive systems resulting from multi-agent interaction. It offers the application of agent-based models in demography, social and economic sciences and environmental sciences. Examples include population dynamics, evolution of social norms, communication structures, patterns in eco-systems and socio-biology, natural resource management, spread of diseases and development processes. It presents and combines different approaches how to implement agent-based computational models and tools in an integrative manner that can be extended to other cases.

New Paradigms in Computational Modeling and Its Applications Apr 09 2022 In general, every problem of science and engineering is governed by mathematical models. There is often a need to model, solve and interpret the problems one encounters in the world of practical problems. Models of practical application problems usually need to be handled by efficient computational models. New Paradigms in Computational Modeling and Its Applications deals with recent developments in mathematical methods, including theoretical models as well as applied science and engineering. The book focuses on subjects that can benefit from mathematical methods with concepts of simulation, waves, dynamics, uncertainty, machine intelligence, and applied mathematics. The authors bring together leading-edge research on mathematics combining various fields of science and engineering. This perspective acknowledges the inherent characteristic of current research on mathematics operating in parallel over different subject fields. New Paradigms in Computational Modeling and Its Applications meets the present and future needs for the interaction between various science and technology/engineering areas on the one hand and different branches of mathematics on the other. As such, the book contains 13 chapters covering various aspects of computational modeling from theoretical to application problems. The first six chapters address various problems of structural and fluid dynamics. The next four chapters include solving problems where the governing parameters are uncertain regarding fuzzy, interval, and affine. The final three chapters will be devoted to the use of machine intelligence in artificial neural networks. Presents a self-contained and up to date review of modelling real life scientific and engineering application problems Introduces new concepts of various computing techniques to handle different engineering and science problems Demonstrates the efficiency and power of the various algorithms and models in a simple and easy to follow style, including numerous examples to illustrate concepts and algorithms

Computational Modelling of Gas Turbine Aerodynamics with Endwall Contouring Dec 13 2019

Computational Modeling in Cognition Dec 17 2022 Key Features --
Principles of Computational Modelling in Neuroscience Jan 18 2023 The nervous system is made up of a large number of interacting elements. To understand how such a complex system functions requires the construction and analysis of computational models at many different levels. This book provides a step-by-step account of how to model the neuron and neural circuitry to understand the nervous system at all levels, from ion channels to networks. Starting with a simple model of the neuron as an electrical circuit, gradually more details are added to include the effects of neuronal morphology, synapses, ion channels and intracellular signaling. The principle of abstraction is explained through chapters on simplifying models, and how simplified models can be used in networks. This theme is continued in a final chapter on modeling the development of the nervous system. Requiring an elementary background in neuroscience and some high school mathematics, this textbook is an ideal basis for a course on computational neuroscience.
Computational Modeling and Visualization of Physical Systems with Python May 18 2020 Computational Modeling, by Jay Wang introduces computational modeling and visualization of physical systems that are commonly found in physics and related areas. The authors begin with a framework that integrates model building, algorithm development, and data visualization for problem solving via scientific computing. Through carefully selected problems, methods, and projects, the reader is guided to learning and discovery by actively doing rather than just knowing physics.
Computational Modelling of Complex Flow and Heat Transfer Jan 14 2020
Artificial Intelligence for Computational Modeling of the Heart Apr 28 2021 Artificial Intelligence for Computational Modeling of the Heart presents recent research developments towards streamlined and automatic estimation of the digital twin of a patient's heart by combining computational modeling of heart physiology and artificial intelligence. The book first introduces the major aspects of multi-scale modeling of the heart, along with the compromises needed to achieve subject-specific simulations. Reader will then learn how AI technologies can unlock robust estimations of cardiac anatomy, obtain meta-models for real-time biophysical computations, and estimate model parameters from routine clinical data. Concepts are all illustrated through concrete clinical applications. Presents recent advances in computational modeling of heart function and artificial intelligence technologies for subject-specific applications Discusses AI-based technologies for robust anatomical modeling from medical images, data-driven reduction of multi-scale cardiac models, and estimations of physiological parameters from clinical data Illustrates the technology through concrete clinical applications and discusses potential impacts and next steps needed for clinical translation
Introduction to Elementary Computational Modeling Jun 30 2021 With an emphasis on problem solving, this book introduces the basic principles and fundamental concepts of computational modeling. It emphasizes reasoning and conceptualizing problems, the elementary mathematical modeling, and the implementation using computing concepts and principles. Examples are included that demonstrate the computation and visualization of the implemented models. The author provides case studies, along with an overview of computational models and their development. The first part of the text presents the basic concepts of models and techniques for designing and implementing problem solutions. It applies standard pseudo-code constructs and flowcharts for designing models. The second part covers model implementation with basic programming constructs using MATLAB®, Octave, and FreeMat. Aimed at beginning students in computer science, mathematics, statistics, and engineering, Introduction to Elementary Computational Modeling: Essential Concepts, Principles, and Problem Solving focuses on fundamentals, helping the next generation of scientists and engineers hone their problem solving skills.
Applied Computational Materials Modeling Nov 23 2020 The scope of this book is to identify and emphasize the successful link between

computational materials modeling as a simulation and design tool and its synergistic application to experimental research and alloy development. The book provides a more balanced perspective of the role that computational modeling can play in every day research and development efforts. Each chapter describes one or more particular computational tool and how they are best used.

Computational Modelling of Concrete Structures Aug 01 2021 The EURO-C conference series (Split 1984, Zell am See 1990, Innsbruck 1994, Badgastein 1998, St Johann im Pongau 2003, Mayrhofen 2006, Schladming 2010, St Anton am Alberg 2014) brings together researchers and practising engineers concerned with theoretical, algorithmic and validation aspects associated with computational simulations of concrete and concrete structures. The conference reviews and discusses research advancements and the applicability and robustness of methods and models for reliable analysis of complex concrete, reinforced concrete and pre-stressed concrete structures in engineering practice. Conference topics and invited papers cover both computational mechanics and computational modelling aspects of the analysis and design of concrete and concrete structures: * Constitutive and Multiscale Modelling of Concrete * Advances in Computational Modelling * Time Dependent and Multiphysics Problems * Performance of Concrete Structures The book is of special interest to researchers in computational concrete mechanics, as well as industry experts in complex nonlinear simulations of concrete structures.

Mathematical and Computational Modeling Dec 05 2021 Mathematical and Computational Modeling Illustrates the application of mathematical and computational modeling in a variety of disciplines With an emphasis on the interdisciplinary nature of mathematical and computational modeling, Mathematical and Computational Modeling: With Applications in the Natural and Social Sciences, Engineering, and the Arts features chapters written by well-known, international experts in these fields and presents readers with a host of state-of-theart achievements in the development of mathematical modeling and computational experiment methodology. The book is a valuable guide to the methods, ideas, and tools of applied and computational mathematics as they apply to other disciplines such as the natural and social sciences, engineering, and technology. The book also features: Rigorous mathematical procedures and applications as the driving force behind mathematical innovation and discovery Numerous examples from a wide range of disciplines to emphasize the multidisciplinary application and universality of applied mathematics and mathematical modeling Original results on both fundamental theoretical and applied developments in diverse areas of human knowledge Discussions that promote interdisciplinary interactions between mathematicians, scientists, and engineers Mathematical and Computational Modeling: With Applications in the Natural and Social Sciences, Engineering, and the Arts is an ideal resource for professionals in various areas of mathematical and statistical sciences, modeling and simulation, physics, computer science, engineering, biology and chemistry, and industrial and computational engineering. The book also serves as an excellent textbook for graduate courses in mathematical modeling, applied mathematics, numerical methods, operations research, and optimization.

Computational Modelling of Biomechanics and Biotribology in the Musculoskeletal System Mar 08 2022 Computational Modelling of Biomechanics and Biotribology in the Musculoskeletal System reviews how a wide range of materials are modelled and how this modelling is applied. Computational modelling is increasingly important in the design and manufacture of biomedical materials, as it makes it possible to predict certain implant-tissue reactions, degradation, and wear, and allows more accurate tailoring of materials' properties for the in vivo environment. Part I introduces generic modelling of biomechanics and biotribology with a chapter on the fundamentals of computational modelling of biomechanics in the musculoskeletal system, and a further chapter on finite element modelling in the musculoskeletal system. Chapters in Part II focus on computational modelling of musculoskeletal cells and tissues, including cell mechanics, soft tissues and ligaments, muscle

biomechanics, articular cartilage, bone and bone remodelling, and fracture processes in bones. Part III highlights computational modelling of orthopedic biomaterials and interfaces, including fatigue of bone cement, fracture processes in orthopedic implants, and cementless cup fixation in total hip arthroplasty (THA). Finally, chapters in Part IV discuss applications of computational modelling for joint replacements and tissue scaffolds, specifically hip implants, knee implants, and spinal implants; and computer aided design and finite element modelling of bone tissue scaffolds. This book is a comprehensive resource for professionals in the biomedical market, materials scientists and mechanical engineers, and those in academia. Covers generic modelling of cells and tissues; modelling of biomaterials and interfaces; biomechanics and biotribology Discusses applications of modelling for joint replacements and applications of computational modelling in tissue engineering

Computational Modeling in Biomedical Engineering and Medical Physics Oct 23 2020 Mathematical and numerical modelling of engineering problems in medicine is aimed at unveiling and understanding multidisciplinary interactions and processes and providing insights useful to clinical care and technology advances for better medical equipment and systems. When modelling medical problems, the engineer is confronted with multidisciplinary problems of electromagnetism, heat and mass transfer, and structural mechanics with, possibly, different time and space scales, which may raise concerns in formulating consistent, solvable mathematical models. Computational Medical Engineering presents a number of engineering for medicine problems that may be encountered in medical physics, procedures, diagnosis and monitoring techniques, including electrical activity of the heart, hemodynamic activity monitoring, magnetic drug targeting, bioheat models and thermography, RF and microwave hyperthermia, ablation, EMF dosimetry, and bioimpedance methods. The authors discuss the core approach methodology to pose and solve different problems of medical engineering, including essentials of mathematical modelling (e.g., criteria for well-posed problems); physics scaling (homogenization techniques); Constructal Law criteria in morphing shape and structure of systems with internal flows; computational domain construction (CAD and, or reconstruction techniques based on medical images); numerical modelling issues, and validation techniques used to ascertain numerical simulation results. In addition, new ideas and venues to investigate and understand finer scale models and merge them into continuous media medical physics are provided as case studies. Presents the fundamentals of mathematical and numerical modeling of engineering problems in medicine Discusses many of the most common modelling scenarios for Biomedical Engineering, including, electrical activity of the heart hemodynamic activity monitoring, magnetic drug targeting, bioheat models and thermography, RF and microwave hyperthermia, ablation, EMF dosimetry, and bioimpedance methods Includes discussion of the core approach methodology to pose and solve different problems of medical engineering, including essentials of mathematical modelling, physics scaling, Constructal Law criteria in morphing shape and structure of systems with internal flows, computational domain construction, numerical modelling issues, and validation techniques used to ascertain numerical simulation results

Computational Bioengineering and Bioinformatics Sep 02 2021 This book explores the latest and most relevant topics in the field of computational bioengineering and bioinformatics, with a particular focus on patient-specific, disease-progression modeling. It covers computational methods for cardiovascular disease prediction, with an emphasis on biomechanics, biomedical decision support systems, data mining, personalized diagnostics, bio-signal processing, protein structure prediction, biomedical image processing, analysis and visualization, and high-performance computing. It also discusses state-of-the-art tools for disease characterization, and recent advances in areas such as biomechanics, cardiovascular engineering, patient-specific modeling, population-based modeling, multiscale modeling, image processing, data mining, biomedical decision-support systems, signal processing, biomaterials and dental

biomechanics, tissue and cell engineering, computational chemistry and high-performance computing. As such, it is a valuable resource for researchers, medical and bioengineering students, and medical device and software experts

Computational Models for the Human Body: Special Volume Apr 16 2020 Provides a better understanding of the physiological and mechanical behaviour of the human body and the design of tools for their realistic numerical simulations, including concrete examples of such computational models. This book covers a large range of methods and an illustrative set of applications.

Computational Modeling in Cognition Jul 12 2022 Key Features --

Computational Modelling of Shakedown Feb 24 2021

Political Attitudes Dec 25 2020 Political Science has traditionally employed empirical research and analytical resources to understand, explain and predict political phenomena. One of the long-standing criticisms against empirical modeling targets the static perspective provided by the model-invariant paradigm. In political science research, this issue has a particular relevance since political phenomena prove sophisticated degrees of context-dependency whose complexity could be hardly captured by traditional approaches. To cope with the complexity challenge, a new modeling paradigm was needed. This book is concerned with this challenge. Moreover, the book aims to reveal the power of computational modeling of political attitudes to reinforce the political methodology in facing two fundamental challenges: political culture modeling and polity modeling. The book argues that an artificial polity model as a powerful research instrument could hardly be effective without the political attitude and, by extension, the political culture computational and simulation modeling theory, experiments and practice. This book: Summarizes the state of the art in computational modeling of political attitudes, with illustrations and examples featured throughout. Explores the different approaches to computational modeling and how the complexity requirements of political science should determine the direction of research and evaluation methods. Addresses the newly emerging discipline of computational political science. Discusses modeling paradigms, agent-based modeling and simulation, and complexity-based modeling. Discusses model classes in the fundamental areas of voting behavior and decision-making, collective action, ideology and partisanship, emergence of social uprisings and civil conflict, international relations, allocation of public resources, polity and institutional function, operation, development and reform, political attitude formation and change in democratic societies. This book is ideal for students who need a conceptual and operational description of the political attitude computational modeling phases, goals and outcomes in order to understand how political attitudes could be computationally modeled and simulated. Researchers, Governmental and international policy experts will also benefit from this book.

Computational Modeling of Cognition and Behavior Nov 16 2022 This book presents an integrated framework for developing and testing computational models in psychology and related disciplines. Researchers and students are given the knowledge and tools to interpret models published in their area, as well as to develop, fit, and test their own models.

Computational Modelling in Behavioural Neuroscience Jun 18 2020 Classically, behavioural neuroscience theorizes about experimental evidence in a qualitative way. However, more recently there has been an increasing development of mathematical and computational models of experimental results, and in general these models are more clearly defined and more detailed than their qualitative counter parts. These new computational models can be set up so that they are consistent with both single neuron and whole-system levels of operation, allowing physiological results to be meshed with behavioural data – thus closing the gap between neurophysiology and human behaviour. There is considerable diversity between models with respect to the methodology of designing a model, the degree to which neurophysiological processes are taken into account and the way data (behavioural, electrophysiological, etc) constrains a model. This book presents examples of this diversity and in doing so represents the state-of-art in the

field through a unique collection of papers from the world's leading researchers in the area of computational modelling in behavioural neuroscience. Based on talks given at the third Behavioural Brain Sciences Symposium, held at the Behavioural Brain Sciences Centre, University of Birmingham, in May 2007, the book appeals to a broad audience, from postgraduate students beginning to work in the field to experienced experimenters interested in an overview.

Computational Modelling of Instability and Transition Using High-resolution Methods Jul 20 2020

Computational Models of Reading Jan 06 2022 "This book describes computational models of reading, or models that simulate and explain the mental processes that support the reading of text. The book provides introductory chapters on both reading research and computer models. The central chapters of the book then review what has been learned about reading from empirical research on four core reading processes: word identification, sentence processing, discourse representation, and how these three processes are coordinated with visual processing, attention, and eye-movement control. These central chapters also review an influential sample of computer models that have been developed to explain these key empirical findings, as well as comparative analyses of those models. The final chapter attempts to integrate this empirical and theoretical work be both describing a new comprehensive model of reading, Über-Reader, and reporting several simulations to illustrate how the model accounts for many of the basic phenomena related to reading"--

Computational Modeling May 30 2021 In this introduction to computational modelling the authors provide a concise description of computational methods, including dynamic simulation, knowledge-based models and machine learning, as a single broad class of research tools.

Computational Models of Complex Systems Oct 15 2022 Computational and mathematical models provide us with the opportunities to investigate the complexities of real world problems. They allow us to apply our best analytical methods to define problems in a clearly mathematical manner and exhaustively test our solutions before committing expensive resources. This is made possible by assuming parameter(s) in a bounded environment, allowing for controllable experimentation, not always possible in live scenarios. For example, simulation of computational models allows the testing of theories in a manner that is both fundamentally deductive and experimental in nature. The main ingredients for such research ideas come from multiple disciplines and the importance of interdisciplinary research is well recognized by the scientific community. This book provides a window to the novel endeavours of the research communities to present their works by highlighting the value of computational modelling as a research tool when investigating complex systems. We hope that the readers will have stimulating experiences to pursue research in these directions.

Computational Modelling of Concrete Structures Feb 13 2020 The EURO-C conference series (Split 1984, Zell am See 1990, Innsbruck 1994, Badgastein 1998, St. Johann im Pongau 2003, Mayrhofen 2006, Schladming 2010, St. Anton am Arlberg 2014, and Bad Hofgastein 2018) brings together researchers and practising engineers concerned with theoretical, algorithmic and validation aspects associated with computational simulations of concrete and concrete structures. Computational Modelling of Concrete Structures reviews and discusses research advancements and the applicability and robustness of methods and models for reliable analysis of complex concrete, reinforced concrete and pre-stressed concrete structures in engineering practice. The contributions cover both computational mechanics and computational modelling aspects of the analysis and design of concrete and concrete structures: Multi-scale cement and concrete research: experiments and modelling Aging concrete: from very early ages to decades-long durability Advances in material modelling of plain concrete Analysis of reinforced concrete structures Steel-concrete interaction, fibre-reinforced concrete, and masonry Dynamic behaviour: from seismic retrofit to impact simulation Computational Modelling of Concrete Structures is of special interest to academics and researchers in computational concrete mechanics, as well as

industry experts in complex nonlinear simulations of concrete structures.

Computational Modeling of Biological Systems May 10 2022 Computational modeling is emerging as a powerful new approach to study and manipulate biological systems. Multiple methods have been developed to model, visualize, and rationally alter systems at various length scales, starting from molecular modeling and design at atomic resolution to cellular pathways modeling and analysis. Higher time and length scale processes, such as molecular evolution, have also greatly benefited from new breeds of computational approaches. This book provides an overview of the established computational methods used for modeling biologically and medically relevant systems.

Computational Models of Argument Aug 13 2022 The investigation of computational models of argument is a rich and fascinating interdisciplinary research field with two ultimate aims: the theoretical goal of understanding argumentation as a cognitive phenomenon by modeling it in computer programs, and the practical goal of supporting the development of computer-based systems able to engage in argumentation-related activities with human users or among themselves. The biennial International Conferences on Computational Models of Argument (COMMA) provide a dedicated forum for the presentation and discussion of the latest advancements in the field, and cover both basic research and innovative applications. This book presents the proceedings of COMMA 2020. Due to the Covid-19 pandemic, COMMA 2020 was held as an online event on the originally scheduled dates of 8 -11 September 2020, organised by the University of Perugia, Italy. The book includes 28 full papers and 13 short papers selected from a total of 78 submissions, the abstracts of 3 invited talks and 13 demonstration abstracts. The interdisciplinary nature of the field is reflected, and contributions cover both theory and practice. Theoretical contributions include new formal models, the study of formal or computational properties of models, designs for implemented systems and experimental research. Practical papers include applications to medicine, law and criminal investigation, chatbots and online product reviews. The argument-mining trend from previous COMMA's is continued, while an emerging trend this year is the use of argumentation for explainable AI. The book provided an overview of the latest work on computational models of argument, and will be of interest to all those working in the field.

The Cambridge Handbook of Computational Psychology Nov 11 2019 A cutting-edge reference source for the interdisciplinary field of computational cognitive modeling.

Computational Models of Brain and Behavior Sep 14 2022 A comprehensive Introduction to the world of brain and behavior computational models This book provides a broad collection of articles covering different aspects of computational modeling efforts in psychology and neuroscience. Specifically, it discusses models that span different brain regions (hippocampus, amygdala, basal ganglia, visual cortex), different species (humans, rats, fruit flies), and different modeling methods (neural network, Bayesian, reinforcement learning, data fitting, and Hodgkin-Huxley models, among others). Computational Models of Brain and Behavior is divided into four sections: (a) Models of brain disorders; (b) Neural models of behavioral processes; (c) Models of neural processes, brain regions and neurotransmitters, and (d) Neural modeling approaches. It provides in-depth coverage of models of psychiatric disorders, including depression, posttraumatic stress disorder (PTSD), schizophrenia, and dyslexia; models of neurological disorders, including Alzheimer's disease, Parkinson's disease, and epilepsy; early sensory and perceptual processes; models of olfaction; higher/systems level models and low-level models; Pavlovian and instrumental conditioning; linking information theory to neurobiology; and more. Covers computational approximations to intellectual disability in down syndrome Discusses computational models of pharmacological and immunological treatment in Alzheimer's disease Examines neural circuit models of serotonergic system (from microcircuits to cognition) Educates on information theory, memory, prediction, and timing in associative learning Computational Models of Brain and Behavior is written for advanced undergraduate, Master's and PhD-

level students—as well as researchers involved in computational neuroscience modeling research.

Principles of Computational Modelling in Neuroscience Feb 19 2023 The nervous system is made up of a large number of interacting elements. To understand how such a complex system functions requires the construction and analysis of computational models at many different levels. This book provides a step-by-step account of how to model the neuron and neural circuitry to understand the nervous system at all levels, from ion channels to networks. Starting with a simple model of the neuron as an electrical circuit, gradually more details are added to include the effects of neuronal morphology, synapses, ion channels and intracellular signalling. The principle of abstraction is explained through chapters on simplifying models, and how simplified models can be used in networks. This theme is continued in a final chapter on modelling the development of the nervous system. Requiring an elementary background in neuroscience and some high school mathematics, this textbook is an ideal basis for a course on computational neuroscience.