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This two-part text fills what has often been a void in the first-year graduate physics curriculum. Through its examination of particles and continua, it supplies a lucid and self-contained account of classical mechanics — which in turn provides a natural framework for introducing many of the advanced mathematical concepts in physics. The text opens with Newton's laws of motion and systematically develops the dynamics of classical particles, with chapters on basic principles, rotating coordinate systems, lagrangian formalism, small oscillations, dynamics of rigid bodies, and hamiltonian formalism, including a brief discussion of the transition to quantum mechanics. This part of the book also considers

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examples of the limiting behavior of many particles, facilitating the eventual transition to a continuous medium. The second part deals with classical continua, including chapters on string membranes, sound waves, surface waves on nonviscous fluids, heat conduction, viscous fluids, and elastic media. Each of these self-contained chapters provides the relevant physical background and develops the appropriate mathematical techniques, and problems of varying difficulty appear throughout the text.

This book is the first of a series covering the major topics that are taught in university courses in Theoretical Physics: Mechanics, Electrodynamics, Quantum Theory and Statistical Physics. After an introduction to basic concepts of mechanics more advanced topics build the major part of this book. Interspersed is a discussion of selected problems of motion. This is followed by a concise treatment of the Lagrangian and the Hamiltonian formulation of mechanics, as well as a brief excursion on chaotic motion. The last chapter deals with applications of the Lagrangian formulation to specific systems (coupled oscillators, rotating coordinate systems, rigid bodies). The level of the last sections is advanced. The text is accompanied by an extensive collection of online material, in which the possibilities of the electronic medium are fully exploited, e.g. in the form of applets, 2D- and 3D-animations. It contains: A collection of 74 problems with detailed step-by-step guidance towards the solutions, a collection of comments and additional mathematical details in support of the main text, a complete presentation of all the mathematical tools needed.

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In their prior Dover book, the authors provided a self-contained account of classical mechanics; this supplement/update offers a bridge to contemporary mechanics. Topics include nonlinear continuous systems. 2006 edition.

Theoretical Mechanics of Biological Neural Networks presents an extensive and coherent discussion and formulation of the generation and integration of neuroelectric signals in single neurons. The approach relates computer simulation programs for neurons of arbitrary complexity to fundamental gating processes of transmembrane ionic fluxes of synapses of excitable membranes. Listings of representative computer programs simulating arbitrary neurons, and local and composite neural networks are included. Develops a theory of dynamic similarity for characterising the firing rate sensitivities of neurons in terms of their characteristic anatomical and physiological parameters Presents the sequential configuration theory - a theoretical presentation of coordinated firing patterns in entire neural population Presents the outlines of mechanics for multiple interacting networks in composite systems

Excerpt from Theoretical Mechanics The study of Mechanics as presented in this volume is founded upon a course in mathematics extending through the Calculus. It is assumed, moreover, that the student has already become familiar with the fundamental ideas of force, energy, and work through such preliminary courses as are included in textbooks on General Physics. In short, this volume presents the

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subject of Mechanics in that relation to other mathematical subjects which has become established in the curricula of the technical schools of this country. It should be emphasized, however, that the volume includes, for purposes of review, a discussion of the fundamental notions and many simple exercises involving these notions. About the Publisher Forgotten Books publishes hundreds of thousands of rare and classic books. Find more at www.forgottenbooks.com This book is a reproduction of an important historical work. Forgotten Books uses state-of-the-art technology to digitally reconstruct the work, preserving the original format whilst repairing imperfections present in the aged copy. In rare cases, an imperfection in the original, such as a blemish or missing page, may be replicated in our edition. We do, however, repair the vast majority of imperfections successfully; any imperfections that remain are intentionally left to preserve the state of such historical works.

This is a textbook written for use in a graduate-level course for students of mechanics and engineering science. It is designed to cover the essential features of modern variational methods and to demonstrate how a number of basic mathematical concepts can be used to produce a unified theory of variational mechanics. As prerequisite to using this text, we assume that the student is equipped with an introductory course in functional analysis at a level roughly equal to that covered, for example, in Kolmogorov and Fomin (Functional Analysis, Vol. I, Graylock, Rochester, 1957) and possibly a graduate-level course in continuum mechanics. Numerous references to supplementary material are listed throughout the book. We are indebted to Professor Jim Douglas of the University of Chicago, who read an earlier version of the manuscript and whose detailed suggestions were extremely helpful in preparing the final draft. He also gratefully acknowledge that much of our own research work on variational theory was supported by the U.S. Air Force Office of Scientific Research. He are indebted to

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Mr. Ming-Goei Sheu for help in proofreading. Finally, we wish to express thanks to Mrs. Marilyn Gude for her excellent and pains taking job of typing the manuscript. J. T. ODEN J. N. REDDY Table of Contents PREFACE 1. INTRODUCTION 1.1 The Role of Variational Theory in Mechanics. 1 1.2 Some Historical Comments 2 1.3 Plan of Study 5 7 2. MATHEMATICAL FOUNDATIONS OF CLASSICAL VARIATIONAL THEORY 7 2.1 Introduction

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