Preface

We live in the age of science. Almost every facet of our society is influenced by scientific discoveries, many of which have happened in the past two centuries. It is foolish to imagine that we can manage this society, and all of the changes it brings about, without some knowledge of science and the way it works. This book is dedicated to bringing this knowledge.

The book is primarily directed toward nonscience undergraduate students who seek to expand their knowledge of the rules of science that underpin our existence, our impact on nature, and nature's impact on us. Of course anyone else who is curious about these matters can benefit from it as well! I assume that the typical reader will have taken high school physics and chemistry – but forgotten most of it. Thus, I remind the reader of basic things as we go. The use of mathematics will be kept to a minimum, but part of the purpose of this book is to show that simple applications of arithmetic (usually multiplication and division, but sometimes an exponential or a logarithm) permit much knowledge to be gained. Thus, we will not shy away from arithmetizing our considerations – after all, part of the scientific method is being quantitative.

The prime purpose of the book is to explain how the scientific process works and the power it brings to dealing with the natural world. The main applications will be to understand scientific results that flow from the media and to develop a rational, fact-based assessment of energy and resource policy. In this regard, I admit to being a data geek. This is good, because part of adopting a scientific worldview is backing up what you are saying with numbers. I'm going to be saying a lot, so this book is chock full of tables and figures. If you find it overwhelming after a while, skip the numbers, but try to take the message in.

The book is designed to accompany a course that is taught in approximately 30 lecture hours. Thus, its length has purposefully been kept in check, although it is still a bit too long to cover in 30 hours. Of course a student can easily read it during the course of a term!

Occasional sentences will appear in boxes throughout the text. These are take-away points – if you remember anything at all of this book, it should be these messages.

You will find a section called "Preliminaries" right after the List of Tables. You should read this carefully if it has been more than a year since you have done any physics or chemistry. You will find reminders on scientific notation and SI prefixes, the units used in this book, and some common physical constants that appear throughout the text. There is also a discussion of something called "dimensional analysis." This is a fancy way of saying that units must work out properly. Don't ignore this section – it can be surprisingly useful and powerful! Finally, you will find short tutorials on using exponentials, logarithms, and some basic chemistry.

Chapters end with a list of important terminology and important concepts. These are *not* replacements for reading the chapter; rather, they are meant to guide you in case you missed something. There are also exercises at the end of each chapter. These are typically conceptual, but sometimes some simple arithmetic is required. If you are stumped, check "Preliminaries" for general help and "Problem Solutions" at the end of the book for a sampling of worked problems. Finally, chapters typically feature many examples; these either elaborate on a point or ask something numerical.

Lastly, I would like to thank Charlie Jones and Liam Swanson for insightful comments on Chaps. 1 and 10, Max Swanson for superb proofreading, Sam Schweber for pointing me to the intriguing story of Fritz Houtermans, Josef Werne and Gavin Schmidt for discussions on subtleties in climate modeling, Gregory Reed for discussions on power systems, and Jim Richardson for permission to reproduce his stunning photograph of Easter Island.

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http://www.springer.com/978-3-319-21987-5

Science and Society
Understanding Scientific Methodology, Energy, Climate, and Sustainability
Swanson, E.S.
2016, XXIX, 276 p. 93 illus., 39 illus. in color.,
ISBN: 978-3-319-21987-5