

**Bibliographic Reference:** Ioannou, P., & Apostolatos, T. (2016). Newtonian Mechanics [Undergraduate textbook]. Kallipos, Open Academic Editions. http://dx.doi.org/10.57713/kallipos-686

## Abstract

This book provides an introduction to the basic concepts of Newtonian Mechanics. Great emphasis is placed on the structure of the theory and its logical coherence. The presentation attempts to highlight Newtonian Mechanics as a comprehensive physical theory that can lead to verifiable predictions. The mathematics involved in the theory are not presented in a separate chapter, as if they were a special tool to be used in the presentation of the various topics. On the contrary, each new mathematical idea is constructed as the best way to study a new physical concept. The aim is to show as clearly as possible the direct connection between mathematics and physical reality. Despite the emergence of mathematics as a basic language in the study of nature, we recommend the use of computers in solving problems, but in such a way as to exercise physical intuition. Furthermore, the numerical calculation of a physical problem leads in a tangible way to a deeper understanding of all aspects of the corresponding topic. The book covers topics (Green's functions, delta functions, symmetries) that are not usually found in introductory engineering textbooks because they are considered technical topics that are more advanced than those covered in an undergraduate course. We believe that the use and discussion of these topics at a very basic and therefore very simple level will help students understand difficult concepts and use them to easily solve problems that are particularly challenging from a mathematical point of view. The book is supplemented with numerous exercises (most of which are original and not copies of exercises from the international literature) aimed at encouraging students to seek/develop their own ways of analyzing physical problems.



The Project is funded by the National Development Programme 2021-2025 of the Ministry of Education and Religious Affairs and implemented by the Special Account for Research Funds of the National Technical University of Athens and the Hellenic Academic Libraries Link.

