

Parameter Estimation and Inverse Problems

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Parameter Estimation and Inverse Problems was inspired by a geophysical inverse methods graduate course that has been taught for over 10 years at New Mexico Tech, first by Rick Aster and for the last four years by Rick Aster and Brian Borchers. The lecture notes were first assembled into book format and used as the official text for the course in the fall of 2001. The draft of the textbook was then used in Cliff Thurber's course at the University of Wisconsin during the spring semester of 2002. In Fall, 2002, Aster, Borchers, and Thurber signed a contract with Academic Press to produce a text by the end of 2003 for publication in 2004.

We expect that readers of this book will have some familiarity with calculus, differential equations, linear algebra, probability and statistics at the undergraduate level. Appendices A and B review the required linear algebra, probability, and statistics. In our experience teaching this course, many students have had weaknesses in their preparation in linear algebra or in probability and statistics. For that reason, we typically spend the first two to three weeks of the course reviewing this material.

Chapters one through five form the heart of the book and should be read in sequence. Chapters six, seven, and eight are independent of each other, but depend strongly on the material in Chapters one through five. They can be covered in any order. Chapters nine and ten are independent of Chapters six, seven, and eight, but should be covered in sequence. Chapter 11 is independent of Chapters six through ten.

If significant time for review of linear algebra, probability, and statistics is taken, then there won't be time to cover the entire book in one semester. However, it should be possible cover the majority of the material by skipping one or two of the chapters after Chapter five.

The text is a work in progress, but already contains much usable material that should be of interest to a large audience. We and Academic Press feel that the final content, presentation, examples, index terms, references, and other features will be substantially benefited by having a large number of instructors, students, and researchers use, and provide feedback on, draft versions. *Such comments and corrections are greatly appreciated, and significant contributions will be acknowledged in the book.* If you would like to review the current draft of the textbook, please contact Rick Aster (aster@ees.nmt.edu) or Brian Borchers (borchers@ees.nmt.edu).