An Introduction to Underwater Acoustics—Principles and Applications, (Second Edition)
Xavier Lurton
Springer, Heidelberg, (2010) 680 pp, hardbound, 279 USD, ISBN 978-3-540-78480-7

This textbook is a good overview of most of the aspects of underwater acoustics. It is comprehensive and covers some of the underwater acoustics fundamentals such as propagation, sound velocity profiles and their influence, background noise, scattering and target strength, absorption, transducers, arrays and array processing. In addition, it also covers applications of underwater acoustics—sonar, passive and active, sonar imaging, navigation aids, sub-bottom profiling, acoustic communications—including a discussion of the parameters that control the quality of the information in the application due to the effects of background noise, propagation and other underwater acoustics phenomena. In a chapter it treats underwater acoustics associated with marine mammals which is mostly descriptive, as one would expect, with data related to the hearing of mammals (audiograms), type and intensity of sound generated by mammals and the impact of natural and man-made sounds on the behavior of mammals. The material is presented in a way that allows someone who is not so familiar with underwater acoustics can use the book to gain a good background knowledge. Furthermore the book contains sufficient details so it can be used as a reference.

While the textbook in general has all the right information, there are comments sprinkled throughout that may lead to a person to gain the wrong impression. Some examples are the comment on the high frequency ambient noise which is generally attributed to thermal process in the ocean while this book seems to associate high frequency noise with thermal noise in the electronics. The latter is also present but it's another contribution. Another comment on piezoelectric transducers that, when operated as projectors, "work in a narrow frequency band". Not all transducers have a high Q and a transducer can be used within a relatively wide frequency band with the right driver electronics, which incidentally are discussed in this book. The book includes a number of appendices which contain the type of material that one would look for quick reference—units, boundary interactions, biological target strengths, typical self-noise of example surface vessels, piezoelectric material principles, parametric array equations, directivity patterns of simple geometries and communication channel capacities. These appendices present the type of underwater acoustics material which is very useful for ready reference. Finally it also includes a comprehensive list of references for those who want to delve deeper into any of the underwater acoustic topics.

Overall the book is a good first textbook and first reference. It can be an effective textbook for an underwater acoustics elective course and will make a good reference for engineers who occasionally have to answer question or deal with issues related to underwater acoustics.

J. M. Cuschieri
Lockheed Martin, Mission Systems and Sensors, Undersea Systems, Riviera Beach, FL
joe.cuschieri@lmco.com