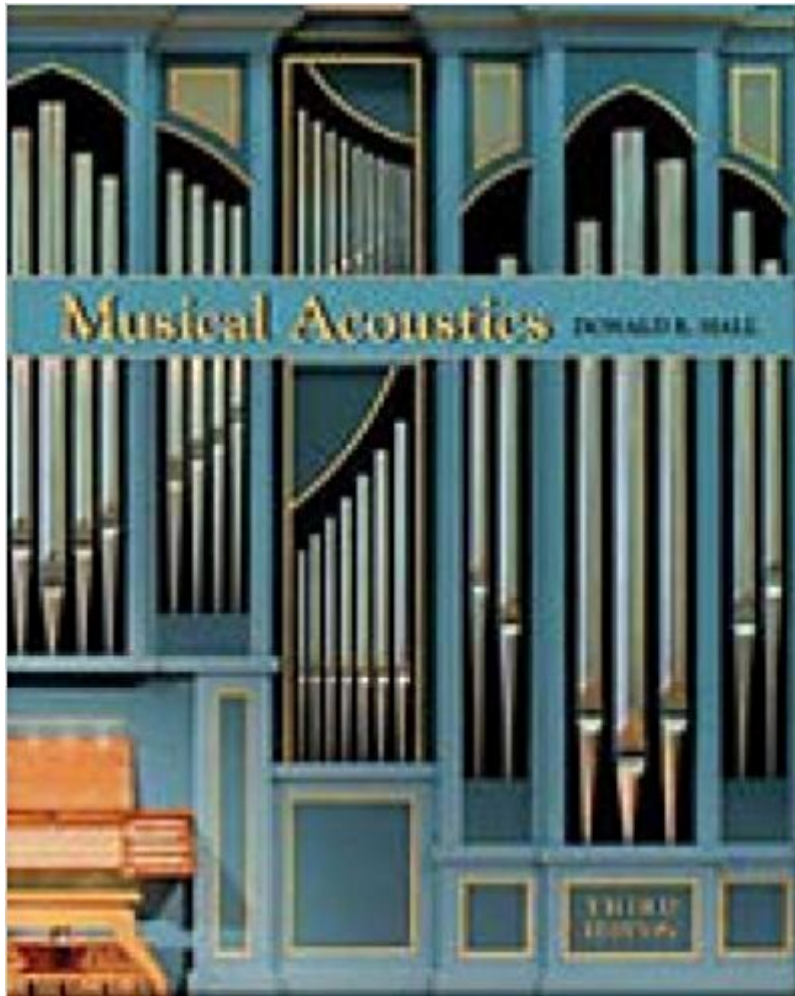




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Musical Acoustics, 3rd Edition



Synopsis

Musical acoustics presents a unique opportunity to see science and art working together. This book is a balanced presentation of all aspects of musical acoustics. It explains how our ears and brains interpret musical events, and connects traditional physical analyses to musical reality. The purpose of the book is two fold: (1) To help students use simple physical concepts as tools for understanding how music works, and (2) To use students' interest in music to motivate the study and appreciation of scientific methods. Any given chapter will challenge students with several points that are not obvious on the first reading. Starred sections are optional and are not a prerequisite to later sections.

Book Information

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Customer Reviews

1. THE NATURE OF SOUND. Acoustics and Music. Organizing Our Study of Sound. The Physical Nature of Sound. The Speed of Sound. Pressure and Sound Amplitude. 2. WAVES AND VIBRATIONS. The Time Element in Sound. Waveforms. Functional Relations. Simple Harmonic Oscillation. Work, Energy, and Resonance. 3. SOURCES OF SOUND. Classifying Sound Sources. Percussion Instruments. String Instruments. Wind Instruments. Source Size. Sound from the Natural Environment. 4. SOUND PROPAGATION. Reflection and Refraction. Diffraction. Outdoor Music. The Doppler Effect. Interference and Beats. 5. SOUND INTENSITY AND ITS MEASUREMENT. Amplitude, Energy, and Intensity. Sound Level and the Decibel Scale. The Inverse-Square Law. Environmental Noise. Combined Sound Levels and Interference. 6. THE HUMAN EAR AND ITS

RESPONSE. The Mechanism of the Human Ear. Limits of Audibility and Discrimination. Characteristics of Steady Single Tones. Loudness and Intensity. Pitch and Frequency. Pitch and Loudness Together. Timbre and Instrument Recognition. 7. ELEMENTAL INGREDIENTS OF MUSIC. Organizing Musical Events in Time. Melody and Harmony. Scales and Intervals. The Harmonic Series. 8. SOUND SPECTRA AND ELECTRONIC SYNTHESIS. Prototype Steady Tones. Periodic Waves and Fourier Spectra. Modulated Tones. Electronic and Computer Music. 9. PERCUSSION INSTRUMENTS AND NATURAL MODES. Searching for Simplicity. Coupled Pendulums. Natural Modes and Their Frequencies. Tuning Forks and Xylophone Bars. Drums, Cymbals, and Bells. Striking Points and Vibration Recipes. Damped Vibrations. 10. PIANO AND GUITAR STRINGS. Natural Modes of a Thin String. Vibration Recipes for Plucked Strings. Vibration Recipes for the Piano. Piano Scaling and Tuning. 11. THE BOWED STRING. Violin Construction. Bowing and String Vibrations. Resonance. Sound Radiation from String Instruments. 12. BLOWN PIPES AND FLUTES. Air Column Vibrations. Fluid Jets and Edgetones. Organ Flue Pipes. Organ Registration and Design. Fingerholes and Recorders. The Transverse Flute. 13. BLOWN REED INSTRUMENTS. Organ Reed Pipes. The Reed Woodwinds. The Brass Family. Playable Notes and Harmonic Spectra. Radiation. 14. THE HUMAN VOICE. The Vocal Apparatus. Sound Production. Formants. Special Characteristics of the Singing Voice. 15. ROOM ACOUSTICS. General Criteria for Room Acoustics. Reverberation Time. Reverberation Calculation. Reverberant Sound Levels. Sound Reinforcement. Spatial Perception. 16. SOUND REPRODUCTION. Electric and Magnetic Concepts. Transducers. Microphones. Amplifiers. Recording. Loudspeakers. Multiphonic Sound Reproduction. 17. THE EAR REVISITED. Types of Pitch Judgment. Pitch Perception Mechanisms. Modern Pitch Perception Theory. Critical Bands. Combination Tones. Loudness and Masking. Timbre. 18. HARMONIC INTERVALS AND TUNING. Interval Perception. Intervals and the Harmonic Series. Musical Scales. The Impossibility of Perfect Tuning. Tuning and Temperament. 19. STRUCTURE IN MUSIC. Melodies and Modes. Chords and Harmonic Progressions. Consonance and Dissonance. Musical Forms and Styles. 20. EPILOGUE: SCIENCE AND ESTHETICS. APPENDIX A. WRITTEN MUSIC. APPENDIX B. THE METRIC SYSTEM. Units for Physical Measurements. Scientific Notation and Computation. APPENDIX G. GLOSSARY. APPENDIX H. HINTS AND ANSWERS TO SELECTED EXERCISES. Index. The Chromatic Scale; The Chromatic Series Slider.

This book is an excellent starting place for someone who wants a somewhat quantitative treatment of the science of sound as it relates to music, but does not have the advanced math background

necessary to digest something like "The Physics of Musical Instruments". The chapters and sections in this third edition are the same as in the previous edition, however some changes have been made to the content. The book is updated with more current references to the end-of-chapter bibliographies, and there is some new material, especially in areas affected by the personal computer's role in the digital processing of sound. The author provides an integrated understanding of three major areas: the production of sound by various sources, the propagation of sound from source to listener, and the perception of sound by the human brain. For easier reading, each chapter starts with an introductory section that sets up the chapter. There are also summaries and lists of symbols, terms, and relations highlighting the most important terms and quantitative expressions in each chapter. There are realistic and interesting exercise sets containing both qualitative and quantitative questions for each chapter, with most chapters containing 20-25 exercises. There are also projects included that provide out-of-class assignments that generally require students to do research. There are approximately three of these in each chapter. Finally, several new photographs have been added to this third edition, particularly of the inner ear structure and of the vocal cords in motion. Like the previous reviewer, I make a habit of purchasing and reading several textbooks a year, and sometimes I am very disappointed and sometimes I am not. This is one of those purchases that I found most worthwhile. If you are interested in the intersection of math, acoustics, perception, and musical instruments I highly recommend it. A math background up to the level of algebra and geometry should be sufficient to understand the quantitative portions of the book. The table of contents is as follows:

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Bought this book for the class at Sac State taught by the author. Excellent book, very intelligent author.

It is a nice introductory book both for music and physics.. physics students who are learning wave theory should consider reading at least some chapters of this book..

Excellent!

It is what is said on the description above

Nicely done... as expected.

This is a technical book. Lot's of detail.

(My son gave me this information. The book was rented for him.) The author writes a little too much like the organist that he is. With a little too much feeling, elegance, and (for Christ's sake, we are taking a college course for a grade here - it's required for my major) with too little concern for the students who need to be able to solve problems.

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