Insight Through Computing Introduction Computational

Explorations in ComputingComputational Thinking: A Perspective on Computer ScienceIntroduction to the Theory of ComputationExplorations in ComputingDemystifying Computation: A Hands-on IntroductionComputation CountsIntroduction to Scientific ProgrammingComputational ThinkingComputational Physics - A Practical Introduction to Computational Physics and Scientific Computing (using C++), Vol. IIIntroduction to Scientific ProgrammingIntroduction to Scientific ProgrammingIntroduction to Computational Modeling Using C and Open-Source ToolsAn Introduction to Computational PhysicsIntroduction to Scientific and Technical ComputingIntroduction to Computer Science Using PythonTheory of ComputationIntroduction to Scientific Computing and Data AnalysisA Gentle Introduction to Scientific ComputingScientific Computing - An Introduction using Maple and MATLABIntroduction to the Tools of Scientific Computing John S. Conery Zhiwei Xu Michael Sipser John S. Conery Apostolos Syropoulos Paul E. Dunne Joseph L. Zachary Peter J. Denning Konstantinos Anagnostopoulos Joseph L Zachary Joseph L. Zachary Jose M. Garrido Tao Pang Frank T. Willmore Charles Dierbach Dexter C. Kozen Mark H. Holmes DAN. LEE STANESCU (LONG.) Walter Gander Einar Smith Explorations in Computing Computational Thinking: A Perspective on Computer Science Introduction to the Theory of Computation Explorations in Computing Demystifying Computation: A Hands-on Introduction Computation Counts Introduction to Scientific Programming Computational Thinking Computational Physics - A Practical Introduction to Computational Physics and Scientific Computing (using C++), Vol. II Introduction to Scientific Programming Introduction to Scientific Programming Introduction to Computational Modeling Using C and Open-Source Tools An Introduction to Computational Physics Introduction to Scientific and Technical Computing Introduction to Computer Science Using Python Theory of Computation Introduction to Scientific Computing and Data Analysis A Gentle Introduction to Scientific Computing Scientific Computing - An Introduction using Maple and MATLAB Introduction to the Tools of Scientific Computing *John S. Conery Zhiwei Xu Michael Sipser John S. Conery Apostolos Syropoulos Paul E. Dunne Joseph L. Zachary Peter J. Denning Konstantinos Anagnostopoulos Joseph L Zachary Joseph L. Zachary Jose M. Garrido Tao Pang Frank T. Willmore Charles Dierbach Dexter C. Kozen Mark H. Holmes DAN. LEE STANESCU (LONG.) Walter Gander Einar Smith*

an active learning approach to teaching the main ideas in computing explorations in computing an introduction to computer science and python programming teaches computer science students how to use programming skills to explore fundamental concepts and computational approaches to solving problems tbook gives beginning students an introduction to

this textbook is intended as a textbook for one semester introductory computer science courses aimed at undergraduate students from all disciplines self contained and with no prerequisites it focuses on elementary knowledge and thinking models the content has been tested in

university classrooms for over six years and has been used in summer schools to train university and high school teachers on teaching introductory computer science courses using computational thinking this book introduces computer science from a computational thinking perspective in computer science the way of thinking is characterized by three external and eight internal features including automatic execution bit accuracy and abstraction the book is divided into chapters on logic thinking algorithmic thinking systems thinking and network thinking it also covers societal impact and responsible computing material from ict industry to digital economy from the wonder of exponentiation to wonder of cyberspace and from code of conduct to best practices for independent work the book s structure encourages active hands on learning using the pedagogic tool bloom s taxonomy to create computational solutions to over 200 problems of varying difficulty students solve problems using a combination of thought experiment programming and written methods only 300 lines of code in total are required to solve most programming problems in this book

discusses such topics as regular languages context free languages church turing thesis decidability reducibility the recursion theorem time complexity space complexity and provable intractability

based on the author s introductory course at the university of oregon explorations in computing an introduction to computer science focuses on the fundamental idea of computation and offers insight into how computation is used to solve a variety of interesting and important real world problems taking an active learning approach the text encourages students to explore computing ideas by running programs and testing them on different inputs it also features illustrations by phil foglio winner of the 2009 and 2010 hugo award for best graphic novel classroom tested material the first four chapters introduce key concepts such as algorithms and scalability and hone practical lab skills for creating and using objects in the remaining chapters the author covers divide and conquer as a problem solving strategy the role of data structures issues related to encoding data computer architecture random numbers challenges for natural language processing computer simulation and genetic algorithms through a series of interactive projects in each chapter students can experiment with one or more algorithms that illustrate the main topic requiring no prior experience with programming these projects show students how algorithms provide computational solutions to real world problems resourcethe book s website at cs uoregon edu eic presents numerous ancillaries the lab manual offers step by step instructions for installing ruby and the rubylabs gem with windows xp mac os x and linux the manual includes tips for editing programs and running commands in a terminal emulator the site also provides online documentation of all the modules in the rubylabs gem once the gem is installed the documentation can be read locally by a web browser after working through the in depth examples in this textbook students will gain a better overall understanding of what computer science is about and how computer scientists think about problems

problem solving in computing is referred to as computational thinking the theory behind this concept is challenging in its technicalities yet simple in its ideas this book introduces the theory of computation from its inception to current form of complexity from explanations of how the field of computer science was formed using classical ideas in mathematics by gödel to conceptualization of the turing machine to its more recent

innovations in quantum computation hypercomputation vague computing and natural computing it describes the impact of these in relation to academia business and wider society providing a sound theoretical basis for its practical application written for accessibility demystifying computation provides the basic knowledge needed for non experts in the field undergraduate computer scientists and students of information and communication technology and software development

this book provides an introduction to several mathematical topics of importance in computer science but often considered to be outside the scope of traditional discrete methods courses it offers basic treatments of calculus complex numbers statistics and linear algebra with a particular emphasis on spectral methods the presentation is intended for students with minimal mathematical background its principal aim being to emphasize the significant applications in modern cs for which some awareness of these fields is essential e g machine learning data science computational game theory and optimization the focus is therefore directed towards applications in cs rather than detailed mathematical exposition about the author paul dunne is a professor of cs at the university of liverpool where he has worked since 1985 he studied cs at the university of edinburgh 1977 1981 and completed his phd research at warwick university 1981 1984 in his time at liverpool he has had experience in teaching all levels of undergraduate from first year through to honours year presenting courses on computability and complexity theory algorithms operating systems and the topic of the present book he has published research in a range of fields from boolean function complexity phase transition phenomena ai and law complexity in multiagent systems and has recently been most active in the area of models of computational argument

developed over a period of two years at the university of utah department of computer science this course has been designed to encourage the integration of computation into the science and engineering curricula intended as an introductory course in computing expressly for science and engineering students the course was created to satisfy the standard programming requirement while preparing students to immediately exploit the broad power of modern computing in their science and engineering courses

this pocket sized introduction to computational thinking and problem solving traces its genealogy centuries before the digital computer a few decades into the digital era scientists discovered that thinking in terms of computation made possible an entirely new way of organizing scientific investigation eventually every field had a computational branch computational physics computational biology computational sociology more recently computational thinking has become part of the k 12 curriculum but what is computational thinking this volume in the mit press essential knowledge series offers an accessible overview tracing a genealogy that begins centuries before digital computers and portraying computational thinking as the pioneers of computing have described it the authors explain that computational thinking ct is not a set of concepts for programming it is a way of thinking that is honed through practice the mental skills for designing computations to do jobs for us and for explaining and interpreting the world as a complex of information processes mathematically trained experts known as computers who performed complex calculations as teams engaged in ct long before electronic computers in each chapter the author identify different dimensions of today s highly

developed ct computational methods computing machines computing education software engineering computational science design along the way they debunk inflated claims for ct and computation while making clear the power of ct in all its complexity and multiplicity

this book is an introduction to the computational methods used in physics but also in other scientific fields it is addressed to an audience that has already been exposed to the introductory level of college physics usually taught during the first two years of an undergraduate program in science and engineering it assumes no prior knowledge of numerical analysis programming or computers and teaches whatever is necessary for the solution of the problems addressed in the text it can be used as a textbook in introductory computational physics or scientific computing classes the book starts with very simple problems in particle motion and ends with an in depth discussion of advanced techniques used in monte carlo simulations in statistical mechanics the level of instruction rises slowly while discussing problems like the diffusion equation electrostatics on the plane quantum mechanics and random walks all the material can be taught in two semesters but a selection of topics can form the material of a one semester course the book aims to provide the students with the background and the experience needed in order to advance to high performance computing projects in science and engineering it puts emphasis on hands on programming of numerical code but also on the production analysis and interpretation of data but it also tries to keep the students motivated by considering interesting applications in physics like chaos quantum mechanics special relativity and the physics of phase transitions there is a c and a fortran edition for the core programming data analysis is performed using the powerful tools of the gnu linux environment all the necessary software is open source and freely available the book and the accompanying software are given under a creative commons license gnu public license as a service to the community it can be used freely as a whole or any part of it in any form by anyone there is no official distribution of hard copies but you can use the printing service of your preference in order produce any number of copies you need for you and or your students for the lazy ones a very nice and cheap paperback can be purchaced from lulu com amazon com and conventional bookstores the ebook can be read in most electronic devices like your pc tablet or favorite ebook reader and it is freely available from the book s website

developed over a period of two years at the university of utah department of computer science this course has been designed to encourage the integration of computation into the science and engineering curricula intended as an introductory course in computing expressly for science and engineering students the course was created to satisfy the standard programming requirement while preparing students to immediately exploit the broad power of modern computing in their science and engineering courses

introduction to computational modeling using c and open source tools presents the fundamental principles of computational models from a computer science perspective it explains how to implement these models using the c programming language the software tools used in the book include the gnu scientific library gsl which is a free software library of c functions and the versatile open source gnuplot for visualizing the data all source files shell scripts and additional notes are located at science kennesaw edu jgarrido comp models the book first presents an overview of problem solving and the introductory concepts principles and development of computational models before covering the programming principles of

the c programming language the author then applies programming principles and basic numerical techniques such as polynomial evaluation regression and other numerical methods to implement computational models he also discusses more advanced concepts needed for modeling dynamical systems and explains how to generate numerical solutions the book concludes with the modeling of linear optimization problems emphasizing analytical skill development and problem solving this book helps you understand how to reason about and conceptualize the problems generate mathematical formulations and computationally visualize and solve the problems it provides you with the foundation to understand more advanced scientific computing including parallel computing using mpi grid computing and other techniques in high performance computing

textbook introducing basic methods of computational physics and giving overview of several advanced topics for advanced undergraduate or beginning graduate students

created to help scientists and engineers write computer code this practical book addresses the important tools and techniques that are necessary for scientific computing but which are not yet commonplace in science and engineering curricula this book contains chapters summarizing the most important topics that computational researchers need to know about it leverages the viewpoints of passionate experts involved with scientific computing courses around the globe and aims to be a starting point for new computational scientists and a reference for the experienced each contributed chapter focuses on a specific tool or skill providing the content needed to provide a working knowledge of the topic in about one day while many individual books on specific computing topics exist none is explicitly focused on getting technical professionals and students up and running immediately across a variety of computational areas

this textbook is uniquely written with dual purpose it cover cores material in the foundations of computing for graduate students in computer science and also provides an introduction to some more advanced topics for those intending further study in the area this innovative text focuses primarily on computational complexity theory the classification of computational problems in terms of their inherent complexity the book contains an invaluable collection of lectures for first year graduates on the theory of computation topics and features include more than 40 lectures for first year graduate students and a dozen homework sets and exercises

this textbook provides an introduction to numerical computing and its applications in science and engineering the topics covered include those usually found in an introductory course as well as those that arise in data analysis this includes optimization and regression based methods using a singular value decomposition the emphasis is on problem solving and there are numerous exercises throughout the text concerning applications in engineering and science the essential role of the mathematical theory underlying the methods is also considered both for understanding how the method works as well as how the error in the computation depends on the method being used the codes used for most of the computational examples in the text are available on github this new edition includes material necessary for an upper division course in computational linear algebra

this book intends to serve a very broad audience of college students across a variety of disciplines it exposes its readers to some of the basic tools and techniques used in computational science with a view to helping them understand what happens behind the scenes when simple tools are used

scientific computing is the study of how to use computers effectively to solve problems that arise from the mathematical modeling of phenomena in science and engineering it is based on mathematics numerical and symbolic algebraic computations and visualization this book serves as an introduction to both the theory and practice of scientific computing with each chapter presenting the basic algorithms that serve as the workhorses of many scientific codes we explain both the theory behind these algorithms and how they must be implemented in order to work reliably in finite precision arithmetic the book includes many programs written in matlab and maple maple is often used to derive numerical algorithms whereas matlab is used to implement them the theory is developed in such a way that students can learn by themselves as they work through the text each chapter contains numerous examples and problems to help readers understand the material hands on

the book provides an introduction to common programming tools and methods in numerical mathematics and scientific computing unlike standard approaches it does not focus on any specific language but aims to explain the underlying ideas typically new concepts are first introduced in the particularly user friendly python language and then transferred and extended in various programming environments from c c julia and matlab to maple and mathematica this includes various approaches to distributed computing by examining and comparing different languages the book is also helpful for mathematicians and practitioners in deciding which programming language to use for which purposes at a more advanced level special tools for the automated solution of partial differential equations using the finite element method are discussed on a more experimental level the basic methods of scientific machine learning in artificial neural networks are explained and illustrated

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