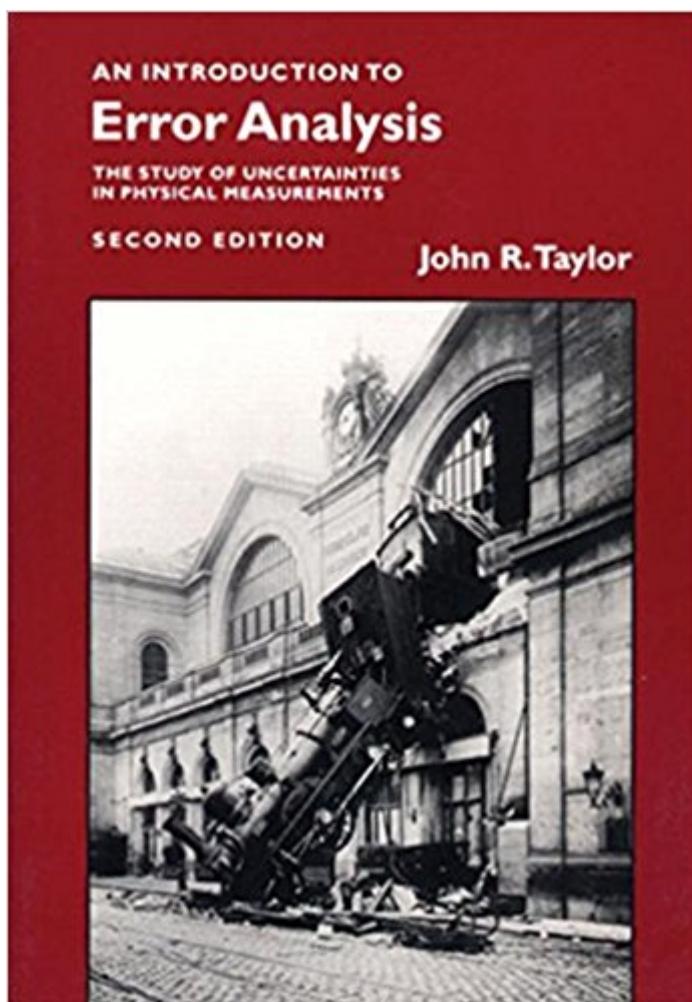


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# An Introduction To Error Analysis: The Study Of Uncertainties In Physical Measurements



## Synopsis

This best-selling text by John Taylor, now released in its second edition, introduces the study of uncertainties to lower division science students. Assuming no prior knowledge, the author introduces error analysis through the use of familiar examples ranging from carpentry to well-known historic experiments. Pertinent worked examples, simple exercises throughout the text, and numerous chapter-ending problems combine to make the book ideal for use in physics, chemistry, and engineering lab courses. The first edition of this book has been translated into six languages.

## Book Information

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## Customer Reviews

A high-quality resource [students] can continue to learn from, even after they graduate. --Physics TodayScore a hit! The book reveals the exceptional skill of the author as lecturer and teacher. --The Physics Teacher

John Taylor is Professor of Physics and Presidential Teaching Scholar at the University of Colorado in Boulder. He has won numerous teaching awards, served as Associate Editor of the American Journal of Physics, and received an Emmy Award for his television series called "Physics 4 Fun." Taylor is the author of three best-selling textbooks.

The contents of this book provide beyond doubt the most important topics an applied mathematician, physicist, engineer, or anyone working in any quantitative discipline can be exposed to. It is also fair to bet that anyone working in these disciplines has encountered these topics early

on in their professional careers, as they are usually the first ones presented to incoming freshman in beginning engineering and physics laboratories. When performing elementary laboratory experiments, beginning students find out right away that their results do not match the perfections of textbook equations. Experimental apparatus is never infinitely precise and frequently mistakes are made in experimental work repeatedly and unknowingly by the experimentalist, engineer, or scientist. Errors and uncertainties accompany any experiment that is conducted in the real world, and how to deal with them is the subject of error analysis, which is now called "uncertainty quantification" in more modern parlance. This subject is vast and in many ways very controversial, and modern technological developments have instigated a lot of research in this area. This excellent book gives an elementary overview of the techniques of error analysis that touches on topics such as uncertainty, propagation of errors, and systematic error. Readers will only require a rudimentary background in mathematics and statistics in order to read and study it. Numerous "quick" practice exercises are embedded in the main text, giving readers immediate challenges to their understanding as they read the text. Problem sets accompany each chapter, and they reflect the kinds of problems that one would encounter in real practice. Error analysis (uncertainty quantification) is certainly the most important activity behind any kind of scientific research and mathematical and simulation modeling. The comparison of results of models to empirical data cannot be done meaningfully without the tools outlined in this book and others. It is therefore very disheartening to find, as the reviewer has on numerous occasions, that any cognizance of errors or uncertainties in modeling and experimental efforts is completely absent. In some contexts, such as research on medical devices and national defense, this omission can be extremely dangerous and actually cause loss of life. The origins of why the practice of error analysis has been forgotten or omitted is unknown, but those individuals who do would gain considerably by a careful study of this book. It would be the most important refresher course that they could take in their professional careers.

Writing an error analysis book for physics students is a tricky task in my opinion. Physics students just need to know how to calculate. They do not need proofs, but they need to understand the methodologies well enough such that they know which technique to apply. I think this book really hits the sweet spot. Proofs are kept to a minimal, but the explanations are full of insight. Another thing that I like is that the examples are closely related to typical physics experiments, so physics students can easily relate the analysis to their experiments. The book is divided into two parts. The first few chapters in Part 1 are somewhat elementary. Everything comes together when it comes to

the chapter on normal distribution. I guess some people might find the progress of the book a bit slow. On the other hand, I think that even a high school physics student can grab the book and learn how to do error analysis for their experiments by reading the first few chapters. I think that it is a great arrangement as error analysis should be introduced early in physics education. Error analysis is very often an overlooked topic. This book is a gem for physics students.

This book takes the time to **DEFINE** terms used in formulas, and give examples at each logical step along the way. If you owned the little yellow edition in college, treat yourself to the modern version with even better explanations than the original edition. The writing style is one which is easy to read, and the index directs the reader to each topic, which are logically presented in self-contained sections. One does not have to read from page one to learn the subscript conventions or identify unfamiliar symbols. Instead, the author John R. Taylor has conveniently placed the lexicon and examples within a page or two of each equation. Marvelous!

It showed up new! Great info in the book.

The writing is clear, applicable to the real world and a joy to read. I recommend this book to every collegiate scientist.

This book does an excellent job of starting from the basics and then building on them at a comfortable pace until the reader has been taken to the more advanced and useful points of error analysis. This book is clearly written, with appropriate and helpful examples throughout. The practice problems at the end of the chapters are relevant and straightforward, further aiding the learning process. The author not only understands the subject of error analysis inside and out, he also knows the right way to teach it. Though the book approaches error analysis from a physics point of view, I found it very applicable to all of my scientific coursework, including biochemistry and (especially) analytical chemistry.

I really enjoyed using Taylor's "Classical Mechanics" textbook for an undergraduate mechanics course. This text has been very useful in developing materials and exercises for use in data analysis for an experimental measurements lab. The writing style is very readable and the author gives a good development of how to properly deal with uncertainties in physical measurements.

I've read and studied more than my fair share wrt error analysis and uncertainty propagation. Hands down this is the best I've ever seen.

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