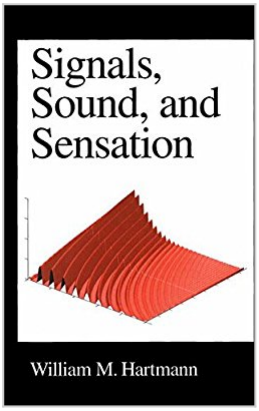

Signals, Sound, and Sensation (Modern Acoustics and Signal Processing)

By William M. Hartmann

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Designed to follow an introductory text on psychoacoustics, this book takes readers through the mathematics of signal processing from its beginnings in the Fourier transform to advanced topics in modulation, dispersion relations, minimum phase systems, sampled data, and nonlinear distortion. While organised like an introductory engineering text on signals, the examples and exercises come from research on the perception of sound. A unique feature of this book is its consistent application of the Fourier transform, which unifies topics as diverse as cochlear filtering and digital recording. More than 250 exercises are included, many of them devoted to practical research in perception, while others explore surprising auditory illusions generated by special signals. Periodic signals, aperiodic signals, and noise -- along with their linear and nonlinear transformations -- are covered in detail. More advanced mathematical topics are treated in the appendices. A working knowledge of elementary calculus is the only prerequisite. Indispensable for researchers and advanced students in the psychology of auditory perception.

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Editorial Review

Review

From the reviews

"...of great importance to the hearing science community... If I were to give an advanced course, this is precisely the book I would recommend." *W. Dixon Ward, University of Minnesota*

"Covers a wide range of topics in a clear, authoritative and easy-to-read style… [It] is intended to be used as a text for a second course in psychoacoustics … Should be considered by anyone wanting to teach signal theory to students with an interest in psychoacoustics." *Physics Today*

"…The book makes very clear the extraordinary complexity of the signal processing performed automatically and effortlessly by the ears … [This book] is specifically aimed at readers deeply interested in the perception of sound. It emphasizes not only advanced psychoacoustic concepts and measurement protocols, but also provides masterly treatment of the mathematics of signals … It is remarkably successful in its simultaneous exposition of the analytical, physical and perceptual aspects of sound and hearing … This is a splendid book, well organized, copiously illustrated and pleasantly written." *American Scientist*

"Signals, Sound, and Sensation" is of great importance to the hearing science community... If I were to give an advanced course, this is precisely the book I would recommend." --- W. Dixon Ward, University of Minnesota

From the Back Cover
This is a unique book on the mathematics of signals written for hearing-science researchers. Designed to follow an introductory text on psychoacoustic, Signals, Sound, and Sensation takes the reader through the mathematics of signal processing from its beginnings in the Fourier transform to advanced topics in modulation, dispersion relations, minimum phase systems, sampled data, and nonlinear distortion. While the book is organized like an introductory engineering text on signals, the examples and exercises come from research on the perception of sound. A unique feature of the book is the consistent application of the Fourier transform, which unifies topics as diverse as cochlear filtering and digital recording. More than 250 exercises are included. Many of them are devoted to practical research in perception, while others explore surprising auditory illusions generated by special signals. A working knowledge of elementary calculus is the only prerequisite. Signals, Sound, and Sensation will help readers acquire the quantitative skills they need to solve signal problems that arise in their everyday work. Periodic signals, aperiodic signals, and noise - along with their linear and nonlinear transformations - are covered in detail. More advanced mathematical topics are treated in the appendices. In no other book are signal mathematics and psychoacoustics so neatly intertwined. Researchers and advanced students in the psychology of auditory perception will find this book indispensable.

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