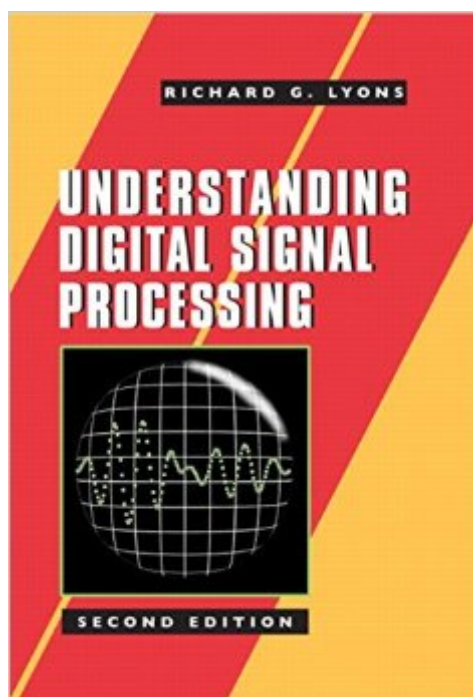


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# Understanding Digital Signal Processing (2nd Edition)



## Synopsis

The effects of DSP has entered every phase of our lives, from singing greeting cards to CD players and cell phones to medical x-ray analysis. Without DSP, there would be no Internet. In recent years, every aspect of engineering and science has been influenced by DSP because of the ubiquitous desktop computer and readily available signal processing software. This book provides engineers and scientists, who are relative beginners to DSP, their best opportunity to learn the basic mathematical and practical-engineering aspects of the burgeoning field of DSP. The book strikes the right balance of mathematical level, and practical engineering guidance, making it accessible to the beginner without dumbing down the topic of DSP. This edition of Understanding Digital Signal Processing will continue bridging the gap between DSP theory and practice. The presentation of additional quadrature processing material makes the book more relevant, and useful, to DSP practitioners in the burgeoning fields of digital communications and wireless networking systems. The new digital filtering material covers modern filter design techniques not covered in our competitor's books. Finally, the popular 'Digital Signal Processing Tricks' material will be expanded to further aid working DSP engineers solve their day-to-day signal processing problems as they design and build commercial products and aerospace systems.

## Book Information

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## Customer Reviews

If you are considering studying digital signal processing for the first time, I would strongly suggest studying this book in conjunction with the Schaum's outline on digital signal processing, and then

going on to a more formal text, such as "Digital Signal Processing: Principles, Algorithms and Applications" by Proakis. This book uses and explains the required background mathematics, with instructive diagrams shown throughout. The author also bothers to explain to the reader the "whys" of digital signal processing. For example, the book even takes the time to explain to the reader the reason that you would want to filter digitally in the first place. All of the basics are covered, including the discrete Fourier Transform, Finite and Infinite Impulse Response filters, the Fast Fourier Transform, and a unique chapter on digital signal processing tricks including data windowing tricks, frequency translation without multiplication, and real-time DC removal. Particularly helpful is that filter design methods are broken down algorithmically into numbered steps with the associated equations. Complete design examples of these methods are also shown to hammer home the concept. Throughout the book, the author assumes the audience is an engineer that, in the end, wants to use this information to build something useful, not to sit through one derivation after another.

OK, let me first start out by saying that I am a little biased here since I helped review the new edition, but this is a fantastic book. While this book isn't a total replacement for the standard DSP tomes like Oppenheim and Schaffer, this is a text that all DSP engineers should own. The second edition expands on the strong points of the first. The book is written by an engineer for other engineers. The topics are accessible to readers, while not being watered down. Less understood, but extremely important topics such as quadrature processing and Hilbert transforms have expanded coverage in this edition. The best improvement to this edition is the vastly expanded chapter on DSP Tricks. The tricks are practical applications of DSP theory. These tricks usually are not taught in school, and are often not well known. The number of pages devoted to tricks has doubled to over 100, and unlike other books, cover a broad range of topics. Application areas cover audio processing, digital communications, simulation, analysis, and others. In summary, you will not be disappointed with this book.

I am an engineer who has read many books, good and bad, obfuscating and illuminating, and concise and lengthy. This is the best by far on the complex (double entendre intentional) subject of DSP. His appendices alone are worth the price of the book. I wish every course on DSP used this text.

This book allowed a middle aged musician whose last math course is a distant memory to

implement custom FFT routines and IIR filters for musical applications. Lyons combines crystal clear writing with an uncanny ability to anticipate where extra explanation is needed. His frequent "Let's pause a moment to see where we are going..." interjections are perfectly timed moments to relax and regroup before plunging ahead. Highly recommended!

Thank you, thank you, thank you, to Richard Lyons for "Understanding Digital Signal Processing", both editions. I had the great pleasure to use and learn from the 1st edition about 5 years ago. At that time, I had the overwhelming urge to convey my appreciation for the wonderful work. Now that the 2nd edition is out, there is even more reason to express how much I enjoyed and still enjoy those works. In particular, the topics are spot on (eg, I needed to learn about CIC Decimation filters), but most importantly, the exposition is so very clear and so easy to understand: each step in the progression is made obvious -- no "and then the magic happens" or "left as an exercise to the reader" for the important stuff. The result is an EXCELLENT EXPOSITION. The care and the craft of carefully showing the intermediate steps makes it real and concrete. And it is done with a beautiful balance of intuition, observation, analysis, and math. Why sling equations around when a simple graph makes things clear? The equations are there, but the pictures are the teaching tools. Other books discuss the topics. Richard Lyons's books illuminate the topics. I'm pleased to be able to purchase these books, and happy that Richard is being rewarded (getting royalties, for he is DSP royalty) for his achievements.

I used this book in conjunction with Proakis and Manolakis. The book may lack the mathematical rigour but provides one of the finest introductions to DSP. I used it very often during my coursework and then turned to the difficult sections of Proakis, the material there was then more revelatory. The fourth chapter on FFT is a case in point, Cooley Tukey radix algorithms become a lot easier to pick up from Proakis after having gone through this book. Though many might disagree at having this as a text for a course because of its distinctly informal approach, it remains a valuable companion and for someone picking up the threads of DSP this should surely be one of the first choices amongst others. Strongly recommended.

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